United Nations ECE/TRANS/SC.3/2017/2

Economic and Social Council

Distr.: General
21 September 2017

Original: English

Economic Commission for Europe

Inland Transport Committee

Working Party on Inland Water Transport

Sixty-first session
Geneva, 4-6 October 2017
Item 4 of the provisional agenda
Exchange of information on measures aimed at promoting transport by inland waterway

Updated concept of Good Navigation Status for European inland waterways

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I. Mandate

1. This document is submitted in line with Cluster 5: Inland Waterway Transport, paragraph 5.1 of the programme of work 2016-2017 (ECE/TRANS/2016/28/Add.1) adopted by the Inland Transport Committee at its seventy-eighth session on 26 February 2016.

2. The Working Party on Inland Water Transport (hereafter SC.3) at its sixtieth session took note of the information about the study on Good Navigation Status (GNS) of inland waterways[1] in accordance with Regulation (EU) No. 1315/2013,[2] which prescribes that inland waterways of TEN-T feature GNS by 31 December 2030, and asked the secretariat to keep it informed about further progress in the concept of GNS (ECE/TRANS/SC.3/203, paras. 47-50).

3. The present document highlights the progress reached by the study consortium[3] in developing the GNS concept and the draft GNS guidelines which were discussed and validated at the second pan-European meeting on GNS held in July 2017 in Brussels. This

* The present report was submitted after the deadline in order to reflect the most recent information.

[1] A detailed concept of GNS was presented in ECE/TRANS/SC.3/2016/6.

[2] http://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32013R1315&from=EN.

[3] Members of the consortium are STC-Group Holding, STC-Nestra B.V., PLANCO, Vlaamse Overheid, Inland Navigation Europe and via donau.

work is still in progress and this document does not yet present the final results or positions. Moreover, it does not present viewpoints of the European Commission (EC) or its member States. The study is expected to be finalized by the end of 2017. Further information is available at: www.inlandnavigation.eu/what-we-do/good-navigation-status/.

II. Updated concept of Good Navigation Status

A. Introduction

4. Waterways of international importance included in the trans-European Transport Network (TEN-T) set out by Regulation (EU) No. 1315/2013 of the European Parliament and of the Council of 11 December 2013[4] are intended to be a part of a sustainable transport system serving the needs of the internal market of the European Union (EU). This concerns the waterways of the core and comprehensive TEN-T networks. According to Article 38 of Regulation (EU) 1315/2013, the Good Navigation Status (GNS) of inland waterways has to be achieved (and thereafter preserved) by 31 December 2030. The map shown on Figure 1 presents the waterways included into TEN-T.

Figure 1
European inland waterways included in TEN-T

[4] http://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32013R1315&from=EN.

5. The GNS concept fully respects the competences of national authorities in line with the subsidiarity principle. The GNS concept aims to ensure a common approach for administrations sharing the responsibility for inland waterways of international importance.

6. GNS is not limited only to the TEN-T Core Network Corridors but has a wider scope. It includes, for example, inland waterways in Sweden, Finland, Lithuania, Italy, Portugal and Spain which are not connected to the common waterway network. Moreover, although GNS has no legal implications, it may also be useful and inspiring for waterways of classes II and III and for non-EU member States. For the latter, the collaboration with UNECE is of relevance, notably the link to SC.3.

7. Finally, the GNS concept is based on best practices and state of technology and, to a large extent, shall be valid as well for inland waterways of international importance in neighbouring countries of EU.

B. Definitions

8. The following definitions were developed during the study based on the desk research and consultation of the experts and stakeholders:

(a) Good Navigation Status (GNS) means the state of the inland navigation transport network, which enables efficient, reliable and safe navigation for users by ensuring minimum waterway parameter values and levels of service. Moreover, GNS is to be achieved considering the wider socio-economic sustainability of waterway management.

(b) The GNS process means the cyclic process of setting the targets, measure development, planning, implementation and monitoring of GNS on inland waterways with the purpose of achieving GNS by 2030 (see para.31, Figure 3).

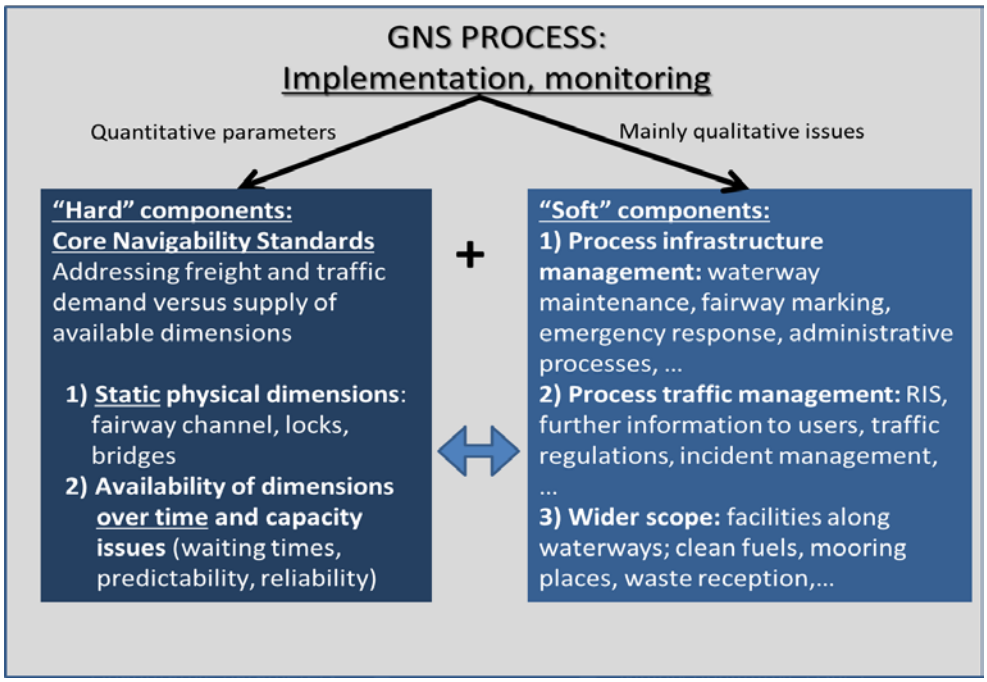
(c) The GNS development plan is a plan of measures aimed at achieving and maintaining GNS on waterway sections of TEN-T by the required date, which is prepared by the waterway administration of a EU member State on the basis of the monitoring results for the national network assessment, duly approved at the national level and permanently updated on the basis of evaluations and the feedback from stakeholders in the course of the GNS process. The plan shall include: the target values for the draught and height under bridges in compliance with the minimum requirements, the description of the shortcomings and/or bottlenecks, measures to achieve GNS, a duly justified request for exemptions, if any, and the involvement of the waterway users. Moreover, rehabilitation or upgrading projects with a request for co-funding by EU shall be described in the plan.

