Course: ITS solutions for traffic and safety management

Topic 7. ITS deployment

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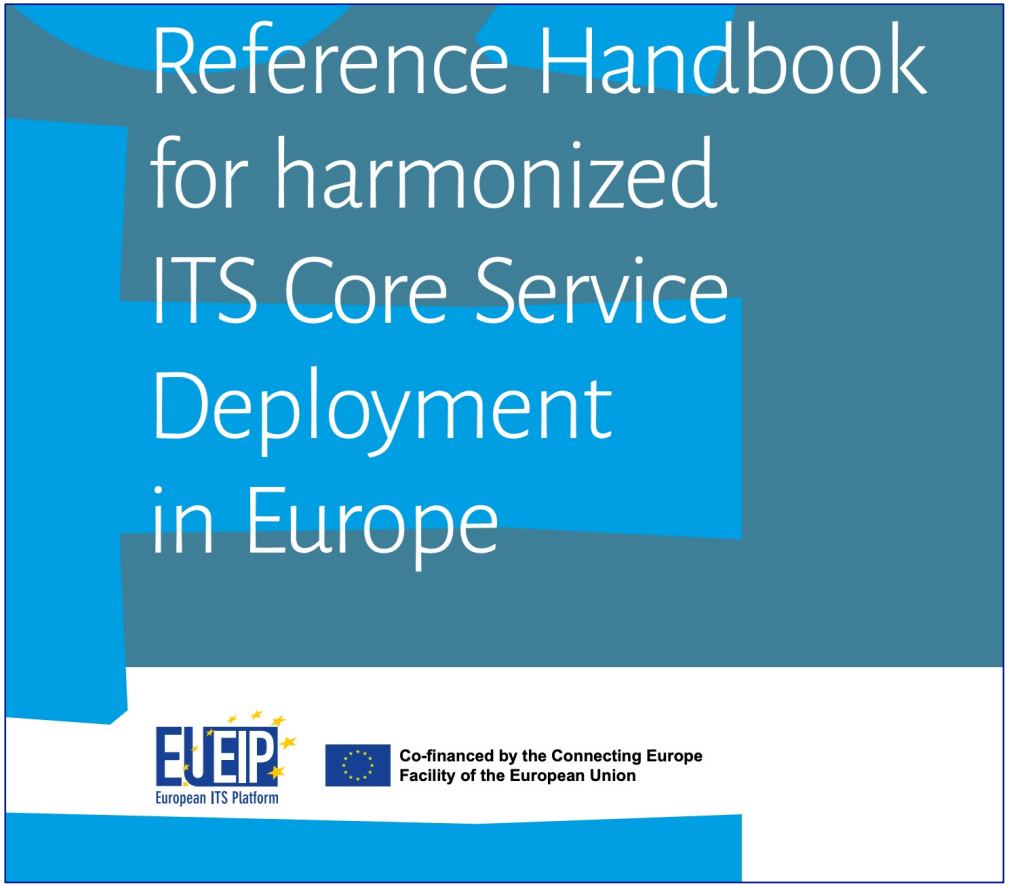

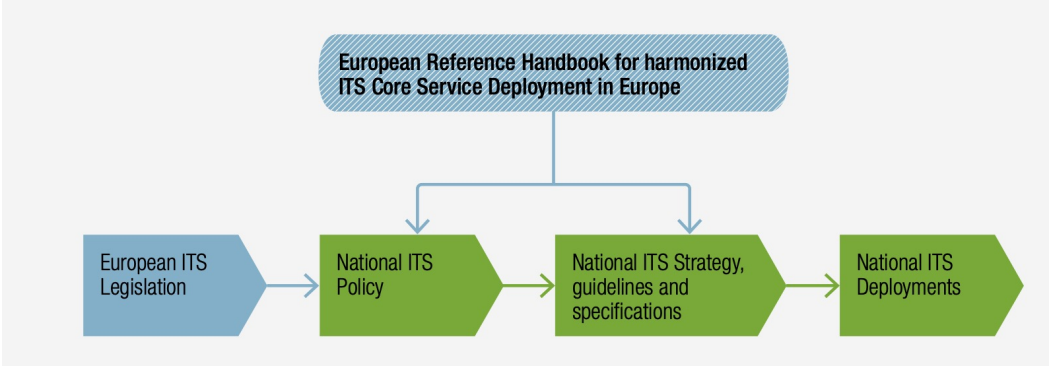

The Reference Handbook constitutes an essential basis for a harmonised and cross-border implementation of ITS services. Thus, it is a powerful tool in the ef fort to master the challenges of the European transport infrastructure described at the beginning. It makes a significant contribution to maintain a competitive European economy and constitutes a major component on the road to a modern and climate neutral society

