



Conférence Européenne
des Directeurs des Routes
Conference of European
Directors of Roads

BEST4ROAD

Best Practice Guidelines

Deliverable no. 5.5

August 2017

UNIVERSITY OF TWENTE. University of Twente (NL)



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Durth Roos Consulting GmbH (D)

Project Nr. 850767

Project acronym:

BEST4ROAD

Project title:

Best Practice Guidelines for Procurement of Road Maintenance

Deliverable no. 5.5 – Best Practice Guidelines

Due date of deliverable: 31.05.2016

Actual submission date: 30.06.2017

Start date of project: 01.06.2015

End date of project: 31.05.2017

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Version: final

Executive summary

Based on the comparison of the practices of procuring road maintenance in 9 countries three scenarios are identified. The scenarios describe typical road networks for which NRAs procure road maintenance, current procurement strategies NRAs are following for these kinds of network and possible organizational and contextual changes they can be confronted with now or in the near future. These changes represent triggers for rethinking the current procurement strategies for the road networks. For each scenario recommendations are formulated for adapting the current procurement strategy to future developments. The recommendations relate to the following different procurement aspects:

- Outsourcing and integration of maintenance work,
- Performance specification,
- Payment mechanism,
- Contract duration,
- Tender evaluation and
- Contract controlling.

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1 Introduction

The transnational research programme “**Call 2014: Asset Management and Maintenance**” was launched by the Conference of European Directors of Roads (CEDR). CEDR is an organisation which brings together the road directors of 25 European countries. The aim of CEDR is to contribute to the development of road engineering as part of an integrated transport system under the social, economic and environmental aspects of sustainability and to promote co-operation between the National Road Administrations (NRA).

The participating NRAs in this Call are Belgium-Flanders, Finland, Germany, Ireland, Norway, the Netherlands, Sweden, United Kingdom and Austria. As in previous collaborative research programmes, the participating members have established a Programme Executive Board (PEB) made up of experts in the topics to be covered. The research budget is jointly provided by the NRAs who provide participants to the PEB as listed above.

BEST4ROAD is a two years project aiming at the development of best practice guidelines and tools for the efficient procurement of road maintenance in a changing world. Based on a comprehensive and integrative framework for maintenance procurement, the project will bring together the extensive, yet scattered procurement knowledge and experiences at National Road Authorities (NRAs) in 9 countries including the US and Australia. It will determine the lessons learnt at the NRAs and based on that will develop a number of hands-on tools and step-by-step guidance for procuring road maintenance taking current and future challenges of NRAs into account.

The benefit of the BEST4ROAD project for NRAs lies in the integration of an in-depth study and comparison of maintenance procurement practices in different countries with the development of tools and guidelines that can be easily implemented and used at NRAs. This will allow NRAs to learn from their peers and at the same time improve their maintenance procurement practices to get prepared for future challenges such as staff turnover and shrinking budgets.

The BEST4ROAD project consists of seven work packages (WP):

- WP1 – Comparison of maintenance procurement practices
- WP2 – Maintenance procurement strategies and maintenance efficiency
- WP3 – Quick scan method for risk in maintenance procurement
- WP4 – Competence profiles and transition processes
- WP5 – Best practice guidelines
- WP6 – Dissemination and demonstration
- WP7 – Project management

The main objective of WP5 is to combine the results of WP1-4 to develop best practice guidelines that recommend maintenance procurement strategies for typical scenarios, explain the risks related to these strategies, recommend measures to manage the risks, present the competence profiles needed to implement the strategies, and recommend the transition towards strategy implementation.

This report presents three general scenarios and makes recommendations for the procurement of road maintenance for these scenarios.

