EUROPEAN UNION AGENCY FOR RAILWAYS

Making the railway system
work better for society.

# Light Impact Assessment

## *Inland TDG Risk Management Platform (RMP)*

| | *Elaborated by* | *Validated by* | *Approved by* |
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*Document History*

| *Version* | *Date* | *Comments* |
|---|---|---|
| 0.1 | 12/06/2018 | First draft of document (with sections 1,2, 3 and 6 completed) |
| 0.2 | 04/07/2018 | Amended version + all sections completed as draft |
| 0.3 | 17/07/2018 | High level description of the proposed Risk Management Platform added in annex I |
| 0.4 | 12/09/2018 | Complements on foreseeable costs/revenues and business model scenarios |
| 1.0 | 7/11/2018 | Consideration of last comments |

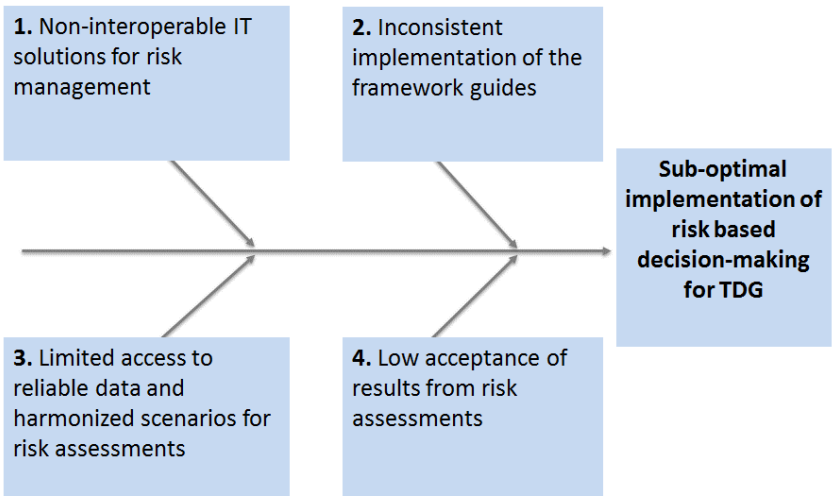
# *Contents*

# 1. Context and problem definition

## 1.1. Problem and problem drivers

**Main problem:** Sub-optimal implementation of risk based decision-making for transport of dangerous goods as set out in the framework of guides.

The following chart shows how this problem is linked to four key problem drivers:




Further details about these problem drivers can be outlined as follows::

- ***Non-interoperable IT solutions for risk management:*** *The current situation is characterized by no harmonized IT solutions for risk management as well as cases without use of any IT tool in this area. This situation may even worsen in the context with the harmonized frameworks where stakeholders would develop their own IT-solutions in order to facilitate their own use of the guides.*
- ***Inconsistent implementation of the framework guides****: Practices and approaches existing today could risk to influence how stakeholders implement the guides or even result in no implementation thereby reducing the achieved harmonisation level.*
- ***Limited access to reliable data and harmonized scenarios for risk assessments****: A major constraint for the application of risk assessments is availability of reliable data sets along with access to harmonised scenarios. This could prevent the take-up of the guides along with restricting the extent to which results from risk assessments are recognized.*
- ***Low acceptance of results from risk assessments****: As a result of differences in the approach towards risk assessments across stakeholders there is limited acceptance of results prepared by*

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| | *another stakeholder thereby limiting the incentives towards implementing the framework guides.*<br><br>**In conclusion, although the introduction of the harmonized framework of guides represents a potential significant step forward, it is likely that due to the problem drivers the implementation and application of risk based decision-making for TDG will not be optimised**. |
| **1.2. Main assumptions** | The scope of the problem is delimited by the considerations put forward in the following documents:<br><br>› *Roadmap on risk management in the context of inland transport of dangerous goods (UNECE, 2014)*<br>› *Inland TDG risk management framework (European Commission – Mobility and Transport, 2018)*<br>› *Terms of Reference for Expert Users and Development Group (EUDG, 2018)*<br><br>In particular, the development of the Inland TDG risk management framework project started on the basis of the conclusions of the workshop organised by the European Commission in February 2014 concerning "the feasibility to harmonise the approach to inland TDG risk management".<br><br>At this workshop States representatives and professional associations considered that, due to the big disparities in existing Inland TDG risk management practices and legal framework, the best instrument to standardise the approach and level the legislative playing field would be the adoption of a harmonised multimodal legal framework for Inland TDG risk management, possibly in the form of a EU Directive.<br><br>However, it was also considered that the potential development of such a Directive could only take place after a first phase of voluntary technical harmonisation which may be used to pave the way for potential future legislative changes. It was decided that this technical harmonisation should take the form of guides. Subsequently, the need for a Directive could be reassessed after a certain period using voluntary arrangements only.<br><br>The context of the voluntary technical harmonisation through the implementation of the framework guides is shaped by the following assumptions / boundary conditions:<br><br>› *The Expert Users and Development Group (EUDG) is responsible for the maintenance and development of the framework*<br>› *The Commission (DG MOVE) and the Agency supervise policy and technical effectiveness of the framework*<br>› *Overarching policy objectives can be achieved by ensuring that the framework guides are set in the right environment such that potential users have incentives to implement and apply these*<br>› *Different legal environment for the three inland modes of transport*<br><br>A key focal point of this light impact assessment is the extent to which the development and implementation of an IT Risk Management |

