5

Developing ITS User Services and the Strawman ITS Future Big Picture

5.1 Introduction

This chapter provides guidance on the execution of activities associated with step 100, "Initial Needs, Objectives, Problems, and Issues"; step 130, "ITS User Services"; and step 140, "Strawman ITS Future Big Picture" of the ITS Cooperative Development Methodology. These are all components of the ITS needs model, which is used to capture initial requirements and support the evolution of those requirements.

5.2 ITS User Services

ITS User Services have their roots in objectives and help to support the *what* part of the what?/how? cycle. So, how do we develop ITS User Services—by exploring requirements, of course!

During the course of many projects utilizing the ITS User Services concept, we have developed an approach to the development of ITS User Services that seems to be effective. First, it is important to recognize that there are three main parts to an ITS User Service, described as follows.

- *A label:* A convenient abbreviation that indicates what the ITS User Service is all about;

- *A description:* A textual description of what benefits or value the ITS User Service provides to the user;
- *Several "shall" statements:* The formal structured English stuff that system developers love to hear.

Our way of supporting the exploration of requirements with the stakeholders and the end users is to initiate and facilitate a dialog with and among stakeholders. Through this, we try to get them discussing with each other what they actually want to get out of the eventual system implementation. We call our facilitation tool the "so what?" analysis. In simple terms, it involves a group of stakeholders talking through various ITS User Service labels while we keep asking them "so what?" in terms of their particular group perspective. The sequence we typically follow is outlined in Sections 5.2.1–5.2.3.

5.2.1 Develop a Series of ITS User Service Labels

An ITS User Service label is a very brief five to ten word label indicating what the ITS User Service is. We have nearly always started by using the labels from the 30 ITS User Services as defined in the National Architecture for ITS as a checklist; these cover a wide range of ITS needs, objectives, problems, and issues. We then review stated needs from the user group and amend the ITS User Service list accordingly. It is important to note that it is not necessary to start with the 30 ITS User Services from the National Architecture for ITS, but they do make a good starting point for U.S. applications. For applications in other countries, it may be more appropriate to begin with the list of ITS User Services being developed by the ISO TC204 Working Group 1. Table 5.1 lists the labels for these ITS User Services.

In the course of one project it was suggested that it would be useful to introduce a rule for ITS User Service labeling: "The User Service label always starts with a verb." This rule helps to separate out ITS User Services from ITS Market Packages, which is an area where stakeholders and user groups seem to encounter difficulty and have a bit of confusion. Incidentally, we refer to it as the "Wagner rule" because it was suggested by our friend, Evelyn Wagner of PB Farradyne.

5.2.2 Conduct a "So What?" Analysis

We have found it very useful to carry out this analysis in small groups of six to ten people with the group being very user perspective specific. For example, on one of our projects, five stakeholder groups were identified as characterizing the entire user community. The five groups were consumers, transit

Table 5.1
ISO ITS User Services

Service Category	Service Number	Service Label
Traveler information	1	Pretrip information
	2	On-trip driver information
	3	On-trip public transport information
	4	Personal information services
	5	Route guidance and navigation
Traffic management	6	Transportation planning support
	7.	Traffic control
	8	Incident management
	9	Demand management
	10	Policing/enforcing traffic regulations
	11	Infrastructure maintenance management
Vehicle	12	Vision enhancement
	13	Automated vehicle operation
	14	Longitudinal collision avoidance
	15	Lateral collision avoidance
	16	Safety readiness
	17	Precrash restraint deployment
Commercial vehicle	18	Commercial vehicle preclearance
	19	Commercial vehicle administrative processes
	20	Automated roadside safety inspection
	21	Commercial vehicle on-board safety monitoring
	22	Commercial vehicle fleet management
Public transport	23	Public transport management
	24	Demand responsive transport management
	25	Shared transport management
Emergency	26	Emergency notification and personal security
	27	Emergency vehicle management
	28	Hazardous materials and incident notification
Electronic payment	29	Electronic financial transactions
Safety	30	Public travel security
	31	Safety enhancement for vulnerable road users
	32	Intelligent junctions

representatives, commercial vehicle operators, infrastructure owners and operators, and a final group that cut across all the other four groups. We split those groups into the five components and then had each group conduct a "so what?" analysis on a subset of the ITS User Service labels.

We usually conduct the "so what" analysis utilizing a marker pen, a flip chart, and a facilitator. On some occasions we have automated the process using an LCD projector to project a large image for all to share and a word processor to capture the inputs and provide the prompts.

To conduct a "so what?" session, an ITS User Service label is selected and written on the flip chart and then the question "so what?" is asked of the group. The group is directed or steered a bit so that the response to "so what?" does not result in a "how." This is because we want to separate the *what* from the *how* in the process, with the *what* being represented and characterized by ITS User Services and the *how* by the ITS Market Packages developed later in the process.

This particular feat is easier said than done, but it may help to explain to the members of the group that if they feel inclined to even think about the word *how*, they should think instead of the phrase "by providing." This should improve the chances of obtaining a "so what?" answer, which consists of a set of benefits or useful utilities to the user rather than a potential solution.