2 Scenario Overview

Based on the comparison of the practices of procuring road maintenance in 9 countries three scenarios are identified. The scenarios describe typical road networks for which NRAs procure road maintenance, the procurement strategies NRAs can follow for these kinds of network and possible organizational and contextual changes they can be confronted with now or in the near future. These changes represent triggers for rethinking the current procurement strategies for the road networks. The three scenarios are:

Scenario 1 – Outsourcing and integration

The first scenario covers a situation many NRAs have already experienced: the transition from single maintenance contract and partial inhouse capacities to further outsourcing and integration of road maintenance under an increased political pressure. It addresses in particular the decision of whether and how a NRA should outsource and integrate road maintenance.

Scenario 2 – Extreme weather and unique structures

In the second scenario, the NRAs already outsource and integrate road maintenance to a certain extent. However, the conducted maintenance of the contractor appears to be insufficient when it comes to extreme weather events such as heavy rain and snowfall. In addition, the expertise of the NRA in managing unique structures is slowly vanishing.

Scenario 3 – Urban area and technology development

In the third scenario, the road network is located in an urban area with an expected further increase in traffic intensity. For the NRA, this means deciding to which extent the existing comprehensively integrated contracts can be further applied or should rather be de-bundled. The role of the NRA in developing and implementing new technologies comes in as an additional factor to consider.

For each scenario recommendations are formulated for adapting the current procurement strategy. The recommendations relate to different procurement aspects such as performance specification, payment mechanism and contract duration. They are amalgamations of the lessons the different NRAs investigated in the BEST4ROAD project have learned and which cover the following themes (BEST4ROAD1.3, 2017):

- Contract incentives
- Contract complexity
- Contract flexibility
- Risk transfer
- Relationship building
- Competence development and retention

In this sense, the three scenarios with their recommendations are not representing specific NRAs but possess common characteristics and best practices identified across all investigated NRAs.

3 Scenario 1 – Outsourcing and integration

3.1 Scenario characteristics

Network

The first scenario addresses a regional highway network in a rather rural area with medium to high traffic intensity. The network consists of typical road assets such as pavements, drainage systems, guardrails and fences. Because of its topological location the network also includes a number of bridges and tunnels that are almost at the end of their lifetime and need to be rehabilitated or replaced within the next years. The network is exposed to a rather mild climate with moderate winters and only few extreme weather events during the year.

Organization

The NRA responsible for the management and maintenance of the road network is organized around a central office and a number of regional offices. All asset management activities are done inhouse. Rehabilitation work is planned and coordinated at the central office whereas the responsibility for regular maintenance lies with the regional offices. Here at the regional level the agency also has some inhouse resources for regular maintenance and traffic management available. That is, monitoring of road condition as well as planning of maintenance measures are performed by NRA staff and most of the operational work is performed by specific contractors. For each regular maintenance and rehabilitation task separate contracts are let. If tasks have to be performed just once (e.g. pavement rehabilitation), discrete contracts are used. Framework contracts are in place for reoccurring or demanded tasks (e.g. mowing grass). The contracts typically have short durations. Performance specifications are task-related as contractors have to carry out prescribed maintenance work. The payment mechanism is based on unit prices. Through their involvement in planning, coordinating, and executing maintenance work employees in the regions possess a comprehensive understanding of the assets and their technical behaviour and peculiarities. However, this knowledge primarily rests in the employees' heads.

Context

In recent years the NRAs have witnessed an increased political pressure for delivering more value with less money. The national government introduced a new policy that aimed at greater competition in the delivery of public services while keeping the current level of service quality. Based on this policy, the NRA decided to outsource more of its operational activities to the private sector and integrate them into larger packages to reduce the number of contracts to be managed.

3.2 Scenario recommendations

The described scenario is typical for NRAs that show a low level of outsourcing and integration (see BEST4ROAD1.3, 2017) and many NRAs experienced this scenario a number of years ago. However, there are still NRAs for which this scenario is or again becomes relevant. Under this scenario NRAs are forced to move from what is described as procurement strategy B towards procurement strategy C (BEST4ROAD2.4, 2017) or a transition towards a higher degree of outsourcing and integration of maintenance work. Here, it is generally recommended to make this move carefully taking the characteristics of the network and the organisation into account. Instead of procuring comprehensive packages of maintenance work including regular maintenance, rehabilitation and asset management activities, NRAs should follow a strategy that corresponds with the current number and condition of owned assets and the competences available at NRAs and private parties.