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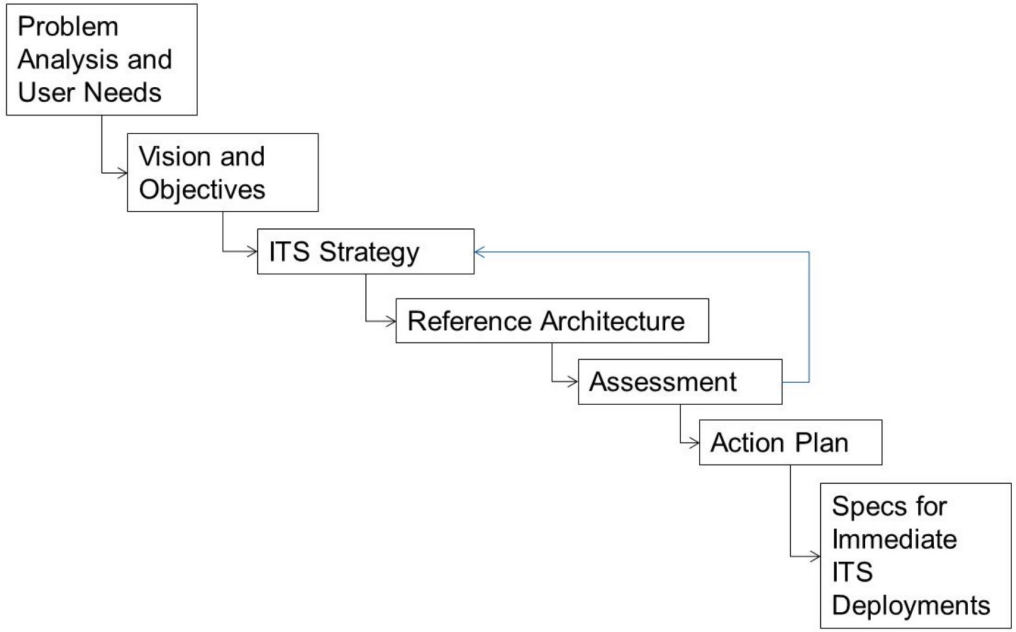
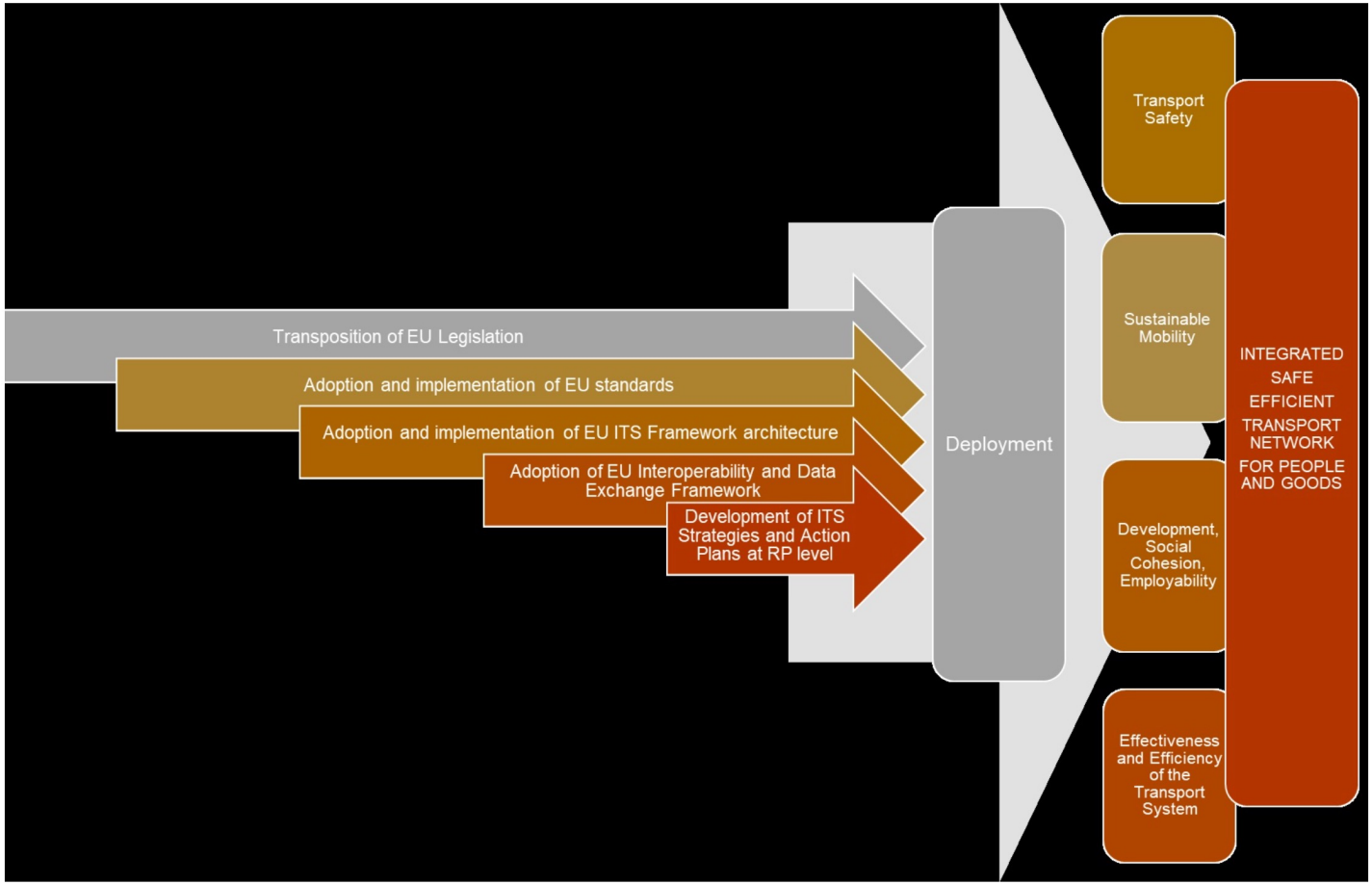
ITS deployment strategy

There is no single, common ITS deployment strategy appropriate to address the different needs of countries across the world – with economies in varying stages of development. Local, national, regional and municipal factors will determine whether ITS is an appropriate investment – as well as how it should be designed and deployed. ITS investments almost always involve a wide range of stakeholders and interest groups from the public, private, and non-profit sectors. In some countries, the research, academic and non-profit institutions also play a key role because of the involvement of advanced information and system technologies, and the level of coordination that this requires.



To ensure that ITS is not overlooked in the transport planning process, a well-considered and easily understood ITS Strategy is required that shows the direct links with the national transport strategy. In summary, the reasons for developing an ITS national and/or regional deployment strategy, are to:

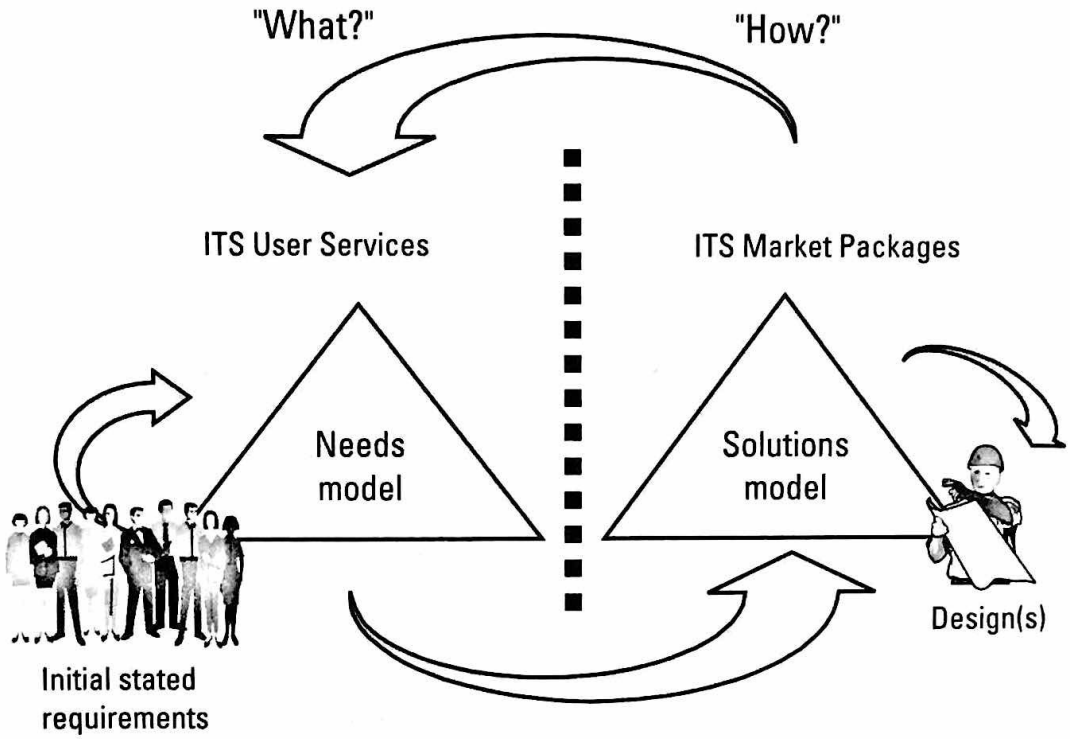
- agree the transport policy objectives that intelligent transport will support in practical terms;
- identify specific transport problems, requirements and needs – where ITS can provide more cost-effective solutions than alternative (non-ITS) measures;
- create a common understanding of the role of ITS in short and long-term transport planning horizons;
- define the principles and points of emphasis for the deployment of intelligent transport systems – such as the legal and organisational framework, ITS architecture and standards;
- clarify the roles of the various stakeholders and develop models for joint working and co-operative partnerships;
- outline the priority projects in different ITS domains and the criteria for investment, performance monitoring and impact evaluation – to be included in an ITS deployment programme;
- provide an action plan to give effect to the ITS deployment programme and fulfill the strategy's objectives.



