Methodology for the implementation of Territorial Needs Assessments (TNA)

Deliverable D.3.2.1

1. Introduction

With the aim of defining the methodology for the implementation of WP3 (Enhancing cross-border maritime and multimodal freight transport planning capacities), the purpose of D.3.2.1 is to provide methods for the territorial needs assessments (TNA) of involved bodies, to be then carried out by each PP in order to obtain results that are homogeneous across all different reports (D.3.2.2–9). Namely, the above mentioned report will analyze territorial needs for:

- Port of Trieste (D.3.2.2);
- Port of Venice (D.3.2.3);
- Intermodal Terminal of Trieste-Fernetti (D.3.2.4) (replacing Intermodal Logistic Node of Padova as PP3);
- Port of Ravenna (D.3.2.5);
- Port of Ancona (D.3.2.6);
- Port of Bari (D.3.2.7);
- Port of Rijeka (D.3.2.8);
- Port of Ploče (D.3.2.9).

This document is structured as follow: after **Section 1** (this introduction), that provides general information, **Section 2** is dedicated to defining procedures to be adopted for each PP's territorial need assessment and is divided in subsections:

- **2.1** presents the necessary steps to be taken to carry out the territorial analysis, with a specific emphasis on those needs related to intermodal transport. Analyses will have a key role for developing future scenarios as explained in the next subsection;

- **2.2** is dedicated to providing guidelines for the activation of action plans enhancing maritime and multimodal freight transport; the activation of new maritime/multimodal links; customs fast corridors and clusterization, to be then tested with pilot actions in WP4;

- **2.2** outlines those opportunities arising from the implementation of shared and harmonized cross-border strategy;

- **2.3** contains instructions to map out all different stakeholders, with the aim of outlining each stakeholder's influence in the program area;

- **2.4** presents IT systems architecture types and implementation models;

- **2.5** includes information and data collected in the previous steps and will be the object for a SWOT analysis, in which strengths, weaknesses of "as is" situation of maritime and multimodal freight transport, threats and opportunities of new action plans (with future scenarios in mind) will be taken into account.

- **2.6** looks at the presentation of results that emerged from previous steps, allowing an easier comparison among each partner's results.

Section 3 will conclude this document by summarizing different contributions, highlighting activity deadlines and reminding responsibilities that PPs will all agree to be taking in order to reach planned targets for WP3. Reports will be consolidated in a cross-border study on maritime and multimodal transport, summarizing and comparing the individual results.

2 Assessing territorial needs

This section explains procedures to be implemented for a common framework to be adopted by different PPs in order to carry out the respective territorial needs assessments. We shall firstly remind the main ways identified by PROMARES for tackling challenges hampering the full-fledged development of the potential for maritime and multimodal freight transport in the Program Area:

- unbalanced development of multimodal transport options;
- lack of coordination among stakeholders and policy makers in the port-hinterland interface;
- uncoordinated measures/tools at cross-border level, leading to increased road transport.

The proposed strategies for enhancing the transport planning competences include: analyzing each territory in details while elaborating a cross-border action plan, to be tested through pilot actions; testing ICT solutions for streamlining freight transport in the ports and the most relevant intermodal logistic nodes, from the port to the hinterland and at cross-border level; setting standards which may be replicated to other logistic nodes. This all requires a thorough assessment of current territorial infrastructures and technologies.
In particular, ports will focus on their Port Community Systems, as scalable and powerful tools to increase communication and coordination among terminal and logistic operators and public institutions.

In the following sections a method description and analysis of the current "as is" scenario of operations/processes in ports and other terminals is presented. All current planning and management models of port/terminal operations and presently adopted ICT solutions should be presented and analyzed, also by using graphical tools, in order to envisage opportunities and potential constraints related to selected actions.

Each PP will deliver a TNA study structured as follows:

Section A – Territorial analisys

subsection A.1 – Territory description in the Programme Area focusing on most significant nodes and hubs

subsection A.2 – Multimodal transport: supply and demand analysis

subsection A.3 – Tools and measures supporting multimodal transport (policies, plans,

etc.)
Section B – Future Scenarios
Section C – Mapping out stakeholders
Section D – Analysis of IT systems

subsection D.1 architecture models
subsection D.2 implementation stage
subsection D.3 usage by and impact on freight agents

Section E – SWOT Analysis
Section F – Main Results

2.1 Territorial Analysis

Section A of each TNA study focuses on territorial analysis and it aims at improving coordination between existing infrastructure and services. For this very reason it is vital to know key elements of each PP and their respective areas.