<table>
<tr><td></td><td>Platform could be a decisive factor for ensuring an optimal level of implementation of risk based decision making for TDG aligned with the framework guides.</td></tr>
<tr><td>1.3. Stakeholders affected</td><td>The relevance of the problem is scored from 1-low to 5-high for each of the categories of relevant stakeholders. The identification of stakeholders and problem importance scoring draw on available information gathered during the development work of the framework guides.<br><br>
<table>
<tr><th>Category of stakeholder</th><th>Importance of the problem</th></tr>
<tr><td>Inland (TDG) transport operators</td><td>5</td></tr>
<tr><td>Other companies involved in TDG</td><td>5</td></tr>
<tr><td>National competent authorities</td><td>5</td></tr>
<tr><td>Regional and local authorities</td><td>4</td></tr>
<tr><td>Agency / Commission</td><td>5</td></tr>
</table>
<br>Overall, a broad range of stakeholders (incl. the Agency) could potentially be affected by the problem while also scoring high in terms of the importance of the problem. Indeed, all but one stakeholder group have been assigned the highest score with respect to the importance of the problem. Obviously, the importance of the problem may vary within stakeholder groups, e.g. linked to particular country contexts.<br><br>In the context of the IA being focused on the potential for an IT Risk Management Platform to facilitate the implementation and application of the framework guides it should be noted that most stakeholders at an advanced level re. risk estimation and assessment are not opposed to a common tool even when they have already their own tools. Moreover, other stakeholders are in favour of a common platform thereby addressing the lack of own tools or no harmonized tool.</td></tr>
<tr><td>1.4. Evidence and magnitude of the problem</td><td>Relevant evidence on the existence and importance of the identified problem are provided in the following documents:<br><br>› DNV (2013) Harmonised Risk Acceptance Criteria for Transport of Dangerous Goods<br>› ERA communication at UNECE Joint Meeting (2014) Roadmap on risk management in the context of inland transport of dangerous goods (see annex of this document on issues and possible solutions)<br><br>In particular, the following aspects were put forward in the Roadmap document:<br><br>› Absence/lack of mutual recognition of results obtained from risk studies</td></tr>
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| | › *Applicable national rules are not always transparent and/or justified*<br>› *Decisions on risk control measure are often obscure and complex to understand*<br><br>These aspects highlight the importance of facilitating harmonized implementation of the framework guides in order to address any problems in an efficient and effective manner.<br><br>› *Framework guides of the Inland TDG risk management framework (link to final draft send to EU publications office)*<br><br>Moreover, stakeholders (incl. potential users of the guides) have stressed that the harmonized framework established by the set of guides cannot be applied with ease without proper supporting tools, in particular relevant IT solutions. |
| **1.5. Baseline scenario** | **Baseline scenario:** This would involve the continuation of the current situation with the harmonized inland TDG risk management framework in the form of the set of guides though without a Risk Management IT platform that could facilitate the voluntary use.<br><br>This may lead to persistent problem drivers as identified earlier:<br><br>› *Non-interoperable IT solutions for risk management. In fact, the existence of the guides could encourage different stakeholders to introduce their own IT tools thereby leading to potentially less harmonisation*<br>› *Inconsistent implementation of the framework guides would most likely continue supported by diversity regarding IT tools (see previous bullet point) as well as other factors (e.g. limited experience in risk-based approaches)*<br>› *Limited access to reliable data and harmonized scenarios for risk assessments*<br>› *Low acceptance of results from risk assessments with no increased extent of recognition of risk assessment results linked to the lack of immediate harmonisation in approaches on the basis of user-friendly IT platform*<br><br>On this basis, the overarching problem of limited implementation of harmonized framework is likely not to be alleviated. |
| **1.6. Subsidiarity and proportionality** | Transport of dangerous goods is already regulated by EU legislation and international agreements in order to facilitate trade within the single market and UNECE countries according to similar requirements. The core focus is on enabling the capture of the harmonisation potential provided by the framework of guides for inland transport TDG risk management. As such, this problem could not be efficiently or effectively addressed by self-regulation nor by Member States as a key element needed would be capacity for coordination. On this basis the issue of **subsidiarity** is addressed. |

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| | As for the issue of **proportionality** the considered step does not mandate any new requirements on stakeholders and is only intended to facilitate the voluntary use of the framework of guides for TDG risk management. As such the Risk Management IT platform would be fully in line with the guides. |

## 2. Objectives

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| **2.1. Strategic and specific objectives** | **Strategic objective(s) of the Agency** with which this initiative is coherent include (*it is noted that as the project is multimodal the relevant objectives would not be rail specific; the ticked boxes are those that are considered most relevant*):<br>☐ Europe becoming the world leader in railway safety<br>☐ Promoting rail transport to enhance its market share<br>☒ Improving the efficiency and coherence of the railway legal framework<br>☒ Optimising the Agency's capabilities<br>☒ Transparency, monitoring and evaluation<br>☒ Improve economic efficiency and societal benefits in railways<br>☒ Fostering the Agency's reputation in the world<br><br>The project's **general objective** can be formulated as follows: Contribute to optimizing the implementation of risk based decision-making for TDG.<br>Remark: The risk management platform would also indirectly contribute to the achievement of the two first strategic objectives.<br><br>**Specific objectives:**<br>1. *Facilitate interoperable IT solution for risk management*<br>2. *Support the consistent implementation of the framework guides*<br>3. *Enhance access to reliable data & harmonized scenarios for risk assessments*<br>4. *Increase acceptance of results obtained from risk assessments* |
| **2.2. Link with Railway Indicators** | The risk management platform will use relevant existing harmonised railway indicators, like the CSIs or other relevant data sources, and should be connected to the COR system in the future. |

## 3. Options

### 3.1. List of options

The following options are under consideration:

- **Option 0 (do-nothing / baseline scenario)** –the situation as present with the set of framework guides but without an IT Risk Management (RM) Platform in place to support users
- **Option 1:** - IT RM Platform to support harmonized implementation and application of framework guides without future legislative changes inland TDG risk management
- **Option 2**: - IT RM Platform to support harmonized implementation and application of framework guides with future legislative changes inland TDG risk management (harmonised multimodal legal framework for Inland TDG risk management)
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### 3.2. Description of options

| Description | Baseline | Option 1 | Option 2 |
|---|---|---|---|
| Harmonised framework guides | Yes | Yes | Yes |
| IT Risk Management Platform | No | Yes | Yes |
| Legislative changes for inland TDG risk management | No | No | Yes |

Remarks: The Yes/No/Yes option is not relevant as it would worsen the current situation of requiring quasi-unpracticable methods due to the complexity of the this work area and the low maturity level of the targeted stakeholders.

Better regulation proinciples would tend to support option 1 as it is a facilitation action not requiring the development of a new piece of legislation.

### 3.3. Uncertainties/risks

Limited uncertainty regarding the specifics of the Baseline and Option 1 (IT Risk Management Platform within a voluntary approach towards harmonisation of inland TDG risk management). On the other hand, there is more uncertainty regarding Option 2 which would concern the IT Risk Management Platform in the context of a mandatory approach towards harmonisation. In particular, the possible scope of a legal intervention would by default be broader. In the case of both Option 1 and Option 2 the level of use of the harmonized framework is not known with precision.

# 4. Impacts of the options

## 4.1. Impacts of the options (qualitative analysis)

A qualitative assessment of the impacts of three options (incl. the Baseline) is undertaken in terms of positive and negative aspects per stakeholder. Overall, the focus is on the implications of complementing the framework guides with an IT Risk Management Platform taking into account the legal context for harmonisation on inland TDG risk management. The following stakeholder categories are considered:

- *TDG / DG companies*
- *National / regional / local authorities*
- *European Union Agency for Railways*
- *Consultancies involved in risk studies*
- *Other*

The inclusion of the stakeholder category 'Other' highlights that there may be other stakeholders influenced by the different options (e.g. professional associations and intergovernmental organisations).

| *Category of stakeholder* | | *Option 0* |
|---|---|---|
| TDG / DG companies | Positive impacts | No changes |
| | Negative impacts | No changes |
| National / Regional and local authorities | Positive impacts | No changes |
| | Negative impacts | No changes |
| European Union Agency for Railways | Positive impacts | No changes |
| | Negative impacts | No changes |
| Consultancies | Positive impacts | No changes |
| | Negative impacts | No changes |
| Other | Positive impacts | No changes |
| | Negative impacts | No changes |
| ***Overall assessment*** *(input for section 5.1)* | Positive impacts | No changes |
| | Negative impacts | No changes |

| *Category of stakeholder* | | *Option 1* |
|---|---|---|
| TDG / DG companies | Positive impacts | Lower risk assessment study costs<br>Reduced resources for decision-making<br>Reduced national barriers for TDG<br>Reduced access to market time |
| | Negative impacts | Possible user charges for access to Risk Management Platform (to be confirmed when deciding on business model scenarios if the |

