

UNIVERSITY OF AMSTERDAM



Ventilation strategies for infection control

Public-Private cooperation

8th September 2020

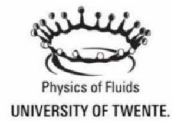
Agenda

- Short introductions (per person)
- Short description of the programme
- Ongoing and future actions:
 - Funding
 - The research proposal
 - Involvement of business partners: use cases
- Introducing the research team (one person per research group)
- Room for Discussion
- Overview of actions

Agenda

- Short introductions (per person)
- Short description of the programme
- Ongoing and future actions:
 - Funding
 - The research proposal
 - Involvement of business partners: use cases
- Introducing the research team (one person per research group)
- Room for Discussion
- Overview of actions

Round of short introductions



Agenda

- Short introductions (per person)
- Short description of the programme
- Ongoing and future actions:
 - Funding
 - The research proposal
 - Involvement of business partners: use cases
- Introducing the research team (one person per research group)
- Room for Discussion
- Overview of actions

Agenda


- Short introductions (per person)
- **Short description of the programme**
- Ongoing and future actions:
 - Funding
 - The research proposal
 - Involvement of business partners: use cases
- Introducing the research team (one person per research group)
- Room for Discussion
- Overview of actions

The role of aerosols in the spread of the virus

- More and more scientific studies suggest that aerosols play an essential role in the transmission of the SARS-CoV-2 virus

ACCEPTED MANUSCRIPT

It is Time to Address Airborne Transmission of COVID-19

Lidia Morawska , Donald K Milton

Clinical Infectious Diseases, cta939, <https://doi.org>

Published: 06 July 2020 Article history

VIEWPOINT: COVID-19

Reducing transmission of SARS-CoV-2

Masks and testing are necessary to combat asymptomatic spread in aerosols and droplets

Respiratory infections occur through the transmission of virus-containing droplets (1 to 10 µm) and aerosols (1 µm and smaller) from infected individuals during breathing, speaking, coughing, and sneezing. Traditional respiratory disease control measures are designed to reduce transmission by droplets produced in the trachea and mouth of infected individuals. However, a large proportion of the spread of coronavirus disease 2019 (COVID-19) appears to be occurring through airborne transmission of aerosols produced by asymptomatic individuals during breathing and speaking (2–5). Aerosols can accumulate, remain infectious in the air for hours, and be easily inhaled deep into the lungs. The ability to transmit disease through aerosols is a major concern. Measures designed to reduce aerosol transmission must be implemented, including universal masking and testing. Nonpharmaceutical measures (to identify and isolate infected asymptomatic individuals).

Humans produce respiratory droplets ranging from 1 to 100 µm. A comparison between droplet size, inertia, gravity, and evaporative characteristics show that small droplets and aerosols will travel in air (6). Larger respiratory droplets will undergo gravitational settling faster than they evaporate, concentrating infection and leading to contact transmission. Smaller droplets, and aerosols, will evaporate faster than they can settle, are buoyant, and thus can be affected by air currents, which can transport them over longer distances. Thus, their air time

1422 14 JULY 2020 • VOL 100 • NO 13

Published by

bioRxiv preprint doi: <https://doi.org/10.1101/2020.07.06.201311>; this version posted July 6, 2020. The copyright holder for this preprint (which was not certified by peer review) is the author/funder, who has granted bioRxiv a license to display the preprint in perpetuity. It is made available under aCC-BY 4.0 International license.

BBC NEWS

Home Video World UK Business Tech Science Stories Entertainment & Arts

World Africa Asia Australia Europe Latin America Middle East US & Canada

Coronavirus: WHO rethinking how Covid-19 spreads in air

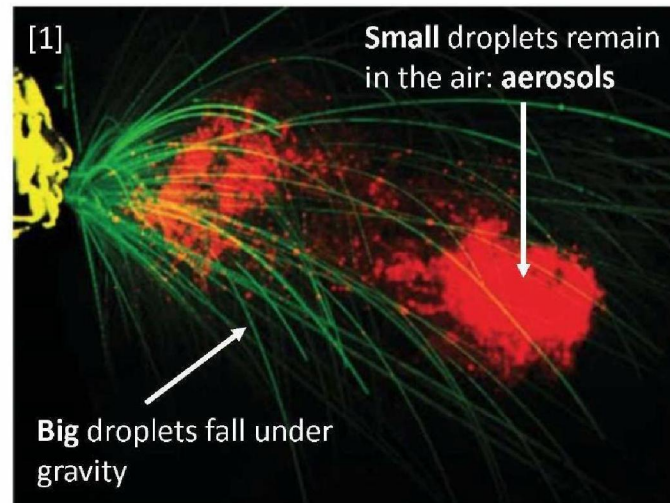
8 July 2020

Coronavirus pandemic

RIVM: verspreiding coronavirus via aerosolen is mogelijk

HOUD 1,5 METER AFSTAND

HOUD 1,5 METER AFSTAND



[1] S. Poulain and L. Bourouiba, Disease transmission via drops and bubbles, Phys. Today, 72, 2019.

Motivation: The current guidelines

- The current guidelines are based on outdated knowledge on the role of aerosols

Motivation: The current guidelines

- The current guidelines are based on outdated knowledge on the role of aerosols
- This leads to various uncertainties:
 - What virus concentration is required to infect a person?
 - Do environmental parameters play a role? (humidity, temperature, external flow)
 - To what extent ventilation can help?