Subsection A.1 – **Territory description in the programme area**

Describing and discussing main features and characteristics of the programme area for each PP while highlighting the most relevant nodes and urban centers located in it.

Subsection A.2 – **Multimodal transport: supply and demand analysis**

Examining main EU corridors for freight transport and multimodal hubs in the programme area. Analyzing main infrastructures and existing data of freight transport flows, including modal share.

Subsection A.3 – **Tools and measures supporting multimodal transport**
Reporting on tools and measures fostering multimodality (policies, plans, etc.). Defining current regulatory framework, as well as relevant policies and measures linked to freight transport. Highlighting strategic plans and actions. Listing and discussing projects to improve multimodality.

2.2 Future Scenarios

In Section B, each PP describes those measures that are either planned for the future or already being implemented. Implications and forecasts for future scenarios and the impact of the above mentioned measures should be discussed. The impact on future infrastructure demand should also be taken into account. Future scenarios will serve as a basis for the implementation of pilot actions for ICT pilot actions involving multimodal hubs, to be carried out in WP4. In addition to future scenarios and measures that are specific to individual actions by the PP, all other known projects and planned actions within the program area should also be mentioned and described.

2.3 Mapping out stakeholders

This section deals with the involvement of major stakeholders in the programme area as a key element for project results'dissemination. Each PPs identifies key stakeholders in the area as they affect project activities and outcomes. In the following tables, the list of stakeholders has to be filled-in. The first table maps stakeholders according to their influence on the project and their level of interest in the project.

		POWER OF INFLUENCE	
		LOW	HIGH
INTEREST	LOW	Marginal Stakeholders Importance = Low	Relevant Stakeholders (e.g. Institutions we would like to involve) Relevance = Medium/High
	HIGH	Operative Stakeholders (stakeholders we must involve) Importance = Medium/High	Key Stakeholders (Essential to project outcomes) Importance = High

Each PP should identify relevant stakeholders that can be interested in and/or influence the project activities. Program objectives targeting some stakeholders can also be of interest to other ones.

Stakeholders can also be mapped according to their role and the benefit (or conflicts) they involvement could bring. They current involvement and strategies to improve their support should also be taken into consideration.

Stakeholder	Role	Importance[1]	Contribution to the project[2]	Benefits[3]	Conflicts[4]	Current support	Strategies to improve support
Name 1	type	…					…
Name 2							

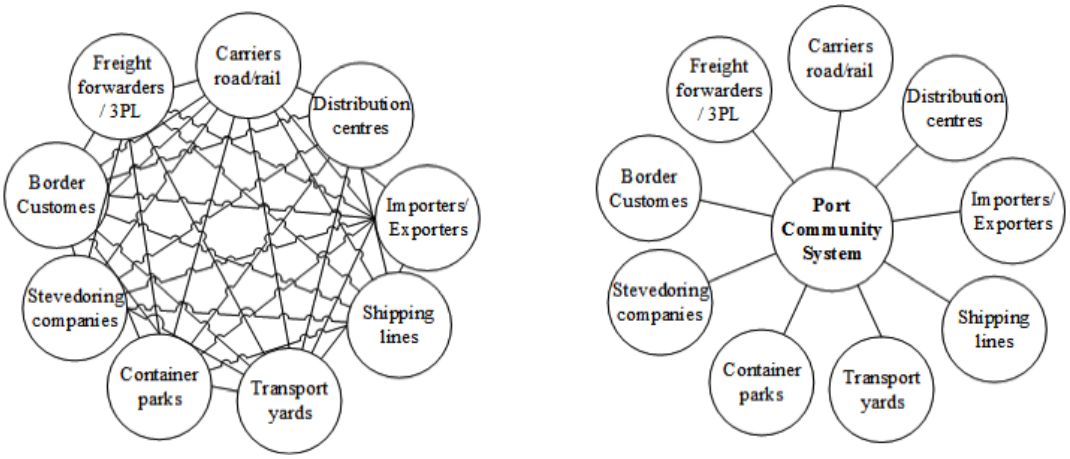
Once stakeholders have been mapped and their needs identified, it will be advisable that all PPs should stay in contacts with their relevant stakeholders to keep track of their expectations and reactions to project activities and impacts.

