Responsible Sensing Lab

Prototype of a procurement tool for cities to safeguard autonomy

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Introduction

This is a prototype of a decision aid intended to support cities in incorporating strategic autonomy into their decision-making process when making and/or buying digital services. The Responsible Sensing Lab established the prototype through interviews with experts from academia and practice, a literature review, and pilot studies. The prototyped decision aid is intended for use by relevant municipal roles such as the "Opdrachtgever," "Inkoper," and "Aanbestedingsteam" during the procurement process of digital services.

The prototype comprises several questions, which are organised into three parts. Part 1 represents the starting point of the decision aid and focuses on clearly defining the functionality that the municipality aims to realise and assessing its criticality. The resulting criticality score is used in this decision aid to assess the need for strategic autonomy. If a functionality is deemed critical in Part 1, high levels of technological sovereignty are desirable. For critical functionalities, we therefore recommend that users of this decision aid proceed to Parts 2 and 3.

Part 2 is intended to aid in choosing a strategy to realise the functionality. This entails deciding whether a functionality is realised through means available in-house, outsourced to the market, or realised in a collaboration between the municipality and the market. Part 2 relies on questions probing the internal and external factors that affect a municipality's ability to be in control and provides a recommendation about the strategies to be favoured.

Part 3 is intended to assess specific vendor options regarding technological sovereignty. It should be filled in to choose a vendor with which the municipality exerts a reasonable amount of control to achieve the desired functionality. This part may also be filled in to assess the current vendor at critical milestones, even when there are no alternative vendors to compare. Note that if the questions presented in this part are used to assess vendor options, this should be transparent to the vendors.

We are looking for feedback on the prototype tool presented in this document. If you have any thoughts or suggestions, please contact: rsl@ams-institute.org.

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Part 1: Functionality and criticality

Why?

Part 1 is intended to give you a clear picture of the functionality you aim to realise and how critical this functionality is for the city. This tool uses criticality to assess the need for sovereignty. Parts 2 and 3 should only be filled in for critical functionalities (see criticality score at the bottom).

How?

Describe the functionality you aim to realise in section 1. Functionality. Then asses the criticality of this functionality by choosing the most fitting options for the questions in section 2. Criticality.

Who?

The questions in this part are meant to be filled in by the "Opdrachtgever".

1. Functionality

Questions		Answer
1.1	**What functionality are you looking for? List the different outputs expected from the functionality.**	

2. Criticality

Questions		Alternatives			Answer
		A	**B**	**C**	
2.1	**Is the functionality critical for the city? (Now, or in 10 years)** Check whether your city has defined the functionality you seek to realise as critical. For Amsterdam, critical functionalities are listed in the "Lijst Kernprocessen".	The functionality is non-critical to the city.	I am unsure about the functionality's criticality.	The functionality is critical to the city.	

If your answer to the previous questions is "B. Unsure.", proceed by filling in the questions below to assess the criticality of the functionality. If your last answer is either "A" or "C", you could directly read the "Recommendation".

Questions		Alternatives			Answer
2.2	**What is the impact if the functionality is not available? (Now, or in 10 years)**	No or little negative impact on the city and it's people.	Significant adverse impact on the city and it's people.	Catastrophic impact on the city and it's people.	
2.3	**How many fallback options are available if the functionality is not available?** For example, in traffic management, even if the traffic light system fails, personnel could be deployed to manage the traffic. In case insufficient people are available, the default traffic rules could still keep the city running.	There are at least four levels of fallback options.	There are at least two levels of fallback options.	There are no fallback options whatsoever.	
2.4	**Does this functionality include the handling of sensitive information in any way?**	No sensitive information is included in this functionality in any way.	Somewhat sensitive information is included in this functionality.	Highly sensitive information is included in this functionality.	

Results Part 1: Functionality and criticality

Result	Recommendation
Your answer to question 2.1 is A.	**The criticality score for the functionality you aim to realise is LOW. No further analysis with regards to technological sovereignty is required.**
Your answer to question 2.1 is B and your criticality score is LOW (Criticality score < 1.8).	**The criticality score for the functionality you aim to realise is LOW. No further analysis with regards to technological sovereignty is required.**
Your answer to question 2.1 is B and your criticality score is HIGH (Criticality score ≥ 1.8).	**The criticality score for the functionality you aim to realise is HIGH. This means that careful deliberation on how to realise this functionality is required. We recommend completing Phase 1 and Phase 2 of this tool.**
Your answer to question 2.1 is C.	**The criticality score for the functionality you aim to realise is HIGH. This means that careful deliberation on how to realise this functionality is required. We recommend completing Phase 1 and Phase 2 of this tool.**

Part 2: Make or buy mix

Why?

