2020 CIVITAS
Cleaner and better transport in cities

DESTINATIONS

D8.4

Guidelines for the management of bid procedures and contracting

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Abstract

Task 8.3 of the CIVITAS DESTINATIONS project provides expert support to sites (Site Managers and Measures Leaders) for the design, implementation and operation of ITS supporting demonstration measures. Sub-task 8.3.2 focuses on the establishment of bidding/contracting process.

Sub-task 8.3.2 comprises support activities for sites at two levels:

- o The provision of methodological guidelines and the release of key recommendations on a) how to set a bidding process, b) how to approach the tender package elaboration and c) how to issue the relevant articles and prescriptions;

- o The provision of "on demand" inputs and targeted contributions based on Site Managers and Measure Leaders requests.

This twofold level approach is reflected in the outputs generated by the sub-task.

Thus the deliverable is only one of the results of sub-task 8.3.2. Further "on-demand" contributions (including, for example, the revision of bidding/contracting documentation, the provision of the expert opinion, etc.) have been/will be provided as requested.

The deliverable provides key guidelines to be taken on board by Site Managers and Measure Leaders for the definition of bidding/contracting processes and main recommendations for the definition of tender package and related prescriptions. In detail, the deliverable:

- Details the approach adopted to issue the recommendations and the assumptions to be used reading the document;

- Clarifies the reference terms used in the document. A glossary is included for this purpose;

- Defines the reference framework for the management of a bidding process in terms of roles and responsibilities of the involved organisations;

- Taking into consideration the available options for the management of the bidding process, it defines relevant scenarios for its selection. Once one of the possible bidding processes is identified as reference, it details the main phases and the key steps;

- Taking into account one of the possible structure of the tendering package (list of documents to be included), it specifies the key articles and prescription for each of them;

- Clarifies the relevance/impacts of resources for the proper management of a bidding/contracting process.

Document History

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Mid-June 2017	Gini, Ambrosino (MemEx)	Details of contents (section 3.2.1 and 4) and minor revision to the document. Abstract and executive summary description included	Draft	
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Contents

Glossary of Terms

Article – paragraph or section of the tendering rule (TR)

Awarding – the official act which appoints the winner of the call for tender and thus the company (or consortium) which will be the Contractor.

Bidder – the Entity (company or consortium of companies) participating to the procurement process

Bid offer – proposal developed and applied by the bidder answering to the call for tender. Its detailed structure depends on the documents specified in the call for tender by the Procurement Entity but it usually composed at least by two main parts (the technical offer and the financial offer) and eventually by other documents (administrative, technical annexes, template to describe the technical offer, etc.)

Bid offer (template) – document included in the tendering package and consisting of the template the bid offer (technical and financial) should be formulated

Bidding process – it involves all the phases related to the selection of awarded Bidder from pre-qualification to the awarding

Call for tender – the specific stage of the procurement process lasting from the publication of the tendering package and the communication of the results of the evaluation of the bid offer

Contracting Organisation – the Entity signing the supply/service contract with the Contractor (eventually related to a part of the supply/service previously tendered)

Contractor – the Entity (company or consortium of companies) signing the supply/service contract with the Contracting Organisation

Evaluation – the process allowing the definition of the final ranking of bid offers according to the evaluation criteria

Evaluation criteria – the criteria (both technical and financial) used for the evaluation of the Bid Offers and the definition of the ranking. The Bidder which is in the first position of the ranking will be awarded through the official appointment act

Integrated procurement – the procurement includes separate systems (which could be provided by different providers). The systems could be functionally integrated or not (from the technical point of view) but anyway they are deployed to support a single CIVITAS DESTINATIONS measure or a range of coordinated measures

ITS – Intelligent Transport System: IT systems supporting the planning/operation of mobility services

Procurement Entity – the Entity managing the procurement process

Procurement scheme – it identified the procedure adopted in the procurement process (open with/without pre-qualification, restricted, etc.);

SLA – Service Level Agreement: Requirements and related performances indicators used to assess a service provided by a provider.

Technical specifications – document included in the tendering package and consisting of the technical, functional, operational specifications of the tendered system

Tendering package – the whole documentation published in a call for tender

Tendering rules – document included in the tendering package and consisting of the administrative and contractual prescription;

Tender requirements – the technical requirements and the contractual obligation included in the tendering package.

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1 Executive Summary

The introduction indicates the ITS market conditions (both on the demand and supply side) familiarising Public Authorities and Administrations (Municipalities, Local Authorities, Mobility/Public Transport Agencies/Operators, etc.) with the setup of a proper and effective bidding/contracting process. This commitment does not only come from a liability/transparency obligation (legal side) but it is also mandatory in order to:

- select the ITS solution which complies at the best with the design specifications (sub-task 8.3.1) at the right price as an enabling condition for the success of the implementation and the achievement of planned objectives/outcomes required by the ITS. The right price is the "trade-off" where Public Administrations don't lose their money without experimenting proper and effective results and the ITS implementation and operation (where concession conditions are applied) is manageable by the Contractor (see the glossary) respecting the required performances (in terms of time and quality)

- create the suitable pre-conditions (both technical and contractual) for the ITS implementation.

In this scenario, the role of ITS bidding/contracting is defined in order to improve the effectiveness and the quality of Mobility and Public Transport services and the relevance this process has for the following steps of the ITS lifecycle.

Once the role and objectives of D8.4 (section 2.1) are set, the methodology to be adopted for the document issuing process is presented (section 2.2 and section 2.3). The approach adopted deals with the requirements to provide recommendations for ITS tendering/contracting applicable to different scenarios (i.e. different tendering schemes, purchasing of ITS as supply or service concession, involvement of different local organisations in the management of tenders and following contracting phase, etc.). The adaptation of the guidelines provided to the real tendering/contracting local scenario and national regulation is left up to the Site Managers.

