

# Accessibility Management System for Integrated Interchanges

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**ABSTRACT:** Architectural, digital and information and communication accessibility is, according to the Law [1], accessibility that meets the requirements of universal design and reasonable accommodation within the meaning of the Convention on the Rights of Persons with Disabilities. According to the law, providing accessibility to persons with special needs is the responsibility of public transport entities including maritime operators. Persons with special needs are those who, due to their characteristics or the circumstances in which they find themselves, need to take additional measures to overcome barriers that prevent or hinder their participation in various spheres of life on an equal footing with others. Thus, these are not only people with disabilities, but also, as the explanatory memorandum to the law indicates, other dependents, the elderly or parents with children. The publication, within the framework of the methodology of the process approach to the management of transport organizations, defines a proposal for the basic criteria of the Accessibility Management System for Integrated Interchanges (AMSII), which will ensure compliance with all the requirements of the Law and related acts.

## 1 INTRODUCTION

Public transport can only replace private transport when better qualitative parameters and a robust state, region and city environmental policy that promotes public transport is achieved, and finally when the current road systems become overcrowded and paralysed. In practice, people switch from private to public transport when:

- paid parking zones become expanded,
- parking spots in paid parking zones become severely limited to the point bordering with inability to find available spots,
- paid parking fees are regularly increased to achieve increasingly more competitive public transport ticket prices,
- alternative public transport systems become established on separate traffic lanes,

- public transport becomes faster than private transport at a “door-to-door” section
- widespread accessibility is ensured.

With the current development of our society, the above criteria will be achieved very quickly and it is only up to us to prevent the exclusion of large groups of people by these changes. The future customer of public transport must have the following aspects ensured:

- quick and frequent public or mixed transport,
- quick and simple interchanges (enabling intuitive and, in time, automatic navigation from stop to stop, navigation in motion, and preventing the customer from being slowed down by other users),
- a well-designed interchange with high capacity,
- safe travel,
- high aesthetic value of travel.

Another step in improving the accessibility is the correct and efficient management of the available infrastructure through the establishment of the Accessibility Management System for Integrated Interchanges. Unfortunately, the available legal requirements and good practices do not provide indications of specific criteria, but only the required objectives that should be achieved by organisations.

## 2 ACCESSIBILITY MANAGEMENT SYSTEM FOR INTEGRATED INTERCHANGES

The purpose of the Accessibility Management System for Integrated Interchanges is to ensure that carriers and transport infrastructure managers achieve their economic targets in an optimal, safe and widely available manner. The current management systems are often integrated with other systems to improve an organisation's overall results on activity and to reduce the costs, with efforts spread out to all levels in the organisation. For this purpose, the proposed requirements for a functional grouping of AMSII requirements utilise the ISO High Level Structure common framework [2-4]. This framework also facilitates the carriers' and infrastructure managers' understanding and use of a process-based approach during the establishment, implementation, maintenance and continuous improvement of their optional quality or safety management systems. According to the new requirements, human behaviour plays a crucial role in ensuring safe and efficient functioning of transport. Whenever it is determined that human behaviour was a factor that limited accessibility, the behaviour could have been affected by organisational factors, such as work load or work organisation, resulting in deteriorated result on activity and worse effects of the given non-compliance. Due to the above, it is of fundamental importance that carriers and infrastructure managers have a systemic concept for supporting human activities and managing human and organisational factors within a management system. The manner in which the issue of accessibility is viewed, appreciated and taken into account in an organisation's priorities reflects its actual commitment to the development of public transport at all of its levels [5]. Due to the above, it is also important for carriers and transport infrastructure managers to determine the activities and behaviours that can shape a positive accessibility culture and to support a culture of mutual trust, certainty and learning via their management system in which employees are encouraged to make a contribution to the development of universal designing by reporting non-compliances and difficulties, and provide information related to accessibility.

The new criteria should be reflected in the declarations of carriers and transport infrastructure managers. An organisation should implement criteria according to the declared specification of the scope, type and field of activity. In addition, it is necessary to verify that an organisation ensures the following during the planning, establishment, implementation and review of its operational processes:

- application of the criteria for the acceptance of risk and accessibility means (corrective actions),

- implementation of plans aimed at achieving the accessibility objectives,
- collection of information for the purpose of measuring the correct application and effectiveness of operational arrangements.