Motivation: The current guidelines

- The current guidelines are based on outdated knowledge on the role of aerosols
- This leads to various uncertainties:
 - What virus concentration is required to infect a person?
 - Do environmental parameters play a role? (humidity, temperature, external flow)
 - To what extent ventilation can help?
- This leads to heated debates

Project Goal

- In view of our health and economy we aim to develop effective guidelines on ventilation strategies for infection control
 - Based on up-to-date scientific knowledge
 - Functional
 - Widely supported

Project Goal

- In view of our health and economy we aim to develop effective guidelines on ventilation strategies for infection control
 - Based on up-to-date scientific knowledge
 - Functional
 - Widely supported
- These guidelines should address how the concentration of a virus in the air can be limited in the **most efficient and sustainable** way for **specific spaces** where a certain amount of people are performing a certain activity

Project Goal

- In view of our health and economy we aim to develop effective guidelines on ventilation strategies for infection control
 - Based on up-to-date scientific knowledge
 - Functional
 - Widely supported
- These guidelines should address how the concentration of a virus in the air can be limited in the **most efficient and sustainable** way for **specific spaces** where a certain amount of people are performing a certain activity
- These guidelines are applicable for the current COVID19 pandemic, but also for other viruses (e.g. common cold, influenza, new future viruses) so as to reduce their economic and societal impact

The approach

- The ideal approach in “normal times” would be:
 - Achieve a complete scientific basis starting from the fundamentals
 - Make and implement guidelines

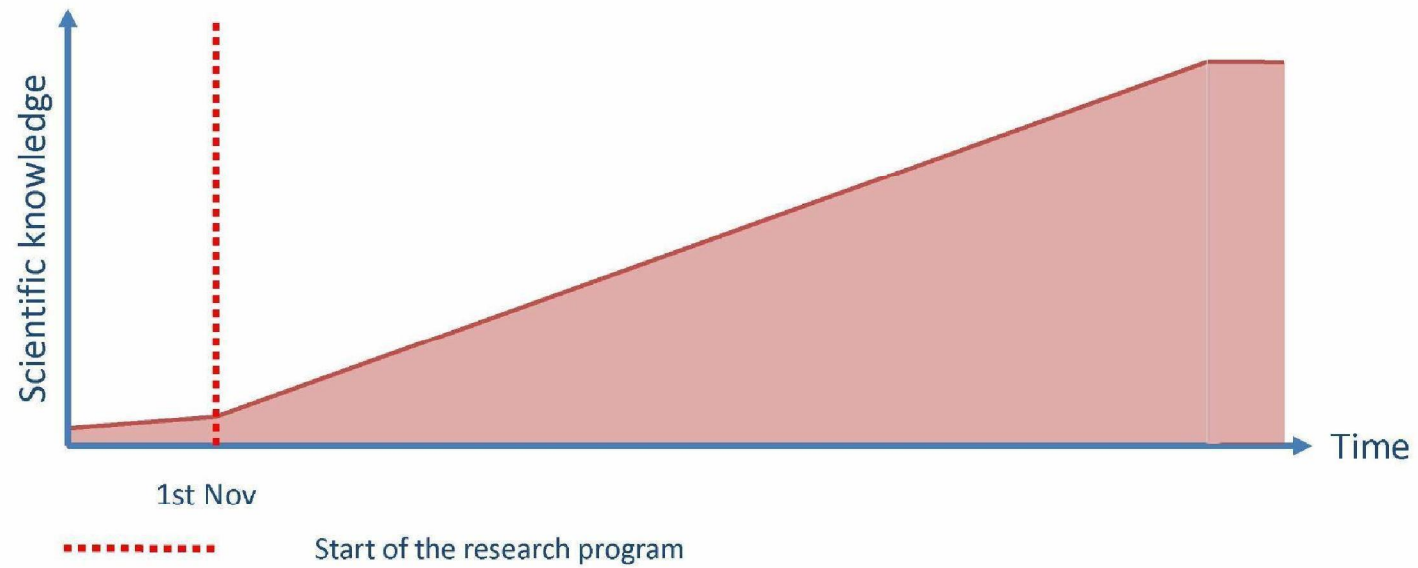
The approach

- The ideal approach in “normal times” would be:
 - Achieve a complete scientific basis starting from the fundamentals
 - Make and implement guidelines
- However, we do not have the luxury of **time**: we need to address the societal needs as quickly as possible, while maintaining a high level scientific basis

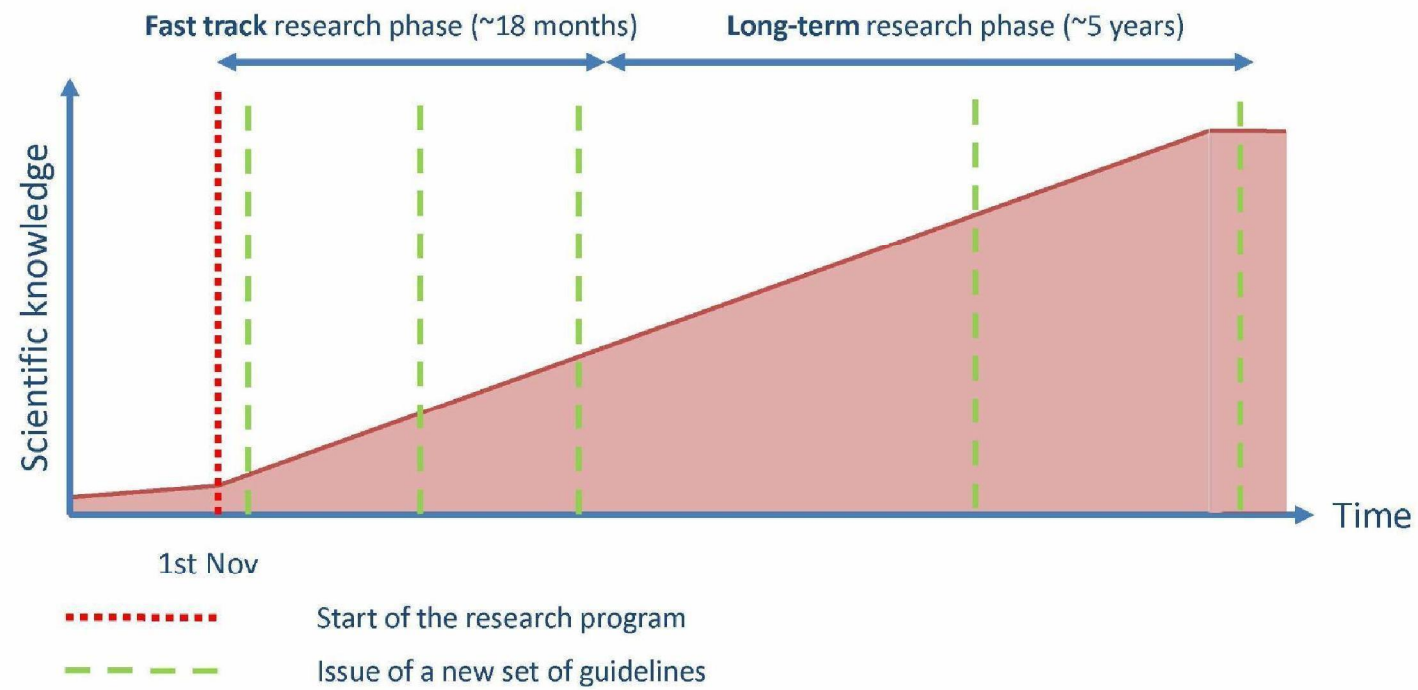
The approach

- The ideal approach in “normal times” would be:
 - Achieve a complete scientific basis starting from the fundamentals
 - Make and implement guidelines
- However, we do not have the luxury of **time**: we need to address the societal needs as quickly as possible, while maintaining a high level scientific basis
- Thus, we propose a phased approach where first, a “**Fast Track**” phase will generate knowledge and guidelines on an accelerated manner. This will be followed by a **long-term** research track where a more comprehensive and fundamental approach will take place.