The "reference" bidding process adopted to issue the recommendations is described in section 3: in particular section 3.1 refers to the definition of a "reference" tender package and section 3.2 deals with the evaluation process of technical offers presented by the bidders. Section 3.1 is the core of the document detailing the key prescriptions/articles to be considered for each one of the documents included in the "reference" tender package:

- Tendering rules and administrative prescriptions (Document named "TR");

- Technical specifications (Document named "TS");

- Description of the templates for the bid offer submissions (Document named "OT").

Finally section 4 highlights the demands of the bidding/contracting process in terms of time and resources and the different disciplines which must cooperate during this phase. The interactions between technical staff and administrative/legal one is highlighted.

2 Introduction

The critical factors of the ITS market impacting on the selection of the most suitable solutions and technology provider (the Contractor) by the Public Administrations and Mobility stakeholders (Authorities, Operators) deal with the conditions of ITS market, some incorrect attitudes on the demand side and some weakness on the supply side.

ITS Market conditions for Mobility and Public Transport

- Availability of a wide range of solutions including both well-consolidated/mature and emerging ones.

Incorrect attitude on the demand side

- Poor details/incorrect approach in the design phase of ITS (see D8.3 for recommendations) leading to confused or too general technical requirements in the tendering package. This scenario on one side causes the release of inhomogeneous technical offers and on the other side risks to inadequately manage a proper evaluation due to the difference between the requirements and the specifications of the offered systems.

- Inconsistencies in the estimation of the economic value by the Procurement Entity when similar systems (with comparable functionalities) are tendered. This is also a result of an incorrect design phase.

- Lack of homogeneous procurement scheme. In particular an overview of a wide range of procurement processes for ITS carried out in European countries shows multiple options in terms of documentation structure, evaluation criteria, estimated economical values, offered prices, etc. that can be hardly standardised This fragmentation make it more difficult to select a "best practice" approach for procurement from the real experiences.

- The lack of consistency and the fault of appropriate level of details in the tendering/contractual specifications, in particular the absence of the prescriptions enabling the complete monitoring and control of the implementation by the Procurement Entity.

Weakness of the supply side

- Presence of experienced IT providers and newcomers.

- Inconsistencies in the offered prices (financial proposal).

All these factors can lead to:

- The selection of a technological/functional solution/ITS system which is not the best one to meet the tender requirements;

- Higher cost in the implementation and start-up of the systems compared to the budgeted ones;

- Delay in the implementation time;

- Negative results (at least partially) in the testing phase requiring the repetition of the testing procedure;

- Negative attitude of final users/owner toward the performance of the systems.

To find answer to these problems the European Commission launched different actions and initiatives (from the last White Paper on Mobility 2010 to the Green Paper "Towards a new culture for urban Mobility" issued in 2007, from the ITS Action Plan to the CIVITAS Initiatives) which have begun to strongly influence the decisions and choices of Local Authorities (Municipalities, Provincial Councils, Public Transport Companies, Mobility Agencies, etc.). On the other hand this "top-down" approach could lose a large part of its effectiveness if it is not joined by a "bottom–up" approach emerging from the analysis, the bench marking and the consolidation of real experiences.

2.1 Objectives of the D8.4

The D8.4 deliverable aims to support Local Authorities (Municipalities, Provincial Councils, Public Transport Companies, Mobility Agencies, etc.) in charge of the management of the procurement process of ITS system/service with a set of key recommendations. The set of recommendations include:

- some guidelines for the definition of the procurement scheme;

- the provision of a standardised tendering package and a "template model" of the specifications to be included in it (both from the contractual and the technical point of view);

- a methodology supporting the evaluation of the bid offer and the selection of the one best matching the tender requirements.

Specific objectives of the deliverable are:

- to define the milestones of the management of the procurement process;

- to define the structure and the "key prescriptions" of tendering package;

- to provide all the indications and recommendations able to guarantee the effective monitoring and the control of the implementation in terms of acceptance of the system, implementation time, verification of the compliance of the realisation with tendering/contractual requirements (testing procedure) and verification of the value of performances indicators achieved by the system during the implementation phase and after the acceptance of the system.

2.2   Adopted approach on issuing the deliverable

The Deliverable has been issued according to this approach and key assumptions:

- The tendering package is seen properly as a contract both from the administrative/regulatory point of view and the technical one. The adoption of this assumption has the following advantages:

- o The Deliverable contents (recommendations and related guidelines) can be applied by CIVITAS DESTINATIONS sites (Site Managers) if the selection of the Contractor of ITS system is managed through a procurement process, or through a simplified benchmarking restricted to a limited number of bidders or through a direct contract (this last option must be justified by detailed motivations such as the presence of an on-going exiting framework contract already established between the Contracting Organisation and the Contractor which is relevant for the awarding of the new contract or the presence of technical justifications restricting the choice of the Contract in the perspective of maximising the benefits of the Contracting Organisation);

- o In addition this approach is beneficial for the Procurement Entity/Contracting Organisation from the practical point of view facilitating the reduction of time required to set up the contract with the Contractor. The bidders become familiar with the contractual prescriptions already in the procurement process and this avoids spending time in the contracting phase. This approach is the same as to include a "contract model" into the tendering package.

- The Deliverable provides recommendations on how to set up the key contractual prescriptions, in particular those ones facilitating the ensuing management of the contract itself, the payment according to the progress and performances achieved by the system during the implementation and the management of acceptance procedure and testing. **Site Managers must be aware that these key prescriptions (and the whole contents of the Deliverable, more in general) need to be adapted to the national regulation on procurement (when applicable compared to the EU legislation).** The Deliverable provides general principles but the effective tuning and adoption of these principles into the tendering package of CIVITAS DESTINATIONS local measures is the responsibility of the Site Managers;

- The Deliverable's guidelines and recommendations are applicable if the ITS system is contracted as a supply or as a concession. Site Managers can easily adapt the recommendations in both these cases;

- The Deliverable's guidelines and recommendations are applicable also in case of "integrated" procurement. The adoption of "integrated" procurements must be considered by Site Managers in order to maximise the resources and efforts required to the Procurement Entity and the Contracting Organisations for the management of this kind of process and to save time for the implementation. The coordinated management of various IT providers (grouped into a single consortium) under a unique contract simplifies the allocation of the responsibilities for the implementation and facilitates the Contracting Organisation for the management. This is even more beneficial in case of systems which are functionally integrated: in this case the benefits are maximised even if the specifications for the integration must be deeply detailed in the design phase (see CIVITAS DESTINATIONS Deliverable D8.3). On the opposite side "integrated" procurement can affect the freedom of the Procurement Entity to select the best solution available for each of the required systems: in case of "integrated" procurement this objective is limited by the fact that the best solution for one of the systems tendered can be offered by a bidder (consortium) whereas the best solution for another of the tendered systems can be offered by a different bidder

(consortium). This factor is more sensitive in the case of systems that are not functionally integrated.