Part 2 is intended to aid in choosing whether to make or buy the functionality described in Part 1. This entails deciding whether a functionality is realised through means available in-house, outsourced to the market, or realised in a collaboration between the municipality and the market. Furthermore, options such as seeking collaboration with partners like VNG or supporting a startup in-residence program are considered in this part.

How?

Choose the most fitting options for the questions in section 3. Internal factors affecting control and section 4. External factors affecting control. If you don't know the answer to any of the questions below, fill in option A.

Who?

The questions in this part are meant to be filled in by the "Opdrachtgever".

3. Internal factors affecting control

	Questions	Alternatives			Answer
		A	**B**	**C**	
3.1	**Do you need support from an external consultant to outline the technical requirements, or can your team manage it independently?**	Extensive support from an external consultant is needed.	Some support from an external consultant is needed, but we can largely outline the technical requirements ourselves.	We can outline the technical requirements entirely without support from an external consultant.	
3.2	**Do you have the resources (e.g., tech know-how, capacity, leverage) to deliver the functionality yourself?**	Not at all.	At least for a few critical parts.	Entirely.	
3.3	**Do you have the resources (tech. know-how, capacity, leverage over (sub-) suppliers,...) necessary to enforce or avoid practical changes to the functionality?** There may be situations where the supplier is influential and reluctant to carry out changes requested by you despite the contractual obligations. There may also be situations where the supplier performs changes (such as software updates) without the explicit consent of the city, and the city does not have enough control to avoid them. We want to avoid such situations.	Not at all.	We have the resources necessary to understand and enforce/prevent practical changes to a few parts of the functionality, but not all.	Yes, for all of the functionality.	

3.4	**How likely is it that the answers to the above questions (3.1 - 3.3) will remain the same for the foreseeable future?**	No certainty.	Two years.	Five years.
3.5	**How confident are you in your answers to the questions in section 3 -- are they based on informed guesses, analysis or practical observations?**	Based on informed guesses.	Analysis.	Practical observations (there is already a precedence).

4. External factors affecting control

Questions		Alternatives			Answer
		A	**B**	**C**	
4.1	**What is the number of organisations (commercial vendors, other gov. organisations,...) that could provide this functionality?**	No, or only one organisation appears to be providing this functionality.	More than one but less than five organisations provide the critical parts related to the functionality.	More than five organisations provide the critical parts related to the functionality.	
4.2	**Are there organisations within the EU that can provide this functionality?**	No, or only one organisation appears to be providing this functionality.	More than one but less than five organisations provide the critical parts related to the functionality.	More than five organisations provide the critical parts related to the functionality.	
4.3	**Do you expect the market that could deliver this functionality to consolidate?** Changes to an organisation's ownership structure could harm the city's control. For example, a small Dutch player delivering critical functionality, if taken over by a big tech company, may no longer be amenable to the city's requests.	The market is moving fast. All of the above-identified organisations were founded or sold in the last five years.	It's a mix. Around 50% of organisations have been founded/sold in the last five years. However, the remaining 50% have worked in this field for over five years.	The market is moving slowly. Non of the above identified organizations have been founded or sold in the last five years.	

4.4	**Are any companies available that could deliver, deploy, and maintain the functionality through open source?** Open-source code provides better accessibility and transparency. A code base may be available in an open-source form, but for it to be of practical use for functionality in the city, someone must be responsible for deploying and maintaining it.	No open-source solutions are available.	Some open-source solutions are available for the critical aspects of the functionality.	Open-source solutions are available for all aspects of the functionality.
4.5	**Do you have any ongoing collaborations or resources to establish new partnerships with other public organisations (e.g., other municipalities with similar needs) to enhance your control capacity vis-à-vis market parties?**	No ongoing collaborations with other public organizations.	There are a few ongoing/potential collaborations that may enhance our control.	Yes, we have ongoing collaborations that will enhance our control capacity.
4.6	**How likely is it that the answers to the above questions (4.1 - 4.5) will remain the same for the foreseeable future?**	No certainty.	Two years.	Five years.
4.7	**How confident are you in your answers to the questions in section 4 -- are they based on informed guesses, analysis or practical observations?**	Based on informed guesses.	Analysis.	Practical observations (there is already a precedence).