"What?/How?" Cycle

One of the most powerful concepts we have come across in our attempts to improve the process of ITS planning and development is the concept we call the what?/how?cycle. This involves the deliberate and clear separation of “what?” and “how?” while requirements are being explored at the start of a project. In other words, the users are asked to initially focus on what they want from ITS by agreeing on the problems, needs, issues, and transportation policy objectives to be addressed by a successful ITS implementation. Only when this has been fully discussed and agreed on by all major stakeholders is the second question “how?” addressed. This question relates to the identification and selection of appropriate combinations of ITS technologies to satisfy the previously defined “whats,” or requirements.

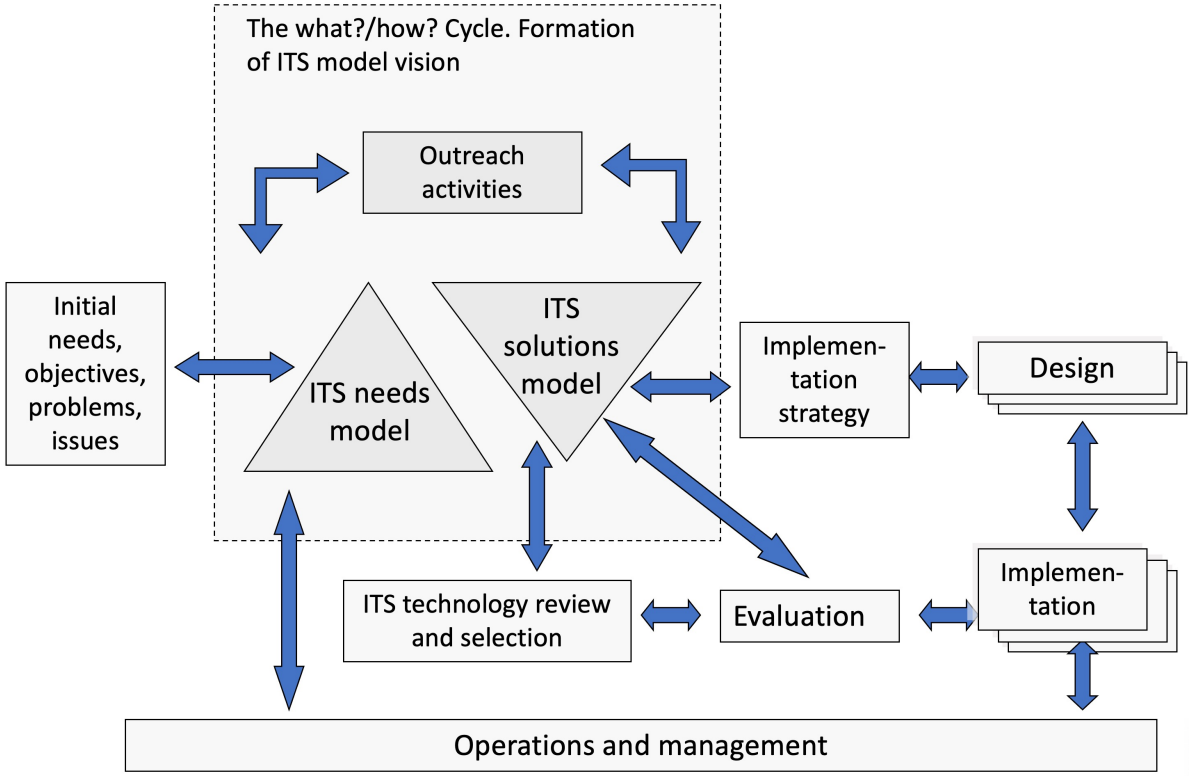
You have probably already guessed that it is not possible to deal with “what?” and “how?” separately for very long. This gets us into a subject we call the what?/how? cycle. Figure illustrates this mechanism.