Typically, the transition towards integrated contracts is characterised by an increasing need to develop deeper contractual competences such as monitoring and surveillance and contract negotiation. Communication and relationship management skills are also vital for this transition to be successful as potentially closer relationships need to be managed and to drive certain supplier behaviours. However, technical skills are still important to understand, for instance, asset condition data, duration and cost of maintenance activities.

Apart from the degree of outsourcing and integration, a new procurement strategy may also involve a change in the performance specifications, the payment mechanism, the contract duration, the tender evaluation and the contract controlling. In this regard, it is recommended to apply the developed quick scan method (BEST4ROAD3.2, 2017) to identify possible risks of changing the different aspects in procuring road maintenance.

For the scenario described above the following recommendations can be made:

Recommendations related to outsourcing and integration of maintenance work

Currently the NRA has implemented separate contracts for regular maintenance and rehabilitation. It is therefore recommended to start with the integration and outsourcing of regular maintenance activities and particularly those that are done by NRA staff. Rehabilitation work should still be separately procured. On the one hand, this prevents the NRA from managing too large contracts for which the required contractual and relational competences are not available at the organization. On the other hand, such an integration would also mean a transfer of asset management activities to the private sector and thus represents a risk for the NRA as most of the asset-related knowledge is bound to single employees in the regions.

In terms of the assets included in the integrated contracts for regular maintenance, it is recommended to exclude bridges and tunnels due to their large number and expected end-of-service life. Depending on the remaining life time of the different structures it might be worth considering a contractual solution that integrates maintenance activities for the service life extension to achieve a more balanced rehabilitation planning.

With an integrated contract for regular maintenance of network assets the NRA may lose some of its flexibility to decide on time and extent of activities to be carried out. Depending on the assets, their performance behaviour and location in the network, the NRA may keep some of the framework contracts.

Part of the considerations for the integration of maintenance work should be the evaluation of market and the competences of the contractors to conduct the expected work. This also includes activities like traffic management that, given the medium to high traffic intensity on the network, could remain the responsibility of the NRA.

Recommendations related to performance specifications

Until now performance specifications have been task-related and the contractor had to perform prescribed maintenance activities. With the move towards a more integrated contract the specified performance could be asset-related. This would offer the contractor the opportunity to plan the maintenance activities in a more efficient way. At the same time, many regular maintenance activities are difficult to specify in terms of asset performance such as litter removal or grass mowing. Vague or unclear specifications bear the risk of misinterpretations or opportunistic behaviour of the contractor. In addition, if performance requirements are set too high, the contractor may not be able to comply with them for a reasonable price. Thus, it is recommended to only use asset-related performance specifications if they can be described in a SMART and achievable way and if the contractual competences are available at the NRA to do so. For other activities, it will be more beneficial to keep task-related performance specifications.

Recommendations related to payment mechanism

The payment mechanism is related to the performance specifications. The integrated contract suggests a change from unit price towards lump-sum payment to stimulate the contractor to obtain efficiency gains. However, this comes with the risk that the contractor tries to reduce costs by doing as less as possible instead of by improving its processes. This may particularly be the case if an unexperienced contractor gets the contract awarded based on a very low bid price. The lower price paid by the NRA might then be offset against higher costs for contract control, negotiation and conflict resolution. These costs can be even higher if the necessary contractual and relational competences are not present at the NRA. It is thus recommended for this scenario to rather use a hybrid form of payment mechanism that uses lump-sum only for activities with clearly specified performance and little expected changes in the amount of work to be carried out and unit prices for other activities.