An organisation should continuously improve the adequacy and effectiveness of its AMSII. The Process Roadmap/Model should reflect the scope of the management system by indicating the parts of activity that are encompassed and the parts that aren't encompassed by it, taking into account the legal requirements. It should specify and describe processes and actions related to the transport activity accessibility, taking into account the related responsibility and the interactions between these processes. A model proposal, including a reference to all recommended processes, is presented in Figure 1.

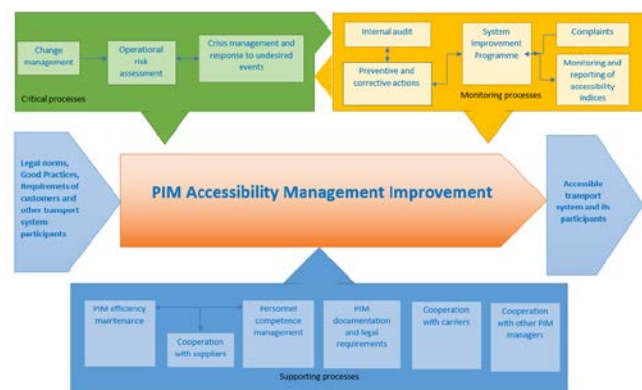


Figure 1. AMSII processes' model proposal

An organisation's accessibility policy should be adapted to the type of organisation and scope of transport activity, approved by representative(s) of higher management and actively implemented, communicated and made available to all employees. It should contain a commitment to meet all legal requirements, control the risk of hazards arising from own actions and the actions of other entities, and to continuously improve the AMSII. It should provide a framework for the establishment of objectives on transport exclusion and assessment of the organisation's accessibility results in relation to these objectives, and be maintained in accordance with the business strategy and assessment of the organisation's AMSII accessibility results.

It is also necessary to put emphasis on the promotion of a positive accessibility culture, also in terms of the integration of human and organisational factors. This approach:

- encompasses the establishment of a strategy and the use of expert knowledge and proven methods in human and organisational factors.
- refers to the risk related to the construction and use of equipment, tasks, working conditions and organisational solutions, taking into account human capabilities and limitations and the impact on human actions.

An organisation establishes the strategy for the continuous improvement of its accessibility culture, relying on the use of expert knowledge and proven methods to identify behavioural issues that affect various parts of the AMSII and introduce measures to

take these issues into account. These provisions necessitate an expansion of the system's monitoring areas - indices. Aside from analysing the results of accessibility task implementation or the measurement of the correct use and effectiveness of operational arrangements, the supervision should encompass the improvement of the accessibility culture and analysis of the awareness of the importance, weight and consequences of actions and the way they contribute to the correct use and effectiveness of the AMSII, including the achievement of the accessibility objectives. This aspect is one of the most difficult changes present in the new requirements.

The accessibility objectives should be:

- consistent with the organisation's accessibility policy and strategic objectives (where appropriate),
- related to the most important risk areas that affect the organisation's accessibility results,
- measurable,
- compliant with the current legal and other requirements,
- reviewed in terms of their achievement and changed where appropriate,
- communicated.

The Process Risk Management description also needs to be verified and updated [6]. Until now, organisations have only applied mandatory (according to the Labour Code) occupational risk management. An organisation should specify and analyse all operational risks (organisational, technical and environmental risks arising from the human factor) important for the type, scope and field of activity conducted by the organisation identify the need for cooperation, where appropriate, with other concerned parties, and to communicate them to its employees and external entities involved. Specify fields of accessibility risks arising from its transport activity, regardless of whether the activity is conducted by the organisation itself, or by its partners or suppliers controlled by it. Ensure that accessibility is taken into account when identifying the organisation's business risk and risk management, and clarify the manner of recognition and resolution of conflicts between exclusion and other business objectives. Where appropriate, the employees, their representatives and external parties involved must be consulted during the establishment, maintenance and improvement of the AMSII in relation to specific parts they are responsible for and in relation to accessibility aspects in operational procedures. Furthermore, an organisation should manage the risk of hazards related to technical measures throughout their entire lifecycle, i.e. starting at the design stage and ending with the use stage, and meet the requirements on human factors throughout the entire lifecycle. At least the following aspects are taken into account to control the risk in important cases for the provided maintenance services:

- determination of maintenance needs to maintain technical measures in a safe operating condition,
- management of the decommissioning of technical measures for maintenance purposes,
- management of putting technical measures back into service,
- management of monitoring and measurement equipment to ensure its adequacy for the intended purpose.