ITS development methodology

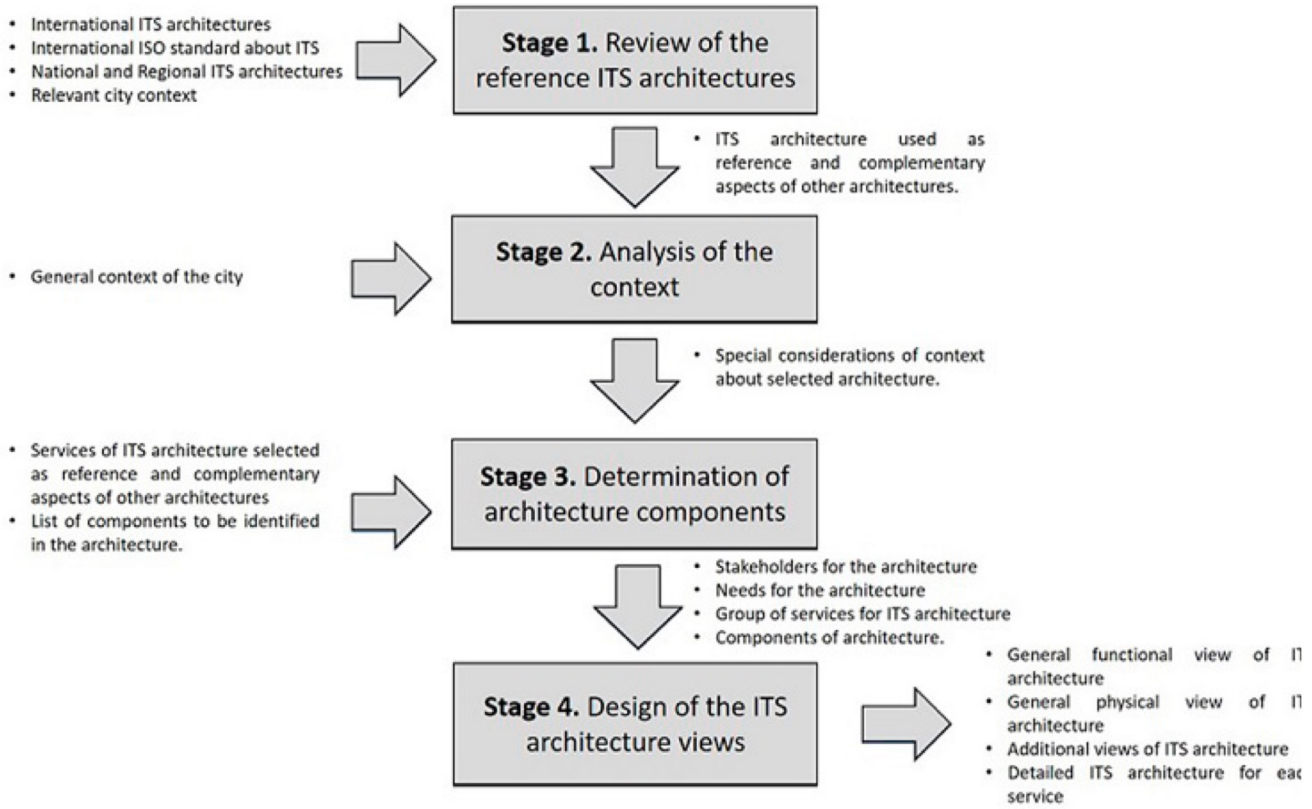
The what?/how? cycle appears to be a feature of many transportation and system development projects. Consequently, the initial "what" defined by the users is altered and enhanced when they are exposed to the initial "how." The converse is also true in that the potential ITS solutions or "hows" will also change to fit the changing requirements. This could, of course, be viewed as one of those endless circles with no beginning and no end. However, we believe that the most sensible way to enter the circle is from the user point of view. Then, the exit from the circle becomes clear as both requirements and solutions stabilize after a number of iterations.

It follows that systems can be developed more economically and more effectively if time and resources are invested wisely at the beginning of a project through the application of requirements analysis techniques that support the user and the analyst in identifying, understanding, and confirming the user requirements for the system.
The figure illustrates big picture of the ITS development methodology.



Methodology for development of city ITS

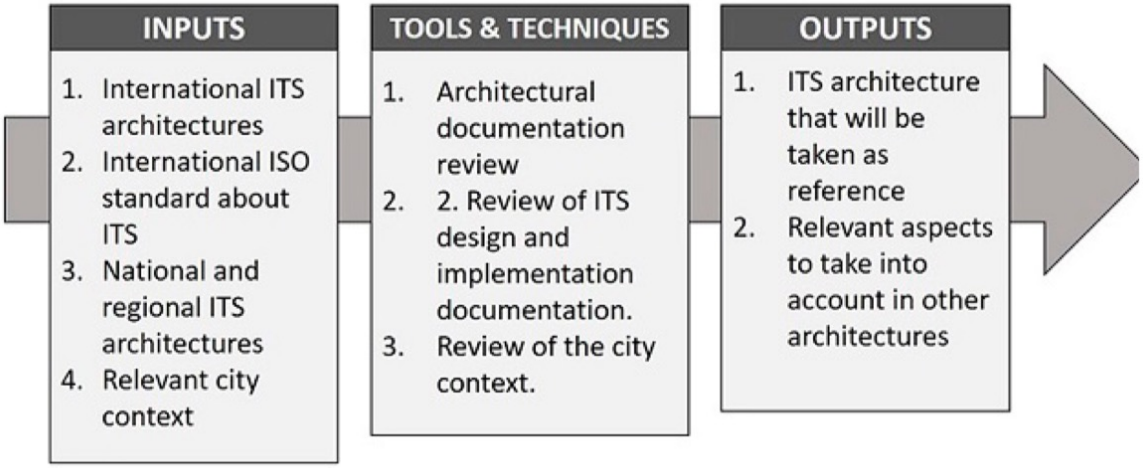
As case study an integral flow chart of the methodology for development of city ITS can be presented by four stages.



1 stage. Review of reference ITS architectures

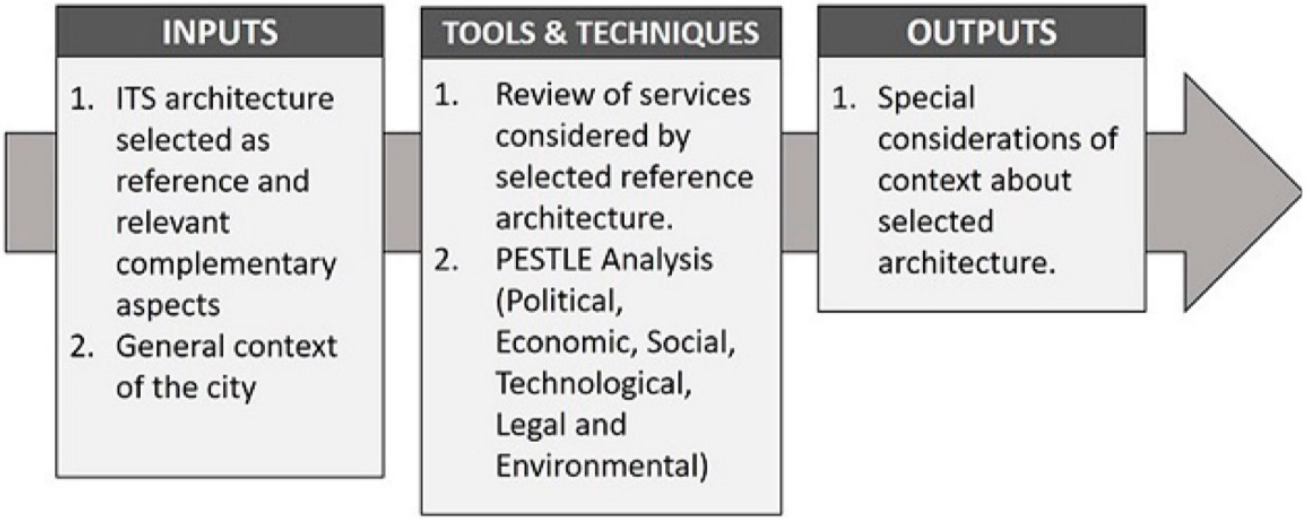
At the first stage of methodology, a revision of the next documents must be done: updated versions of representative architectures at international level, standards (proposal of ISO), national architecture, and regional (or city) architectures designed. Service areas, that each reference architectures considers, is one of the comparison factors in the review. Use of a matrix facilitates identification of services included for each architecture, the matrix would have as rows the service areas to be considered and as columns the ITS architectures. The selected service areas to be taken into account will be the sum of the ones that each architecture has, without repeating them. The number of ITS architectures in the matrix will depend on each case, although it is recommended to take into account at least the main international architectures, ISO standard and National architecture.

