

Muntstroom PCP, Brussels Capital Region

Fields marked with * are mandatory.

INTRODUCTION

Open Market Consultation

NEW: MARKET CONSULTATION REPORT

Questions & Answers document

For more information contact:

muntstroom@stib-mivb.brussels

[QA_final_v3.pdf](#)

What is the Muntstroom PCP?

During the Muntstroom PCP, a technology will be developed and tested to support the future monitoring of people flow in the BCR. The foreseen solution includes creating an outdoor and indoor sensor network and a joint data platform. This in order to visualise people flow (counting, direction, speed), facilitate joint analytics and make the people flow-data available for a wide array of users.

This Open Market Consultation (OMC) is part of the PCP-phase 0. It aims to inform and question technology suppliers that are interested in supplying research and development (R&D) services for developing the desired solution. Via this OMC they get the unique opportunity to give feedback on the requirements of the foreseen pre-commercial tender.

For more detailed information about the Muntstroom PCP, please consult stib-mivb.be/muntstroom and/or download the following background material.

- **Market Consultation document**

[Market consultation document v23.pdf](#)

- **Annex 1) Scope**

[Annex 1 Scope v23.pdf](#)

- **Annex 2) Use cases**

[Annex 2 Overview use cases v23.pdf](#)



Attention

- It is not mandatory to fill out all questions, leave it blank if you do not know the answer. Only fields marked with * are mandatory.
- Please note that you can download a PDF version of the questionnaire or save a draft.
- Please fill out the following questionnaire in English, French or Dutch.
- Any general remarks or documentation can be submitted via the last question.
- Questions about the market consultation process can be asked via muntstroom@stib-mivb.brussels
- Approximate time to complete the total questionnaire: 40-50 min.

Content

This questionnaire is divided in the following 10 sections.

1. Contact details
2. About you
3. Desired output and needs
4. Architecture
5. Use cases (required analytics)
6. Privacy & security
7. Data quality
8. Financial aspects
9. PCP challenges and complexity
10. Last remarks

1. Contact details

* Name:

* Email

* Organisation/company:

* Website:

* Telephone:

I accept that the information is used in the context of Muntstroom PCP.

2. About you

1. In what kind of company are you working?

- a. Small-sized company (less than 50 employees)
- b. Medium-sized enterprise (between 50 and 249 employees)
- c. Large enterprise (from 250 employees)

2. Where is your company based?

- a. Brussels Capital Region
- b. Belgium
- c. Europe
- d. Outside Europe

3. In which field is your company active? (multiple answers possible)

- a. Data capture (incl. sensor technologies)
- b. Data analytics
- c. Data visualisation / services
- d. Infrastructure (incl. backend system and front end system)
- e. Telecommunication
- f. Other

If other, please indicate:

4. How do you envisage to be engaged in this PCP-tender procedure? Are you going to act as:

- a. Consortium (several technology vendors)
- b. Main contractor with sub-contractor(s)
- c. Sole contractor
- d. I do not know yet

5. Are you looking for (a) partner(s) with complementary expertise to form a consortium for the purpose of submitting an offer on the Muntstroom PCP? (Yes, no)

- Yes
- No

If **yes**, for a match-making process we can **share your details with our outreach partners Easme, Agoria, hub.brussels / EEN and BECI.**

I accept that my personal information is shared with the mentioned partners.

You may also provide a description of the expertise & competences you want to bring into the partnership as well as the types of competences you are looking for in a partner.

3. Desired output and needs

The Muntstroom PCP Group would like to develop and test a solution to visualise 24/7-people flow (counting, direction, speed), facilitate shared big data-analytics and make the People Flow-data available for a wide array of users.

The content of the scope document will be addressed on the basis of several questions. **See the scope of the Muntstroom PCP (link below).**

To describe the underlying needs, visualisations were made of the desired solution and the proposed data architecture. **See figures 1 and 2.**

Annex 1) Scope

[Annex 1 Scope v23.pdf](#)