An organisation should determine and control accessibility risks arising from activity commissioned as part of outsourcing, including activity or cooperation with partners and suppliers, and use information referring to investigations intended for risk assessment review, drawing conclusions to improve accessibility and, where appropriate, use remedies or improvement measures [7]. It should also take into account the need to determine, ensure and maintain a safe working environment compliant with the requirements of the current rules of law, especially the Directive 89/391/EEC (Labour Code).

The process of risk assessment and management may be based on methods commonly used in different transport modes (e.g., FMEA, FHA, HAZOP), which guarantee the fulfilment of necessary steps of proper risk management: identification, estimation, evaluation, response, communication, and monitoring [8-9]. The implementation of recommended corrective and preventive actions should be continuously supervised, and their effects should be verified. After a specified deadline for implementing control/preventive measures, the process should be evaluated, and a new risk indicator calculated. If the risk class for a given hazard exceeds the threshold adopted, it is necessary to define additional risk control measures following the strategy adopted. A person responsible for supervising the implementation of activities was also assigned. Once the planned scenario has been implemented, the assessment body re-examines the risk level of the hazards. If a satisfactory level is reached, the procedure is completed. Otherwise, additional actions are taken.

For transport operators' risk management areas, the most used method is FMEA (failure mode and effects analysis) [7, 10]. Valuation of the hazards identified for the entire hazard area begins with determining, on a scale of 1-10, the factors affecting the hazard, where:

W—probability (possibility) of hazard occurrence, determined in the range from 1 to 10. The probability of occurrence is a relative rather than absolute value. The only way to lower the occurrence rank is to prevent or control the cause of error posing the hazard by changing the process.

Z—the probability of hazard detection, determined in the range from 1 to 10, is an assessment (position in the ranking) associated with the best control tool given in the process control tool column. Detection is a relative assessment within a specific FMEA. As a rule, to achieve lower ranks, the planned control tool should be improved.

S—possible consequences of an incident resulting from hazard propagation, a value between 1 and 10, is the level of ranking assigned to the most severe effect for a given type of error causing a hazard to the power industry.

The risk assessment is based on the product [7]:

$$R = Z \times W \times S$$

The R-value for the risk hazard measure ranges from 1 to 1000. Hazards with the R number above 121

are significant. The number R above 150 indicates a critical hazard that seriously threatens the safety of the entire system. The risk value was identified based on the risk matrix:

The risk is unacceptable, significantly threatening the safety of the system, corrective measures should be taken immediately, risk class = 3

The risk is tolerable; appropriate precautions should be taken, risk class = 2

The risk is acceptable, no action is required, risk class = 1

If the risk measure R is in class 3, appropriate process control measures must be taken immediately to eliminate the possible hazard or remove the hazard's possible effects. However, if the risk R is in class 2, appropriate corrective actions have to be taken to prevent the occurrence of a potential hazard. The preventive/corrective actions assessment should be at first focused on the high-risk measure R items. Any corrective action intends to reduce the ranking values in the following order: effect, occurrence, and detectability ranking.

As a rule, it is assumed that if the number W, S reaches the value of 9–10 or Z, the value of 1–2 (extreme), regardless of the value of the R indicator, special attention is paid to ensuring that the risk of hazards is reduced using existing control measures/tools or preventive actions. In all cases, when the effect of the identified error may pose a hazard to recipients, preventive/corrective actions must be taken to prevent the occurrence of a potential hazard by eliminating or controlling the causes, or a method to protect the should be developed.

Implementing the recommended corrective and preventive measures should be continuously monitored and their effects verified with the FMEA method. After the specified deadline for implementing the control/preventive measures, the process should be assessed, and a new risk indicator R calculated. If the risk class for a given hazard exceeds the accepted threshold, it is necessary to specify additional risk control measures following the adopted strategy. A person responsible for supervising the implementation of activities was also assigned. After deployment of the planned scenario, the assessment body double-checks the level of risk of hazards. If a satisfactory level is achieved, the procedure is terminated. Otherwise, additional actions are taken. The entire process is recorded in a dedicated blank.

An organisation should implement and evaluate changes in the management system (AMSII) to maintain or improve its accessibility results. This encompasses decision-making at specific stages of the change management process and the subsequent risk review. It is necessary to determine the potential accessibility risk and adequate corrective measures prior to implementation.