Objective of this stage of the methodology is to determine a reference ITS architecture by selecting some of the revised proposals, identifying (as a complement) relevant aspects of other reference architectures.



2 stage. Analysis of the city context

Outputs from previous stage are used as inputs to the second stage. Context of the city, other entry in this stage, should be analyzed in a broader sense. In addition to the aforementioned review of services of the reference architecture, a context analysis tool should be used in this stage. As a result of stage, the special considerations of the city context must be obtained.



3 stage. Determination of architecture components

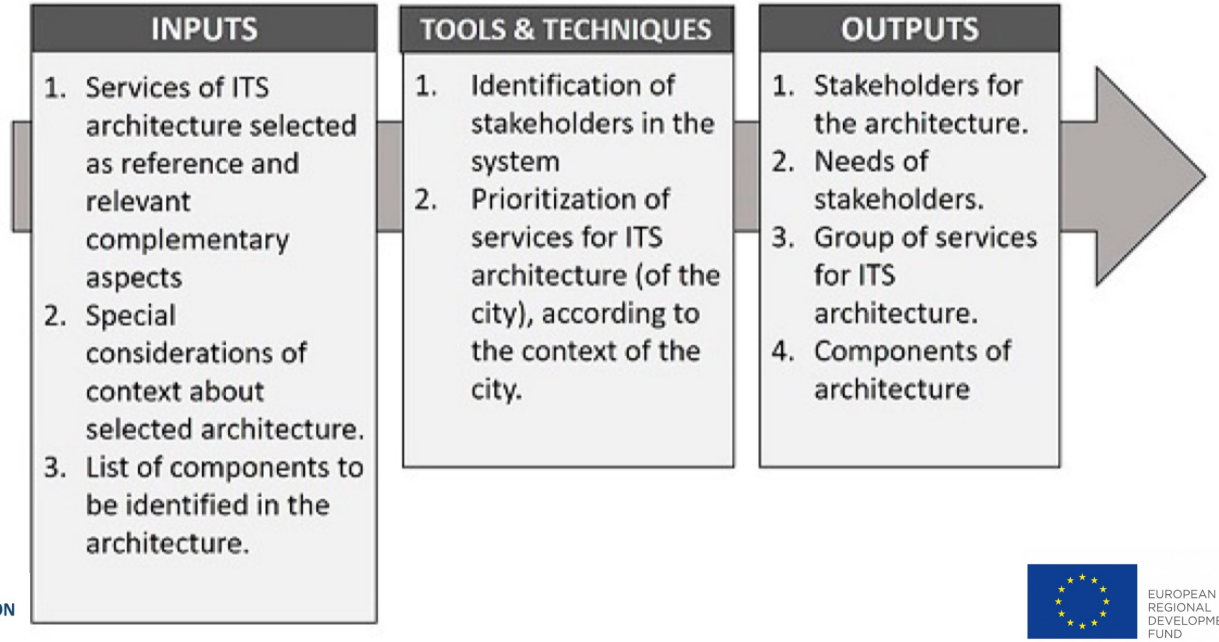
Outputs obtained in stages 1 and 2 are used as inputs in this stage. Additionally, specific components that must be identified to present ITS architecture of the city, should be considered as input to this stage. Some components, which make up the views of ITS architecture of the city, vary depending on the architecture that was taken as a reference. Stakeholders, their needs and services provided are common components in revised reference architectures, while other elements are particularly used by one or another architecture.

For the identification of stakeholders, it is recommended to review documents such as: history of projects related to mobility and transport in the city, ITS architecture documents in other similar international cities and information provided by local government entities. Once the stakeholders have been identified, it is recommended to evaluate them by analyzing their level of influence and position on a possible ITS for the city, to determine whether or not it is taken into account for the needs analysis.

When determining the stakeholders to consider for the ITS architecture, their needs are determined through interviews, surveys and the help of the previously mentioned documents. Then the needs with the largest number of involved stakeholders and high or medium level of influence will be considered.

With the determined needs, we proceed to identify the specific services (of the areas used in the matrix) that will be taken into account for ITS architecture. The selected services will be a subset of services that the reference architecture has, adding relevant services of other architectures. These selected services must meet the specific needs of the stakeholders.

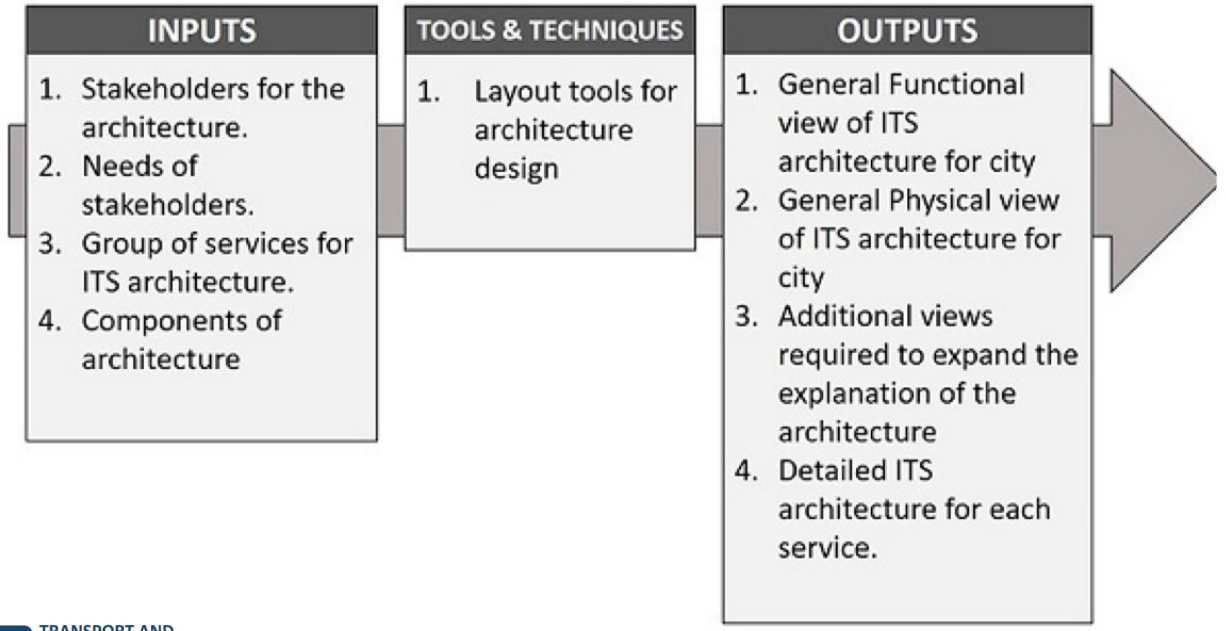
Finally, once the specific services to be provided in the ITS architecture have been determined, the components required in ITS architecture are identified. The specific components to be identified will depend on the ITS architecture selected as a reference.