6. Do you have any general recommendations or suggestions regarding these figures? (Open Question)

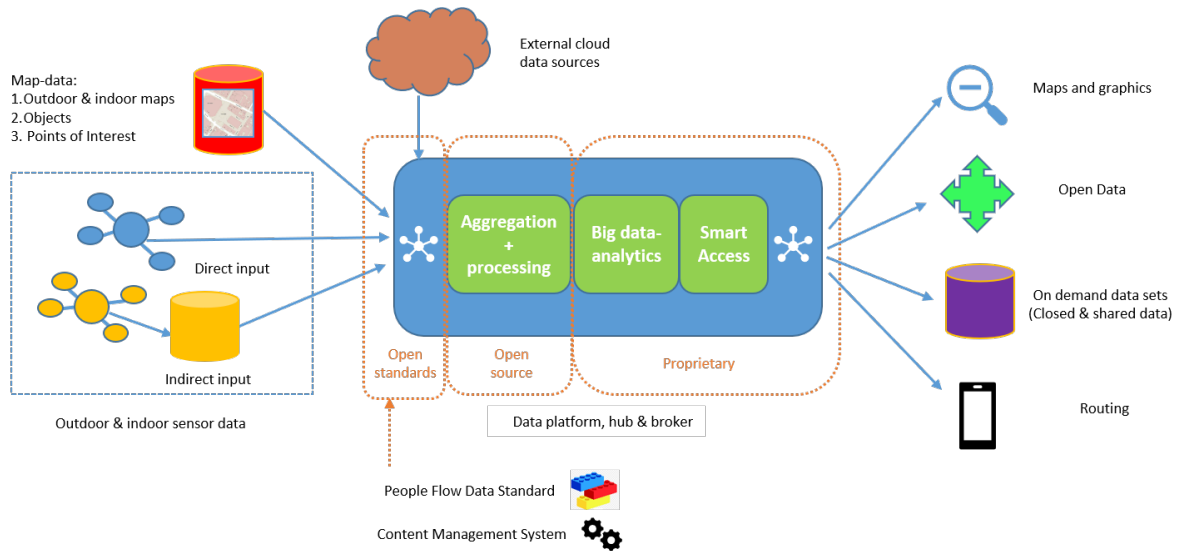


Figure 1: Initial needs description

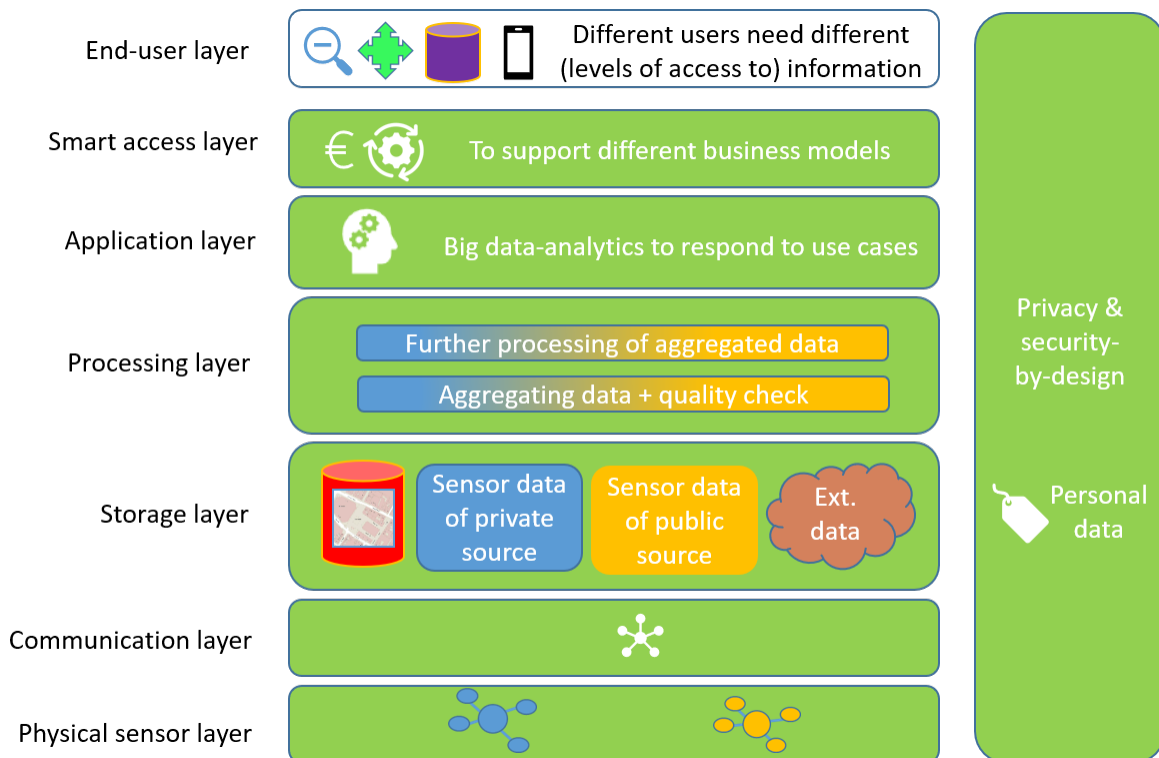


Figure 2: Proposed data architecture

4. Architecture

In this block, the content of the proposed data architecture of figure 2 is discussed.