9. The TEN-T requirements apply specifically to the navigating channel which means the part of the waterway in which a targeted depth, width and vertical clearance (navigable cross-section) are maintained to enable continuous navigation.

C. Specification of the proposed GNS components

10. The GNS concept proposed by the study consortium is based on extensive consultation and input from experts. It includes “hard” and “soft” components as shown on the scheme on Figure 2 below.

Figure 2
Main components of the GNS process



11. The GNS process shall take into account external developments, such as:

- Development of transport demand (e.g. shifting freight flows origin-destinations, growing/decreasing commodities, etc.);
- Impact of climate change (changing water levels);
- Innovations which may bring new possibilities for improving navigation and the waterway management (e.g. more advanced surveying and monitoring approaches).

GNS "hard" components

12. The GNS "hard" components shall have the following characteristics:

(a) They shall focus on the physical waterway infrastructure as a direct output of waterway management activities and measures;

(b) They shall constitute a coherent set of measurable quantitative indicators (presenting the parameter value) applicable to the entire TEN-T waterway network identified using a common methodology that makes GNS measurable and comparable on different waterways;

(c) They are directly targeted by Regulation (EU) 1315/2013 and/or trans-national agreements and regulations such as the European Agreement on Main Inland Waterways of International Importance (AGN).

13. The indicators for GNS "hard" components relate to the physical waterway infrastructure and its use. They will:

(a) describe the dimensions of the navigating channel (e.g. depth, width, height standards) in rivers, canals and lakes and the parameters of locks, ship lifts and bridges and allow to compare present values with the local target parameter values set by the waterway authority. Specific attention shall be paid to the indicator that illustrates the compliance to

the minimum TEN-T target: the draught of 2.5 m and the height under bridges of 5.25 m available all the year round;

(b) describe the availability of the channel for navigation (e.g. closures, available draught during the year) and the availability and capacity of locks, ship lifts and moveable bridges.

14. The minimum target depth value is based on the minimum requirements from Regulation (EU) 1315/2013 that explicitly mention the draught of vessels, i. e. the vertical distance between the waterline and the lowest edge of the keel. This value should ensure that a vessel with a draught of at least 2.5 m is still able to safely navigate on a TEN-T section. Local targets shall apply for the respective depth of the navigating channel, taking into account the appropriate safety margins between the bottom of a river, lake or canal and the keel of the vessel. For rocky bottoms, this will be a higher safety margin compared to soils that consist of clay or sand. For the Rhine, for example, an 'under keel clearance' is typically applied between 0 and 50 cm. Furthermore, the target depth may be set much higher than 2.5 m, for example, for reasons of the efficiency of transport operations, in case of vessels with higher draught values, or reducing the resistance in the water (enabling higher sailing speeds, lower fuel consumption).

15. Moreover, for developing realistic and attainable overall and local targets in accordance with the requirements of Regulation (EU) 1315/2013 for vertical dimensions of the waterway, waterway administrations shall consider occurrences of variation in water levels and longitudinal and cross-currents in both rivers and canals. Water level fluctuations in waterways occur as a result of differences in the discharge, tides, seasonal variations, the wind setup, translation waves, etc. These fluctuations not only affect the dimensions of free-flowing rivers and impounded (regulated) waterways, but also cause variations in canals with a fairly fixed water level.

16. For free-flowing river sections, the target values shall be related to the reference water levels in order to reflect natural and statistical variations in the water discharge that may cause situations when the target dimensions cannot be guaranteed for 365 days per year by reasonable means. It should be noted in this respect that Regulation (EU) No. 1315/2013 already foresees *"paying particular attention to free-flowing rivers which are close to their natural state and which can therefore be the subject of specific measures"*. This could also include the definition of refined target values for free-flowing sections, which are coupled to the reference water levels in these sections. The reference water levels – mean high and low water levels (MHW and MLW) – are of a particular importance for the design of the waterway and refer to the water levels at which the waterway is fully functional for navigation. Higher or lower water levels, relatively to the reference water levels, may impose restrictions on the height under bridges and the waterway profile (even obstruction). When determining the reference water levels, the probability, severity and duration of restrictions must be taken into consideration, in case the water level exceeds the range of reference water levels. MHW and MLW are set by the water management authority and laid down in its management plan.