2.3   Institutional level

The procurement is managed by a Procurement Entity: this is applicable also in the case of "integrated" procurement or in the case the tendered system is then contracted by various Contracting Organisations (each of them contracting the tendered system relating to the specific part under its own responsibility/competences).

In this case the following one is a procurement scheme widely adopted:

- The procurement is managed by a Procurement Entity;

- Once the Contractor has been awarded, various Contracting Organisations sign separated contracts with the Contractor. Each contract deals with a specific part of the whole system which has been tendered.

2.4   Procurement process and tendering schemes

At general level, the main objective of the procurement process is to select a provider of the ITS system, supply or concession. The selected ITS provider should be the bidder whose proposal demonstrates effective compliance with the technical requirements and call for tender terms and conditions (financial, implementation deadlines, operation).

The overall procurement process and the key criteria of the tender package should focus on the required level of compliance to the technical, functional and operational specifications of the tendered system. It should ensure that the first priority for any proposal is to satisfy the requirements, and only then are the opportunities sought for best price through market competitiveness. Thus, the overall tendering scheme and prescriptions should be defined so that the financial factor only comes into play among the bidders whose proposals are acceptable and comparable in technical terms.

Various procurement schemes are available to achieve this objective. The range includes open or restricted procedures, with or without pre-qualification (on economical/technical basis), etc. In general the main steps of a procurement process are the following:

- Invitation to tender (which may follow from pre-qualification);

- Publication/transmission of tendering package;

- Application of bid offer and evaluation;

- Negotiation and contracting.

3 Procurement process

Based on the main steps of a procurement process identified in section 2, a set of recommendations is provided for each of them in the following sub-sections.

3.1 Pre-qualification

The pre-qualification relates to restricted procurement schemes. The pre-qualification establishes which are the providers to whom the tendering package is sent/made available. The pre-qualification can take place in advance compared to the timing slot of the procurement process for example when the pre-qualification produces a shorted list of pre-selected providers which are involved in any possible procurement (which could be launched over a maximum pre-defined time period since the pre-qualification). Vice versa the pre-qualification can be a proper phase (the first one) of the (restricted) procurement process itself.

In case an open procurement process is chosen, the tendering package is public and no restriction is applied to accessing the package. In such a case a proper pre-qualification does not take place. A qualification phase is included in the call for tender itself and described in the tendering package.

Pre-qualification (or qualification) requirements define the eligibility of the bidders to participate to the call for tender in case of restricted procurement scheme (or the eligibility of the bid offers to be evaluated in case of open procurement scheme) Pre-qualification (or qualification) requirements must be defined in terms of:

•   Legal/Ethics requirements;

•   Financial requirements (financial position);

•   Technical requirements.

D8.4 focuses on the indications required for the definition of technical requirements. These requirements can involve a detailed summary of the past bidder's experience and technical capabilities by providing descriptions of past systems implementation/services which are similar to those required in the tender. Experience and past performance on previous contracts.

The requirements must be described in a very detailed way indicating which is the mandatory information to be provided and which could be the optional to be added: the dimensions of the implementation, the technical/functional specifications of implemented systems, dates and results (acceptance by the Contracting Organisation, implementation under progress). For each implementation phase, the bidder should be obliged to indicate points of contact (name, address, and telephone number), which can be used as references for work performed in the area of system/service required. Selected Contracting Organisations may be contacted by the Procurement Entity in order to verify the quality of declared past professional experiences and the reliability of provided information.

3.2 Tender package

The tender package can be structured in a variety of ways. The following options are available:

•   Tendering rules and administrative prescriptions (Document named "TR");

•   Technical specifications (Document named "TS");

- Description of the templates for the bid offer submissions (Document named "OT", it can also be included in TR);

- Other technical annexes (Documents named "TA") describing the context (such as indications for installation, data format and technical specifications for systems integration, etc., they can also be included in TR).

The above structure assumes that tendering rules (TR) are already written in a contractual context; alternatively the contractual scheme (Document named "CS") should be added to the package as a separate document.

In the following sections, each of the listed documents included in the tendering package are described. Key guidelines to issue them are provided.

3.2.1   Tendering rules: the key articles

Key articles of tendering and contractual rules are as follows:

- object of the tender;

- evaluation criteria;

- warranties;

- possibility to modify the components during the contract;

- upscaling of the system;

- implementation plan, the milestones and the related payments;

- testing procedure and performances indicators;

- penalties and contract resolution.

Italics are used in the following when an example of the sentence/paragraph to be directly adopted in the tendering package is provided. The examples of sentence/paragraph is also included between quotation marks (" ") in order to differentiate these from the deliverable text.

Tender object

The object aims to clearly identify the systems/tools (hardware, software) and the support services which are tendered. The description must be as much detailed as possible in order to allow bidders to define a suitable price. The "overall" cost estimation for the supply (the value of the bid at the end) should include not only the cost referred to the technology (the hardware components, the software modules, etc.), but also the costs related to the operation and support services that the Contractor should face for implementing the overall system (total days for the installation in different depots, meeting with contractors, resources necessary for detailed design, management of the project, maintenance of the system, etc.).