4.1 Physical layer

4.1.1 People Flow-data standard

When you look into the field of walking, it becomes clear that no pedestrian is alike. **To well analyse any situation it is thus important that the metrics of People Flow are well defined.** The Muntstroom PCP Group therefore wants to use the Public Life Data Protocol (PLDP, 2017) of Gehl Institute, that defines 3 levels of details for describing the category pedestrians.

Public Life Data Protocol

[Annex 1 Scope v23 Annex A People Flow Protocol.pdf](#)

7. Can you indicate till which level of detail is it possible to capture People Flow-characteristics?

(Via your technical solution or in general)

Pedestrian (in general)

- a. The subcategories (Walking, Running, Supported, Carried, Rolling)
- b. Advance content (more details within the subcategories)
- c. No specific metrics
- d. Other, namely

If other, please indicate:

8. Can you indicate whether there are other data standards (other than Public Life Data Protocol, 2017) that could be more suitable for the Muntstroom project? (Open Question)

4.1.2 Interoperability

The Muntstroom PCP Group wants:

- that the output of different sensor technologies can be combined and analysed.
- that the output of different People Flow-related sensors could also be combined and analysed in all systems.
- to receive, understand and (re)utilise sensor-data.
- to prevent that during PCP-phase 3 (Living Lab-phase) there are too many sensors placed at one place.
- to prevent that sensors only work on one back end.

To achieve this, the Muntstroom PCP Group intends to promote interoperability.

9. How would you make sensors of different providers work together in an end-to-end solution?

(Open Question)

10. How would you measure interoperability in a procurement process? What are the KPIs? (Open Question)

4.1.3 Minimal Total Costs of Ownership

The Muntstroom PCP Group would like to control and minimize the Total Costs of Ownership (TCO). As a prerequisite this means that:

1. The sensors need to

- a. be as stable as possible
- b. be easy to install and remove, maintained and/or replaced
- c. have a minimal susceptibility to interference
- d. have a long lifespan
- e. have a CAPEX and OPEX that are as low as possible.
- f. that have limited telecommunications and interoperability costs

2. The intelligence and innovation need to be, in particular, in the platform and not in the sensors.

(This is an absolute requirement!)

11. Which general recommendation(s) could you give on the relation between the TCO and sensors?

(Open Question)

4.2. Communication layer

4.2.1 Open standards

12. The Muntstroom PCP Group intends to promote interoperability. To achieve this, it wants to mandate open communication standards. How would you arrange this? (Open question)

4.3. Storage layer

4.3.1 Storing different sorts of data

The desired solution needs to be flexible and secure to store different sorts of data like:

- a. personal and non-personal data
- b. data from different sources (via B2G or G2G[1] data sharing)

[1] Business to Government and Government to Government

13. How would you comply with this flexibility and security in the system? What are the challenges?

(Open Question)

14. What KPIs would you use to measure these requirements? (Open Question)

4.4. Processing layer

For the combination of data and the basic processing (like a quality check) software needs to be developed. The Muntstroom PCP Group wants this software to be open source (OSS), so other contracting authorities can use, reuse and modify the software, in accordance with their needs.

15. Do open standards (open source software) for the combining and basic processing of sensor-data already exist, (yes/no)

- Yes
- No

If yes, can you give some examples?

16. What KPIs would you use to measure these requirements? (Open Question)

4.5. Analytics layer

The required analytics are defined by the use cases. Each use case presents a different scenario for analytics, with possibly different data sources. See the use case-document and the questions in the following block.

Annex 2) Use cases

[Annex 2 Overview use cases v23.pdf](#)

The required analytics are defined by the use cases. **See the use case-document and the questions in the following block.** Each use case presents a different scenario for analytics, with possibly different data sources.