Another criterion is the obligation to identify potential emergencies and measures that must be taken in a timely manner to manage such situations and restore normal conditions of conducting activity. In relation to any identified type of emergency, an organisation should ensure the following:

- the ability of making immediate contact with emergency services,
- provide all relevant information to the emergency services, both in advance, to prepare a response to the emergency, and during the emergency,
- granting first aid with the use of internal resources.

An organisation should ensure that:

- the recommendations of domestic accessibility management bodies and recommendations derived from discipline-specific or internal investigations are evaluated and, where appropriate, implemented or commissioned for implementation,
- relevant reports or information derived from other concerned parties, such as transport enterprises, infrastructure managers, maintenance entities and vehicle keepers, are analysed and taken into account.

An organisation should also use information referring to investigations intended for risk assessment review, drawing conclusions to improve accessibility and safety and, where appropriate, use remedies or improvement measures.

In terms of Reporting, an organisation should ensure the submission of a periodical accessibility report to domestic accessibility management bodies and the competent Marshal's Office in a scope dependent on the Programme of equal opportunities for persons with disabilities and counteracting their social exclusion and aid in the implementation of tasks towards the employment of persons with disabilities.

Any filed customer complaint concerning a service's non-compliance with reference to transport accessibility should be analysed. A complaint is a request of the passenger/service recipient addressed to the service seller arising from unsatisfactory quality in the field of accessibility. The passenger/service recipient reports that the agreed service requirements have not been met. A complaint should be recorded in a Complaints Register. Then, the transport operator is obliged to complete the complaint sheet and open the complaint processing procedure. Relevant information should be analysed as part of Management Reviews and constitute the basis for updating the accessibility policy and building the System Improvement Programme.

An organisation should also define appropriate communication channels (Information Flow Process) to ensure that accessibility information are exchanged between different levels of the organisation and with external parties concerned, including partners and suppliers, but mainly transport process recipients/customers. In order to control information and communication in cases important for the accessibility of operational actions, relevant employees must be notified about the details of any infrastructure/transport management conditions, including any important changes that may lead to hazards, temporary or permanent operational restrictions and of any conditions concerning extraordinary events, where appropriate. As part of the process description, it is recommended to develop maps of the flow of evidentiary information within the organization, and with external entities. The

structure of these models depends on the nature of the organization and the type of transport.

In order to control the risk of hazards on Supplier Qualification, an organisation should define the criteria for selecting partners and suppliers, as well as agreement requirements to be met by such entities, including the following:

- legal and other requirements related to accessibility,
- level of competence required to implement the tasks specified in the agreement,
- responsibility for the implemented tasks,
- expected accessibility results that must be maintained throughout the term of the agreement,
- obligations on accessibility information exchange,
- traceability of agreement documents.

An organisation should ensure that proper formats and carriers are used in the creation and updating of documentation concerning the AMSII, and to control the AMSII documentation, especially its storage, distribution and changes to ensure its availability, usefulness and protection, where appropriate.

In terms of the AMSII's Continuous Improvement/Management Review, the higher management should periodically review the AMSII in terms of its adequacy and effectiveness, at least in terms of the following aspects:

- detailed information on the progress of implementation of actions identified as result of previous management reviews,
- changing internal and external circumstances,
- the organisation's accessibility results in terms of its accessibility objectives, its monitoring activity, including findings from internal audits, complaints and internal investigations conducted in the aftermath of accidents and the status of relevant actions,
- proper results of supervisory actions taken by domestic bodies,
- improvement recommendations.

Based on the management review results, the higher management should adopt general responsibility for the planning and implementation of the necessary changes in the system (AMSII):

- adoption of general accountability and responsibility for accessibility,
- ensure the engagement in accessibility of management at different levels of the organisation through actions and in its relations with employees and suppliers,
- ensure that an accessibility policy is established and that its objectives comply with the organisation's strategic direction,
- ensure the integration of the AMSII's requirements with the organisation's business processes,
- ensure the availability of resources required for the AMSII,
- ensure the AMSII's effectiveness in controlling the accessibility risk caused by the organisation,
- encourage employees to support actions intended to ensure compliance with the AMSII's requirements,
- promote the AMSII's continuous improvement,
- ensure that accessibility is taken into account when identifying the organisation's business risk and risk management, and clarify the manner of

recognition and resolution of conflicts between accessibility and other business objectives,

- promote a positive accessibility culture.