Added to a general statement as "*The bidder must define its technical and economical proposal to design, supply, install, integrate, configure, test and maintain software, servers and other related technologies required for system X, system Y, …… and system Z (under the modalities detailed in TS)*", the tender object must provide a detailed list of each hardware component, software tool and required services such as:

"The supply relates to:

- *The supply, installation, integration, configuration, testing and maintenance of equipment and servers according to the technical requirements defined in TS document. It is anticipated that the Contractor is in charge of the supply and installation of the networking* hardware *component, if necessary*

- *The design, supply, installation, integration, configuration, testing and maintenance of software according to the functional requirements defined in TS document*

- *The design and supply of a testing software to perform functional and performance verification*

- *The installation and integration of the required hardware equipment in the internal network to be carried out in accordance with the technical and normative directives and the supply of all the material required for the installation, integration, configuration, testing and running of the system*

- *The supply of "as-built" schemes related to the installation of the equipment*

- *The supply of the documentation related to the software design process and user manuals*

- *The supply of technical assistance for the start-up of the system*

- *The supply of the maintenance service and maintenance manuals….."*

Tender Evaluation criteria

Evaluation criteria are both technical and financial. The mutual relevance between technical and financial criteria must be defined in such a way to preserve the technical value of the offer. Evaluation criteria are defined as follows:

- Technical quality of the proposal. Under these sub-criteria the proposals can be evaluated on the basis of: technical quality of hardware components, hardware /software architecture, software modules and functionalities, quality of the installation work, scalability, etc;

- Quality of the maintenance service. Under these sub-criteria the proposals can be evaluated on the basis of: time period covered by the maintenance period, activities provided in the preventive maintenance, SLA guaranteed in the preventive maintenance SLA guaranteed in the reactive maintenance, etc;

- Description of the implementation modalities. Under these sub-criteria the proposals can be evaluated on the basis of: time planned to complete the implementation, technical quality of the description of the implementation plan, quality/contingency plan, number, profile and professional skill of involved resources, etc;

- Technical assistance for the start-up of the service. Under these sub-criteria the proposals can be evaluated on the basis of: on-site assistance, remote assistance;

- Technical documentation.

For each of the above mentioned criteria and for each of related sub-criteria appropriate weighted factors are specified. The Procurement Entity defines which level the specification of the criteria and sub-criteria must be detailed (first level consisting of the evaluation criteria, second level consisting of evaluation sub-criteria). In parallel the Procurement Entity establishes if (and at what level of detail: only for the criteria or for the sub-criteria too) the related weighted factors must be specified.

The evaluation process must be specified in this article too: how are scores assigned to the technical/financial offer? This description must detail the calculation of both intermediate score (for example, related to the evaluation of each sub-criteria and/or each criteria) and final score (for technical/financial offer). Several modalities/formulas can be defined to assign scores to the bid offers then it is difficult to reduce wide range of possibilities available to the Procurement Entity and to recommend one specific of these. National regulation must be taken also into account for this.

Furthermore this article should include also a sort of "safety prescriptions" supporting the Procurement Entity in the management of the process lasting from the launch of the call for tenders to the award to the selected bidder and the signature of the contract. An example of this prescription is provided below.

"The launch of the call for tender does not mean a commitment by the Procurement Entity to award a contract. The Procurement Entity can freely decide to annul the call for tender in case of new events or needs which have been occurring after the launch of the call for tender and/or in case this decision should be taken for its convenience or/and it can decide not to award the tender in case of any of the bid offer is matching the tender specifications/rules and/or it can decide to reduce the value of the tendered system/services according to the reduction of the finance contribution in case this reduction is not up to the Procurement Entity itself. The application of a bid offer to the call for tender is not a justification given to the bidders to obtain a reimbursement including the expenses for bid offer's preparation and application".

A methodology to be adopted for the evaluation of the technical offer is presented in section 4.3. The methodology is based on the evaluation criteria defined in TR and on the templates defined in OT.

Warranties

Warranties can be various depending on their role and objective: warranty for the eligibility of the offer (eligibility warranty), warranty for the compliance of the implementation to technical specifications and contract rules (implementation warranty) (during the implementation up to the final acceptance of the system/start of the concession), warranty for the compliance of services and prescriptions after the implementation is completed (to be used for the services to be provided by the Contractor after the acceptance of the system: for example the maintenance in case the system is purchased as a supply or the operation of services contracted in case of concession, "service operation" warranty).

The first warranty typology is requested to make eligible the bid offer and it is annexed to the bid offer. In this case, at the end of the evaluation phase, the warranty provided by not awarded bidders is returned back by the Procurement Entity.

In order to guarantee compliance with the prescriptions included in the tendering package, the Contractor must be obliged to provide the Contracting Organisations with a warranty up to a maximum of 10% of the total value of the Contract. The Contractor must integrate its first warranty up to the total amount of the warranty for the contract (i.e. 10% of the value of the contract). The warranty should be provided before the signature of the contract. If the Contractor fails to enter into a formal contract, the eligibility warranty may be retained by the Contracting Organisation.

Furthermore this article describes the modalities for the supply of the warranty and the procedure that the Contracting Organisation uses to give back the warranty to the Contractor (it can be recommended that a part of the warranty is retailed by the Contracting Organisation up to the successful result of the final testing).

This article must indicate that the modalities warranty provided by the Contractor is returned back by the Contracting Organisation. On the other hand this article must indicate the terms and conditions under which the Contracting Organisation are allowed to retail the warranty.

The last typology of warranty must be provided in correspondence of the successful result of the final testing of the system when the Contracting Organisation pays the last amount defined in the payment plan (see below for details) and gives back the "implementation" warranty to the Contractor.

This warranty could be returned back by the Contracting Organisation at the end of the maintenance (or concession) period each time the level of performance of services to be provided has been shown to be compliant with the required indicators (i.e. at the end of the first year of the concession, at the end of the second year of the concession, etc.). Thus a predefined number of testing sessions is organised during the concession period and the warranty is paid back step-by-step up to the total amount.