17. What consequences / challenges would this raise for e.g. the architecture? (Open Question)

4.6 Smart Access layer

The Muntstroom PCP Group would like the desired solution to support different business models, like visualised in the figure below.

When you combine this requirement with the earlier requirements on the storage and analytics, a challenge emerges. We have a couple of questions about this.

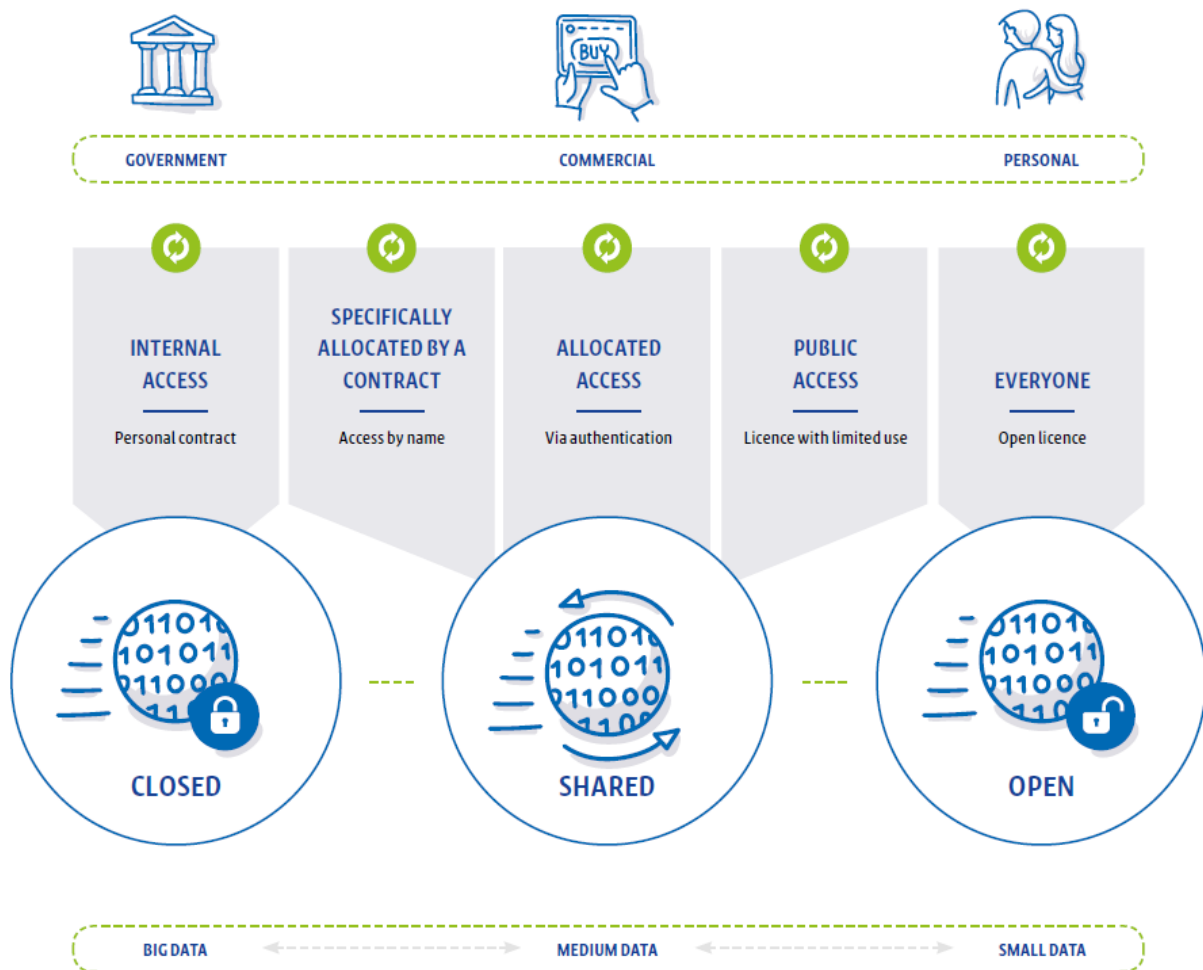


Figure 3: Different business models for data, Source: Agoria White Paper Data (2018)

18. How can you ensure that the output data per use case complies with the sharing conditions of both public and private data sources? (Open question)

19. Can you suggest measurable values / KPIs for the different business models (Closed, Shared and Open from Figure 3)? (Open Question)

4.7. End-users layer

20. How can you ensure the different level of access to different end-users, while being compliant with Data Protection Regulation. (Open question)

21. Which requirements can you suggest for the end-user layer?














5. Use cases

The required analytics are defined by the use cases.