17. For the GNS "hard" components, at the request of a EU member State, exemptions may be granted by EC from the TEN-T minimum requirements, in case the target value on the draught and the height under bridges cannot be reached for justifiable reasons.

GNS "soft" components

18. The GNS "soft" components include process-related management aspects of the infrastructure (e.g. maintenance, marking) or of traffic (e.g. information to users), which contribute to an improved score on the indicator linked to the "hard" components. Moreover, the "soft" components are a compilation of processes and utilities that determine

and affect the level of service on and along waterways. For example, improved maintenance processes shall provide a better value for the actual depth (available draught) of the navigating channel of a waterway section. Another example is more accurate information and predictions about the water levels which allows shipowners to increase the payload (the transport efficiency).

19. Furthermore, "soft" components may optionally address a wider[5] scope of the inland waterway infrastructure which is not directly related to navigation itself (e.g. facilities along waterways for clean fuel bunkering, waste disposal, resting places, car lifts, shore power and internet connections). For some of these elements a legal reference is also found in Regulation (EU) 1315/2013. Furthermore, port, terminal and handling facilities are of key importance for achieving a competitive inland waterway transport operation. However, in Article 15.3(b) of Regulation (EU) 1315/2013 which introduces GNS for rivers, lakes and canals as defined in Article 14.1 (a)-(c), does not explicitly mention the status of the related infrastructure, inland ports, associated equipment, telematic applications (RIS[6]) or connections of inland ports to other modes of transport in TEN-T. It can, therefore, be concluded that, from a legal viewpoint, the focus shall be on the quality of the fairway in relation to navigation.

20. The GNS "soft" components shall have the following characteristics:

(a) Infrastructure and traffic management process components are important for GNS, as they influence the level of ambition and achievement of the targets for GNS "hard" components (e.g. actual draught and waiting times).

(b) The impact of introducing GNS "soft" components might vary from region to region, depending, for example, on whether infrastructure management processes are already in place or shall be newly introduced.

(c) Specific EU regulations apply for these components:

- Directive 2005/44/EC[7], as mentioned in Article 15.3 (c) of Regulation (EU) 1315/2013;
- Directive 2014/94/EU[8], as mentioned in Article 39.2 (b) of Regulation (EU) 1315/2013.

21. "Soft" components are not always measurable in a quantitative manner at the level of specific TEN-T sections. Some of them can be monitored by means of qualitative descriptions of processes covering multiple TEN-T sections or even entire corridors. An example may be the description of information systems in place to provide water level forecasts for particular waterway sections.

D. Specification of the minimum standards of the GNS process

22. The GNS concept shall include minimum standards for both the process and methodology for achieving GNS in a systematic way for TEN-T sections. EU member States shall incorporate the GNS process in their waterway management plan.

[5] Beyond the navigating channel, locks, ship lifts and bridges.

[6] River Information Services.

[7] Directive 2005/44/EC of the European Parliament and of the Council of 7 September 2005 on harmonized river information services (RIS) on inland waterways in the Community.

[8] Directive 2014/94/EU of the European Parliament and of the Council of 22 October 2014 on the deployment of alternative fuels infrastructure.

23. The GNS process primarily focuses on the “hard” components, or physical dimensions that make up the core navigability standards described in paragraph 13 (a) above, as they are a direct outcome of waterway management measures, on the one side, and have the largest economic impacts on inland waterway transport operations, on the other side. Furthermore, in order to avoid unnecessary and unacceptable administrative burden for EU member States and waterway managers, there is no need to run again through a full-fledged GNS process on the waterway sections that already fulfil core navigation standards over a longer period. The GNS development plan shall primarily focus on waterway sections that have a combination of the following situations: free-flowing waterways characterized by variable width, depth or height, sections with limited availability of locks and sections with too limited width, depth or height dimensions.

24. Free-flowing waterways characterized by variable width, depth or height:

These limitations, or rather their unpredictable variations, have a negative impact on the reliability and economic efficiency of inland waterway operations. Notably in case of poor maintenance, the set targets for MLW will be breached and the waterway depth may be insufficient for the draught of the vessel on an excessive number of days per year. As a consequence, inland waterway operators (and their customers) are faced with deteriorated load factors and increased or fluctuating freight rates and, therefore, the attractiveness and competitiveness of inland waterway transport may be reduced. If there is poor management or maintenance of a waterway, specific attention shall be given to remedial measures.

25. Waterway sections with the limited availability of locks:

Limited availability and capacity of locks will generally lead to unpredictable delays and increased waiting times. This has a direct impact on the economic efficiency and reliability of inland waterway transport operations. Consequently, the share of non-productive operational hours is increased and the on-time reliability of inland waterway transport is impaired. GNS-related measures may aim for increasing the capacity.

26. Waterway sections with too limited width, depth or height dimensions:

Sections with limited curve radii, width of canals and height under bridges (which, however, in general have stable dimensions) can be bottlenecks in certain corridors. The GNS process shall be aimed at identifying such limiting infrastructure bottlenecks and produce solutions for their remediation. User consultation is a key mechanism to identify bottlenecks in the infrastructure and to discuss the possible solutions.

27. The GNS process is proposed as a continuous improvement cycle. It shall fulfil the main attributes of the integrated waterway management (PLATINA, 2016):

- *Targeted:* every waterway maintenance or management activity shall be performed within the framework of defined targets, e.g. target values, levels of service, etc.
- *Strategic:* for a coordinated, effective and efficient achievement of targets, a specific waterway management strategy shall be applied, aiming for achieving and maintaining GNS at least by the time-horizon 2030 and maintaining the status from 2030 onwards.
- *Multi-disciplinary:* waterways are not only traffic routes but are characterized by a variety of other uses with sometimes conflicting interests.
- *Participatory:* due to the multi-disciplinary character of waterways, participatory management is advisable in order to understand and respect the other uses of waterways. All relevant stakeholders should therefore be engaged in the planning process to achieve and maintain GNS.