Results Part 2: Make or buy

Result	Recommendations
Your internal factors affecting control are HIGH (Internal factors score ≥ 1.8), and your external factors affecting control are HIGH (External factors score ≥ 1.8). This means that the market and internal conditions that determine municipalities' level of control are favourable.	1. You should 'Buy' since the market is favourable. However, to maintain your position of strength, allocate resources to maintain in-house expertise and exert control over the market parties. 2. Continue maintaining in-house expertise. 3. Identify critical members and take measures to retain them. 4. Ensure there is adequate documentation. 5. Improve the knowledge base by conducting sharing sessions. 6. Continue to assess external conditions periodically by studying the market. If events that could risk your position (such as consolidation) occur, reanalyse your position. 7. Create collaborations with other municipalities to share your knowledge and consolidate your position.
Your internal factors affecting control are HIGH (Internal factors score ≥ 1.8), and your external factors affecting control are LOW (External factors score < 1.8). This means that the internal conditions that determine municipalities' level of control are favourable. The external conditions are unfavourable.	1. You should 'Make' at least in the short term. Evaluate whether you would go to the market for this functionality in the next five years. 2. Maintain internal competency. Identify key members and a strategy to retain them. Improve competency through documentation and internal knowledge-sharing sessions. 3. Are you dependent on someone for execution (e.g., sub-vendors)? Ensure that the supply chain is adequately in control and that there are sufficient alternatives. 4. If you wish to have an option to 'Buy' in the long term, create a favourable market. This could be through startup in-residence and/or knowledge-sharing sessions.

Your internal factors affecting control are LOW (Internal factors score < 1.8), and your external factors affecting control are HIGH (External factors score ≥ 1.8). This menas that the market conditions that determine municipalities' level of control are favourable. The internal conditions are unfavourable.	1. You should 'Buy' since the market conditions are favourable. 2. To be in control, you should improve your internal competency. 3. To improve internal competency, is there an opportunity to hire external talent (either as an employee or as a consultant)? 4. Is there a possibility of reallocating resources from less critical functionality to this one? 5. Seek collaboration with other trusted partners such as VNG or other municipalities. Could your team learn from their expertise?
Your internal factors affecting control are LOW (Internal factors score < 1.8), and your external factors affecting control are LOW (External factors score < 1.8). This means that neither the market nor the internal conditions that determine municipalities' level of control are favourable.	1. You should 'Buy with caution' since it is likely the only way to realise the functionality. Over the long run, device strategy to improve the factors affecting control. 2. Revaluate the functionality. Are the criteria really necessary? Is there a way to reduce the functional requirements to generate more vendor options? 3. Seek collaboration with other trusted partners such as VNG or other municipalities. Could your team learn from their expertise? 4. To improve internal competency, is there an opportunity to hire external talent (either as an employee or as a consultant). 5. Is there a possibility of reallocating resources from less critical functionality to this one? 6. To improve the market conditions, startup in residence may help in the long run.

Part 3: Choosing between vendor options

Why?

After it has been decided to put out a tender, several vendors may express interest. The following checklist compares them in terms of technical sovereignty. With which vendor can the municipality exert a reasonable amount of control to achieve the desired functionality?

How?

For each vendor that you want to consider, choose the most fitting options for the questions in sections on 5. Replacability, 6. Legal and Contract and 7. Data sovereignty. If you don't know the answer to any of the questions below, fill in option A.

Who?

The questions in this part are meant to be answered by the "Inkoper" and "Aanbestedingsteam."

5. Replaceability

	Questions	Alternatives			Answer
		A	**B**	**C**	
5.1	**What is the number of organisations (commercial vendors, other gov. organisations,...) that could provide this functionality?**	No, or only one, organisation appears to be providing this solution using similar technology within the EU.	More than one but less than or equal to five organisations within the EU use a similar technology to provide this solution.	More than five organisations within the EU use the same technology to provide this solution.	
5.2	**Do you have the resources (tech. know-how, capacity, leverage over (sub-) suppliers,...) necessary to enforce or avoid practical changes to the functionality?** There may be situations where the supplier is influential and reluctant to carry out changes requested by you despite the contractual obligations. There may also be situations where the supplier performs changes (such as software updates) without the explicit consent of the city, and the city does not have enough control to avoid them. We want to avoid such situations.	Not at all.	We have the resources necessary to understand and enforce/prevent practical changes to a few parts of the functionality, but not all.	Yes, for all of the functionality.	