See Annex 2) Use cases

[Annex_2_Overview_use_cases_v23.pdf](#)

22. Is the approach of use cases in the context of PCP clear to you? If not, what would you have explained (differently)? (Open Question)

	Use case	Subject	
Analytics		1. Pedestrians analytics	Understanding "the" pedestrian.
		2. Analysis on reasons of movements	Understand why pedestrians move around.
		3. Event analytics	Understanding the behaviour of pedestrians that visit events (specific zones and specific time horizon).
		4. Crowd analytics: security	Understand and react to security issues.
		5. Crowd analytics: COVID	Understand and react to social distancing issues.
		6. Mobility hub analytics: usage of specific public transport lines	Quantify the alighting, onboardings, people onboard and interchanges.
		7. Mobility hub analytics: transfers	Understand how travellers transfer between public transport lines.
		8. Asset management	Understand how pedestrians / travellers make use of assets.
		9. Commercial analytics: Shopping policy and research	Understand the vitality of a street, its commercial attractiveness and the commercial potential of a specific location.
		10. Commercial analytics: Individual shop	Understand the relation between the people flow and individual marketing strategies.
		11. Traffic light analytics	Understand the impact of traffic lights on people flow and indicators e.g. safety.
Routing		12. PMR routing: Wheelchair	Defining and testing step-free routes.
		13. PMR routing: Partially sighted person	Defining and testing the routing of a partially sighted person.
		14. Indoor routing: Subsurface	Defining and testing routing within underground corridors.
		15. Indoor routing: Building	Defining and testing routing within a building.
Access		16. Smart access	Testing the technologies to support different business models.

23. Do you have a remark on any or several of the use cases?

Help message	Comments
Use case 1. Pedestrian analytics	
Use case 2. Analysis of reasons of movements	
Use case 3. Events analytics	
Use case 4. Crowd analytics: security	
Use case 5. Crowd analytics: Covid	
Use case 6. Mobility hub analysis: usage of specific PT-lines	
Use case 7. Mobility hub analytics: transfers	
Use case 8. Mobility hub analytics: Asset management	
Use case 9. Commercial analytics: shopping policy and research	
Use case 10. Commercial analytics: individual shop	
Use case 11. Traffic light analytics	
Use case 12. PMR routing: Wheelchair	
Use case 13. PMR routing: Partially sighted person	
Use case 14. Indoor routing: Subsurface	
Use case 15. Indoor routing: Building	
Use case 16. Smart Access	

24. Could you indicate the complexity of the use cases by ordering them as basic (1), intermediate (2), advanced (3).

Matrix Text	1	2	3
Use case 1. Pedestrian analytics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use case 2. Analysis of reasons of movements	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use case 3. Events analytics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use case 4. Crowd analytics: security	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use case 5. Crowd analytics: Covid	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use case 6. Mobility hub analysis: usage of specific PT-lines	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use case 7. Mobility hub analytics: transfers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use case 8. Mobility hub analytics: Asset management	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use case 9. Commercial analytics: shopping policy and research	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use case 10. Commercial analytics: individual shop	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use case 11. Traffic light analytics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use case 12. PMR routing: Wheelchair	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use case 13. PMR routing: Partially sighted person	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use case 14. Indoor routing: Subsurface	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use case 15. Indoor routing: Building	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use case 16. Smart Access	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

In PCP-phase 3 the developed prototype will be tested in a real environment. The foreseen test period is half a year and the solution will be tested by means of some of the use cases.

