4 Analyse Potential Technologies

Figure 4.1 Analyse Potential Technologies within the Evaluation Process

Analyse potential technologies

To help in determination of which technologies to select and implement via pilot, demonstration or full-scale deployment, a preliminary analysis of the technologies' development and potential can be of value. Based on its own assessment of 10 technology groups, the STTRIDE project recommends an examination of:

- The future impact logic: An overall assessment of the scale and nature of the impact the technology's deployment will have on modal choice, as well as the road authority's role and ability to influence the impact.
- The future market characteristics and potential: who are suppliers and customers, what is the geographic scope and potential market size?
- Innovation characteristics: What are the main challenges and enablers to the technology's development and deployment, in a system perspective?

Once relevant technologies have been identified, a preliminary assessment of the technologies' development prospects and potential impact can help NRAs to prioritise interventions. These assessments can be done in-depth, as they were in the STTRIDE project (see D3.1 and D3.2 on the STTRIDE web site), but can also be done at a very basic level. Even a simple 'best guess' assessment of important characteristics can provide a basis for comparison and a starting point for further investigation as technologies develop and conditions change.

STTRIDE recommends a descriptive assessment of each technology's potential to impact modal choice. A thorough approach is to develop a 'logic map for each technology, describing how interventions related to the technology link together to eventually impact modal choice and environmental and economic outcomes. Such a logic mapping is recommended for all technologies that are selected, and the mapping process is described as part of the 'Describe the Intervention Logic' module on the toolkit page of the STTRIDE web site. If a logic mapping is out of scope at this preliminary phase, a simple determination of the type of modal shift encouraged, the user needs being met, the overall potential impact, and the ability of the National Road Authority (NRA) to influence that impact through its investments can provide a valuable basis for comparison.

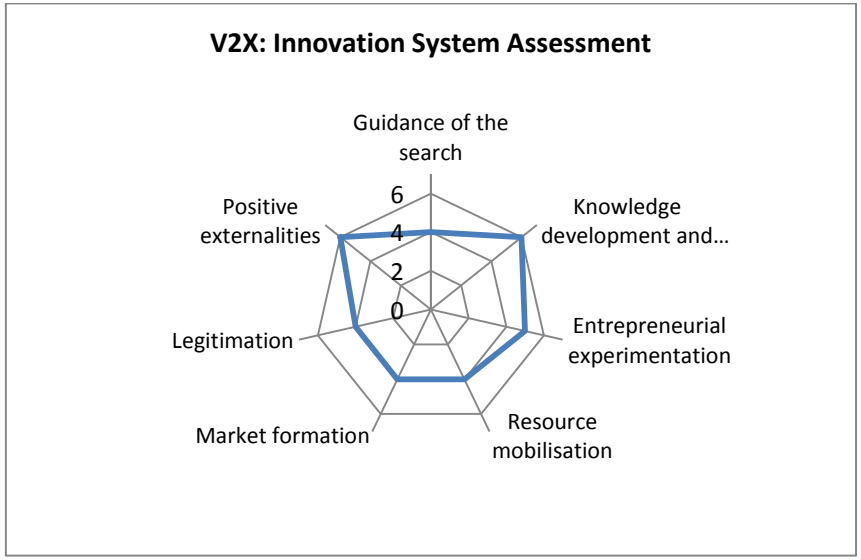
In addition, we recommend estimating and comparing key characteristics of future markets for the technology, especially the likely time to commercial maturity, as well as the most important barriers to the technology's continued development. Identifying barriers can be done through a scan of contextual factors according to the PESTLE (Politics, Economics, Society, Technology, Legal, an Environment) categories. Another, complementary approach, is to take innovation system perspective, using the Technology Innovation System (TIS) framework's seven functions. Templates for PESTLE analysis and TIS framework are available in the template file for this module on the STTRIDE web site.

We recommend the TIS functional analysis framework as a useful way to systematically identify drivers and barriers to a technology's adoption, expanding the scope beyond the developer's or user's perspectives. The functional analysis of an innovation system is anchored in the literature and involves an assessment of seven different functions related to the development potential of the innovation. These seven functions are:

- Guidance of the search: This function involves the signals and expectations of actors, including users, in the innovation system. A positive assessment indicates convergence of the signals (policies, statements, activities) and expectations towards the same direction.
- Knowledge development and dissemination: Knowledge development involves learning activities (e.g. R&D activities, patent-taking) while knowledge dissemination involves the spread of learning through networks.
- Entrepreneurial experimentation: Involves the translation of knowledge into business through experimentation in a commercial context.
- Resource mobilisation: Involves the allocation of financial and human resources towards the development of the innovation.
- Market formation: Involves actions to facilitate commerce around an innovation, including both incentives and trust-building and market-making activities
- Legitimation: Entails the creation of support in society, and among decision-makers for the innovation. Often in the form of advocacy.
- Positive externalities: Positive externalities may arise when the development of an innovation spills over or has enabling consequences for other desirable innovations or societal goals, thus reinforcing the innovation system in question.

A very simple assessment of these seven functions, scoring them on a 7-point scale, perhaps supported by interviews with experts or discussions internally within the organisation, can provide a sense of the most important barriers to be overcome. A representation of the system functioning in a spider diagram as in Figure 4.2, easily created in a spreadsheet or presentation programme using the template on the STTRIDE web site, can support comparisons between technologies.

Figure 4.2 Example of an Innovation System Assessment



Once the assessment of innovation system-level barriers has been made, the NRA will likely wish to consider context-specific barriers to deployment as well. These have not been the subject of analysis within STTRIDE but may include:

- Finance for deployment
- Legal barriers to deployment
- Links with other transport service providers and multi-modality
- Education and training required
- Standardisation and technical interfaces

The key barriers can be summarised alongside potential impact on modal shift, market characteristics etc. in a single table to support selection of technologies for piloting/testing/demonstrating/deploying. Table 4.1 below provides an example. The two boxes below provide short summary results of such an analysis of potential of two technology areas (V2X and Wearable Technologies) from the STTRIDE project.

Potential analysis: V2X

V2X technologies have a 'soft' impact on modal shift by meeting the user needs ease of use and safety. This impact is likely to be negative in the medium-term, as comfort and safety for drivers leads to additional car journeys, but potentially strongly positive in the longer-term, when MaaS scenarios featuring autonomous vehicle fleets could additionally deliver reduced costs and improved journey efficiency. The primary barriers to V2X adoption are first-mover disadvantages, since benefits are tied to network effects. A rapid transition to the positive modal shift scenario is likely dependent on strong policy action and public investment.

Potential analysis: Wearables

Wearable technology and smart textiles can help make walking and cycling easier, safer and more efficient. In addition, such devices can increase awareness and leverage growing consciousness of healthy choices, encouraging people to walk and bike more. Barriers today relate to a lack of interoperability between these devices and other systems. In the future connected wearables may create privacy concerns.

Table 4.1: Technology potential assessment (example text in *grey italic*)

Type of Modal shift encouraged	Technologies	User needs met	Impact on modal shift	Nature of impact NRA role	Time to market maturity	Barriers to development/deployment
Individual car use →Public transport	Tech 1	*Reduced cost, ease of use*	*Medium impact*	*Impact direct NRAs play key role*	*Mature*	*Concerns about data security, privacy issues*
	Tech 2					
Individual car use →Mobility service	Tech 3	*Ease of use, reduced travel time*	*High impact*	*Impact indirect NRAs influence weak*	*5-7 years*	*Uncertain EU strategy*
	Tech 4					
Individual car use→Walking, cycling	Tech 5					
	Tech 6					

A template for this table is available in the templates file for this module on the STTRIDE web site.