Software license and system scale up

TR should oblige the bidder to provide unlimited software licenses. Unlimited software licenses means not only that the licenses are not time limited, but also that no extra costs will occur in case of the license upscaling (e.g. increase of vehicles connected to the AVM – Automatic Vehicles Monitoring system, increase of equipped depots for data upload and download, etc.). The tender documentation should require bidders to declare/list the cost of each device, component or services (on-board terminal, on-board unit, gate, contact/contactless reader, training day, etc.) in the OT. It should also require that the Contractor is obliged to maintain these prices for a specified time period e.g. 5 years in case of upscaling of some system components.

"*The Contractor must provide unlimited software licenses for time and dimension coverage. No extra-costs for software licenses are paid to the Contractor in case of the up scaling of the system. Scalability doesn't include the cost of configuration and set up of additional equipment. These costs will be addressed separately at the time any extension is required. The costs must be defined on the basis of the prices specified by the Contractor in OT*".

Implementation plan

The first step of the implementation plan for an ITS system can be the development of a pilot of the system. Taking into account the ITS described in D8.3 it is possible to identify the following pilot system:

- Some of the end-users services and/or the provision of key functionalities relating to some of the available data, for the aggregating platform or the city/company APP;

- The buses assigned to a depot/service area (i.e. certain lines or all the lines covering a city area), for the AVM or the e-ticketing system;

- A service area or a vehicles station, for the vehicle sharing;

- A parking area, for the Parking Management System.

This pilot will assure a smooth sign-off of the system with minimisation of the organisation/operational impacts, avoiding "large scale" problems that frequently occur when complex systems are introduced in a single step. Although the reduced dimension of the pilot, it is recommended to activate all the sub-systems and the related functionalities in this first implementation step (or at least the main functionalities). This will help to identify and solve main problems (if any). The subsequent phases would be managed as "extension" of the components (e.g. on-board terminal to be connected to the Central system for the AVM or the e-ticketing system) and consolidation of the functionalities in the various operational context. Each phase must be clearly identified through a milestone. The implementation phase should be defined on the basis of a realistic timing and suitable deadlines accordingly estimated in the design phase. Bidders should be discouraged to present offers with "unrealistic" short implementation time (by setting the evaluation criteria accordingly). This will help to avoid common problems such as delays, conflicting behaviour of the Contractor, etc.

The definition of a step-by-step implementation plan and the setup of related milestones facilitates the management of payment plan and penalties due to delays during the implementation (sign-off of each phase, positive results of the testing procedure, final acceptance, etc.).

Payment plan

Payments should be scheduled according to each implementation milestone in term of percentage of the total price. Each payment would be carried out after the successful test planned for each phase. The last payment (average 10% of the total) should be linked to the successful final testing (acceptance) of the overall system and to the proven compliance with all the contract obligations.

This approach allows the Contracting Organisation to monitor the progress of the work and balance the payments with the effective level of acceptance of the system. In order to achieve this objective, TS must define: A) an appropriate Implementation Plan divided into modular steps, each of them corresponding to a tangible result and related to a clear (and realistic) deadline (see above for details); B) the payment takes place at successful result of intermediate/final testing session. Value and timing of the payments will assure adequate

cash-flow for the provider (especially in the first phase of the implementation), without leaving the Contracting Organisation over-exposed.

"The payment for the design, the supply, the installation, the integration, the testing and the maintenance of the system is managed according to the scheduling timetable defined in the following table.

- *Step 1) Supply of detailed specifications by the Contractor to be accepted by the Contracting Organisation*

- *Step 2) Implementation of a "Pilot" of the system consisting of…….*

- *Step 3) Extension of the "Pilot" of the system to ……*

- *Step 4) Final testing session of the system*

- *Step 5) Maintenance (or concession) period.*

POSSIBLE PAYMENT PLAN	
Acceptance of detailed specifications by the Contracting Organisation	X% of the total amount of the contract value. It could be appropriate a figure from 10% up to 20%. A similar percentage of the warranty (one or more warranties depending if a single or more contracts are signed) can be returned back by the Contracting Organisation to the Contractor.
When the intermediate testing session relating to Step 2) is successful	X% of the total amount of the contract value A similar percentage of the warranty (one or more warranties depending if a single or more contracts are signed) can be returned back by the Contracting Organisation to the Contractor.
When the intermediate testing session relating to Step 3) is successful	X% of the total amount of the contract value A similar percentage of the warranty (one or more warranties depending if a single or more contracts are signed) can be returned back by the Contracting Organisation to the Contractor.

POSSIBLE PAYMENT PLAN	
When the final testing session (Step 4) is successful	X% of the total amount of the contract value (up to reach the entire value of the tender or the specific contract signed). The last quota of warranty (one or more warranties depending if a single or more contracts are signed) is returned back by the Contracting Organisation to the Contractor. The Contractor provides the Contracting Organisation with the "service warranty" (one or more warranties depending if a single or more contracts are signed)
When the first intermediate testing session relating to Step 5) is successful	The Contracting Organisation gives back X% of the "service operation warranty" (one or more warranties depending if a single or more contracts are signed) to the Contractor.
When the second intermediate testing session relating to Step 5) is successful	The Contracting Organisation gives back X% of the "service operation warranty" (one or more warranties depending if a single or more contracts are signed) to the Contractor.
…………………………………..	……………………………………….…
When the final testing session relating to Step 5) is successful	The Contracting Organisation returns back the remaining quota of the "service operation warranty" (one or more warranties depending if a single or more contracts are signed) to the Contractor.

Table 1: Example of Payment Plan

System acceptance and testing

The testing procedure takes place at the end of each implementation phase (milestone) and at the end of the realisation (for final acceptance of the whole system and the start of the concession, if included in the call of tender's object).

The testing of the results of each phase (both intermediate and final) is organised into three different levels:

- quantitative and technical congruency of system supply and components;
- functional tests of the single device or sub-system and of the whole system;

- performance tests.