28. In addition, discussions with stakeholders and waterway managers have revealed that the GNS process should fulfil the following additional requirements:

- *Fact-driven:* the process shall create transparency for all involved parties, that is, a compliance or non-compliance with the target values shall be easily monitored by means of selected performance indicators.
- *Minimum administrative burden:* the process and reporting efforts shall be minimized by using available data and digital sources to the maximum possible extent, possibly supported by the European Commission. Furthermore, it should be pursued to harmonize available databases (e.g. the UNECE database of main standards and parameters of the E waterway network (the Blue Book database), the TENtec database (TENtec)[9] and national waterway databases) and mitigate multiple requests and delivery of similar data.
- *GNS process as a means to an end:* the GNS process, including the data collection and reporting, shall ultimately result in a well-functioning European waterway system in line with the provisions of Regulation (EU) No. 1315/2013.

29. The intention of the proposed GNS process is not to identify or re-define the target dimensions for waterway sections at the start of each process cycle. The existing national and supra-national regulations and regimes, as summarised in the Task 2 Report on the GNS study,[10] provide a good starting basis for improvement cycles aimed at reaching the agreed target values. Through the study it became clear that on many waterways meeting the current targets is already challenging (e.g. the sufficient draught on the Danube, the Elbe and the Oder).

30. On the other hand, the proposed GNS process could provide a guidance to waterway managers on how to determine adequate targets for the navigating channel dimensions (also for waterways not meeting the requirements of class IV). This shall be part of a long-term vision or a plan to implement a cyclical process for reaching and maintaining GNS, also based on stakeholder consultations. In this way, the GNS process contributes to improving and monitoring the navigability conditions on a permanent basis, supported by the waterway administrations experienced in a long-term planning and working in cyclical processes.

E. Specification of the minimum standards of the GNS process

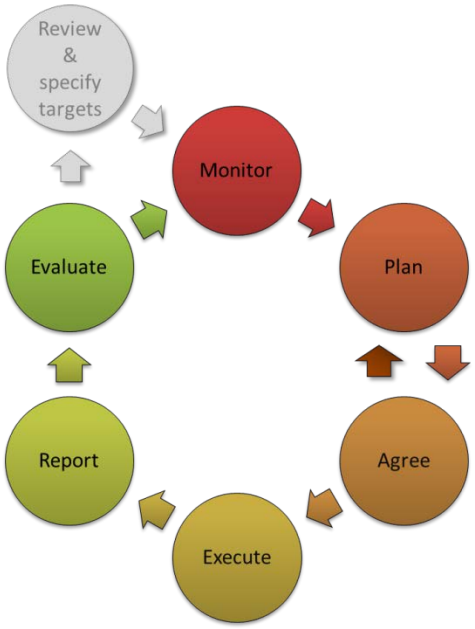
31. Based on various good practice examples for each of these steps (as identified in the course of stakeholder consultations and based on desk research that will be described in the Task 7 GNS Guidelines report), the main elements of a minimum GNS process have been formulated and structured in six process steps as shown on Figure 3. As some of the proposed process steps are already part of a usual practice in some countries, they would be easily accepted by stakeholders in these countries, notably the waterway managers. The GNS development plan shall refer to these good practices, available documents and waterway management plans. The main added value of this process description is based on the fact that, for the first time, all process steps are consolidated into one cyclical process, inspired by good practices and the best process elements encountered throughout Europe

[9] http://ec.europa.eu/transport/infrastructure/tentec/tentec-portal/site/index_en.htm.

[10] Task 2 Report, Approaches towards a Good Navigation Status on European Inland Waterways, was finalised and submitted to EC in December 2016. The report is available at: www.inlandnavigation.eu/what-we-do/good-navigation-status/.

during the study. The resulting GNS process shall normally be carried out in yearly cycles. As a cyclic process, the GNS process can basically start in any of the process steps (i.e. not necessarily in the monitoring phase). In any case, a description and evaluation of the status quo is needed as an initial starting point. This may lead to a review of targets and specification (see the grey circle in Figure 3).

Figure 3
Main steps of the GNS process



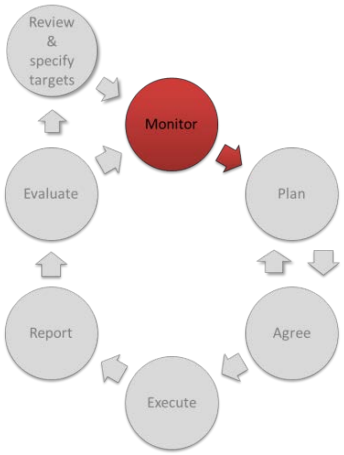
Step 0: Review and specify targets

32. As identifying or defining new target dimensions for a waterway section is not the key objective at the start of each cycle of the proposed GNS process, the target review and specification is not included as a default, but as an optional, initial process step (if needed). Strategic in-house guidelines and targets, which pertain to the fairway maintenance, are normally already in place and can be extracted from the relevant management and core processes of the waterway authority (as summarized in the GNS Task 2 report). Only if the overall waterway management targets are apparently lacking with a view to reaching GNS by 2030, or the evaluation activities (Step 6) discover that they need to be revised or refined, a consultation of stakeholders shall be initiated. This may lead to a redefinition of the local target values, in order to achieve and maintain GNS.