2.4 IT systems structure and implementation

The implementation and/or upgrade of ICT and Port Community Systems are examples of territorial needs that have already been identified by several PPs. Over the last decades, transport hubs have faced the need to manage the evolution of the international trade and container through-put, the changes in freight agents requests, and the development of IT systems. Regarding the growing role of IT in seaports, organizations perceive an increasing need to adopt IT tools to support all their processes, in particular, the requirements related to containerized and passengers traffic. IT makes carriers and terminals to work together assuming a collaborative orientation as

[1] High, medium, low
[2] Which contribution they provide to the project
[3] Which benefits they get from participating
[4] Potential, existing

parts of an integrated infrastructure[5]. Thus, in the nodes implementing IT systems, all the actors involved, that is, port administrations, terminal operators, truckers, customs, freight forwarders, carriers, ship agents, and other organizations, are electronically linked, thus improving the information and data sharing within the port community[6]. In order to facilitate these communication processes and the development of the inter-organizational relationships among stakeholders in the freight agent community, ICTs such as port community systems (PCSs) have been introduced.



Communication between individual port freight agents without the PCS (left) and with the PCS (right)[7]

Not all PPs are port or port-related entities that can be involved into collaborating to PCS. Different types of ICT tools might also arise, in that case the same indications for the evaluation of port community systems can be adapted to describe IT systems, concerning their architecture, implementations level and usage type.

[5] Long, A. (2009). Port community systems. World Customs Journal, 3(1)

[6] World Bank. (2007). Port Reform Tool Kit—The evolution of ports in a competitive world, 2nd ed.

[7] Irannezhad, E., Hickman, M., Prato C.G. (2017) "Modeling the Efficiency of a Port Community System as an Agent-based Process based", ABMTrans.

Several contributions in the literature provide definitions of PCSs, focusing on roles and functions. Srour et al[8] have defined PCSs as "*holistic, geographically bounded information hubs in global supply chains that primarily serve the interest of a heterogeneous collective of companies*."

In this definition, the companies mainly include terminal operators, carriers (sea, road, and rail), freight forwarders, customs agencies, port authorities, various stakeholder groups (including workers' unions and policy makers). Furthermore, PCSs have been defined as "networks which link up the port with all the companies that use it" Instead, European Port Community Systems Association have conceptualized PCS as "*an electronic platform that permits to connect the multiple systems operated by a variety of organizations that make up a seaport community*" explaining the integration of each organization to the port community system[9].

IT permits "an easy, fast, and efficient information exchange," that is, Electronic Data Interchange (EDI); the customs declarations; the electronic management of all information about the handling operations in import and export; the traceability of the traffic flows along supply chain; the reporting and statistics; and so on. In addition, PCS facilitates both collaboration and integration, allowing both members of the community to immediately access relevant data and to interact and control data improving the quality of the same data among the stakeholders, and also preventing the unnecessary duplication of the same. The main tasks attributed to PCS consist of improving port operations efficiency and increasing the competitiveness along the supply chain, which requires the cooperation between private and public stakeholders.

Therefore, IT promotes a fast and safe exchange of information among both private and public organizations with the specific goal to improve the competitiveness of transport hubs. All the involved stakeholders have to effectively collaborate creating the critical prerequisite that allows the optimization of logistic processes using a single data submission.

[8] Srour, F. J., van Oosterhout, M., van Baalen, P., & Zuidwijk, R. (2008). Port community system implementation: Lessons learned from international scan. Transportation Research Board 87th Annual Meeting, Washington, DC.

[9] Rodon, J., & Ramis-Pujol, J. (2006). Exploring the intricacies of integrating with a port community system. 19th Bled eConference eValues, Bled, Slovenia.

The main function recognized for ICT consists of making the users to manage the service requests and directly upload their information into the hub's information system. Indeed, IT systems significantly reduce paperwork, improve data quality, allow integrating data among different stakeholders, and support the port management for operations. Even if an important role has clearly been assigned to IT systems, some actors still show strong resistances to adopting them.