At each stage, some information drops out that is valuable to the analyst later in understanding user needs, objectives, issues, or problems that are embedded in the ITS User Service label.

In terms of output from the "so what?" analysis, we really expect to get three separate components that make up a complete ITS User Service. The first component is confirmation that the ITS User Service label is useful in being a shorthand way of describing the ITS User Service. Second, we expect to be able to take the various layers of the "so what?" analysis to form the outline of an ITS User Service description. Third, we hope to use the raw material generated from the "so what?" analysis to create "shall" statements. The shall statements contain the succinct, structured information that help the system developer to start thinking about the appropriate technologies to address user needs.

Going back to the ITS User Service description, a key goal in developing the ITS User Service descriptions (the text that is used to describe the ITS User Service) is to get to the point where each user group can see itself in the ITS User Service description. The groups can see their needs, objectives, policies, and issues encapsulated, and the ITS User Service label relates specifically to their needs.

5.2.3 Lessons Learned

In the course of applying the "so what?" analysis, we have identified some lessons that we would like to pass on our readers.

The "so what?" analysis is an excellent tool for supporting a dialog between the user and the system developers and among the members of the user community. When this dialog emerges, you start to understand that there are more perspectives than you imagined even within what is supposed to be a homogenous grouping.

There seems, at first glance, to be a lot of work involved in the process. For example, if you start with one ITS User Service label and you come up with five "so what?" responses and then go on and say "so what?" to those responses, you may create another five each. You can see that the amount of work grows exponentially. It requires quite a lot of resources to support the entire process. The good news is that the process does tend to close again as repetition starts to creep in after level two or level three. This repetition can be easily dealt with in a fairly mechanical way. Consequently, we have been able to attain output from the process that justifies the investment in resources and would, therefore, recommend the use of the "so what?" analysis as a way of supporting the definition of ITS User Services.

We have also learned that the "so what?" analysis provides a way of making sure that the first cut of ITS User Services created for the project are fairly representative of the users' demands. The process also develops a high degree of ownership.

The whole question of ownership is something that has been somewhat neglected in the development of ITS. Perhaps the assumption is that engineers and system designers know a lot more than the user. Unfortunately, this is usually not the case, particularly when you are talking about the users' problems, issues, and objectives. In fact, the users are the experts in these areas, while the system developers and designers need to be experts in how the technology can be used to address user needs. Ownership transfer is key to the process—not just coming up with and agreeing on a set of user needs or a solution but making sure that the ownership for those user needs and the solution lies firmly with the user community.

Another interesting feature of the "so what?" analysis is that the typical end result after several layers will be what we refer to as an *irreducible* or *goal.* These constitute a fairly small number of relatively high-level objectives such as the following:

- Save money;
- Protect the environment,
- Save lives;
- Improve the economy;
- Improve personal wealth.

An interesting insight from the use of the "so what?" analysis is that sometimes users can be rather impatient and a little frustrated about the top-down nature of the technique approach. We have seen this exhibited in numerous projects and have come to refer to it as *top-down tension.* This is where users get impatient and frustrated and want to leap off and do something, anything, as long as it means getting some results and getting something to show for the effort.

In applying the "so what?" analysis, we have experienced the situation in which some users in the user groups simply want to install devices without going through a rigorous process that they perceive to be analysis paralysis. They believe that we are producing another report that goes on the shelf and that there is not going to be any action. Accordingly, it is important to counter the top-down tension, designing into your approach some way of relieving that tension and showing users that the effort will yield some meaningful results that will, in turn, lead to tangible action.

The existence of top-down tension illustrates the continuing influence of the "what?/how?" cycle: You have to start the cycle somewhere, preferably by asking users what they want, but often at an early stage, depending on the user group, you will find it necessary to explain *how* you can actually satisfy user needs. Frequently, a degree of skepticism builds up about the continued analysis of *what* people want when they receive no explanation of how you plan to satisfy their needs.

We have also learned that it is important that the "what?/how?" cycle rotates fairly rapidly. Once users have some insight into the technological possibilities, their needs change. They start to climb the learning curve about ITS technological capabilities, and they get into much more meaningful dialog because there is a real, tangible end in sight.

Finally, always bear in mind when using the "so what?" analysis that rigorously going through the layers and sticking to the rules is not essential, since the process itself does not have a great deal of value. The value is in the dialog that it supports between the users and the system developers and among the users themselves. In fact, the "so what?" analysis should be considered a fairly flexible tool to get this critical dialog underway.

5.3 Strawman ITS Future Big Picture

Like many things in life, beginnings are important in the development cycle. This step in the process encapsulates the activities required to identify, explore, evaluate, and confirm the user requirements that the proposed ITS will have to address and satisfy.