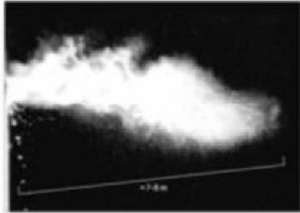
Project timeline



Project timeline

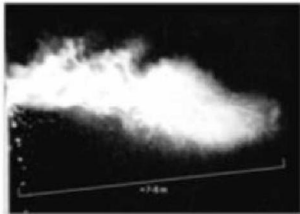


Project Structure (open for extension)



P1: Infectivity of viruses in
aerosols
UMCG (lead), UvA, RIVM

Project Structure (open for extension)

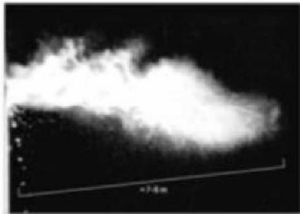


P1: Infectivity of viruses in aerosols
UMCG (lead), UvA, RIVM



P2: Spreading of Aerosols
UT (lead), UvA, TU/e

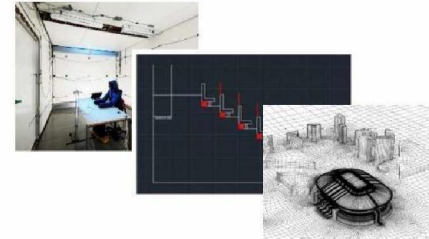
Project Structure (open for extension)



P1: Infectivity of viruses in aerosols
UMCG (lead), UvA, RIVM

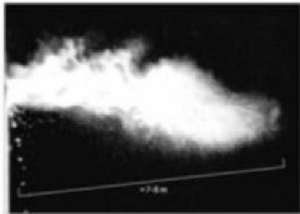


P2: Spreading of Aerosols
UT (lead), UvA, TU/e



P3: Ventilation concepts for the removal of aerosols
TU/e (lead), TUDelft

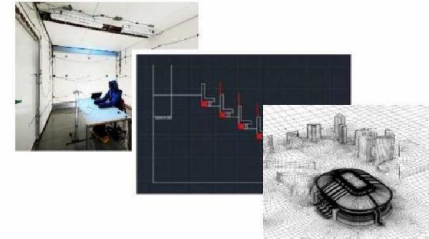
Project Structure (open for extension)



P1: Infectivity of viruses in aerosols
UMCG (lead), UvA, RIVM



P2: Spreading of Aerosols
UT (lead), UvA, TU/e

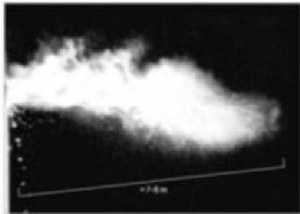


P3: Ventilation concepts for the removal of aerosols
TU/e (lead), TUDelft

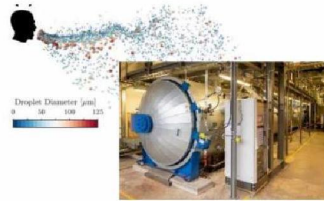


P4: Real world use cases
MARIN (lead), ALL partners invited

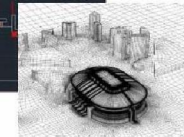
Project Structure (open for extension)



P1: Infectivity of viruses in aerosols
UMCG (lead), UvA, RIVM



P2: Spreading of Aerosols
UT (lead), UvA, TU/e



P3: Ventilation concepts for the removal of aerosols
TU/e (lead), TUDelft



P4: Real world use cases
MARIN (lead), ALL partners invited



P5: Strategies for Infection control
TUDelft (lead?), ALL partners invited

Agenda

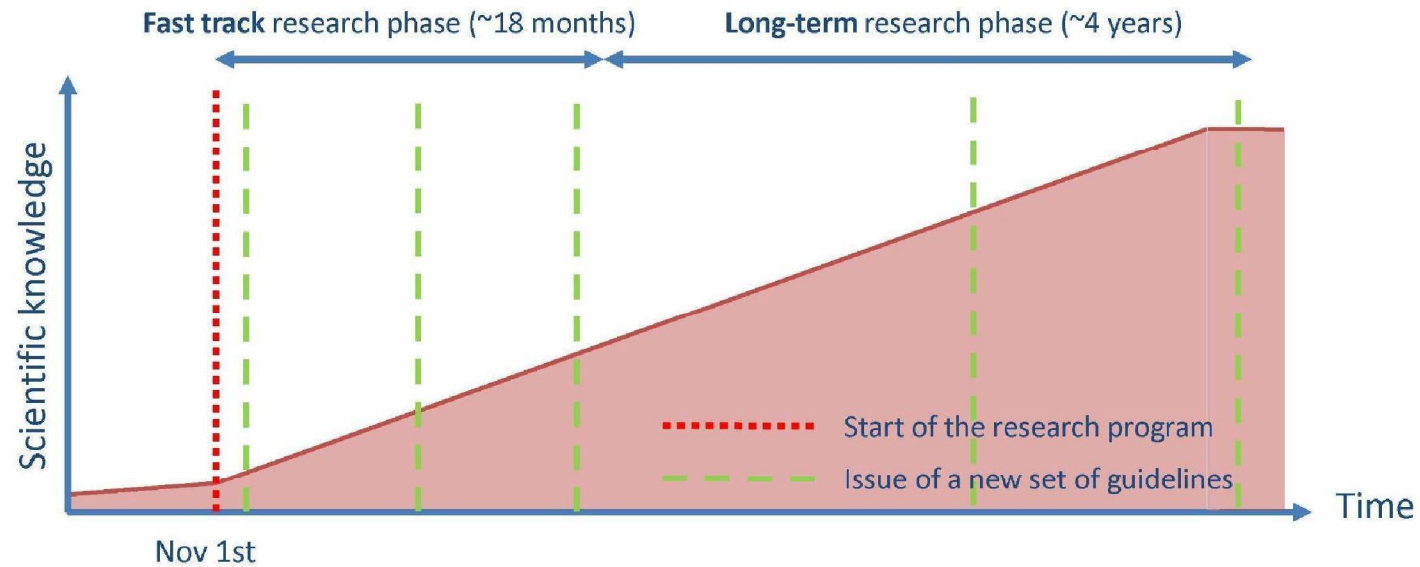
- Short introductions (per person)
- Short description of the programme
- Ongoing and future actions:
 - Funding
 - The research proposal
 - Involvement of business partners: use cases
- Introducing the research team (one person per research group)
- Room for Discussion
- Overview of actions