Recommendations related to contract duration

For implementing an integrated contract, it seems reasonable to let the contract for a period longer than one year. Contractors always need some time to settle in and get familiar with the network before efficiency gains can be achieved. However, longer contracts do not necessarily stimulate innovative approaches of the contractor particularly if those require additional investments and the contract period is shorter than the asset service life. In addition, the longer the duration of the contract, the less the flexibility of the NRA to respond to contextual changes. Thus, for this scenario a contract duration of three years is recommended. It gives the contractor sufficient time to capitalize on potential learning and keeps enough flexibility for the NRA. It could be considered to offer the possibility for extending the contract for a period up to one or two years to set an incentive for the contractor.

Recommendations related to tender evaluation

With the integrated contract, more responsibility for coordinating and planning regular maintenance work is shifted to the contractor and this requires related competences from the contractor. A tender evaluation solely on price would ignore the capability of the contractor to do the work in an integrated manner and bears the risk of accepting a bidder lacking these competences. It is recommended to use a tender evaluation based on quality and price. Quality refers in this scenario to the capability of contractors to plan and coordinate the regular maintenance work and they should prove this capability by presenting for example a quality management plan or a maintenance operation plan. The prices of the contractors are then only considered if contractors pass a minimum threshold value of the quality evaluation. Since the NRA has the technical competences and experiences inhouse, it should be possible to assess the feasibility of the submitted quality documents and the proposed approaches and measures.

Recommendations related to contract controlling

In order to reduce the effort of the NRA to control the delivered work of the contractor, the contractor can be put in the position of providing evidence for the accomplishment of the contractually agreed work and performance specifications. For the NRA, it is important to do site inspections on a regular basis to verify the reported performance of the contractor. The technical competences and experiences of the employees in the region are beneficial for this assessment. However, the NRA should also start collecting and storing the reported performance in a structured way to make the data accessible and useful for the asset management of the NRA and any follow-up contractor.

4 Scenario 2 – Extreme weather and unique structures

4.1 Scenario characteristics

Network

The second scenario is covering a regional network of highways and primary roads in a rural area with medium to low traffic intensity. The network consists of typical road assets such as pavements, drainage systems, guardrails and fences. Due to a larger number of rivers and channels the network also includes a large number of movable bridges. Some of these bridges are very old and possess monumental status. They use specific driving mechanisms to lift up the bridge deck. The network is located in a region with humid climate that regularly leads to heavy rainfalls in summer and heavy snowfalls in winter.

Organization

The NRA responsible for the management and maintenance of the road network is organized around a central office and a number of regional offices. All asset management activities are done inhouse. Rehabilitation work is planned and coordinated at the central office whereas the responsibility for regular maintenance lies with the regional offices. This also includes that information about assets (e.g. location, dimension, condition) is collected in decentralized systems in the regions. While daily monitoring of road condition as well as planning of maintenance measures are performed by NRA staff, the operational work is completely done by private contractors. Detailed inspections and condition monitoring are also executed by private engineering consultants. Integrated contracts are used for regular maintenance (including winter maintenance) and discrete contracts are let for rehabilitation work. The integrated contracts have a duration of five years with a possible extension of two years. For both integrated and discrete contracts asset-related performance specifications and lump-sum payments are applied. Typically, at the regional offices employees have been working who possess a comprehensive understanding of the assets and their technical behaviour and peculiarities. However, most of those employees have already retired or are about to retire in the next couple of years.

Context

Over the last years the number of extreme weather events has increased. During summers there were more heavy rainfalls leading to flooded roads and it turned out that flooding was partly a result of clogged drainage systems. During winters there were a number of blizzards causing blocked roads and highways for a longer time, since the snow removal capacity of the contractor appeared to be insufficient.