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| | | | platform is charging user fees or not)<br>Though given voluntary context these users would obtain net-benefits.<br>Particular company aspects not incorporated in the IT tool (though likely to be insignificant) |
| | National / Regional and local authorities | Positive impacts | Reduced investment costs in recognized tools<br>Lower risk assessment study costs<br>Reduced resources for decision-making<br>Easier and better justified decisions<br>Level playing field between modes ensured for TDG risk management.<br>Particular national / regional / local aspects can be incorporated in the IT tool |
| | | Negative impacts | Possible user charges for access to Risk Management Platform (to be confirmed when deciding on business model scenarios if the platform is charging user fees or not)<br>Though given voluntary context these users would obtain net-benefits. |
| | European Union Agency for Railways | Positive impacts | Availability of IT Risk Management Platform for Agency risk assessment studies<br>Optimal implementation and application of risk based decision-making for TDG.<br>Linked to other data sets managed by the Agency, like future COR system, might further improve the usability of the platform. |
| | | Negative impacts | Initial and ongoing (maintenance and operation) costs for Platform.<br>A decision on the preferred business model and related fees, in line with Agency regulation principles on fees, would mitigate these costs. (see details in annex II) |
| | Consultancies | Positive impacts | Consultancies involved in risk studies are likely to benefit significantly from improved access to market their services as well as overall market growth on an international scale |
| | | Negative impacts | Minor disadvantages for consultancies providing dedicated modelling services although likely |

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| | | to be mitigated through overall market growth and alternative business opportunies |
| Other | Positive impacts | The elements given above would also be of relevance for this stakeholder category |
| | Negative impacts | The elements given above would also be of relevance for this stakeholder category |
| ***Overall assessment*** *(input for section 5.1)* | Positive impacts | Significant positive impacts that could contribute towards the optimal implementation and application of risk based decision-making for TDG |
| | Negative impacts | Limited negative impacts mainly concerning one-off implementation costs for the Agency as well as ongoing costs in case the platform would be free of charge.<br><br>Remark: With a system of fees respecting the Agency's fees principles, it would be possible to compensate on-going costs. |

| *Category of stakeholder* | | *Option 2* |
|---|---|---|
| TDG / DG companies | Positive impacts | As for Option 1. |
| | Negative impacts | As for Option 1. In addition, a mandatory approach may result in administrative burden |
| National / Regional and local authorities | Positive impacts | As for Option 1 |
| | Negative impacts | As for Option 1. In addition, a mandatory approach may result in administrative burden |
| European Union Agency for Railways | Positive impacts | As for Option 1 |
| | Negative impacts | As for Option 1 |
| Consultancies | Positive impacts | As for Option 1 |
| | Negative impacts | As for Option 1 |
| Other | Positive impacts | The elements given above would also be of relevance for this stakeholder category |
| | Negative impacts | The elements given above would also be of relevance for this stakeholder category |
| ***Overall assessment*** *(input for section 5.1)* | Positive impacts | As for Option 1 |
| | Negative impacts | Limited direct negative impacts mainly concerning one-off implementation costs for the |

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| | <table><tr><td></td><td></td><td>Agency as well as ongoing costs. However, a mandatory direction for harmonisation is premature and may also lead to additional administrative burden</td></tr></table> |
| **4.2. Impacts of the options (quantitative analysis)** | The focus of this impact assessment is on the qualitative analysis of the options (see Section 4.1), while detailed quantitative analysis has not been undertaken. From a high level perspective the main costs linked to the introduction and operation of an IT Risk Management Platform would concern:<br>› *One-off costs incurred by the Agency in relation to the implementation of the platform (likely to involve approx. 0,5 – 0,75* ***M€*** *(in accordance with experience from other IT systems within the Agency)*<br>› *On-going costs (notably maintenance and development of Platform) is likely to amount to about 10% of the initial costs, so roughly 80-100* ***K€***<br>These costs should be contrasted to the possible benefits in relation to complementing the framework guides with an IT Risk Management Platform, notably:<br>› *Reduced investment (and maintenance) costs in recognized national tools*<br>› *Enhanced quality and reliability of implementation and application of framework guides*<br>› *Reduced costs associated with risk assessment studies*<br>› *Reduced national barriers for transport of dangerous goods*<br>› *Reduced resources for decision-making*<br>› *Easier and better justified decisions*<br>› *Reduced time for access to market*<br>Given the relative low costs involved (incurred by the Agency) it is likely that the above listed benefits would outweigh the cost resulting in overall net-benefits. |

# 5. Comparison of options and preferred option

## 5.1. Effectiveness criterion (options' response to specific objectives)

On the basis of the findings from section 4.1 the extent to which the various options respond to the specific objectives have been assessed, using a scale from 1-very low response to 5-very high response. Subsequently, the individual scores for each option are added together and the average score per option is calculated (**effectiveness**).

| | *Option 0 (baseline)* | *Option 1* | *Option 2* |
|---|---|---|---|
| *Facilitate interoperable IT solution for risk management* | 1 | 5 | 5 |
| *Support consistent implementation of the framework guides* | 1 | 5 | 5 |
| *Enhance access to data & harmonized scenarios for risk assessments* | 1 | 5 | 5 |
| *Increase acceptance of results obtained from risk assessments* | 1 | 5 | 4 |
| ***Overall score*** | 4 | 20 | 19 |
| ***Effectiveness (average score)*** | 1 | 5 | 4.8 |

Options 1 and 2 both score high in terms effectiveness with the difference in average score being insignificant. The slightly lower score for Option 2 is due to possible concerns re. The extent to which increased acceptance of results obtained from risk assessments will be ensured fully in a mandatory context.

## 5.2. Efficiency (NPV and B/C ratio) criterion

This impact assessment is largely qualitative (as explained in Section 4.2) with focus on effectiveness (see Section 5.1). However, it was outlined that the relative low costs are likely to be outweighed by the benefits. In particular, from an efficiency perspective the IT Risk Management Platform would complement the framework guides creating with limited resources the optimal conditions for capturing the benefits associated with harmonized implementation and application of risk based decision-making for TDG.

## 5.3. Summary of the comparison

In the following table the comparison of options is summarized taking into the effectiveness dimension only (as stated above an aggregated scoring of efficiency has not been undertaken for this impact assessment).

| | *Option 0 (baseline)* | *Option 1* | *Option 2* |
|---|---|---|---|
| *Effectiveness* | 1 | 5 | 4.8 |
| *Efficiency* | n.a. | n.a. | n.a. |
| ***Overall rating*** | **1** | **5** | **4.8** |

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| **5.4. Preferred option(s)** | The following options are the two top ranked:<br>› *Option 1 (IT Risk Management Platform + framework guides in a voluntary setting) has the highest effectiveness (5)*<br>› *Option 2 (IT Risk Management Platform + framework guides in a mandatory) has a slightly lower effectiveness (4.8)*<br>Considering that:<br>› *the IT Risk Management Platform is likely to generate net-benefits for the identified stakeholders by facilitating in a cost-efficient way the realization of the benefits associated with harmonized implementation and application of risk based decision-making;*<br>› *the potential development of any legislative changes for mandating harmonisation of inland TDG risk management can only take place after a first phase of voluntary technical harmonisation (as agreed in 2014); and*<br>› *if an efficient and effective voluntary framework is sufficient to capture the full benefits of harmonisation in this field then legislation is not required (in line with the Commission's Better Regulation initiative)*<br>The preferred option would be **Option 1** involving the introduction of an IT Risk Management Platform to facilitate use on a voluntary basis. |
| **5.5. Further work required** | This final draft already includes a first analysis of EUDG members' feedback including a discussion of RBM-II experience by RIVM (i.e. Dutch ministry of public health).<br>It also includes a first analysis of the preferred option concerning the IT development project type as categorised by ITFM and the possible business model.<br>It is suggested that the best option is actually falling in the IT category called 'Platform' including the use of a Cloud computing service (see the draft analysis of business models in annex II).<br>Still one aspect is to be confirmed: **Is it desirable/possible for the Agency to charge fees to the users of the platform?** It is an important decision the Management Team should take in order to finalise the business and operation model analysis.<br>A first analysis suggests that even with low yearly fees charged to users (around 130 euros – BM3 ; around 260 euros - BM4 – see business models developed in Annex II) it would be possible to **outweigh the maintenance and operation costs of the platform** while respecting the fees charging principles established in the Agency regulation.<br>However the Agency did not reach to find a solution for funding the development of the platform, for the moment. |