25. Which use cases would you focus on? Why?

26. What methodology would you recommend to test the use cases?

6. Privacy & security

With the desired solution the Muntstroom PCP group would like to “follow the river, but not the little droplets”. This means that the desired Muntstroom solution should be designed in line with the current Data Protection Regulation and that an end-to-end solution for privacy and security is needed. **See figure 2: architecture**

6.1. Privacy-by-design strategies

The EU Agency for Cybersecurity (ENISA) has defined different strategies to integrate privacy and data protection principles directly in the design phase. When these strategies are mapped against the data architecture it shows clearly what principles should be in place in the different stages. **See example in Table: Privacy by design strategies. Source: Privacy by design in big data (ENISA, 2015)**

BIG DATA VALUE CHAIN	KEY PRIVACY BY DESIGN STRATEGY	IMPLEMENTATION
1 Data acquisition/collection	MINIMIZE	Define what data are needed before collection, select before collect (reduce data fields, define relevant controls, delete unwanted information, etc), Privacy impact Assessments.
	AGGREGATE	Local anonymization (at source).
	HIDE	Privacy enhancing end-user tools, e.g. anti-tracking tools, encryption tools, identity masking tools, secure file sharing, etc.
	INFORM	Provide appropriate notice to individuals – Transparency mechanism.
	CONTROL	Appropriate mechanisms for expressing consent. Opt-out mechanisms. Mechanisms for expressing privacy preferences, sticky policies, personal data stores.
2 Data analysis & data curation	AGGREGATE	Anonymization techniques (k-anonymity family, differential privacy).
	HIDE	Searchable encryption, privacy preserving computations.
3 Data storage	HIDE	Encryption of data at rest. Authentication and access control mechanisms. Other measures for secure data storage.
	SEPARATE	Distributed/ de-centralised storage and analytics
4 Data use	AGGREGATE	Anonymisation techniques. Data quality, data provenance.
5 All phases	ENFORCE/DEMONSTRATE	Automated policy definition, enforcement, accountability and compliance tools.

Table 2: Privacy by design strategies in the big data value chain

27. Which privacy-by-design strategies do you propose per data-architecture layer? Please upload a picture of a document describing this (possibility to upload a picture)

Please upload your file

The maximum file size is 1 MB

The use cases present a multitude of challenges and target groups where many variables have to be taken into account.

28. How would you apply the data-by-design strategies to the use cases? Can you point out any main differences among the use cases? (Open Question)

6.2. Privacy embedded in an end-to-end solution

The Muntstroom PCP Group would like an end-to-end solution that embeds privacy & security by design. Therefore personal and non-personal data need to be treated with a high standard of data protection

29. Do you know any technologies that can automatically differentiate personal and non-personal data within an end-to-end solution? (Open Question)

6.3. Other

30. Do you have any suggestions / recommendations on the KPIs in the context of privacy & security? (Open Question)

31. Do you have any specific privacy concerns that you would like to address? (Open Question)

7. Data quality

Regarding the assessment of the data quality, the Muntstroom PCP groups will request data quality management plans from the technology vendors and their compliance thereof. But maybe there are other options.

32. How would you ensure the quality of your data? How can this be evaluated? What are the KPIs? (Open Question)

8. Financial aspects

During the PCP technology providers need to design the solution (PCP-phase 1), build a prototype (PCP-phase2) which will be tested during the Living Lab (PCP-phase 3). The Muntstroom PCP group would like to know which financial involvement is needed to co-fund these activities.

8.1. The needed financial involvement

33. How much do you estimate it will cost you in total to design the solution (PCP-phase 1, in €)

34. How much do you estimate it will cost you to develop the prototype (PCP-phase 2, in €)

35. How much do you estimate it will cost you to install and operate the Living Lab (PCP-phase 3, in €)

36. What would your estimated total Research & Development cost be ? (in €, PCP phases 1,2 and 3)

37. Could you give a rough overview of the highest, possible costs that you would make?

- a. use of sensors / hardware / ... (e.g. rental costs)
- b. use of software
- c. installation costs
- d. operational cost (including energy consumption)
- e. maintenance costs
- f. other, like

38. Could you reason on the financial pros and cons of using Open Source or non-Open Source components/software? (Open Question)

39. Could you give a rough overview of the highest, possible costs that you would make in relation to the proposed architecture:

- a. Physical layer
- b. Communication layer
- c. Storage layer
- d. Processing layer
- e. Advanced analytics layer
- f. Smart Access layer
- g. End-user layer

8.2. Buffer times in the Living Lab-phase

In Muntstroom PCP-phase 3 (Living Lab) a prototype will be tested in a Living Lab. This will require the installation of the system, a start-up period to finetune the settings and a learning period before analytics can function in full.