Agenda

- Short introductions (per person)
- Short description of the programme
- **Ongoing and future actions:**
 - Funding
 - The research proposal
 - Involvement of business partners: use cases
- Introducing the research team (one person per research group)
- Room for Discussion
- Overview of actions

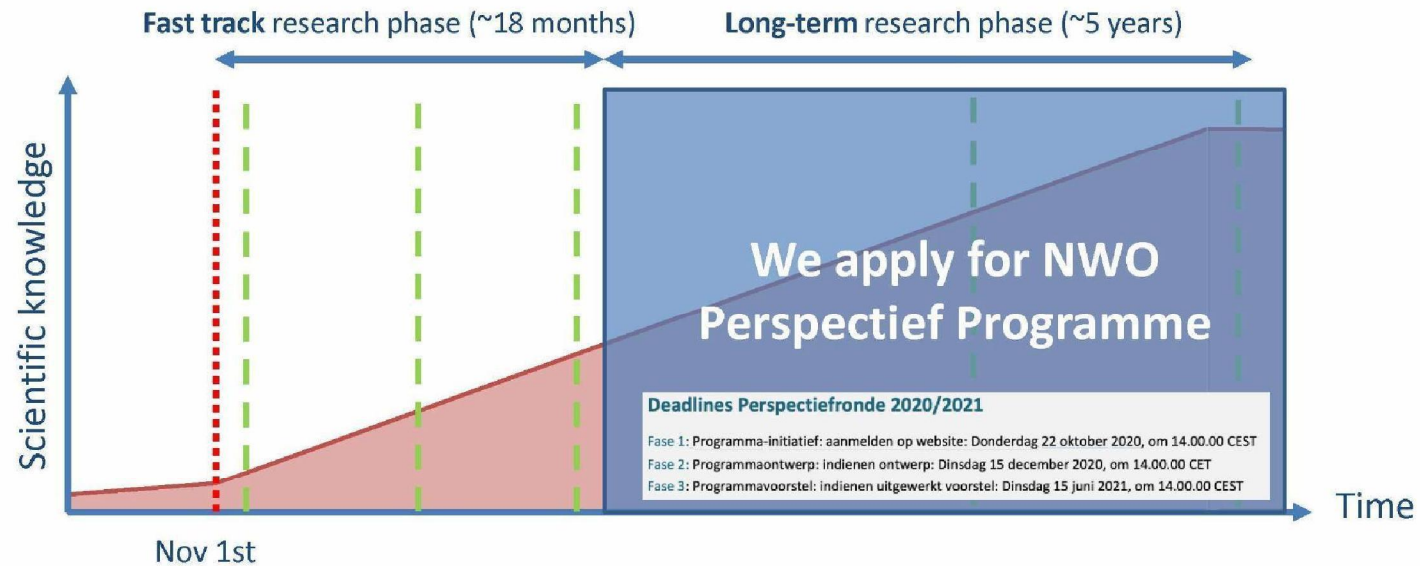
Funding

- Time line: starts in November 1st 2020
- Total budget: 15 – 20 MEuro



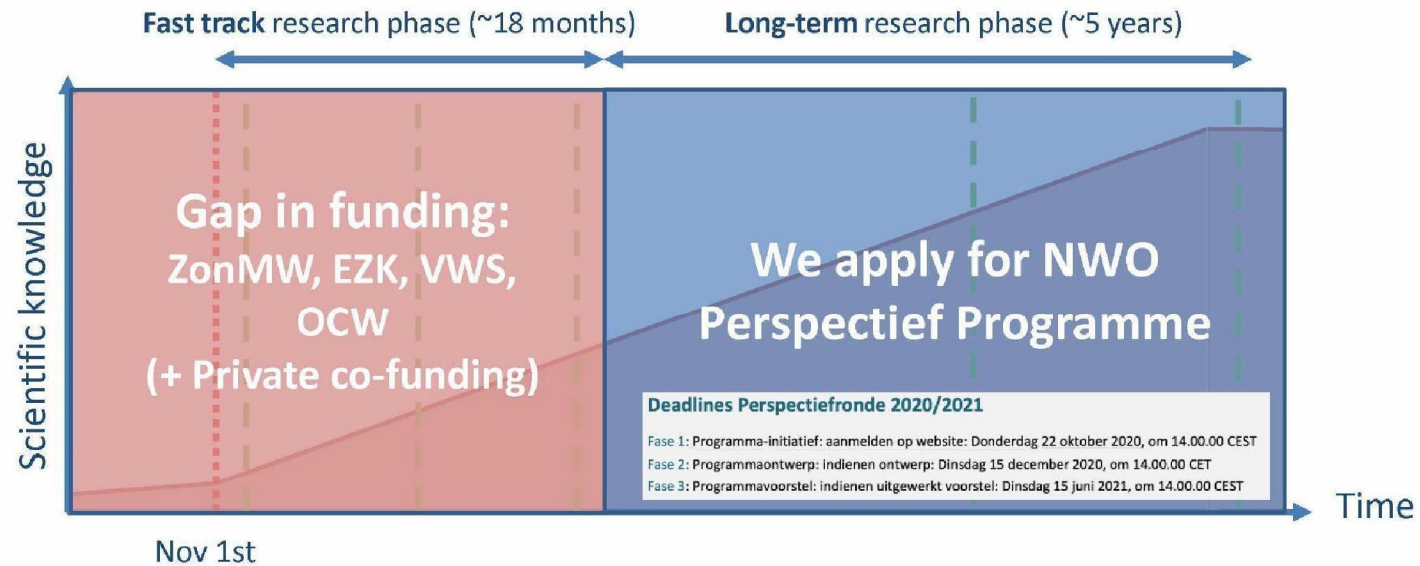
Funding

- Time line: starts in November 1st 2020
- Total budget: 15 – 20 MEuro



Funding

- Time line: starts in November 1st 2020
- Total budget: 15 – 20 MEuro



Agenda

- Short introductions (per person)
- Short description of the programme
- Ongoing and future actions:
 - Funding
 - The research proposal
 - Involvement of business partners: use cases
- Introducing the research team (one person per research group)
- Room for Discussion
- Overview of actions

Agenda

- Short introductions (per person)
- Short description of the programme
- Ongoing and future actions:
 - Funding
 - **The research proposal**
 - Involvement of business partners: use cases
- Introducing the research team (one person per research group)
- Room for Discussion
- Overview of actions

The research proposal

- We (MARIN) started compiling the proposal
 - We have received input from some of you. First *draft* has been written, however it needs **further improvement**.

The research proposal

- We (MARIN) started compiling the proposal
 - We have received input from some of you. First *draft* has been written, however it needs **further improvement**.
- We propose that every research partner contributes to the writing (details will be provided by e-mail)
 - Detailed description of challenges
 - Detailed description of scope of work and WPs for both fast track and long-term projects
 - Propose a budget estimate

The research proposal

- We (MARIN) started compiling the proposal
 - We have received input from some of you. First *draft* has been written, however it needs **further improvement**.
- We propose that every research partner contributes to the writing (details will be provided by e-mail)
 - Detailed description of challenges
 - Detailed description of scope of work and WPs for both fast track and long-term projects
 - Propose a budget estimate
- MARIN compiles, and produces the final document (to be reviewed by all of you)