# 6. Monitoring and evaluation

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| **6.1. Monitoring indicators** | The established Expert Users and Development Group (EUDG) has been assigned a series of tasks re. the established framework for TDG risk management including monitoring and analysis of user feedback (see Terms of Reference for EUDG). It is foreseen that the EUDG will develop specific monitoring indicators including the operation and use of the Risk Management Platform. At this point a preliminary set of indicators would include:<br>› *Level of use of the IT Platform*<br>› *Types of users (incl. country split etc.)*<br>› *Proportion of use cases supported by the IT Platform*<br>› *User experiences (feedback through on-line survey) incl. overall satisfaction and identification of updates' needs.*<br>› *Costs of operating and maintaining the IT Platform* |
| **6.2. Future evaluations** | On the basis of the regular monitoring of the use of framework in general and the IT Platform in particular future evaluations could be undertaken to assess the extent to which the harmonisation benefits have been captured incl. improvement in level of recognition of the results from risk assessment studies.<br>These evaluations are not scheduled yet but may take place after a suitable period of time after the current transition period ends (2020). Such evaluations could also feed into any re-evaluation of the relevant legal framework.<br>Remarks: 1) the general monitoring of the framework is already identified as an activity of the EUDG members ; 2) the specific monitoring of the Risk Management Platform users is counted in the expenses for maintenance and operations of the Platform. |

**Annex I: High level description of the Risk Management Platform**

# Inland Transport of Dangerous Goods Risk Management Platform *(High-level description)*

## Context

The "Inland TDG Risk Management Framework" will be published by the EU Publications Office in 2018 as a deliverable of ERA TDG Roadmap phase I.

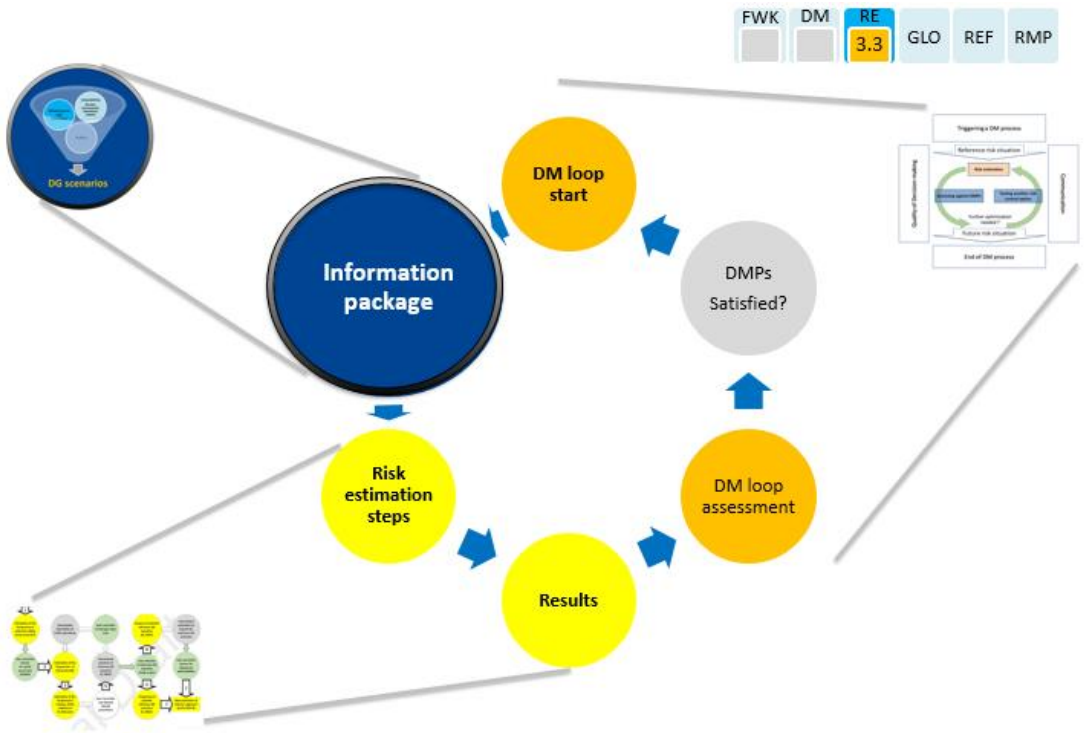
The Agency started the Phase II TDG Roadmap with the aims of maximizing the impact of the published framework and assisting potential users in the implementation of the risk-based decision-making method described in the framework.

One of the components to achieve this objective, as planned in the Agency SPD 2018, is the development of an IT risk management platform.

This document describes the main components of this platform, as envisaged by the Agency with the collaboration of the Expert Users and Development Group of the framework.

Remark: for some packages of the envisaged platform, the methods reported in the framework guides contain a more detailed level of description than the one reported hereinafter.

The "Inland TDG Risk Management Platform" is the tool to facilitate the implementation of the framework method for risk-based decision-making whose main methodological steps are summarized by the diagram below




*Source: Presentation extract from the 1st dissemination workshop, Luxembourg, 10th July 2018*

The risks management platform shall support the implementation of these steps by:

- *Managing decision-making cases and related risk estimations*
- *Describing studied risk situations*
- *Providing risk estimation results for each studied risk situation*
- *Formatting the results of the risk estimations*
- *Comparing the results of different risk estimations*
- *Managing the security of the platform*

The risk management platform shall support the harmonisation of risk management by:

- *Guiding the users in the application of the method (proposing where applicable the reuse of reference material from the knowledge base and configuration of the platform)*
- *Allowing the use of relevant reference data for the risk estimations (continuous improvement of knowledge base) of DG events (description of risk situations, relevant safety performance indicators, transport statistics, dangerous goods releases characteristics*
- *Allowing platform users to select relevant reference data or to improve it with own data in a traceable manner.*

Targeted users of the platform are:

- *Road / railways / inland waterways dangerous goods transporters (including multimodal logisticians)*
- *Infrastructure managers*
- *Public authorities*
- *The Agency*
- *Others, potentially including DG Move for multimodal assessments…*

Having this wide range of users the platform shall be available on the internet. Information about users' risk estimations are confidential and shall not be disclosed to parties other than the concerned user of the platform.

Public reference material (knowledge base) is available to all users of the platform as an assistance for the implementation of the platform.

## Packages of features for the platform

This section describes the features of the platform.


### Package 1: Decision making package

In this package we group the features related to the management of the decision-making cases and related risk estimation files. This will allow a user to manage different studies and within a study have several risk estimations.