The testing procedures should be proposed by the Contractor, accepted by the Contracting Organisation and agreed with the parties. The acceptance criteria should also be defined.

The quantitative and technical congruency of the supplied system is based on the following verifications:

- number of installed components;

- technical and operational conformity of installation activities;

- presence of software licenses;

- technical documents and manuals included in the object of the contract.

Functional tests measure the level of responsiveness of functions to contractual specifications: they can be divided in tests of the single sub-system and of the whole system. Each functionality must be tested under a wide range of operational conditions representing the different scenario planned for service/system operation.

Functional tests prove that the function complies with specification (during the specified test). *Performances tests* measure how long the system is able to provide the functionality properly over a certain time period or number of tests.

The positive verification of each milestone (phase) testing leads to the processing of related payment. If the results of the testing are negative and the impacts generated by the unsuccessful testing can affect the operation of the system and/or its extension, the Contracting Organisation can decide that the test should be entirely repeated and the implementation activities/installation of next phase should be stopped (waiting for positive verification of repeated tests). In this case no payment will be processed.

If the results of the testing are negative but the impacts generated by the unsuccessful testing don't affect the operation of the system and/or its extension, the Contracting Organisation can decide that the test should be partly repeated and to go on with the implementation activities/installation for next phase. A percentage of the payment will be transferred to the Contractor, the remaining quota will be paid when current problems are solved.

The supply and installation of components doesn't imply that these components are fully operated by the Contracting Organisation. It is normal to have a period of live operation and debugging: even more the start-up and operation of the system is mandatory to allow the overall ITS system(s) to be tested in live conditions in order to detect problems that were not apparent in the testing of the individual units. The positive results of the phase test regulate the payments but it doesn't mean the final acceptance of the testing: all hardware and software products may not be accepted until the final testing is positive.

The warranty should start its validity from the date of the final acceptance of the system (positive acceptance tests). It should be avoided that the reference date for starting the validity of the warranty is the date of the first installation of each component, or its initial testing. The personnel of the Contracting Organisation need to carefully check the testing reporting and understand the impacts of what they sign at various testing phases.

For the service period (maintenance in case of supply, all the services contracted for operation in case of concession) testing procedures and related acceptance criteria must be

defined too. The success (or not) of the tests planned for the maintenance/concession impacts on the release of the "service operation" warranty. The approach is the same used for the implementation of the system.

Performances indicators

Performance indicators of the ITS systems can be divided into two categories:

- "Reliability" of the individual component/device/sub-system. This kind of indicator can be calculated as the ratio between the time when the component, device or sub-system provides all the functionalities in a proper way and the total planned operational time. (A server may be rated on 24/7 availability; an AVM workstation may be rated against the operational hours of the Control Centre, etc.);

- "Level of performance" guaranteed by the main functionalities of the whole system over a defined monitoring time period. These indicators are strictly related to the functionalities of each kind of system and then they are specifically defined for each system typology. Some examples of performance indicators are provided in the following (the ITS selected for example come from D8.3):

  - Infomobility (platform for the aggregation of contents, APP, webportal, etc.)

    - *Response time Index*: time (seconds) required to display information upon the request sent by the user;

    - *Load Index:* number of simultaneous info requests generated by client (end users) devices which are processed by the system;

  - Fleet Monitoring and Users Information System

    - *Monitoring Index:* number of trips which are monitored by the system over the total number of service operated trips;

    - *Event Identification Index:* number of events generated during the operated service which are correctly identified over the total number of occurred events;

    - *Real-time information provision Index:* number of real-time information which are correctly generated over the total number of real-time information generated during the operated service;

  - E-ticketing system

    - *Completed Transactions Index*: number of validation/selling operations not completed and not annulled by the users over the total number of validation/selling operations which have been started;

    - *Progressive Transactions Index*: verification of the congruency of the sequence of the progressive ID codes assigned by the system to the transactions. This sequence should not include any replication of codes (there cannot be two operations with the same ID code) and any missing ID code (there is an operation managed by the system which has not been registered);

- o Vehicle Sharing Management System:

  - ▪ *Pick up/release Index*: number of pick/up/release operations correctly completed over the total number of operations;

  - ▪ *Monitoring Index:* number of trips which are monitored by the system over the total number of operated trips;

  - ▪ *Event Identification Index:* number of events which are correctly identified over the total number of events occurring during the service.

- o Parking Management System

  - ▪ *Occupancy Index*: number of available lots identified by the system compared to the real number of available lots.

The target value of the indicators measures the performance of the system over the time, up to the final acceptance tests and during the "service operation" period. When the measured value is far from the target, penalties can be applied.

Penalties

In addition to fraud and cases demonstrating incompetence of the Contractor carrying out the work, contract termination must also be closely related to technical non-performance-provisions. Technical non-performance-provisions basically mean the most relevant conditions that measure the technical inability of the Contractor to complete the work and finalise the contract according to the provisions of the contract. To accomplish this objective, reasons for contract termination can be defined on the basis of:

- Max delay to achieve the results defined for each implementation step (target milestone);

- Max delay to achieve successful result of intermediate/final testing session;

- Negative results of intermediate testing/final session;

- Cumulative value of penalties up to a maximum percentage value of the warranty (both during implementation and service operation).

3.2.2 Technical Specifications

The technical specifications (TS) are based on the main results of the design activities (see also D8.3). When the outcomes of the ITS design is structured as TS, it is recommended to focus on functionalities and operative requirements rather than technology solutions and technical features of each components. Functional specifications should be described in terms of "operational scenarios". This makes the bidders free to propose the most effective solution, while meeting the TS requirements. It also avoids errors or needless constraints on the part of Procurement Entity, who may not fully aware of the latest developments of the technologies.