33. A review of the waterway management targets could also lead to starting larger projects such as the preparatory studies and construction of new lock chambers, construction of parallel canals, increasing the bridge height, eliminating sharp bends, increasing the width/depth of canals, etc.

34. For free-flowing river sections, a review of the waterway management targets could also include the definition of refined target values which are related to the reference water levels.

Step 1: Monitor and analyse status of the waterway



35. As the GNS process is fact-driven, measuring and monitoring activities constitute a core process step.

Step 1a: Data collection

36. Topical data on the "hard" components, i.e. the physical status of the waterway, are collected in the first step of the GNS process, and optionally/voluntarily this may be extended to waterways of lower classes and waterways of non-EU countries:

- Fairways: analysis of the closures of waterways for navigation and the current state of the navigating channel (depth/width) on the basis of hydrographic riverbed surveys. This shall include: (a) monitoring of hydrological structures and the fairway buoyage and marking in order to identify critical areas in the navigating channel (reduced depth and width or curve radius), and (b) analysis of the fairway availability (e.g. monitoring closures through ice, floods, accidents, events, etc.). It is recommended, where available, to use a digital interface between the data abstracted from Notices to Skippers (NtS) and TENtec;
- Locks: monitoring of closures and waiting times at locks and the lock availability, possibly through the data from electronic lock dispatching tools; here, NtS is recommended as the source of information. Furthermore, the AIS position data may be used for developing information on waiting and journey times, however, this may require a legal justification at the national level and the acceptance by shipowners;
- Height under bridges: Monitoring of closures and the bridge clearance values either through vertical sensoring systems or through calculations related to the reference gauges.

37. For the successful application, TENtec data formats and sectioning shall be aligned as much as possible with the data structures used by different waterway administrations. This avoids duplication of data collection efforts. Scripts will be needed to prove a bridge between daily NtS messages for specific sections and objects and the aggregated data for TENtec on a yearly basis. It may be considered to expand such monitoring instrument on a voluntary basis as well to non-EU member States and waterways of lower classes.

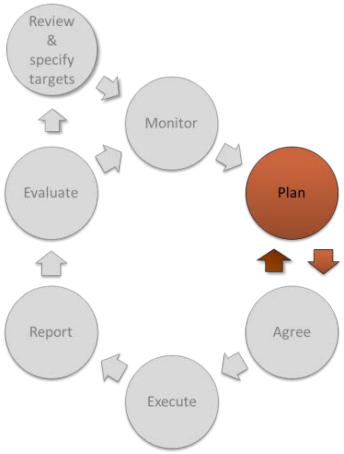
Step 1b: Data analysis and the identification of bottlenecks to reach GNS

38. Based on the analysis of the collected data, the most critical waterway sections in the particular year shall be identified. This may concern waterway sections with a long duration

of unexpected closures, e.g. lock breakdowns and navigating channels which do not reach the target dimensions. Ideally, such assessment can be done by means of TENtec. Critical sections can be highlighted by means of maps. However, this will require a good quality of data and a good filling rate of the TENtec parameters.

39. The actual location of shallow sections, which do not meet the minimum standards (as defined in Step 0), may vary from year to year and from week to week, especially in the free-flowing sections. For this reason, regular riverbed surveys shall be carried out, depending on the dynamic character of particular stretches. Locks and bridges imposing the most critical limitations shall be identified through systemized data analysis (e.g. longest average waiting times, longest downtimes, strongest clearance limitations). In addition to measurements by official authorities (e.g. waterway, RIS and lock operators), a feedback from transport users shall be organized regularly, in order to jointly identify and validate the most critical bottlenecks which shall be the starting point for plans on eliminating or mitigating the bottlenecks as a part of GNS development plans.

Step 2: Plan measures



40. At the end of Step 1, a list of bottlenecks or critical sections in the waterway network is identified. It shall take into account the existing plans of improving the navigation conditions. Based on these monitoring results and analyses, the remedial and/or preventative actions and measures need to be defined, planned and presented in waterway management or GNS development plans prepared by EU member States. For international waterways, this shall be done in close cooperation with international coordination platforms, such as River Commissions. These plans shall refer to already existing plans and programmes on the regional/national levels and on the level of River Commissions and shall identify additional plans/measures (if needed). GNS development plans shall, in particular, focus on:

- Shortcomings in the network in view of compliance with the target values that require adaptation measures (e.g. rehabilitation or upgrading works) or an exemption, if the minimum standards cannot be reached;
- Measures to reach GNS with a request for co-funding from European programmes, such as the Connecting Europe Facility (CEF).[11]

[11] Regulation (EU) No 1316/2013 of the European Parliament and of the Council of 11 December 2013 establishing the Connecting Europe Facility (CEF).

41. Measures may include the following:

(a) Traffic management measures:

- Improving the fairway buoyage and marking based on the traffic intensities and available dimensions of the fairway;
- Intensification of service times of locks and bridges;

(b) Infrastructure maintenance measures:

- Navigating channel dredging (e.g. removing sediments from the fairway deep channel, dredging the full width of the fairway);
- Preventative maintenance of lock gates and chambers;

(c) Infrastructure engineering measures:

- Adaptation of hydraulic structures (e.g. groynes or training walls);
- Upgrading or construction of bridges and locks/dams;
- Modernization of canals (e.g. width/depth expansion) or building new canals.

Step 2a: Draft concept of measures

42. Remedial and/or preventative measures shall be specified and planned for further discussion with stakeholders (Step 3) and execution (Step 4). The draft measures for the fairway maintenance shall identify the location, timing, sediment type and cubature (m^3) to be dredged as well as the location of the site where dredged material shall be dumped back into the river. Lock maintenance activities shall be defined in the same manner.