Module 1 – risk estimation file management

- The user will create and manage a risk study (understood as a container for several estimations of related risk situations). Within a study the user will describe several risk situations for which risk estimations shall be calculated.

- The users will have the choice to save their studies in the platform (within a limit of resource to be defined) or to export related data in a file.
- Users shall be able to share data and results with other users using a clear and secure process.

Module 2 – results formatting and comparisons

- This module will format the results and will allow comparing risk estimations results of different risk situations in order to provide input to the decision making process.
- Various pre-defined reports are envisaged (risk indicators).

Module 3 – risk calculation configuration

- In this package we integrate parameterization of the study (how many risk situations, modes of transports considered, classes of dangerous goods that are the subject of the study, etc.)

Module 4 – interface manager

- This module shall manage the automation of external input data from users sources that are necessary for the estimation of risks (e.g. import user data from Geographical Information System).
- This module shall also allow exporting risk estimation results from the platform.

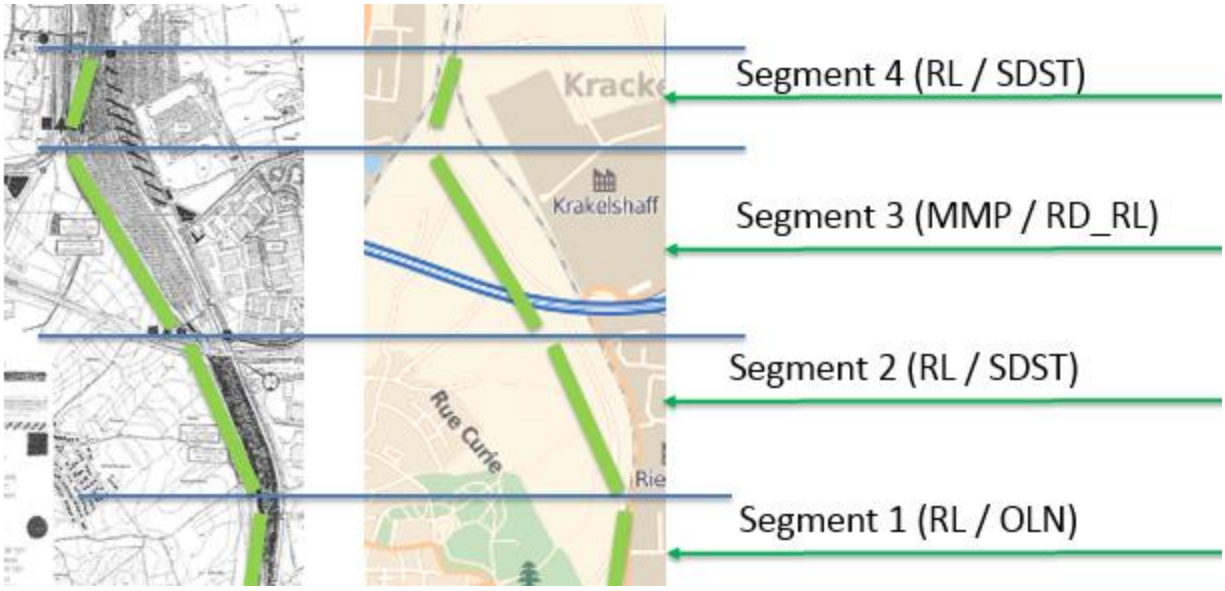
**Package 2: Risk situation description package**

In this package we grouped the features related to the description by the user of one risk situation. This information is used by the calculation engine package features to produce the risk estimation results.

The platform shall allow the user to:

Module 1 -Describe the infrastructure and the operations of interest for the risk estimation

- It consists of defining segments (of railways, roads and/or waterways) and associating relevant characteristics related to the infrastructure and to the operations on these segments.




- The user shall be guided in the tasks by the platform when reference material exists for transport events relating to the infrastructure categories and operations categories.

Module 2 - Describe the traffic (DG traffic, normal freight, passengers)

- It consists of defining segments overlapping the infrastructure segments and associating characteristics related to the traffic, like the classes of dangerous goods carried. It consists also of detailing the traffic structure (like the size of cargoes used).
- The user shall be guided in this task by the platform when reference material exists for the traffic in this area on the corresponding category of infrastructure.

| Segment number (№) | Traffic volume (passengers) | Traffic volume (non DG freight) | Traffic volume (All DG) | Class 1 | Class 2.1 | Class 2.2 | Class 2.3 | Class 3 | Class 4.1 | Class 4.2 | Class 4.3 | Class 5.1 | Class 5.2 | Class 6.1 | Class 6.2 | Class 7 | Class 8 | Class 9 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (1..1000) | (pass./y | (tons/y | (tons/y | (% ton) | (% ton) | (% ton) | (% ton) | (% ton) | (% ton) | (% ton) | (% ton) | (% ton) | (% ton) | (% ton) | (% ton) | (% ton) | (% ton) | (% ton) |
| 1 | | | | 0.03 | 0 | 5.9 | 0 | 81.94 | 0.09 | 0.03 | 0.14 | 1.01 | 0 | 2.35 | 0 | 0 | 5.81 | 2.7 |

- This information is used to estimate the type of releases in case of a dangerous goods event. In this task the user shall also be guided with proposed default values when reference material exists about the traffic composition.
- Based on the traffic structure composition the frequencies of occurrence of dangerous goods can be proposed to the user (based on reference material).

*Remark: peak hours for the traffic may be defined if required by the study.*

Module 3 - Describe the DG scenario relevant for the risk estimation

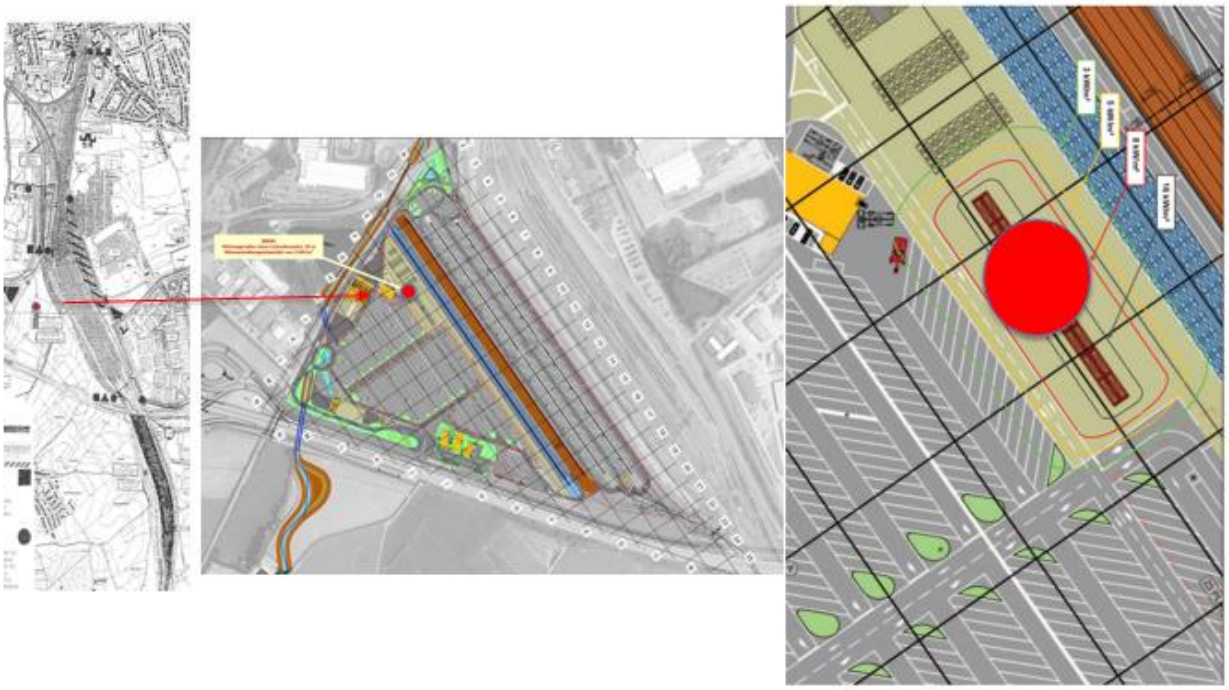
- Based on the classes of dangerous goods in the description of the traffic the platform will propose a list of DG scenarios (based on the table of allocation of DG scenarios).
- The user will select the DG scenario applicable to its risk situation.
- From the selection of the applicable DG scenarios the platform estimates the consequences, for example distance and area of effects of each selected DG scenario.