4.2 Scenario recommendations

In this scenario, the NRA has already outsourced and integrated maintenance work and follows procurement strategy C as described in BEST4ROAD2.4 (2017). It represents a typical situation NRAs are confronted with and addresses contextual changes that require adjustments in the procurement of road maintenance. This does not necessarily mean that the entire procurement policy has to be changed. Within the boundaries of the policy, adaptation of procurement aspects might be already possible and sufficient to cope with the new situation. In this sense, it is recommended to first assess the possibilities within the existing procurement policy for adapting the procurement of road maintenance for a specific network. This also suggests that procurement policies should not be rigidly formulated and adhered to, but should be flexible enough to allow tailored procurement strategies for regional networks or single assets.

Adapting or tailoring a procurement strategy may involve changes in the extent of outsourcing and integration, the performance specifications, the payment mechanism, the contract duration, the tender evaluation and the contract controlling. In this regard, it is recommended to apply the developed quick scan method (BEST4ROAD3.2, 2017) to identify possible risks of changing the different aspects in procuring road maintenance.

For the scenario described above the following recommendations can be made:

Recommendations related to outsourcing and integration of maintenance work

The NRA is using integrated contracts for all regular maintenance activities to be done at the network including winter maintenance. The capacity problems of the contractor during blizzards suggest to remove winter maintenance from the integrated contract if the NRA cannot accept the risk of having roads blocked by snow for a longer period during the extreme event. Framework contracts for winter maintenance may then bring back some flexibility for the NRA to decide when, where and how much capacity is deployed for snow removal. The drawback of this approach is an increased planning and coordination effort of the NRA and the necessary competences for it. The NRA may also consider keeping winter maintenance as part of the integrated contract and additionally use framework contracts for increasing capacity during extreme events. However, this requires a clear distinction between regular and extreme snowfall and enough regional contractors that are able to provide additional winter maintenance capacity.

The old movable bridges are unique for the region and until now the NRA has had internal technical competences for the monitoring, maintenance planning, and structural design of these bridges. The competences have been developed over the years by a number of employees who have already retired or are going to be retired. In other words, there is the risk of losing these competences. This may suggest to outsource the activities done by NRA staff to engineering consultancy firms. However, the uniqueness of the bridges and the specialised competences needed to keep them working may not persuade these firms to develop these competences as the market is too small. If engineering firms are not willing to invest in competence development, the NRA needs to ensure that knowledge and competences of staff members are transferred to other or new employees. Transition periods in which experienced and new employees are working together in teams may be a possible approach for this.

Recommendations related to performance specifications

The experienced problems with flooded roads due to clogged drainage systems and roads blocked by snow due to limited winter maintenance capacity of the contractor suggest that current performance specifications do not adequately address extreme weather events. The NRA uses asset-related performance specifications which in the case of drainage systems may be vaguely formulated (e.g. "The drainage system needs to be free of debris."). As a consequence, the drainage capacity might be reduced at certain moments which could be unproblematic for normal rainfall but more serious in case of heavy rainfall. Although a more precisely formulated performance specification can stimulate the contractor to keep the drainage capacity at a certain level, it cannot guarantee this level because contractors can have different risk attitudes. In addition, flooding can also occur if the drainage systems have been properly maintained. In this case, the maximum drainage capacity of the system has been exceeded. The challenge for the NRA is to distinguish between flooding as a result of a clogged drainage system and flooding as a result of the maximum drainage capacity of the system exceeded. It is recommended to ensure, at least, performance specifications that do not allow room for different interpretations so that the risk of a flooded road can be clearly allocated.

A clear distinction between regular and extreme snowfall and thus risk allocation becomes also important if the capacity problem during winter maintenance emerges from the performance specifications. In other words, the contractor may have enough winter

maintenance capacity to also deal with heavy snowfall, but from his perspective the performance specifications do not cover the extreme event and thus he is not contractually obliged to increase his capacity.