The specifications should not include technical conditions or requirements which could be seen as a restriction of open competition, or which give an unfair advantage to a bidder. Restriction on competition could occur if the tender specifies the use of a specific type of equipment, or a specific piece of proprietary software, even though other makes could equally do the job. It is reasonable to state a preference for something if it is already in widespread use in the Procurement Entity or the Contracting Organisation but it is not reasonable to make it mandatory if there is no technical barrier to alternatives.

As example of unfair advantage, integration may be required between the tendered system and a legacy platform or software. The supplier of the legacy system (if bidder too) would have a strong advantage through its understanding of the system, and its knowledge of the amount of work involved in the integration. To overcome this, the tender process could provide all qualified bidders with the system description, functionality, data elements, etc. of the legacy system.

3.2.3 Templates for tender/bid offer presentation

It is necessary to provide instructions to bidder for the presentation of bid offer. The instructions should also include templates (i.e. structure of the single part/section of the bid offer and main contents). The objective is to receive the different technical proposals under a standardised structure which could also be consistent with the technical specifications provided in TS. This makes it easier to evaluate the level of compliance of the technical offer with the TS and facilitate the work of evaluation of the technical offer. It also makes more difficult for the bidder to use excessive and irrelevant details to obscure areas of non-compliance or weaker performance.

For this purpose, the tender package should include a document (OT) with an index/summary to be followed by the bidders in preparing their technical proposal. Standard tables and templates can be used in order to structure all the proposals in a common way.

Also a maximum length for each section can be indicated.

3.3 Tender/Bid evaluation

To perform the technical evaluation of the bid offer, Evaluation Committee can apply the following methodology. The advantages of such a methodology are:

- It allows a rigorous and unbiased analysis of the technical proposals;

- It allows an adjustment of the level of the analysis based on the willingness of the Evaluation Committee to go into details (up to a very detailed level);

- It allows a guided analysis of the bid offer able to make easier and more consistent the evaluation even if the bid offer are inhomogeneous in terms of the description's approach and the level of details of the description.

The evaluation is based on the repeated identification of the evaluation sub-criteria (at N+1 level) that contribute to the evaluation of each criteria/sub criteria (at N level) according to the weighted factors. This methodology is applied starting from the bottom level of criteria or sub

criteria that is defined in TR up to the level which is considered appropriate. Table 2 shows an application of this methodology for the evaluation of the bid offer on the basis of criteria and sub criteria defined in section 4.2.

EVALUATION LEVEL	EVALUATION CRITERIA	EVALUATION SUB CRITERIA	WEIGHT
1st	Technical quality of the proposals		40/100
2nd		Technical quality of hardware components	15/100
3rd		Technical performance of the equipment	XX/100
3rd		Availability of spare part	XX/100
3rd		Certifications/use of international standard	……………………
2nd		Hardware/Software architecture	10/100
3rd		Modularity	35/100
3rd		Scalability	65/100
3rd		……………………	……………………
2nd		Software modules and functionalities	45/100
3rd		XX	XX/100
3rd		XX	XX/100
4th		……………………	……………………
2nd		Quality of the installation work	30/100
3rd	……………………	……………………	……………………
1st	Quality of the maintenance service		15/100
2nd		Time period covered by the maintenance period	40/100
2nd		Activities provided and SLA of the interventions	60/100
3rd		Preventive maintenance	15/100
3rd		Reactive maintenance	60/100
3rd		Remote technical assistance	25/100
3rd	……………………	……………………	……………………
1st	Description of the implementation modalities		20/100
2nd		Technical quality of the description of the implementation plan	75/100
3rd		Description of implementation step, activities and identification of required support	40/100

EVALUATION LEVEL	EVALUATION CRITERIA	EVALUATION SUB CRITERIA	WEIGHT
3rd		Number of resources, professional skills and profile of the involved technicians	50/100
3rd		Quality procedure to check the implementation	10/100
2nd		*Time for the implementation and testing*	*25/100*
1st	**Technical assistance for the start-up of the system**		**15/100**
2nd		*"On site" technical assistance*	*75/100*
3rd	……………………..	Training	……………………
2nd		*" Remote" technical assistance (phone contact)*	*25/100*
3rd	……………………..	……………………	……………………
1st	**Technical documentation**		**10/100**
2nd		*Users manuals*	*75/100*
2nd		*Data models*	*25/100*

Table 2: Application of a methodological approach for the evaluation of the technical offer

The lower level of the methodology described in Table 2 is achieved when the sub-criteria to be used in the evaluation are detailed enough and homogeneous to be coherently evaluated without any subjective interpretation.

At the bottom level (M+1) identified in the methodology, the Evaluation Committee assigns its vote. Applying the weighted factors related to the factors at level M+1, the evaluation score related to the technical factors at level M is calculated. Following this procedure the evaluation score at 1st level is calculated and then the final score for the technical evaluation of each offer.

The selection of evaluation criteria is described also in section 4.2. As indicated in section 4.2 the Procurement Entity must define the appropriate level of criteria/sub-criteria to be included in TR (identification of evaluation criteria).

3.4 Negotiation

After the definition of the bidders ranking (taking into account both the score assigned to the technical and financial offer), the Procurement Entity can carry out the negotiation phase (if

declared in the tendering package). Procedures and rules of the negotiation phase must be clearly detailed in the tender specifications.

The negotiation phase can be managed with the bidder whose proposal is in the first position of the evaluation rank or it can be enlarged also to others (a certain number of bidders who stand from the first to the Xth position of the evaluation rank, all the bidders whose proposals achieved an evaluation value that is over a predefined threshold, all the bidders participating apart from those excluded during the process, etc.).

The objectives of the negotiation phase are:

- Verify all the inconsistencies, the discrepancies and the technical issues requiring a detailed clarifications which were identified in the evaluation;

- Verify the financial consistency of the offer compared to the technical and functional requirements, the level of compliance to them that is guaranteed by the bid offer, the allocated resources and the time constraints (implementation time proposed by the bidder). In order to achieve this objective, it is mandatory to delete any possibility of misunderstandings or inconsistencies on technical issues and to achieve a complete mutual understanding on the solutions/services proposed;

Based on the above mentioned objectives, it could be recommendable that the negotiation phase is restricted to the bidder whose proposal was in the first position of the evaluation rank.