| Impact type | Probit OR Intensity of the impacts on considered vulnerabilities | Hazardous area (m2) | Maximum hazardous distance (m) | Shape of exposure area footprint | Shape parameter 1 | Shape parameter 2 | Shape parameter 3 | Stability Class | Wind Speed (m/s) |
|---|---|---|---|---|---|---|---|---|---|
| | >= 1% | | | | | | | | |
| Lethality | 1% | 0 | 33.5 | CIRCULAR | 33.5 | | | D | 4 |
| Lethality | 1% | 0 | 29.5 | CIRCULAR | 29.5 | | | F | 1.5 |
| Lethality | 1% | 0 | 0 | | | | | | |

Module 4 - Describe the vulnerabilities

- Based on the areas of effects of the selected DG scenario(s) the platform will show the areas where the vulnerabilities shall be considered.
- The user will define the different vulnerabilities to take into account in the risk situation and provide the characteristics of each vulnerability.

*Remark: areas of effects may have to take into account wind roses if required in the study.*



**Package 3: Calculation engine package**

In this package the features for calculating the risk are detailed. The platform shall provide the following:

Module 1 - Merged mapping

- Once the risk situation is provided the platform shall divide the “map” into cells for the calculation.
- The granularity (size) of the cells shall be determined by the platform based on the information provided in the risk situation description taking into account the segments, the areas of effects and a parameterized value for the precision of the calculations.

Module 2 - Calculation engine

- Based on the information provided in the risk situation description the calculation engine will evaluate the frequency of DG events in each cell of the infrastructure for the traffic.
- It will then evaluate the severity of impact in each cell of the vulnerabilities for the selected DG scenarios.

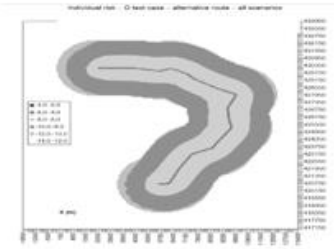
Module 3 - Grid builder and viewer

- In order to allow the user to examine the details of the calculation this module will provide a visual interface showing the cells considered and the details of the calculations for the frequencies of DG scenario and severities of impacts.

Module 4 - Results formatter (connected to comparison module of package 1)

- Various risk indicators derived by aggregating the raw results of the cells shall be possible with the platform (individual risks, F/N curves, societal risks, grouped risks).

| Consequence | Likelihood: Very Likely | Likely | Possible | Unlikely | Highly Unlikely |
|---|---|---|---|---|---|
| Fatality | Extreme | High | High | High | Medium |
| Major Injury | High | High | High | Medium | Medium |
| Minor Injury | High | Medium | Medium | Medium | Medium |
| First Aid | Medium | Medium | Medium | Low | Low |
| Negligible | Medium | Medium | Low | Low | Low |



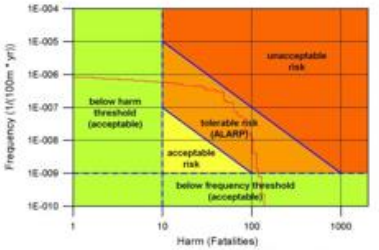



**Figure 5:** Example of a diagram with ISO risk graphs of the spatial distribution of the individual risk (exponent for $10^{-x}$/annum, from [11])

**Figure 6:** Example of an FN graph for societal risk with possible areas for risk evaluation (presentation of principle with arbitrary scaling)

**Package 4: Defaults configuration package**

This package allows the EUDG users to manage the knowledge base used to guide and support public users in elaborating their risk situation description. This information can be overwritten by the user when applicable:

Module 1 - Reference information related to infrastructure and operations

- This is used to configure the infrastructure and operations parameters: mode of transport, infrastructure categories and transport operations categories.
- The reference material related to frequencies of transport events shall also be maintained in this module.

*Remark: Possible future additional interfaces*
*This module may be interfaced with the COR system when it is online and will be able to provide relevant statistics. For other modes similar data may be obtained from an interface with other safety monitoring databases, for example, on the reporting of TDG occurrences.*

Module 2- Reference information related to traffic

- This is used to configure the predefined load size per class of dangerous goods, the predefined characteristics of the traffic structure and the ten most transported goods (UN numbers) per DG class.
- Associated to this information, reference material related to the frequencies of DG events and harmonized release breakdown shall also be maintained in this module.

*Remark: This module may be interfaced with TAF TSI data if anonymous statistics can be extracted from the message conveyed by operators. In 2018, ERA requested RailData to perform a feasibility test concerning the elaboration of some freight transport statistics.*

Module 3- Reference DG scenarios

- In this module we cover the different aspects related to DG scenarios: the list of DG scenarios, the table of allocation of DG scenarios and the pre-calculated reference DG scenario information (covering among others the parameters to calculate the distances and shapes of effect).

Module 4 - Reference information related to vulnerabilities

- This module focuses on vulnerabilities parameters (how to describe vulnerability).

**Platform added-value and feasibility**

The proposed platform is a breakthrough development in the field of risk-based decision-making.

It differs from the two other public tools[1] on the market on the following important aspects:

1. *it is a multimodal harmonized approach*
2. *it is continuously improved and enriched by users and the EUDG through reference material*
3. *it is a recognised and harmonised approach to risk estimations*
4. *it is a recognized and harmonised calculation method (based on existing risk estimation algorithms)*

This harmonisation stage was reached during the 1st phase roadmap with the collaboration of more than 50 TDG experts.

The Expert Users and Development Group (EUDG) was created early 2018, in accordance with the Agency SPD 2018, to maintain and improve the risk management framework.

**EUDG members covers all categories of potential future users.**

This group discussed the platform in two meetings and gave a **favourable feedback** to the platform business requirements proposed by the Agency.

From the experience gained with RBM-II/NL, QRA-Tunnels/PIARC and in-house in depth analysis of the risk estimation method, we have gathered enough evidence to ascertain that **the proposed platform is technically feasible** and may be used by a quite large number of users[2].

Draft static and dynamic data maps of the proposed platform were developed by the Agency to confirm the feasibility.

However, the Agency did not reach to find a solution for funding the development of the platform, for the moment.