43. For increasing the navigating channel availability, the waterway authorities may choose between various possible options, which are characterized by different costs, impact on the availability, the realisation time, the duration of impact, resulting costs, impact on the environment as well as on other uses and stakeholders. In order to identify the optimal measure for the given section, all measures shall be compared to the status quo ("zero alternative") as well as with each other. This information is shared with the involved stakeholders, thereby taking into consideration the socio-economic output, financial analysis, and social acceptance of projects, as prescribed in national procedures. This is done in order to set up a transparent and integrative planning process, with feedback loops and iteration between process Steps 2 (plan measures) and 3 (agree on measures). The stakeholders to be officially involved (and to be granted the status of a party to the approval procedure) in the planning phase shall depend on national provisions and the scope of the project (e.g. navigation authorities, land owners, national park authorities). Started from the viewpoint of transportation interests, initial plans shall be adjusted to reach synergies and compromises.

44. A clear and important example in this respect is the close interaction that shall be organised with the environmental requirements and interests stemming from the EU Water Framework Directive (WFD)[12] and the objective to reach Good Ecological Status on European waters.

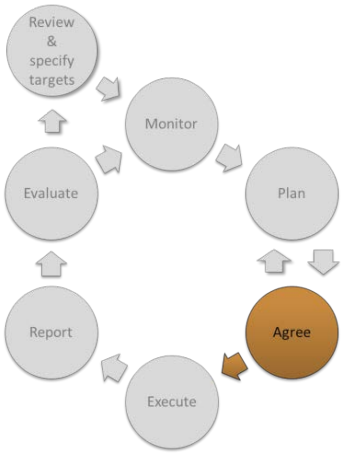
[12] Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy.

Step 2b: Time and budget planning

45. The planning phase also includes a provisional time planning. The time needed for permission and approval procedures can normally be planned on the basis of previous experiences. In particular, in case of free-flowing sections, the time planning of the actual execution of works is highly dependent on the actual water discharge, but in any case shall be based on time series and statistical values (e.g. expected low water season) taking into account environmental aspects (protection of spawning grounds in spawning time, the migratory seasons for birds, etc.). Moreover, lock revision activities (especially the preventative maintenance) shall be planned in the low navigation season. Consultation with the transport industry and notification well in advance to transport users of the waterway is important to minimize the hindrance. It is important that the transport industry also makes active use of these opportunities to provide a feedback on the time planning.

46. Key success factors for the process of the coordination of the lock maintenance are a good interaction of all stakeholders and a good exchange with the transport industry. The industry representatives shall have the opportunity to make proposals for improvements in the scheduling of lock closures, as well as for improvements of the inland waterway infrastructure in general. After consideration, the schedule shall be made binding for the waterway authorities, respectively, managers and lock operators, and be communicated well in advance to transport users. Similar consultation and information processes with the transport industry shall be in place for the construction works (e.g. bridges) which may give hindrance to traffic.

Step 3: Agree on measures



47. As mentioned, there is a close interaction between Step 2, Planning, and Step 3 for the agreement on measures. The stakeholder engagement and acceptance is a key to the success of the GNS process. Furthermore, in case of international waterways, the waterway administrations shall take account of stakeholders from all riparian states at various levels and from multiple fields of expertise.

Step 3a: Develop measures with stakeholders (national user fora)

48. Integration of stakeholders and interest groups is especially important for critical waterway sections where different uses (e.g. ecology, flood protection, recreation) are conflicting or where the achievement of GNS is most heavily disputed, in order to come to commonly accepted solutions. Successful good practices on stakeholder engagement are characterized by regular, recurring and fact-based communication (usually once or twice

per year). Stakeholders shall be informed on the following issues based on the GNS development plan:

- Present status of waterway and measures carried out in the previous period;
- Present monitoring results (current status of waterway);
- Present proposed measures and their expected impacts;
- Planned timing of measures.

49. The inputs and feedback of stakeholders can thereby be used for adaptation of proposed measures (a feedback loop to Step 2) or their prioritization; this will be reflected in updates to the GNS development plan. Setting priorities for measures on transport infrastructures basically involves a ranking, e.g. regarding the highest negative impact on infrastructure users, the worst condition compared to a target level of service or the highest monetary losses due to malfunction. As an example, typical priorities for the fairway maintenance on free-flowing river sections shall be given to shallow sections with the lowest navigating channel depth at low water levels. Additional criteria, such as the width of the remaining fairway with a sufficient depth and/or the rate of sedimentation on critical bottlenecks may be applied.

50. The basic aim shall be the integration of all relevant interests (objectives of the shipping industry, environment, fishery, etc.) into the design of measures, thus preventing later barriers and significantly reducing the amount of potential compensation measures. Integrated planning would, therefore, include:

- Integration of relevant stakeholders in the initial scoping phase of a measure (Step 2);
- Identification of integrated project objectives comprising objectives of inland navigation, environmental law as well as other uses of the river reach such as nature protection, flood management and fishery;
- Implementation of integrated planning process to transfer the navigation and environmental objectives into concrete project measures thereby creating win-win results;
- Navigation and environmental monitoring at all stages: prior, during and after the project works, thereby enabling an adaptive implementation of the measures when necessary.