We propose the following timeline



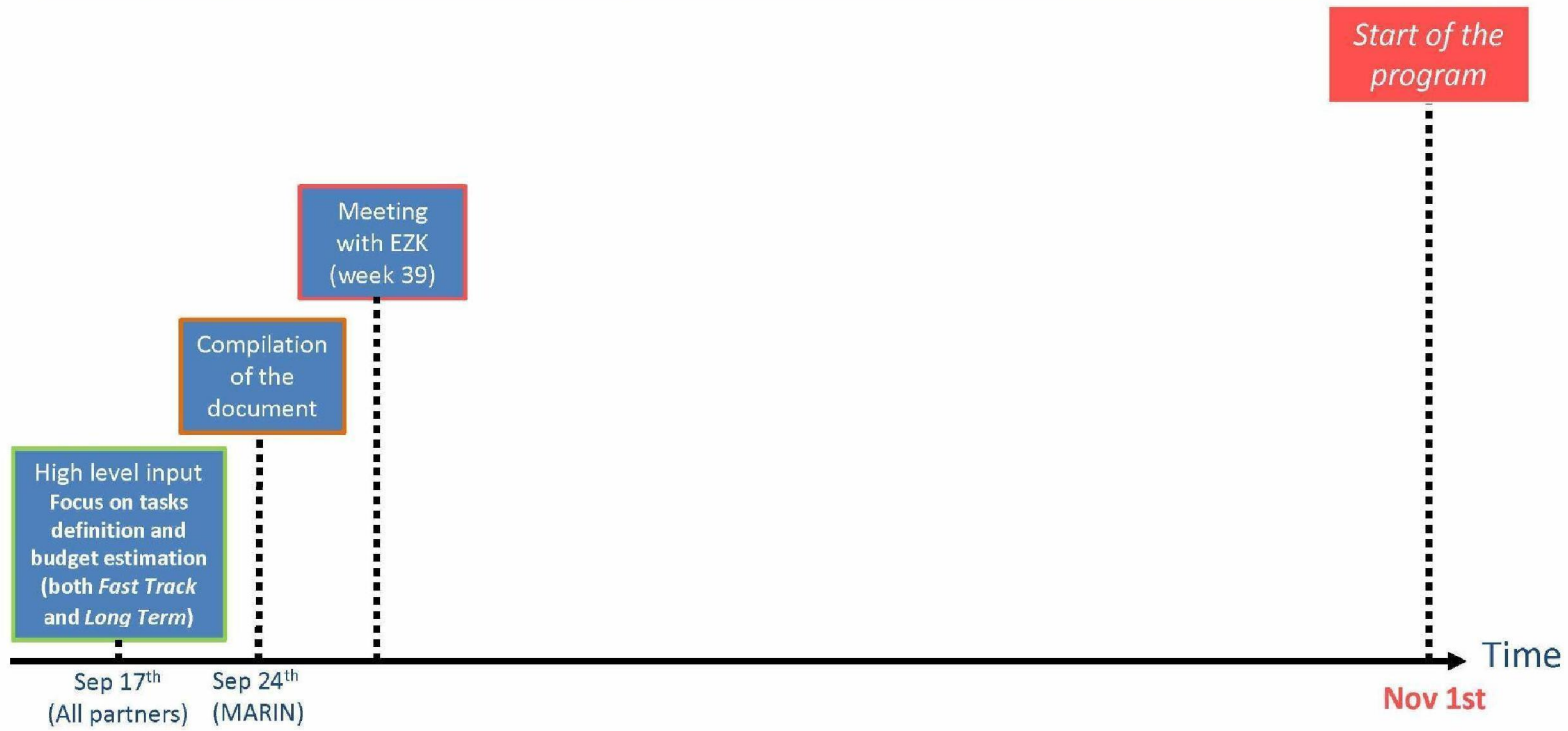
We propose the following timeline