Recommendations related to payment mechanism

The NRA uses lump-sum payments for its contracts which may also induce the performance problems with the drainage systems and the winter maintenance particularly in combination with the performance specifications. The contractor might be tempted to reduce its costs by putting as less effort as possible in maintaining the drainage system with the possible implication that the system is just working under normal rainfall but not under heavy rainfall. Similar for winter maintenance the contractor may try to orientate its capacity planning on the normal snowfall and may ignore the heavy snowfall events to lower its costs. Penalties can be applied to counteract such behaviour but require clear performance specifications to be effective. Using unit price payment particularly in combination with framework contracts can move the risk assessment and treatment back to the NRA and can bring back flexibility for the NRA to deal with uncertain but critical events.

Recommendations related to contract duration

The contract duration of currently five years is possible for the integrated contract. However, it might be also worth considering a reduction to three years to increase the flexibility of the NRA for conducting rehabilitation work on the drainage system. In addition, with a shorter contract duration the NRA could continue with winter maintenance as part of the integrated contract to further assess the criticality of blizzards and the capacity of the contractor. In case the performance of the contractor remains low, the NRA can still pull out winter maintenance within a short time period. If framework contracts are let for winter maintenance, a contract duration of one to two years is sufficient.

Recommendations related to tender evaluation

Quality assessment of the bidding contractors becomes essential for the NRA during tender evaluations. It will ensure that contractors have the competences to maintain the required performance level of the drainage systems and have sufficient capacity in place to deal with certain winter conditions. Here, it should be clear from the tender documents to which winter conditions performance specifications refer to or to which extent the risk of heavy snowfall is transferred to the contractor. The prices of the contractors are then only considered if contractors pass a minimum threshold value of the quality evaluation.

Recommendations related to contract controlling

As part of the integrated contract, the contractor is responsible for providing evidence of the conducted work and the performance status of the assets. This information should be stored and analysed in the already existing systems of the NRA to give early indication for any insufficient performance of the contractor. Here, it might be also beneficial to work towards a more centralised system or allow the sharing of data between regions. This would make comparisons between regions and contractors possible to give further indications of expected performance of assets and contractors. For being able to quickly respond to capacity problems the contractor may face during winter maintenance, such problems should be immediately reported to the NRA. Based on the performance specifications and the available capacity the NRA can then decide whether a reduced performance level is accepted or additional capacity shall be mobilized.

5 Scenario 3 – Urban area and technology development

5.1 Scenario characteristics

Network

The third scenario is about a network of highways and primary roads in an urban area with high traffic intensity. The network consists of typical road assets such as pavements, drainage systems, guardrails and fences and a few structures such as bridges. Due to the urban location, the network has many road equipment and communication devices such as traffic lights, road signs and traffic control systems. The network is exposed to a rather mild climate with moderate winters and only few extreme weather events during the year.

Organization

The NRA responsible for the management and maintenance of the road network is organized around a central office and a number of regional offices. Most of the asset management activities are done inhouse. Rehabilitation work about a certain threshold value is planned and coordinated at the central office whereas the responsibility for regular maintenance lies with the regional offices. This also includes that information about assets (e.g. location, dimension, condition) is collected in a centralized system. Monitoring of road condition as well as planning of maintenance measures is only partly done by NRA staff. Asset inspections and planning for all maintenance work up to the threshold value is taken over by private contractors. The operational work is completely done by private contractors. Integrated contracts are used for regular maintenance and rehabilitation work up to the defined threshold. Discrete contracts are let for the remaining rehabilitation work. The integrated contracts have a duration of seven years with a possible extension of two years. For both integrated and discrete contracts asset-related performance specifications and lump-sum payments are applied. Many employees who had a comprehensive understanding of the assets and their technical behaviour and peculiarities have left the NRA in recent years and have not been replaced.

Context

The traffic intensity in urban areas is expected to further increase. More and more people move towards cities and the number of registered cars has increased as well. At the same time, innovative developments regarding information technologies have made a leap forward allowing more reliable and timely tracking of traffic and provision of route information to users.