2.4.1 Architecture types

In order to describe current ICT architecture types, the below models can be considered. Researchers have distinguished four different architectural types for IT systems[10]:

1. bilateral (1 to 1);
2. private hub (1 to N);
3. central hub (N to 1 to M);
4. modular distributed plug-and-play architecture (N to M).

The first architectural type, *bilateral*, is made of one-to-one connections in which two partners are strongly linked sharing and integrating their data and information and services requests, mostly using traditional communication channels and technological tools, such as phone or also adopting Electronic Data Interchange (EDI), the integration between the two partners easily occurs without the need of intermediaries. This communication has primarily grown as port stakeholders have implemented point-to-point systems. A port could have a well-established system for transferring trade data from the sea carrier to the port terminal and another system between the terminal and customs. This architecture works well for establishing connections between large parties, with many information exchange transactions. However, when considering multiple small parties within the port terminal, this architecture suffers from problems of scalability. In order to connect all *n* parties with each other, [n (n-1)] / 2 connections are required. This number of connections explodes: for example, connecting 10 parties requires 45 point-to-point connections; 20 parties require 190 connections; 30 parties requires 435 connections. Hub architectures serve to solve this problem: the second and third architectural types, *private hub* and *central hub*, allow connecting to many partners with minimal linkages. Each party connects to the hub, and a connection with another party is established through the hub. By doing so, significantly fewer connections are required – to fulfill the connectivity requirements for 10, 20 or 30 parties requires only 10, 20 or 30 connections to the hub, respectively. In fact, two different typologies of hubs exist: in the private hub only one party owns the same hub and all the connection, whereas in the central hubs the

[10] Srour, F. J., van Oosterhout, M., van Baalen, P., & Zuidwijk, R. (2008). Port community system implementation: Lessons learned from international scan. Transportation Research Board 87th Annual Meeting, Washington, DC.

parties perform and are interconnected in hub that does not belong to any of the parties in the network. More in details, the private hub consists of a one-to-many type, while on the contrary the central orchestration hubs are considered many-to-many. Parties directly exchanging information with their partners may feel that going through a central hub is unnecessary – especially if doing so requires a change in technology. Furthermore, the success of a central hub type system is highly dependent on all parties contributing and using the trade data. However, if the port environment and culture is already based on a system of central control, then a central hub architecture may be preferable.

The fourth architectural type, *modular distributed plug-and-play architecture*, concerns hubs in which parties are connected not permanently but mainly considering their plug-and-connect capabilities. They connect in order to share information and data only when they need to: therefore, it is not possible to standardize the information and data communication process.

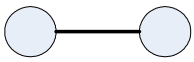
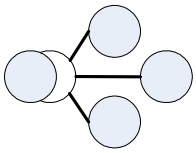
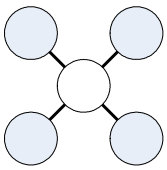
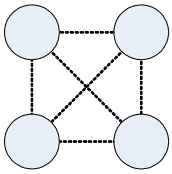
Architectural Type		Explanation
	Bilateral (1:1)	• Point-to-point (P2P) connectivity. • Direct connection between two trading partners. • Connectivity in its most basic form. • Works well for established partnerships.
	Private hub (1:N)	• Hub structure that makes it possible to connect to many partners with minimal linkages. • Internal applications need only one connection point. • Standardized access for external partners. • Generally initiated by a strong party, to link with many smaller parties
	Central orchestration hub (N:M or N:1:M)	• Like a private hub; but generally run by independent operator. • Expected to work best in industries without dominant parties.
	Modular distributed plug & play architecture (N:M)	• No permanent linkages – plug & connect capabilities. • Parties connect when interaction needed, exchange information and conduct business. • Standardization is critical.

figure from: van Baalen, P., Zuidwijk R. (2007) "Inter-organizational Information Systems in Port Communities"

2.4.2 Implementation steps

Partners should self-evaluate and report about their respective steps of ICT systems'implementation. Four stages have been identified[11] in designing and implementing of IT systems:

1. project initiation;
2. system analysis and design;
3. implementation and adoption;
4. maintenance and growth;

In project initiation: the collective goal of an inter-organizational information system is to intelligently process and re-distribute information to organizations that participate in the network. The network participants cannot achieve this collective goal individually. The success of information systems depends on the willingness to contribute to the set up and maintenance as well as the willingness to exchange company information with other partners in the supply chains transiting in the port. In the project initiation stage, stakeholders need to be identified and involved in formulating the underlying problems while setting the project objectives and scope.