5.3	**Is the solution or parts of it proposed to be made open source?** If the solution is open source, the knowledge is publicly available. This may facilitate sharing similar hardware, algorithms, and data formats while moving to an alternate vendor, eventually reducing the cost of migrating to another vendor.	There is no plan to make any part of the proposed solution as open source. The hardware design, algorithms and data are all proprietary.	A part of the implementation critical to the functionality is proposed to be made open source.	The entire implementation is from an open-source code or proposed to be made open-source.	
5.4	**Does the city already use alternative vendors, or is there any plan to use alternatives alongside this supplier?** If the city already has alternative vendors, it implies an existing workforce is comfortable with the solutions offered by the alternative vendor (e.g., the city mainly uses Dell, but 10% also uses Apple).	The city does not use any alternative vendors, nor does it have any plans to do so.	The city already uses at least one alternative vendor, or it plans to do so soon. The extent to which alternative(s) vendors are used is comparatively small.	The city already uses more than three vendors, with none having more than 50% share.	
5.5	**Is the solution replicable in other cities, departments or applications?** If the solution is replicable in other cities, collaboration is possible, which may improve the knowledge base and also provide some commercial leverage.	The solution is very specific. Reusing the current hardware design, data, or algorithm is not possible, and any replication would require significant redevelopment.	Some parts could be reused, which is estimated to save 30%—60% of the non-recurrent cost.	The solution could be replicated in other cities and departments with a similar problem. Reusing it is estimated to save more than 60% of the non-recurrent cost.	

5.6	**Does the vendor's proposed solution allow you to build a technical edge? Does it attempt to address changing scenarios (at least up to ten years in the future)?** If the solution is very short-sighted, the city runs the risk of losing the technical edge and may eventually incur higher costs to upgrade.	The proposed solution addresses the current problem. We currently don't see it addressing future challenges.	The proposed solution addresses the current problem. The challenges over the next decade and their associated risks have been identified, and solutions have been proposed.	The challenges over the next decade have been systematically identified. The proposed solution addresses the current problem and attempts to address future challenges.	
5.7	**Does the hardware and software support interoperability?** Are the interfaces to the hardware as per public standards (e.g., HDMI for cameras or USB for data transfers, as well as standard power sockets, which are available off-the-shelf)? Are there APIs to easily interface with the software provided by the vendor, and is there sufficient documentation available? This will enable another vendor to interface with the code (without knowing the code itself) provided by the current vendor. This will also allow another vendor to independently create a drop-in replacement for the software provided by the vendor.	No interoperability.	Some interoperability.	The hardware, as well as the software, is highly interoperable.	
5.8	**How likely is it that the answers to the above questions (5.1 - 5.7) will remain the same for the foreseeable future?**	No certainty.	Two years.	Five years.	
5.9	**How confident are you in your answers to the above questions (5.1 - 5.7) -- are they based on informed guesses, analysis or practical observations?**	Based on informed guesses.	Analysis.	Practical observations (there is already a precedence).	

6. Legal and contract

Questions		Alternatives			Answer
		A	**B**	**C**	
6.1	**Have you come across any reports or prior incidents that suggest the vendor is vulnerable to pressure from other organisations or government entities outside the EU, which could, for example, lead to surveillance or discontinuity of service?**	There are confirmed reports that suggest that the vendor is vulnerable to pressure from an entity outside the EU.	There is a possibility (no confirmed reports) that the vendor may be vulnerable, now or in future, to pressure from an entity outside the EU. For example, the organisation is owned by a hostile state outside the EU.	There are no reports, and there is minimal possibility that the vendor is vulnerable to pressure from an entity outside the EU.	
6.2	**Are there any contractual or legal constraints or business reasons that inhibit the city from scaling the technology for the current application or other applications?** For example, if the solution provided by the vendor is patented, it can ask for a steep price for a marginal increase in deployment. Moving to an alternative vendor may also be difficult since the infrastructure has been developed for the current solution.	Replicating the solution for other applications or cities is impossible due to contractual/legal constraints.	Reusing the solution is possible but may come with a very high price tag, making it practically difficult to consider.	The reuse of the solution is possible at an affordable cost.	