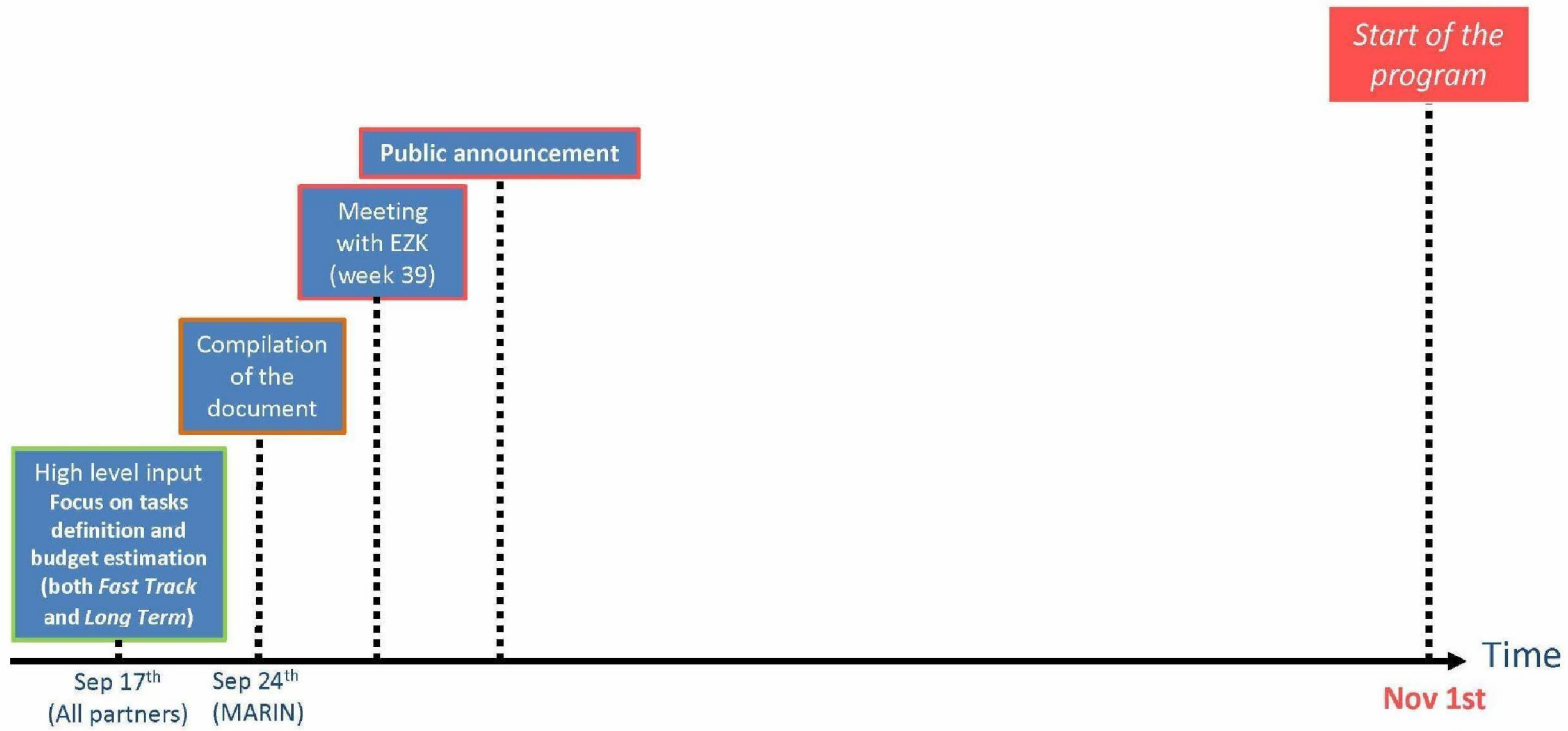
We propose the following timeline



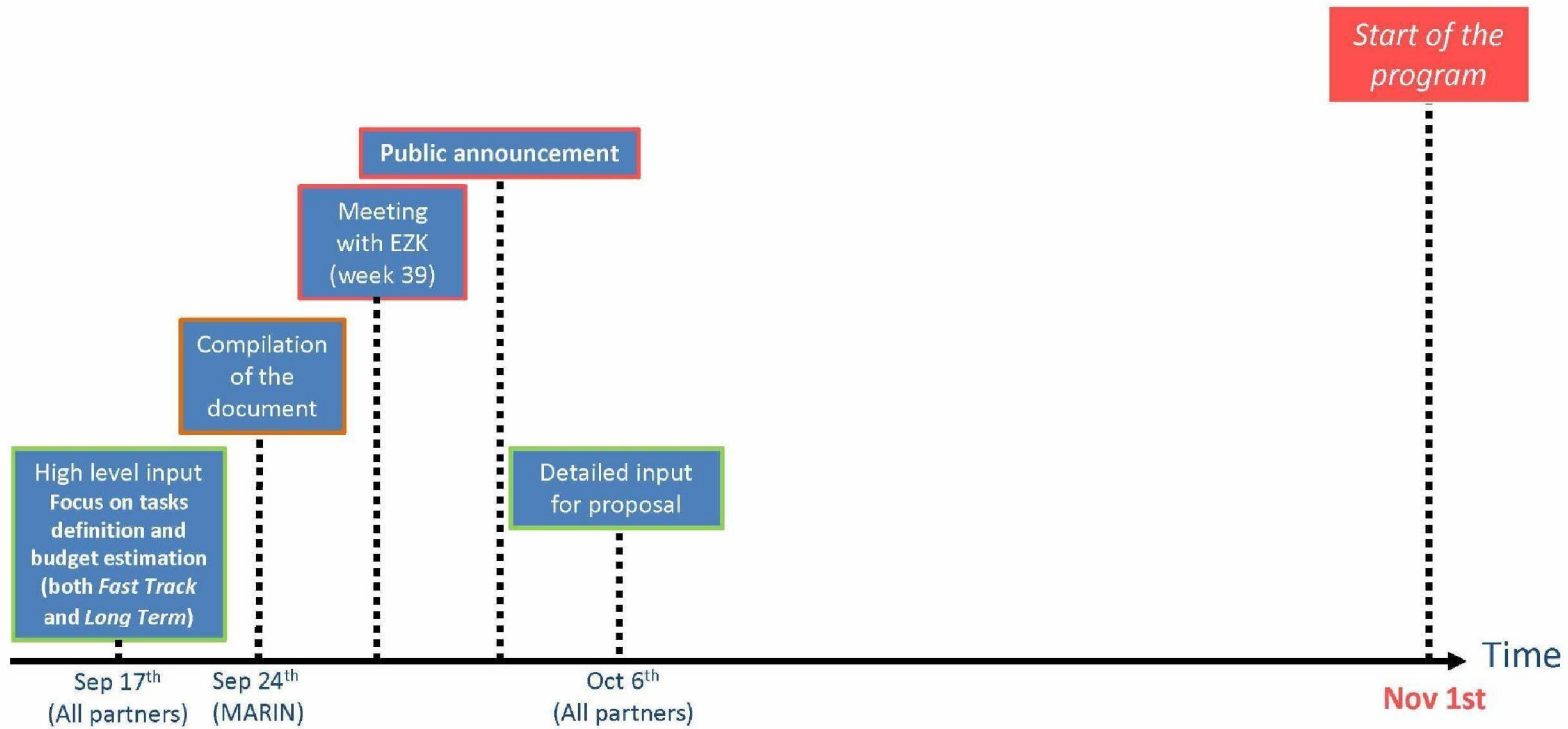