In the *system analysis and design stage*, requirements based on the context are transformed into an information system model. This model serves as the basis for design of the information system architecture. Moreover, the system architecture should mirror the organizational context. A system that reflects the current operational environment will be seen less as a radical change and more as an automating or facilitating existing operations and technology.

Until *implementation and adoption begins*, the development of an information system largely remains an exercise of speculating about the benefits and costs, advantages and disadvantages of such a system. Information system implementation is the stage during which an organization alters its business practices and applications in order to interface with the information system. In a network of organizations, the decision made by each individual organization to start actively using the information system constitutes the adoption process.
As port information systems are often large and designed to connect a network of partners, this

[11] Peterson, D. M. (2003) "Power to the BPEL" Business Communications Review, 33(6), 54.

stage is likely to see some turbulence between individual agents and the network. A lack of resources at the enterprise level might lead to the withdrawal of an organization from the implementation; this in turn may have direct negative impacts on the benefits of all the other network participants. Thus, the system implementation must be properly phased to ensure the continued interest and support of all parties. One method to achieve this is via a modular implementation strategy in which each module has clear objectives and quickly realized tangible benefits for all parties involved.

Maintenance and growth: the deployment of a port information system is a continuous process. In order to synchronize system specifications with agents' requirements, continuous change is necessary to maintain high system usage levels. Due to continuous change both inside and outside all organizations and within the port community, performance gaps between the participants and the technology will arise. Those factors that initially influenced adoption and implementation are expected to shift. In the context of the port, this is a shift from electronically exchanging previously paper documents to intelligently combining or redistributing data from the documents, orchestrating central workflow and providing active alerts. Therefore, in order for a system to remain beneficial to the community that deployed it, the system must continue to evolve with the needs of all parties and be able to seize emerging opportunities.

2.4.3 Assessing impact of IT systems adoption

After assessing the architecture design and implementation stage of their ICT, one should also evaluate the impact of ICT adoption and the actual use different stakeholders make of ICT.

For example, ICT such as PCS helps port authorities take the lead by providing a logistics solution to private actors, encouraging them to share information that may lead to lower logistics costs, to faster delivery/pickup in the import/export chain, and to higher customer satisfaction. Bringing all users together enhances the efficiency of the physical flow of freight, drives economic growth, and as a secondary result, assists in reducing externalities such as pollution, congestion, and land use impacts. For example, the system helps transport yards and container parks to predict and plan future shipments and helps carriers to better plan for their fleets

We should take into account the impact of the IT systems on inland stakeholders, such as intermodal transport hubs and the general state of container transport system, in which shipping lines decide whether to act individually or to cooperate in order to deliver import containers, while

maintaining the objective to minimize logistics costs.
In a first scenario, the choices of vehicle type and delivery routing are optimized individually by shipping lines and other carriers, with individual agents acting independently. In the second scenario, all deliveries are managed by the IT system and the collaboration outcome is the result of full cooperation of all freight agents to deliver their shipments through the system; In the third scenario, the freight agent decides whether to act individually or collaborate with others, by means of cooperative delivery plans through the system.
Each PP should map out their relevant agents and stakeholders in the way the interact with each other and the system.

Freight agent (name, type)	1) choice of vehicle type and routing set by carriers	2) deliveries managed by system with agents collaborating	3) agent sometimes uses system other time acts individually
Agent 1	X		
Agent 2			X
Agent 3		X	
Agent 4			

Example table for displaying collaboration scenarios by freight agents.

2.5 SWOT Analysis

SWOT analysis[12] serves to identify key internal and external factors perceived as important to achieving project objectives as they stem from previous project activities. All relevant elements are divided into two main categories:

1. Internal factors — *Strengths* and *Weaknesses*
2. External factors —*Opportunities* and *Threats*

Analysis may view the internal factors as strengths or as weaknesses depending upon their effect on the project objectives. Factors are derived from the previous steps of territorial need assessments, such as the examination of the programme area, future scenarios, stakeholder involvement and their feedback.
The external factors may include stakeholders, technology, regulations and policies, cultural aspects, infrastructure, market demands. The results are presented in the form of a matrix. When filling in the matrix, one should keep in mind that it is not merely about compiling a list: important factors should be examined in defining factors and achieving objectives.
In the present case, SWOT analysis should deliver factors involved in reaching target objectives, thus enhancing cross-border maritime and multimodal freight transport, with a focus on ICT solutions, infrastructure development and optimization, implementation and upgrading.