5.2 Scenario recommendations

In this scenario, the NRA has gone far with outsourcing and integrating of road maintenance work and follows what is described as procurement strategy D in BEST4ROAD2.4 (2017). Although this strategy can provide efficiency gains if the right contractual and relational competences are present at the NRA, it also reduces the flexibility of the NRA to quickly respond to dynamic developments in urban areas or new technologies. The challenge lies here in finding the appropriate involvement of the private sector while keeping enough options open for adjusting to changed situations. The often too abrupt transition towards a comprehensive outsourcing and integration of maintenance work has ‚hollowed out‘ (loss of staff, competences and knowledge) NRAs quickly. That makes it difficult to get control back since it also requires to get competences and knowledge back. Increasing control and flexibility of the NRA eventually coincides with a transition back towards procurement strategy C. Such a transition requires a careful evaluation of procurement aspects to identify

those aspects that can provide more flexibility. This also includes the evaluation of the existing competences at the NRA and the extent to which certain competences need to be redeveloped. In this regard, it is recommended to apply the developed quick scan method (BEST4ROAD3.2, 2017) to identify possible risks of changing different aspects in procuring road maintenance.

For the scenario described above the following recommendations can be made:

Recommendations related to outsourcing and integration of maintenance work

The NRA is currently using quite integrated contracts that not only include regular maintenance but also rehabilitation work up to a certain threshold value. Given the expected further increase in traffic intensity it is recommended to remove the rehabilitation from the integrated contract and use discrete contracts to procure this work. With the limited time windows for maintenance work in an urban area, gaining efficiency through the combination of regular maintenance and rehabilitation is rather restricted. In addition, preventive maintenance strategies are also harder to realize because of the split in responsibilities for rehabilitation work between the NRA and the contractor. Giving the full planning and coordination control of the larger maintenance work back to the NRA would offer the possibility to achieve more preventive maintenance strategies with minimal traffic hindrance. Since this kind of work has already been planned at the NRA, the necessary competence is available. Regular maintenance can stay in the integrated contract, since the management effort in an urban area can be considerable and can be best transferred to the contractor.

In terms of assets, it might be also beneficial to remove the communication devices from the integrated contract. On the one hand, due to the large number of devices, there is the possibility for separate contracts that can be interesting for specialised contractors and may also allow for some efficiency gains. On the other hand, due to the importance of the devices for the traffic flow in the urban network, having their maintenance subcontracted under the integrated contract increases the coordination effort in case of disruptions. The introduction of new technologies might be hampered as well. Separate contracts could be set up in a way that the implementation of innovative technologies is stimulated. In order to rebuild necessary technical competences at the NRA, it should be considered to set up partnership contracts.

Recommendations related to performance specifications

Until now performance specifications have been asset-related. For the regular maintenance activities, it is recommended to evaluate whether asset performance is SMART formulated. Many regular maintenance activities are difficult to specify in terms of asset performance such as litter removal or grass mowing. Vague or unclear specifications bear the risk of misinterpretations or opportunistic behaviour of the contractor. For the urban area specifications in terms of worker and road user safety are essential and need extra attention. Performance specifications can be also used to trigger innovative approaches. This requires, however, contractual and technical competences of the NRA. Sometimes contracts are not specified well enough (to allow for innovation) and in these instances contractors may use these contractual shortcomings to their own advantage, e.g. supplying a cheaper material than NRAs expected but did not specify.

Recommendations related to payment mechanism

The currently used lump-sum payment alone will be not sufficient to drive innovations at the contractor's side. It may provide incentives to find new approaches for organising the maintenance process, but in order to stimulate the implementation of new product technologies the NRA should work with other incentives. This may involve extra budget that is reserved for innovative ideas the contractor proposes or the share of cost-savings that are achieved by using an innovative solution.