4 stage. Design of the views of the ITS architecture

Outputs of stage 3 are presented in this stage as inputs. A design tool should be used to present the views of ITS architecture. These views can use the type of diagram that uses reference ITS architecture or can use a standard language of systems description.

In addition to views of the general ITS architecture, ITS architectures detailed by each of services must be implemented. The detailed architecture of each services employs a subset of that components.



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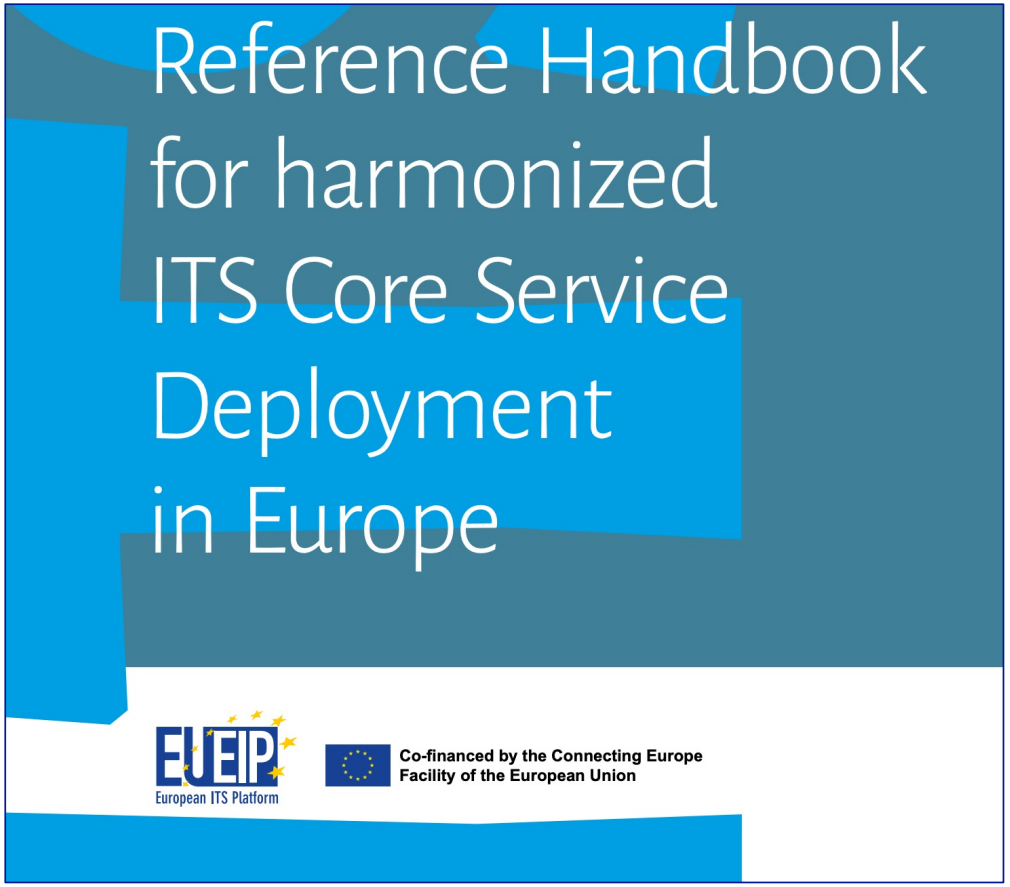