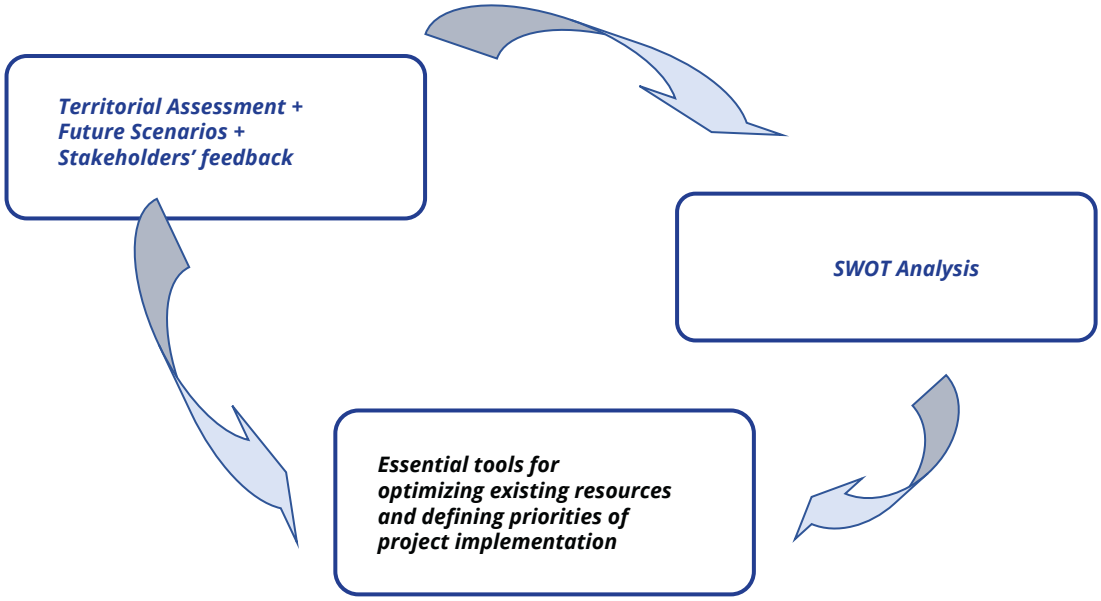
[12] Pickton, D.W. and Wright S. (1998) What's SWOT in strategic analysis? Strategic Change, 7 (2), pp. 101-109

Details on SWOT analysis can be found at http://www.academia.edu/15540458/

3. Conclusions

Each TNA study should be concluded with a one-page summary of the main achieved results. Importance should be given to those elements that are relevant to the outcomes of PROMARES.

The Territorial Needs Assessment process has long proved to be a "learning by doing" process. Currently, it provides PPs with a set of indications, guidelines and tools that allow for a well-structured and efficient implementation process. However, when it comes to stakeholders' involvement, tools are useful but not enough. Dealing with people and their particular interests and positions requires a set of soft skills that can be helpful along the way. Dealing with multiple stakeholders in a successful way is vital to the project's outcomes. However, involving as many stakeholders as possible in the process does not guarantee better results. Only those that have relevance, importance and legitimacy can help achieve expected outcomes.


Territorial Assessment +
Future Scenarios +
Stakeholders' feedback
SWOT Analysis
Essential tools for
optimizing existing resources
and defining priorities of
project implementation


D.3.2.2
TNA study for Port of Trieste
draft: 06/2019
final: 09/2019
D.3.2.3
TNA Study for Port of Venice
draft: 06/2019
final: 09/2019
D.3.2.4
TNA Study for Intermodal Terminal of Trieste-Fernetti
draft: 06/2019
final: 09/2019
D.3.2.5
TNA Study for Port of Ravenna
draft: 06/2019
final: 09/2019
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TNA Study for Port of Rijeka
draft: 06/2019
final: 09/2019
D.3.2.9
TNA study for Port of Ploče
draft: 06/2019
final: 09/2019
D.3.2.1
Methodology for TNA Studies
VIU (PP2)