We propose the following timeline



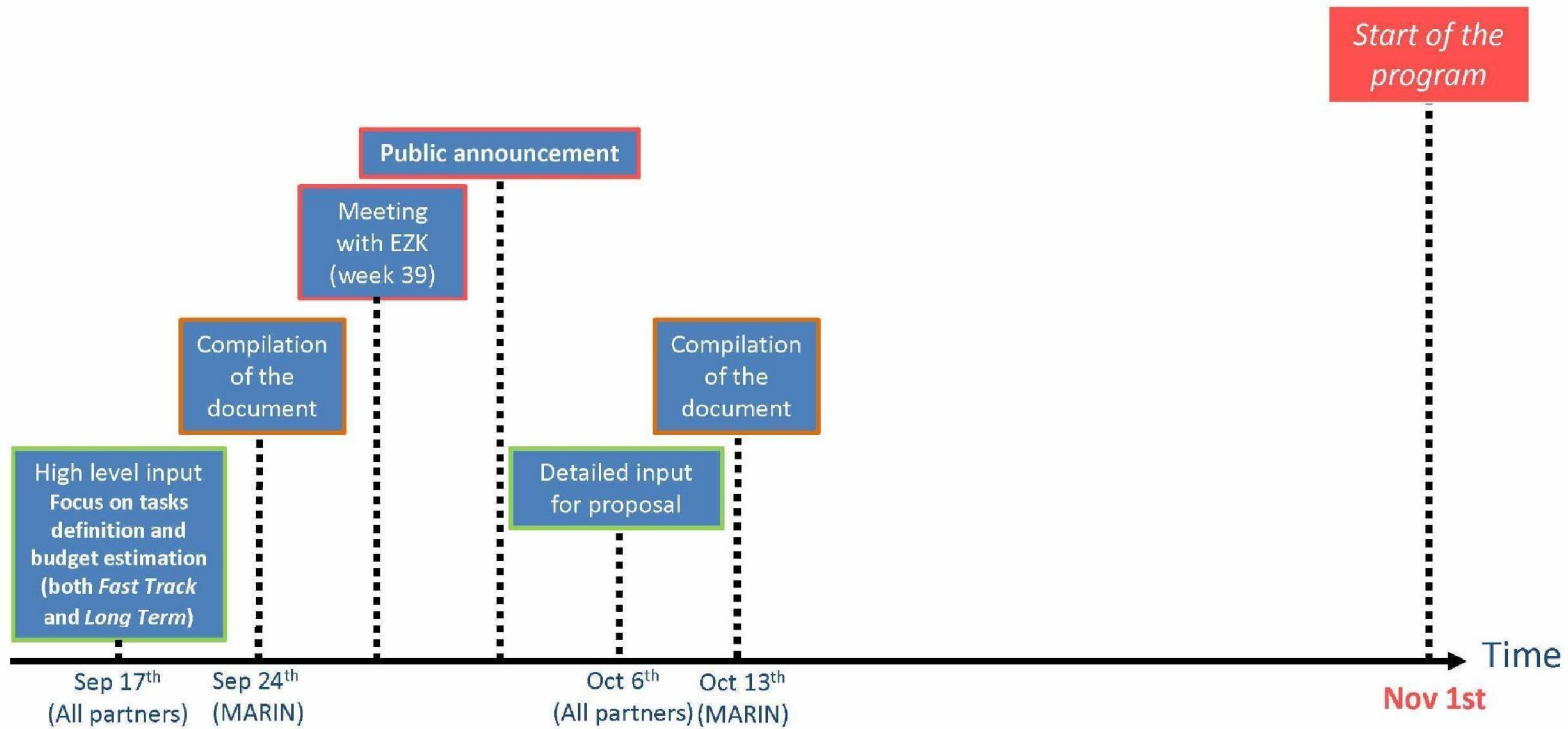
We propose the following timeline



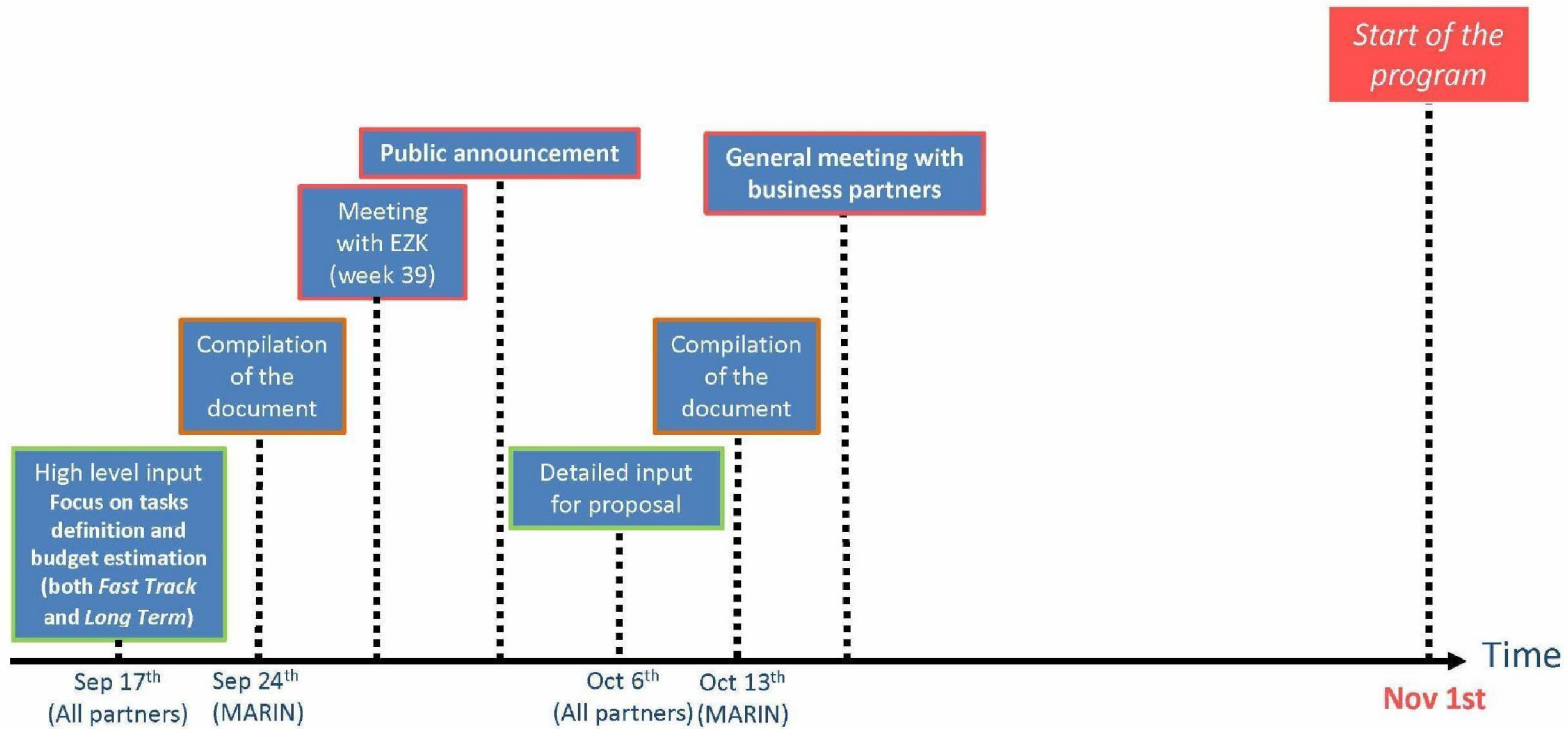