[1] RBM-II is the national regulatory tool used in The Netherlands to perform risk estimations, however Dutch ministry of transport supports the development of the proposed harmonised risk management platform in order to allow better recognition of harmonised risk study.
PIARC – QRA-Road tunnel model – uses similar calculation steps but is limited to road tunnel and does not benefit from a transparent and harmonised maintenance and development process. To our knowledge this tool was not maintained from 2005 to 2018 and does not seem to offer the required level of sustainability for public users.

[2] It is estimated that the number of potential users is higher than 1,000 and may reach 8,000 users within the EU and may rise to 30,000, if used outside the EU.

# Annex II: First analysis of business models, costs and revenues

## Initial and On-going costs (estimates from ITFM)

| Cost Estimates | | | | | | |
|---|---|---|---|---|---|---|
| Category | Initial Setup costs/ Upfront costs | On-going Costs | | | | |
| | | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
| Project Initiation Costs | € 200,000.00 | | | | | |
| Hardware | € 75,000.00 | € 15,000.00 | € 15,000.00 | € 15,000.00 | € 15,000.00 | € 15,000.00 |
| Software | € 250,000.00 | € 30,000.00 | € 25,000.00 | € 25,000.00 | € 25,000.00 | € 25,000.00 |
| Compute Capacity Costs | € - | € - | € - | € - | € - | € - |
| Storage Costs | € - | € 5,000.00 | € 5,000.00 | € 5,000.00 | € 5,000.00 | € 5,000.00 |
| Developer Tools Usage | € - | € - | € - | € - | € - | € - |
| Database Costs Usage | € - | € - | € - | € - | € - | € - |
| Hardware Maintenance | € - | € - | € - | € - | € - | € - |
| Software Maintenance | € - | € - | € - | € - | € - | € - |
| Human Resource | € 115,000.00 | € 10,000.00 | € 10,000.00 | € 10,000.00 | € 10,000.00 | € 10,000.00 |
| Training & Adoption | € 85,000.00 | € 40,000.00 | € 30,000.00 | € 30,000.00 | € 30,000.00 | € 30,000.00 |
| Enterprise Upgrades | € - | € - | € 15,000.00 | € 15,000.00 | € 15,000.00 | € 15,000.00 |
| Security & Compliance | € 25,000.00 | € - | € - | € - | € - | € - |
| Data Center | € - | € - | € - | € - | € - | € - |
| *<Add additional cost categories>* | | | | | | |
| *<Add additional cost categories>* | | | | | | |
| *<Add additional cost categories>* | | | | | | |
| *<Add additional cost categories>* | | | | | | |
| *<Add additional cost categories>* | | | | | | |
| **Total Upfront Cost** | **€ 750,000.00** | | | | | |
| **Total Annual Costs** | | **€ 100,000.00** | **€ 100,000.00** | **€ 100,000.00** | **€ 100,000.00** | **€ 100,000.00** |
| **Cumulative Costs** | | **€ 850,000.00** | **€ 950,000.00** | **€ 1,050,000.00** | **€ 1,150,000.00** | **€ 1,250,000.00** |

These estimates are based on the description of the business requirements of the platform reported in annex I and their consistency with the business models analysed in the following section.

## Business models

The following draft scenarios take into account:

- *the light IA preferred option1: an IT assistance to the users for the voluntary use of the guides,*
- *the preferred IT solution: a platform including a Cloud computing service, as categorised by ITFM,*
- *the experience gained by ITFM on the development of the OSS,*
- *an interview on the experience with the software RBM-II (RIVM),*
- *the experience (E. Ruffin) with the road QRA (EC/OECD/PIARC),*
- *the experience (E. Ruffin) with the development of a multimodal QRA (INERIS).*

On this basis, the following business models have been analysed and discussed with ITFM:

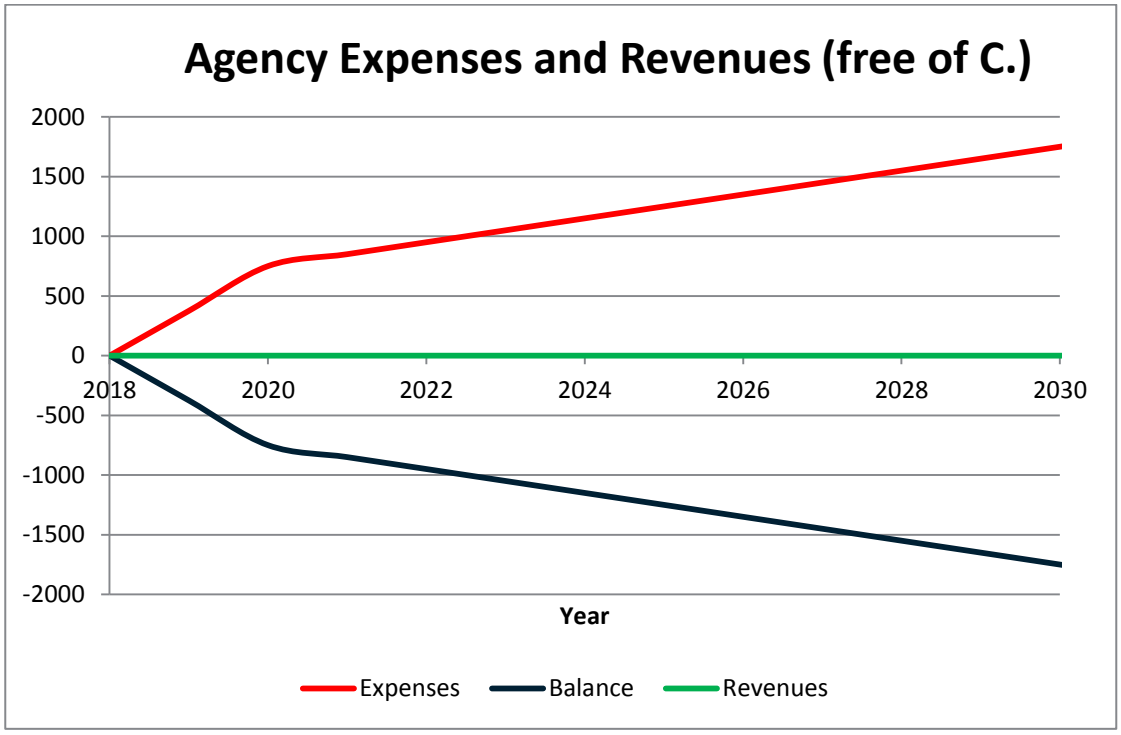
- *(Risky)* ***BM1: A platform opened to any type of users, free of charge.***

  -

  ➔ *It corresponds to ITFM estimation for the initial development and maintenance costs*

  ➔ *Cloud computing service is offered to the users of the platform (risky and maybe impracticable in case of big studies / cloud computing cost may be higher than expected)*