In an ideal world, a comprehensive group of potential users of the system would get together behind closed doors and emerge after a while with a definitive set of objectives, problems, needs, and issues to be addressed by a proposed system. The consultant or system developer would then take this and come back some time later with a fully operational system that would perform the required jobs. Subsequently, the user group and the client would check off all the things the system does against their original set of objectives, problems, issues, and needs; note that they had all been addressed; and then cheerfully sign off on the deployment—everyone would be happy. Unfortunately, this never happens due to a number of factors. First, the initial user group may not include all key users and participants. Identifying key users and participants, or *stakeholders,* is an important part of successful system development, but it is also one of the most difficult parts for system developers to handle on their own.

In practice, you rarely start off with a complete set of stakeholders, and, in fact, we believe that beginning this way should not be a goal. The set of stakeholders tends to snowball when you first try to identify all the stakeholders that you believe you need and then get them together for a meeting. From that meeting there will probably be suggestions regarding people who were omitted or not invited who should have been invited. It is wise to take full advantage of this powerful mechanism. It is better to have many minds—local minds, in fact—telling you who should attend rather than trying to pre-empt that decision and think it all out yourself.

Another way of identifying stakeholders would be for the system developer to sit down with a small number of well-informed system users and identify who they think should be involved. This is probably the way most system user groups are initially defined, as some users usually have a clear idea of the local situation. They would pinpoint the main players and the stakeholders whose objectives would have to be satisfied for the system to be considered successful.

In our experience, this is a good starting point, but it never provides the full list of key stakeholders. This is mainly because user perceptions of the system capabilities are vague and the full impact of the system is not yet understood.

The identification of stakeholders for an ITS deployment is a particularly critical aspect of the whole exercise. If you do not identify and invite people to come along who would be impacted by the ITS, or you forget about some key group, it is possible that at some point in the future, that group will cause more difficulty than if it had been involved from the beginning. Therefore, it is actually worthwhile to spend a little bit of time and effort in doing a fully comprehensive analysis of the likely effects of your proposed ITS. Unfortunately, this

gives us another chicken-and-egg situation, because it would suggest that we would have to complete the architecture before fully identifying all the likely effects on the region. This is, of course, impossible, as you want your stakeholder group to work with you in defining the architecture.

Accordingly, it is necessary to make an initial assessment of the impacts of the ITS and the architecture. This is where a Strawman ITS Future Big Picture or candidate architecture solution can be very valuable in actually taking a leap ahead to the end of the process. By using your skills and judgment to tap into experiences from previous implementations and previous architecture development programs, you can develop a solution that could be used as a vehicle for communicating with the stakeholders. We call this the Strawman ITS Future Big Picture, since you will put it on the table and ask the users to attempt to pull it apart like a straw man.

As the needs of each project vary considerably, it is not possible for us to provide you with a recipe for developing a Strawman ITS Future Big Picture. Sometimes we have utilized a proposed institutional and organizational framework; sometimes we have used a proposed technical solution. It really depends on the needs of your particular user group and the consultant's or developer's own previous experience. However, we can offer some guidance by highlighting and explaining the essential ingredients of a Strawman ITS Future Big Picture.

5.3.1 Based on Needs

Carry out an initial review of the needs, objectives, issues, and problems that the stakeholder group or lead customer has expounded. Make sure that the Strawman ITS Future Big Picture clearly addresses these requirements.

5.3.2 Credible

Although you may end up throwing it out when the stakeholders have finished with it, the Strawman ITS Future Big Picture has to be credible to be useful. There is no point in incorporating highly advanced technologies that cannot be explained to the stakeholders. Similarly, it is a waste of time to suggest an approach that obviously could not be afforded or implemented.

5.3.3 Drawn From the Consultants' or Developers' Experience

This is the key to a good Strawman ITS Future Big Picture. Drawing on the knowledge the consultant or developer has won from earlier development projects, it is possible to produce a highly effective Strawman ITS Future Big

Picture. This is a balancing act though, since you do not want to fall into the trap of using an earlier off-the-shelf solution without a full check that it will meet your needs. There is a real danger here that you will like the Strawman ITS Future Big Picture so much, you will not want to go through the other steps.

5.3.4 Very Rough and Obviously Incomplete

This is one way to avoid the danger of blind adoption of the Strawman ITS Future Big Picture. Making sure that the Strawman ITS Future Big Picture is obviously incomplete and not able to be implemented helps to make the point that it is after all only a good guess at the most appropriate solution.

5.3.5 Simple to Explain and Understand

Remember that the main objective in developing the Strawman ITS Future Big Picture is to provide a communications tool to facilitate the discovery and understanding of the real requirements. It is important that the consultant or system developer keeps this in mind and avoids the urge to look smart through over sophistication.

5.3.6 Graphically Oriented

Building on the previous point, we have found that it is very helpful to describe, define, and communicate the Strawman ITS Future Big Picture in mainly graphical ways with little reliance on text descriptions.

5.3.7 Disposable

For the Strawman ITS Future Big Picture to do the job, it has to be disposable. The consultant or developer must ensure that the resources invested in the development of the Strawman ITS Future Big Picture are small enough for it to be viewed as disposable by the whole development team.