These objectives should be monitored as part of the System Improvement Programme.

An organisation should conduct internal audits in an independent, unbiased and transparent manner to collect and analyse information for its own monitoring actions, encompassing the following:

- schedule of planned internal audits that can be modified depending on the results of previous audits and monitoring of results,
- identification and selection of auditors with proper competencies,
- analysis and assessment of audit results,
- determination of the need to use remedies or improvement measures,
- verification of the implementation and effectiveness of these measures,
- documentation on carrying out the audit and its results,
- submission of audit results to the higher management.

The responsibility, accountability and permissions of employees performing functions that affect accessibility are defined for each level of official hierarchy within the organisation, documented as well as assigned and communicated to those employees – description of processes, job sheet. An organisation also ensures that the employees responsible for accessibility tasks have the permissions, competencies and adequate resources to perform their tasks without being exposed to the negative impact of the actions of other business functions. The competence management system maintained by the organisation must ensure that employees performing functions that affect accessibility are competent in terms of tasks related to limiting mobility for which they are responsible, and at least encompass the following:

- determine the competencies required for the objectives of accessibility tasks,
- the rules of selection (minimum education, required mental and physical fitness),
- minimum training, experience and qualifications,
- on-going trainings and periodical updating of competencies,
- periodical evaluation of competencies and testing mental and physical fitness to ensure the maintenance of qualifications and skills over time,
- specialist trainings concerning the relevant parts of the AMSII to ensure that they implement the accessibility tasks.

An organisation should provide a trainings programme for employees performing accessibility tasks. The trainings programme must guarantee the following:

- it is implemented in accordance with the identified competence requirements and the employees' individual needs,
- where appropriate, the trainings provide the employees with the skill to act in any conditions of activity (in normal conditions, in an emergency and crisis),

- the duration of trainings and frequency of refresher trainings comply with the training objectives,
- the trainings of all employees are being documented.
- the trainings programme is regularly reviewed, audited, and changed where appropriate.

The most important change in this field is the awareness of the importance, weight and consequences of the employees' actions and the way they contribute to the correct use and effectiveness of the AMSII, including the achievement of the related objectives. As part of its organisational learning processes, an organisation must ensure measures to incentivise employees and other parties concerned to act actively to improve accessibility.

In terms of the Maintenance Process, an organisation should:

- ensure that technical measures are used for their intended purpose and their safe operating conditions is maintained,
- manage technical measures in normal conditions and in an emergency,
- detect as soon as reasonably possible any failure to comply with the operating requirements prior to or during the operation of technical measures, including the application of use restrictions,
- ensure that its arrangements on the technical measures' management comply, when appropriate, with all basic requirements specified in legal requirements and identified good practices.

### 3 SUMMARY

On 19 July 2019, a new, ground-breaking act [1] on ensuring accessibility to persons with special needs was adopted into the Polish legal order. The act identified the legal and organisational framework for making the concept of accessibility a reality by imposing obligations to ensure accessibility in terms of architectural, digital as well as information and communication aspects on all public entities. Most rules of this act are in force from 30 September 2019, while others entered into force gradually over the next two years. The same year also saw the adoption of the Directive of the European Parliament and of the Council (EU) no. 2019/882 [11] on the accessibility requirements for products and services, which aims to approximate the laws of the Member States with regard to accessibility requirements for certain products and services, in particular by eliminating and preventing barriers for the free movement of certain products and services that arise from

diverging accessibility requirements in specific Member States. The obligations specified in this Directive, should apply equally, with certain reservations (especially Article 4 paragraph 1 in relation to Article 14 paragraph 6 of the Directive no. 2019/882), to economic operators from the public and private sectors (Recital 57 of Directive no. 2019/882). Meeting the requirements contained in these sectoral acts and documents intended for specific transport types will streamline and systematise operational activities related to ensuring the accessibility of interchanges.

The publication proposes a new model for managing the availability of transport operators in the area of transport hubs. The methodology for describing the model's criteria corresponds to the process approach. Such a model does not currently exist in practice and cannot be evaluated with the audit tool available for the methodology. In the next stages, after the implementation of the proposed model at the operator, validation studies and analyses will be carried out.

### LITERATURE

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