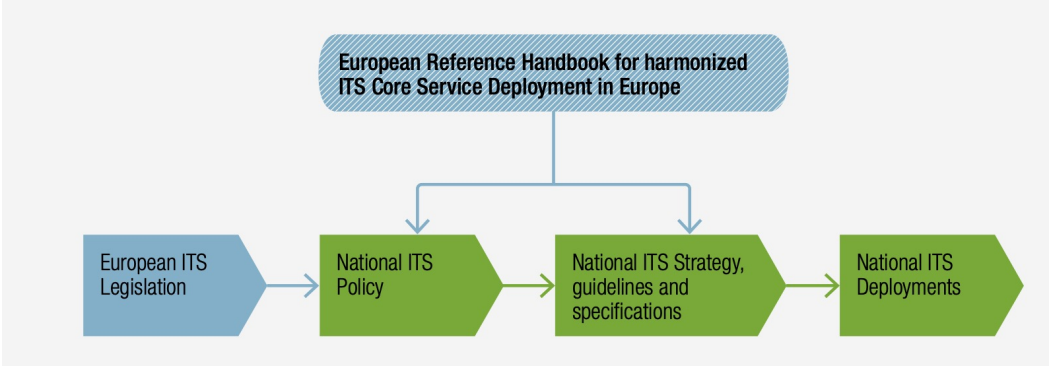

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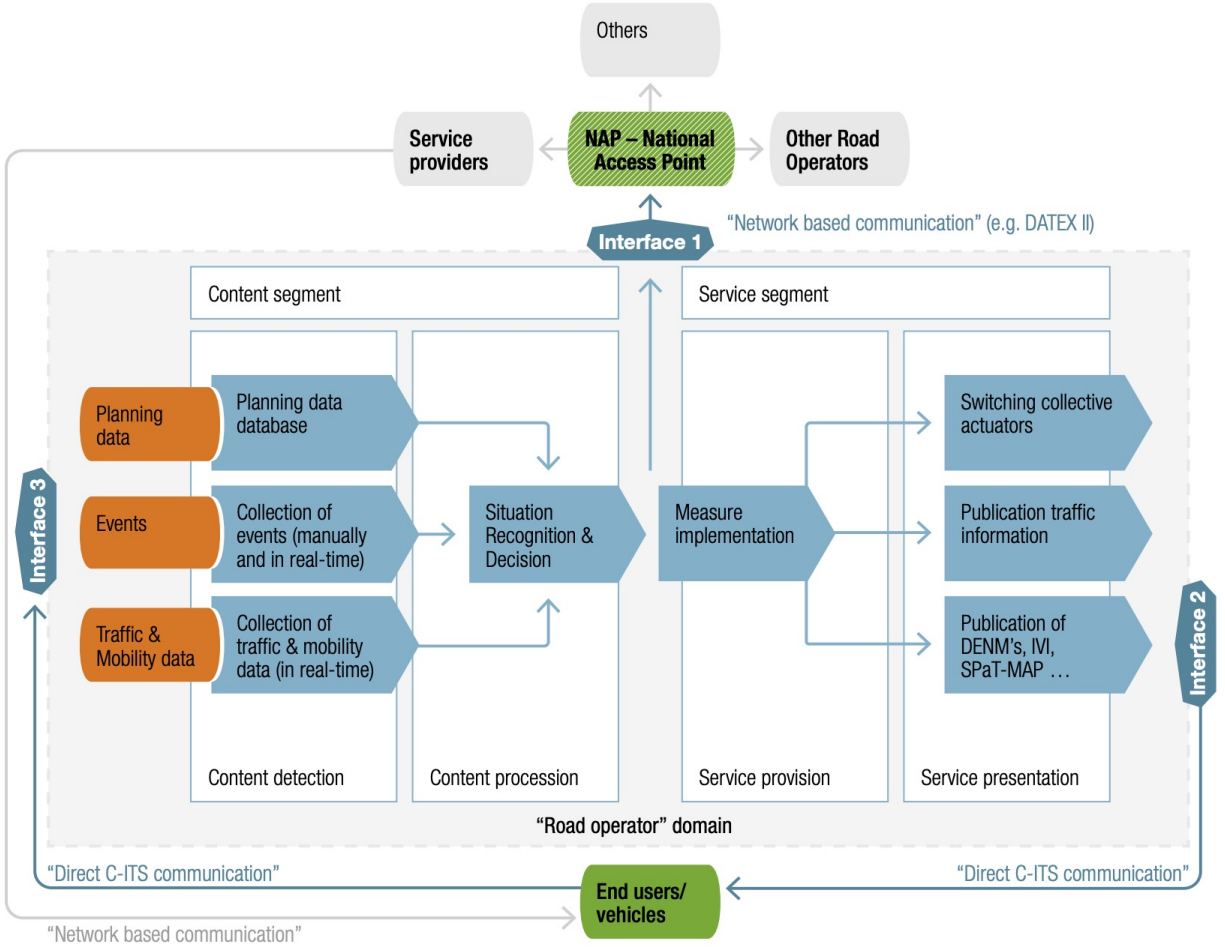
Data sharing architecture



Example: Variable Speed Limits

4.3 TMS-02 Variable Speed Limits

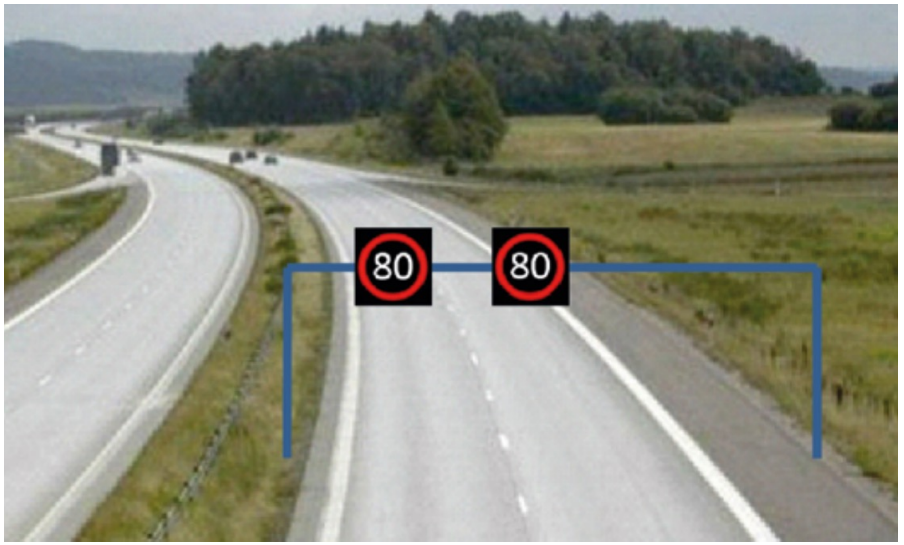
4.3.1 ITS service at a glance

ITS service definition

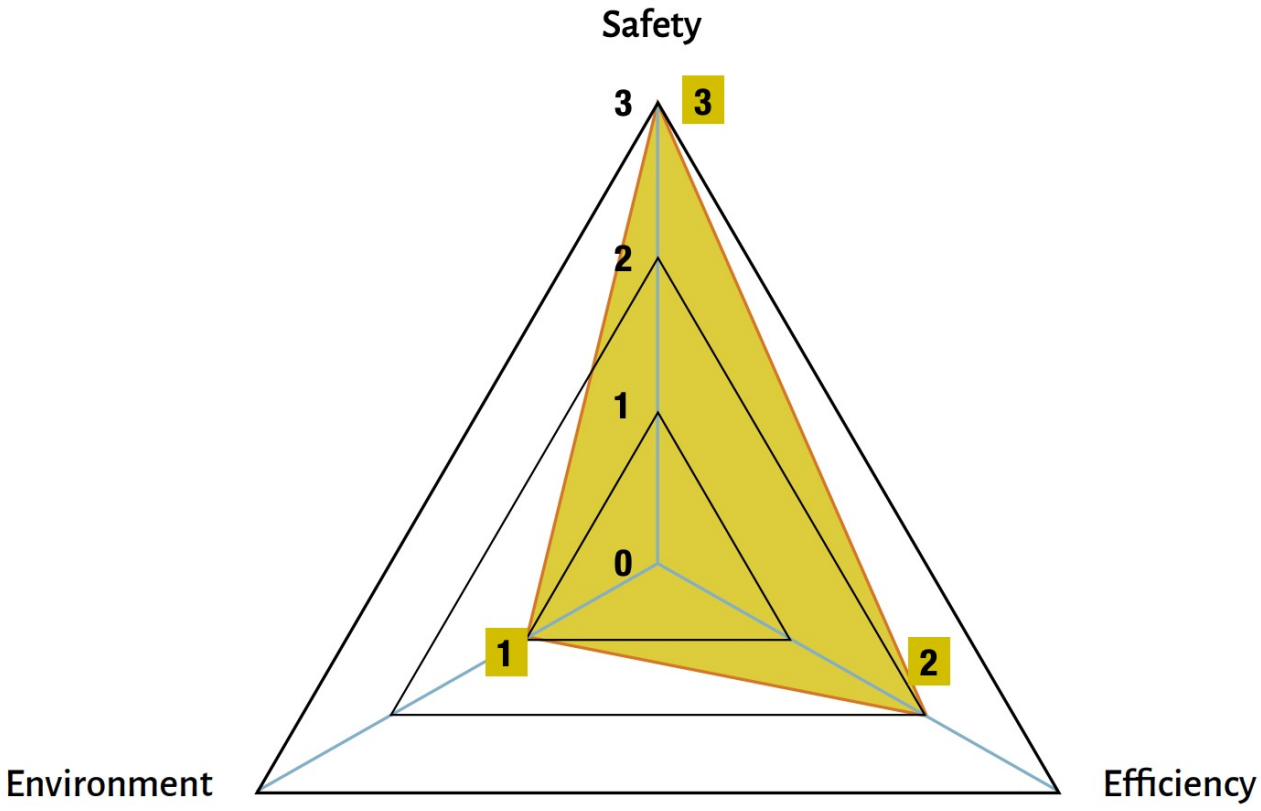
Variable speed limit (VSL) system use Variable Message Signs (VMS) to display speed limits (maximum), advisory speed (recommended) or compulsory minimum speed, to guide drivers to travel at a speed suitable to the prevailing traffic, road or weather conditions.