Step 3b: Coordinate proposed measures with other waterway managers (on the corridor level)

51. In case of international waterway corridors, supra-national coordination on waterway management measures is crucial and shall be integrated in the process. Coordination of the waterway management measures at the corridor level shall contribute to:

- Ensuring the continuity of navigation and common levels of service for the waterway;
- Prevention of longer disruptions of navigation at transboundary sections;
- Exchange of good practices among waterway managers (e.g. effective procedures to reach targets at minimal costs from public budgets).

52. The existing Corridor Fora, macro-regional steering groups, or coordination groups of River Commissions can be used as a platform for multilateral coordination of waterway management activities at the corridor level.

Step 3c: Attain formal approval and permits on national level (if applicable)

53. Annual briefing meetings for maintenance works shall be prepared, with the aim of attaining consensus with the navigation authority as to the necessary measures and prioritizing the fairway management interventions.

54. For the fairway maintenance measures, official notifications or licences are in some cases needed from the competent national authorities as pertaining to:

- Applicable EU legislative framework;
- Water law;
- Environmental law (including an impact evaluation with regard to Natura 2000 areas);[13]
- Navigation law;
- National park law (in some regions) and other relevant legislation.

55. In the course of attaining legal permission for waterway management measures (usually an iterative negotiation and hearing process), the competent authorities shall consider user interests and usage aspects. The authorities usually involve official experts in judging different effects of waterway management measures on other uses of waterways (e.g. fishery, ecology, recreation, nature reserve, drinking water, hydropower).

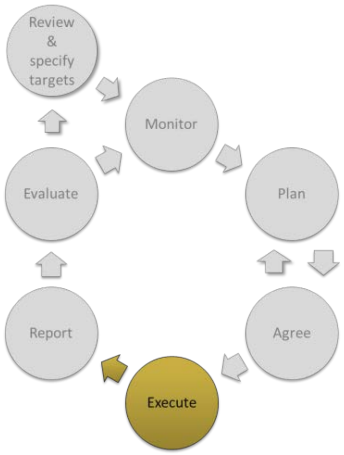
56. In principle, permits shall be requested from the national authorities for every single physical intervention measure in the waterway, but long- or medium-term permits are generally preferred. An effectual notification always includes certain regulatory requirements as to how the maintenance works in question shall be performed (e.g. defining specific months in which no dredging is allowed because of disturbance of fauna and flora, specific water levels above/below which dredging is forbidden, or restrictions on the amount of dredged material to be dumped in the river at once). In some cases, long- or medium-term notifications are issued by the authorities, which may cover physical interventions over the period of several years, based on specific regulatory requirements for the approved maintenance works. In this case, permits for single measures are not required.

57. Achieving a balance between the need for physical interventions for navigation and adequate environmental protection can be a challenge. But, in many cases, measures to achieve GNS can be designed in such a way as to minimise the impacts on important waterway functions or to even restore ecological functions. Mitigating measures may include the restoration of river banks through rip-rap removal, the establishment of stagnant water zones and gravel/sand structures, the reconnection of side arms, etc.

58. The processes described above will be sufficient for regular maintenance works. However, in case of big projects of structural upgrading of the waterway, more extensive assessments are needed. The costs and benefits of measures shall be taken into account from a neutral and broad socio-economic perspective based on the competency-based approach focused on finding the optimum for the parameter values and services for the navigation quality, while taking into account the transport potential on the corridor.

[13] A coordinated network of protected areas in EU member States. More information is available at: http://ec.europa.eu/environment/nature/natura2000/index_en.htm.

Step 4: Execute measures



Step 4a: Carry out or subcontract agreed measures

59. In most EU member States construction and maintenance activities are carried out by private contractors on the basis of framework agreements covering a time span of several years.

60. Most common maintenance work is dredging in order to reach the required levels of depth and width of the navigating channel. This is a key requirement for GNS, especially on dynamic free-flowing sections. In the Task 7 GNS Guidelines report, specific best practices are presented on this issue.

Step 4b: Inform stakeholders in real-time

61. In addition to the information that is provided in advance and in hindsight, selected stakeholders shall be informed on a real-time basis as well. A suitable tool for that is NtS provided by RIS; this standardized data format can be used both for pull services (publishing of notices on the Internet) and push services (e.g. distribution by e-mail). In addition to RIS, online and mobile information services provide information on the status and availability of waterways. In this case, a corridor-wide service is preferred over national solutions.

Step 5: Report outcomes

Step 5a: Document results of fairway management activities

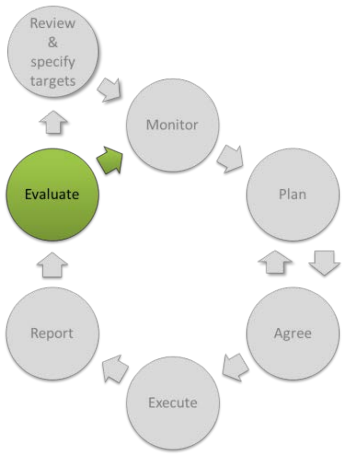
62. The outcomes of fairway management measures shall be properly documented and reported. The work of possible contractors shall be monitored and controlled; for this reason, the reports drafted by the site supervision as well as the final hydrography survey of both dredging and dumping sites shall be analysed. In addition, the information necessary for monitoring of performance indicators shall be collected. Data shall be processed not only on the national level, but key performance data shall also be transmitted to the TENtec database, in order to maintain a topical overview of the navigation status of various European waterways.

Step 5b: Inform stakeholders ex post

63. National and local waterway authorities shall have the obligation to inform users about issues that might influence safety and accessibility of waterways. The type of information and the transmission tools shall meet the requirements of manifold user groups: skippers, logistic service providers, waterway administrations, dredging companies, etc. Availability of continuous and target group-specific information on the state of the fairway to the waterway users and other stakeholders is of key importance to the GNS process. Information has to be accurate, up-to date and easily accessible. In the best case, it should be available on one single online platform per transport corridor. In any case, a cross-border and corridor-wide information approach is crucial.