6.3	**What legal leverage do you have over the organisations that could provide this service?**	There is no leverage whatsoever.	We have some leverage. The contract covers some parts of the dependencies.	Reasonably good leverage. The contract covers critical dependencies and has been approved by the legal.
6.4	**Can you ensure that the organisations that could provide this functionality comply with potential regulatory frameworks?** For example, if personal data processing is required, would they comply with GDPR?	No regulatory frameworks apply, or we do not have the capacity or knowledge to ensure compliance.	We could partly ensure compliance.	Yes, we have enough competency and capacity to audit the organisation to ensure compliance.
6.5	**What financial leverage do you have over the organisation that could provide this service?** For example, if the contract from the city forms a significant part of the vendor's revenue, it may be more amenable to the requests from the city.	The supplier's annual revenue is greater than twice the city's annual budget.	The supplier's annual revenue is between half of the city's and twice the city's annual budget.	The supplier's annual revenue is less than half of the city's annual budget.
6.6	**What other forms of leverage do you have over the supplier and sub-suppliers?** Is there any leverage through complaints, PR pressure, or political pressure? Are there any mutual dependencies? Does the city develop and maintain the technology/algorithm being used by the vendor? Is the data collected for this project valuable to the vendor?	There is no leverage whatsoever.	There is some leverage, but not to a very high extent.	Reasonably good leverage. There are critical mutual dependencies.
6.7	**Has the supplier agreed to comply with the GIBIT (checklist from VNG for procurement)?**	No.	-	Yes.

6.8	How likely is it that the answers to the above questions (6.1 - 6.7) will remain the same for the foreseeable future?	No certainty.	Two years.	Five years.	
6.9	How confident are you in your answers to the above questions (6.1 - 6.7) -- are they based on informed guesses, analysis or practical observations?	Based on informed guesses.	Analysis.	Practical observations (there is already a precedence).	

7. Data sovereignty

	Questions	Alternatives			Answer
		A	**B**	**C**	
7.1	**How is the security of personal data ensured, even against the rogue elements within the vendor's organisation?** Adequate protection through technology means and audit mechanisms must be provided to protect personal data and validate its effectiveness periodically.	The personal data is stored in an unencrypted form. There is insufficient access control.	All the personal data is encrypted. However, there is no formal mechanism for access control.	All personal data is encrypted. Access is strictly controlled on a 'need to know' basis. Access to the data is logged, including who accessed it, when, and for what purpose. The logs are audited periodically.	
7.2	**What is the data ownership model?** The city must be in control of the data of its citizens. If the vendor is replaced, the data must reside with the city. The city should have the authority to use the data for the public good and eventually delete it when it is no longer required.	The vendor owns the data exclusively. The city has no rights towards it.	The city has the right to the data at a nominal license fee. However, the city does not own the data and thus can not license it to another public body.	The city owns the data and controls access. It can also grant other bodies access to the data and decide when to delete it.	

7.3	**Is any of the data generated or any part of the operations subject to the laws of a country outside the EU?** The EU has stringent laws related to the collection, storage, and use of personal data, which may not be true for countries outside the EU. Therefore, it is desirable that the data is not subjected to the laws of a country outside the EU.	The data is stored on a server outside the EU, and the company's operations are outside the EU's jurisdiction.	Some parts of the data/operations are not within the jurisdiction of the EU.	The entirety of the data will be stored and processed within the EU. The vendor company operates entirely within the EU and is subjected to its laws.
7.4	**Is the data generated/stored in accordance with a public standard?** In other words, would it be possible to interpret and reuse the data if a different vendor takes over? Or can a different vendor use a standard data format interface with the software provided by the current vendor to implement a different functionality? Interoperability and replaceability will benefit if data is generated/stored according to a public standard.	The data storage format is not known. The vendor has not disclosed it.	The data storage format is custom. However, documentation about the format is available.	The data storage format is in accordance with a public standard.
7.5	**How likely is it that the answers to the above questions (7.1 - 7.4) will remain the same for the foreseeable future?**	No certainty.	Two years.	Five years.
7.6	**How confident are you in your answers to the above questions (7.1 - 7.4) -- are they based on informed guesses, analysis or practical observations?**	Based on informed guesses.	Analysis.	Practical observations (there is already a precedence).

Results Part 3: Choosing between vendor options

Result

The final version of this tool will present separate scores for Replaceability, Legal and contract, Data sovereignty and an Overall score for each vendor that the questions are filled in.

Recommendations

1. Generally, the vendor with the highest score should be chosen.
2. The overall score should be greater than 1.8.
3. The average score for each category should be greater than 1.5.
4. If none of the vendors meets recommendations (2) and (3), this indicates that none of the alternatives is a good option considering sovereignty. In such a case, more options should be created in the long term. For the short term, use your discretion.
5. If the overall averages for the vendors are comparable (very close), use the individual category averages to select the vendor. The projects may have different priorities, and the individual topics indicate that.
6. There may be situations where you want to choose a vendor with a lower overall score. For example, suppose a functionality involves highly sensitive information. In that case, you may select the vendor with the highest score on Data sovereignty, even though its total score might be lower than that of the alternative vendor.

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