3.5 Contracting

The negotiation phase is the last step of the procurement process before the contracting. This phase could be carried out by the Procurement Entity directly or by the different Contracting Organisations.

Based on the recommendations provided in section 2 the resources required for the translation of tender specifications (both the administrative specifications and the technical ones) into the contract model is minimised. This advantage arises when the scheme used for TR is similar to a contract model or a contract template is annexed. Anyway the activities that are required to move from the tendering package to the contract documentation are as follows:

- Revision/updating of the tender package based on the answers provided to the clarifications requests;

- Integration/updating of the technical specifications based on the bidder proposed solutions (where the solutions proposed by the bidder are better than the tender requirements);

- Revision/updating of the technical specifications based on the results of the negotiation phase.

The tender package, the offer of the awarded bidder, the results of the negotiation phase, supplemental terms and conditions, etc. must become part of the contract.

4 Resources for the tendering process

Deliverable D8.3 highlighted the relevance of requirements and needs analysis for the definition of technical specifications of ITS. In the same way D8.4 aims to explain that the proper and effective definition of the technical and contractual prescriptions in the tendering procedure is a pre-condition for an efficient implementation of ITS solutions.

The procurement process and the following contract set up are critical and relevant for the management of the realisation/implementation process and the achievement of benefits and performances estimated in the feasibility and design phase. They must formalise the technical requirements defined in the feasibility analysis and they must enable the selection of the most suitable solution/provider based on a clear, fair and effective evaluation process. The efficiency of the procurement process directly affects the contracting phase and thus the costs and the time required for the project execution.

For this reason, the Procurement Entity must give the required attention to the tendering/contracting process not only due to the legal impacts it has but as a key milestone in the whole ITS lifecycle (from the feasibility to the operation).

The resources and the time required for the management of the procurement process must not be underestimated.

In terms of resources, adequate staff must be made available. It is not sufficient to delegate the set-up and management of the tender to administrative and legal officers alone. They must work together in close collaboration with the technical staff in charge of the definition of technical specifications in order to translate properly the outcomes of the design phase in the tendering package and to create the required synergies between the technical and the contractual/administrative part. The following examples clarify the relevance of this synergies:

- Definition of the technical and financial requisites (administrative issue) for the participation to the tender (restricted process) defined properly with the effective requirements to assure the proper expertise and solvability in the implementation (technical issue);

- Definition of payment amounts (contractual issue) in accordance with implementation plan and main milestone (technical issue);

- Definition of award criteria and related weights (administrative issue) in accordance with the contents/approach used to describe the system specifications (technical issue);

- Definition of template for the description of technical offer (OT) (administrative issue) in accordance with the contents/approach used to describe the system specifications (technical issue);

- Definition of accepted minimum thresholds of the performances indicators (for the acceptance test, the warranty period and the operation) (contractual issue) to be defined based on technical/operational requirements and constraints.

The organisational structure involved in the management of the bidding process should include:

- A person responsible for the whole process: he/she will be a "high-level" managing profile of the Procurement Entity. He/she will be in charge of signing all the bidding process documentation and to assume the risk of the legal effects of the actions related to the bidding process management;

- A staff Coordinator (it is recommended he/she will be not a strict legal issues) in charge of the coordination of the staff, the supervision of the progress and the interaction with the process;

- The legal staff (resources to be allocated depending on tender complexity, economic value and number of bidders). It will consist both of administrative and legal expertise: the first one is required for the elaboration of the tender package, the operative management of bidding phases (i.e. communications to the bidders, clarifications, issuing of evaluation reporting and minute of the evaluation committee, verification of the financial/administrative documentation included in the bid offer). It deals with staff working on purchasing procedures and contract management. The second consists of legal advice/approach more focused on the management of bid rules. It can be provided by internal personnel of the Procurement Entity (for large Public Administrations or Mobility/Public Transport Authority/Operators) or contracted as external supporting services (in particular in case of small Public Administrations or Mobility/Public Transport Authority/Operators)

- The coordinator (or the main responsible) of the technical staff involved in the system design (and in charge of the future management of the operation of the system). He/she should be involved from the beginning of the bidding process (this means from the definition of bidding process and tendering scheme to be adopted).

The composition of all staff for the management of the bidding process should result in a mix of multidisciplinary profile/skills covering administration/purchasing/contracting, legal expertise in tender management and technical responsibilities. The presence of legal expertise in such a process is mandatory but often is used for specific advice or key opinion: on the other hand the huge amount of practical/administrative stuff required by the management of a bidding process should not be underestimated.

In terms of time, the most demanding steps are:

- The elaboration of the tender package in particular for the multiple cross-reference among the various documents and the verification of their consistencies;

- The verification of technical/financial/administrative requisites for tender participation (for restricted process in particular but also in open process; in this case this activity is included in the evaluation process which is even more time consuming);

- The evaluation of the technical offer;

- The certification of all the bidding process steps in a proper documentation (i.e. minute of the restricted/public evaluation session, evaluation reports, etc.).

Obviously the time required for the management of a bidding process is variable according to the system complexity (reflecting into the complexity of tender package), the number of the bidders and the typology of bidding process and tendering scheme adopted. A minimum level of complexity is established by the management of a formal/transparent process (and

related procedure) unless the system/tender complexity and the economic value. The duration of a bidding process (including the evaluation of the bid offers) is 3-4 months at least but the risk of unpredictable prolongation (due to clarifications or appeals produced by the bidders) must be considered even in the simple cases. This consideration kindly request Site Managers to estimate the time required for the management of the bid in a safe way based on the adopted process and tendering scheme, the national regulation and the current practice of the involved organisations. The estimation should be prolonged by 25% in order to consider unexpected events which often occur in such a process.

The estimated time should include a benchmarking analysis of similar past experiences in terms of economic value, award criteria and conditions for bid participation.