64. User-oriented maintenance of the fairway aims at applying the best methods for transmitting relevant information to users and at getting the necessary information from them. This includes not only *informing* in the best way, but also *consulting* and *integrating* the users in the course of the maintenance process. It is crucial that decision-makers in politics as well as in the waterway administrations are willing to accommodate customer's expectations into the process.

Step 6: Evaluate measures



Step 6a: Ex post impact evaluation

65. Evaluation means the assessment of the efficiency of the measures undertaken in order to reach GNS, for example, the effects of fairway maintenance measures (i.e. maintenance dredging works or repositioning the course of the navigating channel) shall be measured to check if works were effective to reach the targets for the draught. The evaluation of width/depth dimensions is based on monitoring the hydro-morphological changes in the river bed and ecological effects. For the evaluation of measures addressing

the lock availability and the height under bridges over the past period, mostly automated data sources, such as NtS and other RIS tools, can be used.

66. An indispensable prerequisite for any evaluation of the effects of fairway maintenance activities is a sufficient number of hydrographic riverbed surveys, notably for free-flowing sections. Only a systematic evaluation of bathymetric riverbed surveys in combination with a detailed analysis of factors influencing riverbed dynamics will enable an assessment and optimization of fairway maintenance measures.

67. An interesting development which may be integrated in future in the evaluation is data collected from the echo-sounder equipment on commercial vessels, which is currently being developed and tested in projects PROMINENT[14] and CoVadem.[15] The transport industry may use such data and instruments to identify actual bottlenecks due to insufficient depth of the section and notify the waterway authorities. Such direct user involvement shall help to increase the reliability of the waterway and may be efficient for improving the quality of maintenance works.

68. Other "hard" factor indicators, such as data on waiting times at locks, the height under bridges, etc., can partly also be determined via electronic means, such as the electronic lock log book based on AIS, that could be supported by users (skippers) that are ready to share their AIS data anonymously for such purposes.

Step 6b: Carry out regular user satisfaction studies and define lessons learnt

69. In order to increase customer satisfaction, the waterway administrations shall make use of consultative instruments, such as checklists and transport user consultations, in particular, for monitoring the status of the GNS "soft" components. Anonymous user surveys could help to evaluate their performance in connection with regular maintenance activities, the provision of information, etc.

70. The results and experiences of the GNS process shall be summarized and documented in GNS development plans, as an input for a learning curve of both waterway managers and involved stakeholders.

F. Organisational approach for the GNS process

71. A set of organizational measures is required for the practical implementation of the GNS process in order to reach adequate coordination at the national, international and EU levels ensure smooth functioning of the TEN-T waterway network in whole. Here, already existing GNS processes and cross-border coordination processes may be used in order to avoid additional work load without added value, therefore, a possible change of working practices, on the basis of strengthened cooperation at different levels should be addressed, where needed. In a preliminary manner, the organizational framework for the practical implementation of the GNS process will consist of 4 levels: the national level (Level 1), the connected international waterways (Level 2), the European level (Level 3) and the pan-European level (Level 4). It can be summarized as follows.

[14] A project addressing the key needs for technological development and the barriers to innovation and greening in the European inland navigation sector, funded by EC from the Horizon 2020 programme. More information is available at: www.prominent-iwt.eu/.

[15] CoVadem is an initiative by MARIN, Deltares, Autena Marine and Bureau Telematica Binnenvaart for the real-time collection of ship and river data. More information is available at: www.covadem.org/.

(a) National Level (Level 1)

72. A national body in charge of the GNS process in each concerned EU member State (the Ministry of Transport or national waterway administrations):

- Contributes to the identification and implementation of infrastructure improvements, maintenance works, process traffic management and other GNS “hard” and “soft” components;
- Identifies sections where targets for the GNS “hard” components cannot be reached for physical or operational reasons and prepares the corresponding requests for exemptions;
- Establishes waterway management plans incorporating the GNS process elements and/or the GNS development plan, if needed;
- Consults the stakeholders about service quality levels in different waterway sections and provides the information exchange.

(b) Connected international waterways (Level 2)

73. A body in charge of international coordination of the GNS process:

- Acts as a platform for monitoring the effective achievement of GNS, coordinated cross-border actions;
- Proposes measures adapted to the international waterway in question;
- Provides technical advice to national authorities, conducts GNS-related studies for the river basin, etc.

(c) European level (Level 3)

74. EC:

- Provides a database with up-to-date information on the GNS status of each TEN-T waterway section (TENtec), which can be used as a basis for monitoring and network assessments for GNS; a cooperation framework with national bodies, shipping industry, River Commissions, supported by monitoring studies and network assessments;
- Consults within this cooperation framework proposals from EU member states for granting exemptions;
- Maintains the cooperation to update and further elaborate the GNS Guidelines and evaluate, in due time, the progress achieved;

75. TEN-T Corridor Work Plans identify inland waterway infrastructure works that are needed for achieving and preserving GNS. Required financial measures are envisaged for those works in the context of CEF and/or Regional Funds.

(d) Pan-European level (Level 4)

76. UNECE may consider to support the GNS process by means of alignment between GNS development plans and TENtec with AGN and the Blue Book, thus avoiding double work. In particular, the coordination and alignment of the navigability standards between EU member States and neighbouring countries may be a topic to address at the UNECE platform. Seamless transport across the whole of Europe will also require coordination with non-EU member States.