Recommendations related to contract duration

Whether a contract duration of seven years will work as incentive for the contractor to invest in new technologies depends on the expected service life of the assets. Since communication devices have a rather short service life, the contract duration might be sufficient to work as incentive. However, it is recommended to assess the service life of the assets that are covered by the contract and whether the contract duration is long enough for the contractor to replace the asset several times. Then the contractor is forced into a situation where he has to think about an appropriate strategy for replacing them and if investing in new technology can lead to a more cost-effective strategy. If the contract period is less than the service life of an asset, investments in new product technologies cannot be expected. The drawback of a longer contract duration is a lower flexibility of the NRA.

Recommendations related to tender evaluation

The integrated contract is associated with more responsibility of the contractor for coordinating and planning maintenance work and this requires related competences from the contractor. It is recommended to use a tender evaluation based on quality and price. Quality refers in this scenario to the capability of contractors to plan and coordinate the regular maintenance work by taking into account the traffic situation and the related safety issues. They should prove this capability by presenting for example a safety management plan or a maintenance operation plan. The prices of the contractors are then only considered if contractors pass a minimum threshold value of the quality evaluation. The NRA may also consider eliciting innovative ideas through the tender procedure and evaluating the innovativeness of bidders. Besides contractual competences this will also require from the NRA some technical understanding to be able to specify requirements and assess bids.

Recommendations related to contract controlling

With an integrated contract, the contractor is put in the position of providing evidence for the accomplishment of the contractually agreed work and performance specifications. For the NRA it is important to do site inspections on a regular basis to verify the reported performance of the contractor. Particularly at the beginning of a contract it might be beneficial to check the compliance of the contractor with safety and traffic management requirements. The centralized system for collecting data on asset performance and conducted maintenance can help in detecting any deviations of actual from scheduled performance. Depending on innovative solutions proposed the NRA can consider setting up test sites to get a better understanding of the performance of the solution and the requirements for implementing and operating it. This would also include a specific monitoring system that should be established together with the contractor.

6 Conclusions

In this report three different scenarios of procuring road maintenance are presented, which try to cover the diversity of road network characteristics, procurement strategies NRAs can follow and the contextual and organizational changes they can face. With the scenarios recommendations are provided for NRAs on how they can adapt their current way of procuring road maintenance. However, it is important to note that each NRA has its own organisational history, structure and working culture. Whether and how procurement strategies should be changed depends on a number of organisational factors such as the available technical and managerial knowledge and skills, the existence of careful asset inventories, sound history and trend data on asset conditions and maintenance cost. Often the effects of changed practices on working procedures, competencies of employees and relational behaviour of contract partners are insufficiently assessed. Forced to quickly present a changed situation, the dynamic and complex character of a change in procurement is often neglected. That also means that much effort is employed to find adequate answers to problems in the management processes, but less effort is spent to find ways how these answers could become part of the operational practice. With the developed scenarios, it should be also shown that changing practices require additional effort and resources to adjust them to the peculiarities of the network, the organization and the market situation. What is often neglected is the fact that change processes do not stop with a new concept or a first successful test in a pilot project. Implementation and consolidation of new practices are also connected with conflicts and problems emerging from contradictions with the existing social, legal and technical environment of which the new practice becomes part. Additional effort and resources are needed to address these problems and to integrate the new procurement practice into its surroundings.

7 References

BEST4ROAD1.3 (2017). Framework for Analysing Maintenance Procurement Practices, BEST4ROAD project, Deliverable no. 1.3, June 2017.

BEST4ROAD2.4 (2017). Maintenance Procurement Strategies and Maintenance Efficiency, BEST4ROAD project, Deliverable no. 2.4, June 2017.

BEST4ROAD3.2 (2017). Maintenance Procurement Strategies and Maintenance Efficiency, BEST4ROAD project, Deliverable no. 3.2, July 2017.

BEST4ROAD4.3 (2017). Competence Profiles and Transition Processes, BEST4ROAD project, Deliverable no. 4.3, June 2017.