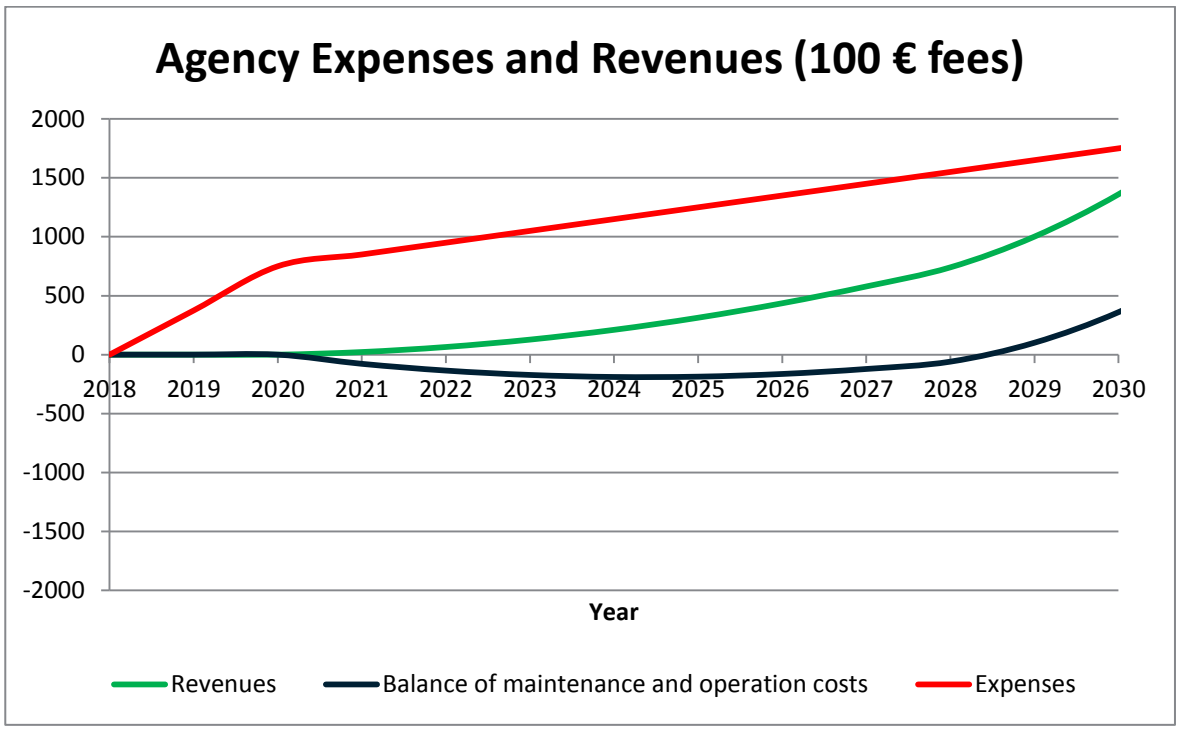
  ➔ *It could be perceived as unfair competition by consultants and /or software editors. However this is considered as a very low risk as today the market is not developed and initiatives by individual consultants are not fully recoginsed by the others. Therefore the Agency is considered to be the best placed institutional actor for the development of a harmonised platform. Consultants that are currently members of the EUDG supports this initiative.*




- *(Not feasible)* ***BM2: A platform only accessible to Consulting companies, including yearly access fees and charging specific Cloud computing costs.***

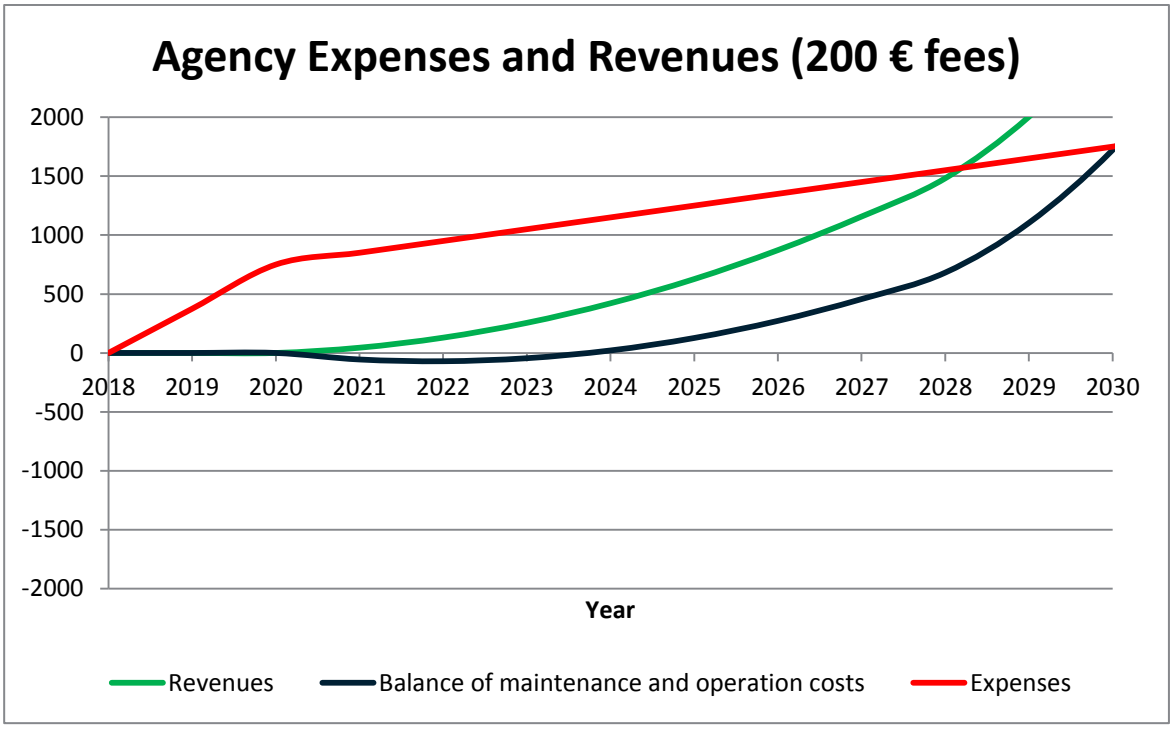
  ➔ *This model seems not applicable for a EU body platform (discrimination of potential users), it would also put the Agency in direct competition with some editors of existing software (e.g. DNV) and would not allow to achieve one of the policy objective: increase the number of users of risk management methodology.*

- *(Not optimal)* ***BM3: A platform opened to any type of users, including yearly access fees covering the cost of a Cloud computing service only for 'small studies'***




- ➔ *Fulfils the policy objective*
- ➔ *Not in competition with consultancy or relevant software markets (to be confirmed by the on-going survey of EUDG members)*
- ➔ *Less risky than BM1 as a part of the operating costs are covered by flat rate access fees (example with 100 euros on average)*
- ➔ *Cloud computing service to be limited to a certain amount per user (to be defined)*
- ➔ *It would not allow to perform big study case, which would be a limitation of the interest for some users.*

- *(Preferred)* ***BM4: A platform opened to any type of users, including differentiated access fees/functionalities depending on the category of users, and charging the user specific Cloud computing service in order to cover 'big' studies and 'small' studies (tailored running costs).***




- ➔ *This model fulfils the policy objectives and would be the less risky for the Agency budget*
- ➔ *Initial investment cost is covered by the Agency budget for subsidiarity reason*
- ➔ *Maintenance, operation (Cloud computing) and specific developments are covered by access (example with 200 euros fees on average) and operation fees.*
- ➔ *It also allows to develop the platform step by step starting with a first version of the platform that is not too complex and, in a second phase, this business model would allow to add specific functionalities for the different categories of users,*
- ➔ *If the number of users allows it, this model might allow to cover the costs of further platform developments using the revenues obtained from the access fees.*

BM4 is considered as the most efficient business model, if it is admitted that the Agency is entitled to charge fees for the maintenance and operation of the platform.