40. How much time do you think the suggested buffer times could be (in weeks)?

- a. Start-up period to finetune the setting / do the calibration
- b. Learning time for descriptive analytics
- c. Learning time for the deeper analytics

41. What would be the personnel costs of each of the suggested buffer times (in man-days)?

- a. Start-up period
- b. Learning time for descriptive analytics
- c. Learning time for the deeper analytics

8.3. Co-funding

The Muntstroom project gives technology vendors the possibility to pilot solutions that can be later commercialised to public / private buyers. This also allows helps to speed up the time-to-market of these solutions. Therefore there are different incentives for technology vendors to co-fund the R&D together with the Muntstroom PCP Group.

42. How much of your total R&D-costs (see the question before) would you be willing to fund yourself? (With a minimum of 20%)

8.4. Royalty scheme

In case the developed proprietary solution can be successfully commercialized to third parties, the Muntstroom PCP Group wants to set up a fair pay back scheme of their investments done in the PCP.

43. Are you familiar with the concept of a royalty scheme approach ?

- Yes
- No

44. Are there any suggestions and/or recommendations you can make in order to set up such as fair pay back scheme?

E.g. regarding the maximum percentage of the PCP investments you would consider as a fair amount to pay back to the participating contracting authorities, the maximum duration of the pay back scheme, the support you would expect from the contracting authorities (by acting as a reference project) in commercializing the developed proprietary solution to third parties, etc.

9. PCP challenges and complexity

All the above challenges and questions will be brought together in one PCP-process.

The Muntstroom PCP Group uses a PCP-approach to procure the required innovation. See the figure below. A PCP is a competitive and risk sharing procedure where technology vendors develop solutions in subsequent phases. See for more information the market consultation document.

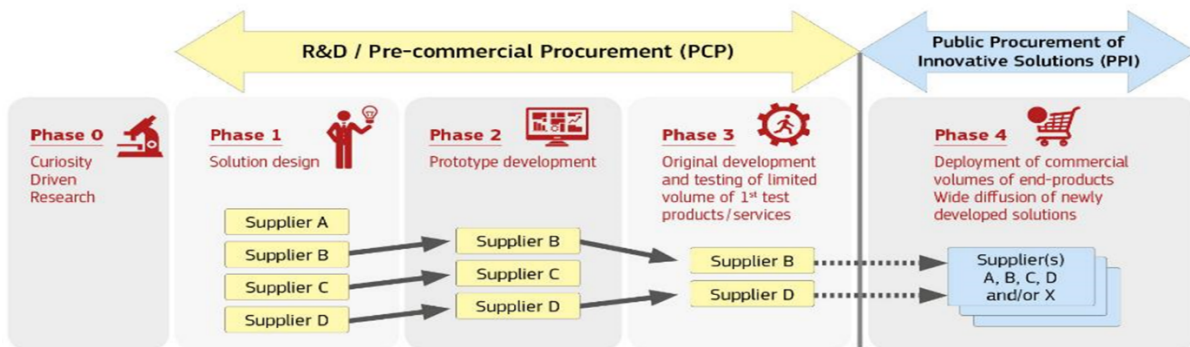


Figure 1: “Pre-commercial procurement: driving innovation to ensure sustainable high quality public services in Europe”, COM(2007) 799 final

45. Are you familiar with the concept of Innovation Procurement / Pre-commercial procurement?

- Yes
 No

The Muntstroom PCP group proposes the following duration of the 3 PCP-phases :

PCP-phase 1 (solution design): 3 months

PCP-phase 2 (prototype design): 7 months

PCP-phase 3 (test in a Living Lab): 6 months

46. Is the proposed timeline a good estimation, based on the complexity and scope of the project? If not, please elaborate. (Open Question)

47. Do you see the objective of the Muntstroom PCP-project (developing and testing an end-to-end solution for People Flow) as too complex or too long-winded? If so, which part? (Open Question)

48. What do you see as the main challenges from your side? (one answer possible)

- a. The integration of individual components (e.g. sensors, data-storage and analytics) to an integrated end-to-end solution.
- b. The integration of the business cases of individual components into one integrated business case to deliver the end-to-end solution.
- c. The development of the Analytics-layer
- d. The development of the Smart Access-layer
- e. Other, namely

If other, please explain:

10. Last remarks

49. Any last remarks? or would you like to upload a file?

Please upload your file

The maximum file size is 1 MB

With assistance of:



Many thanks for your interest and feedback!

Questions: muntstroom@stib-mivb.brussels

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