ITS service objective

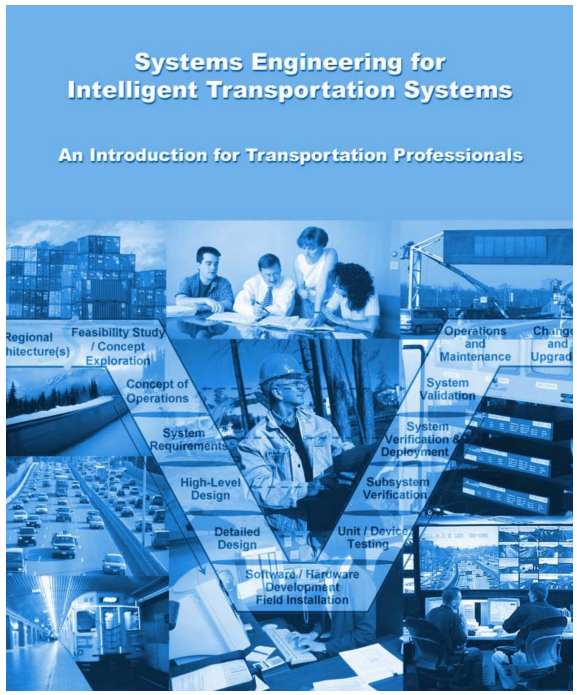
The common main objective of VSL is to support drivers travelling at a safe speed or to improve traffic fluency. In some cases, these systems are also used to mitigate environmental effects, such as pollution or noise.
In most cases, the displayed speed limit should correspond to the traffic, road and weather conditions the drivers encounter, and therefore will be experienced as relevant. The drivers are then more likely to adhere to the speed limits. This will result in better safety, better mobility, smoother traffic, increased comfort and a reduced impact on the environment. However, there are cases when circumstances call for a reduced speed limit for which the reason is not obvious to the drivers, i.e. environmental reasons or problems downstream like incidents or work zones.

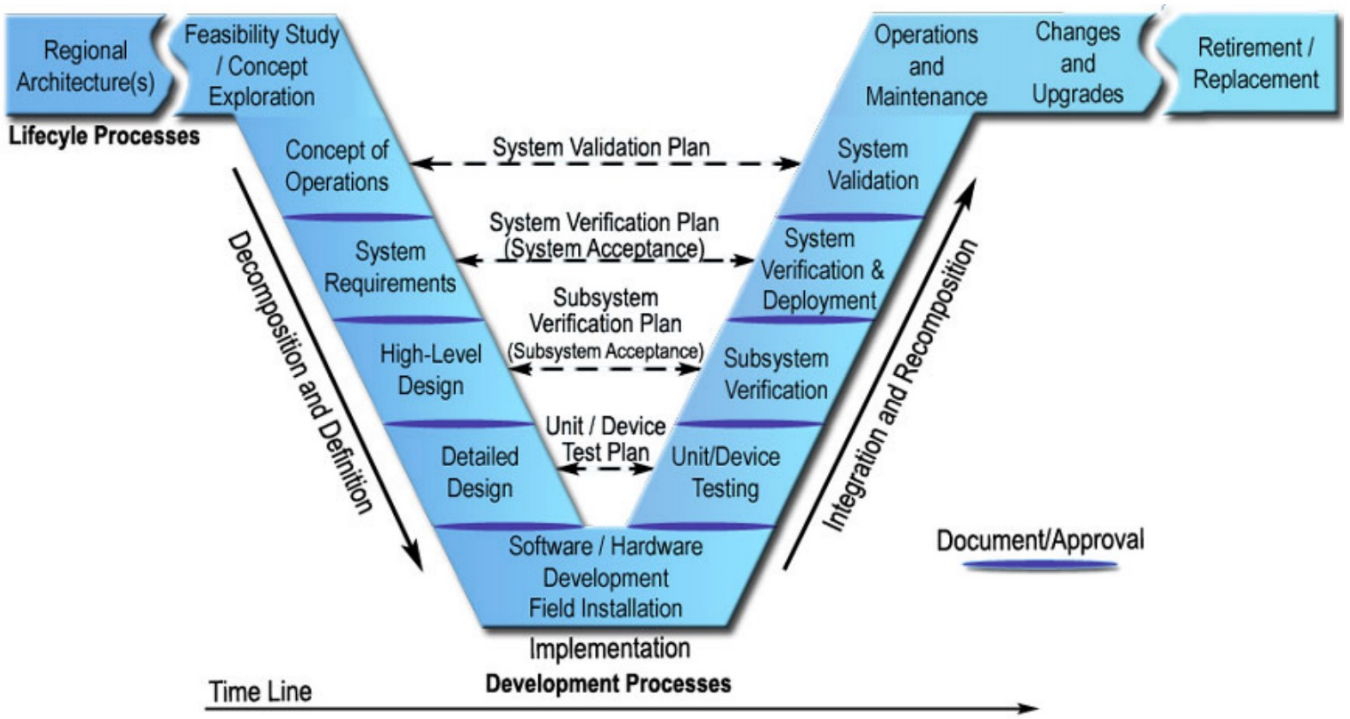


ITS service radar



System Engineering for ITS Development





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