We propose the following timeline



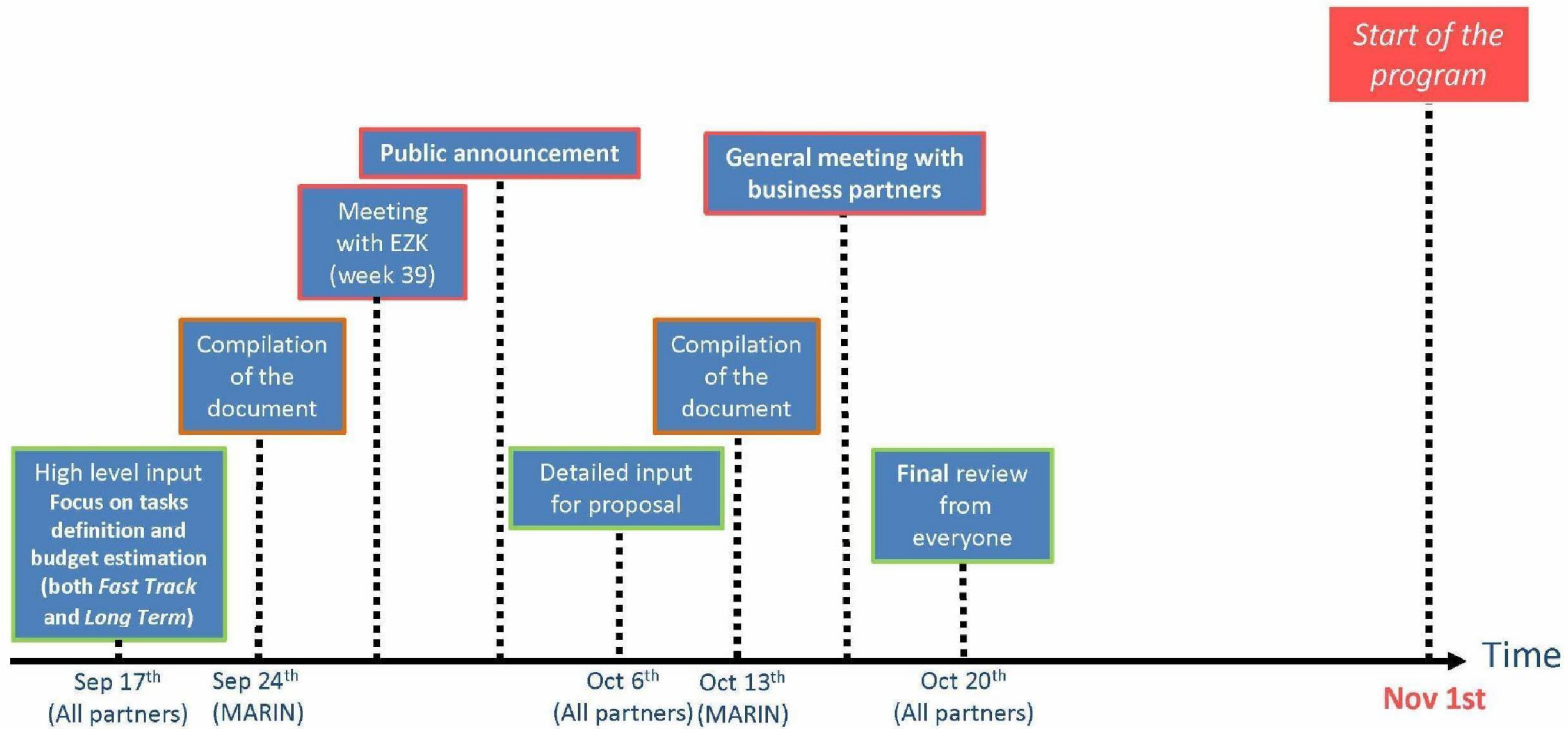
We propose the following timeline



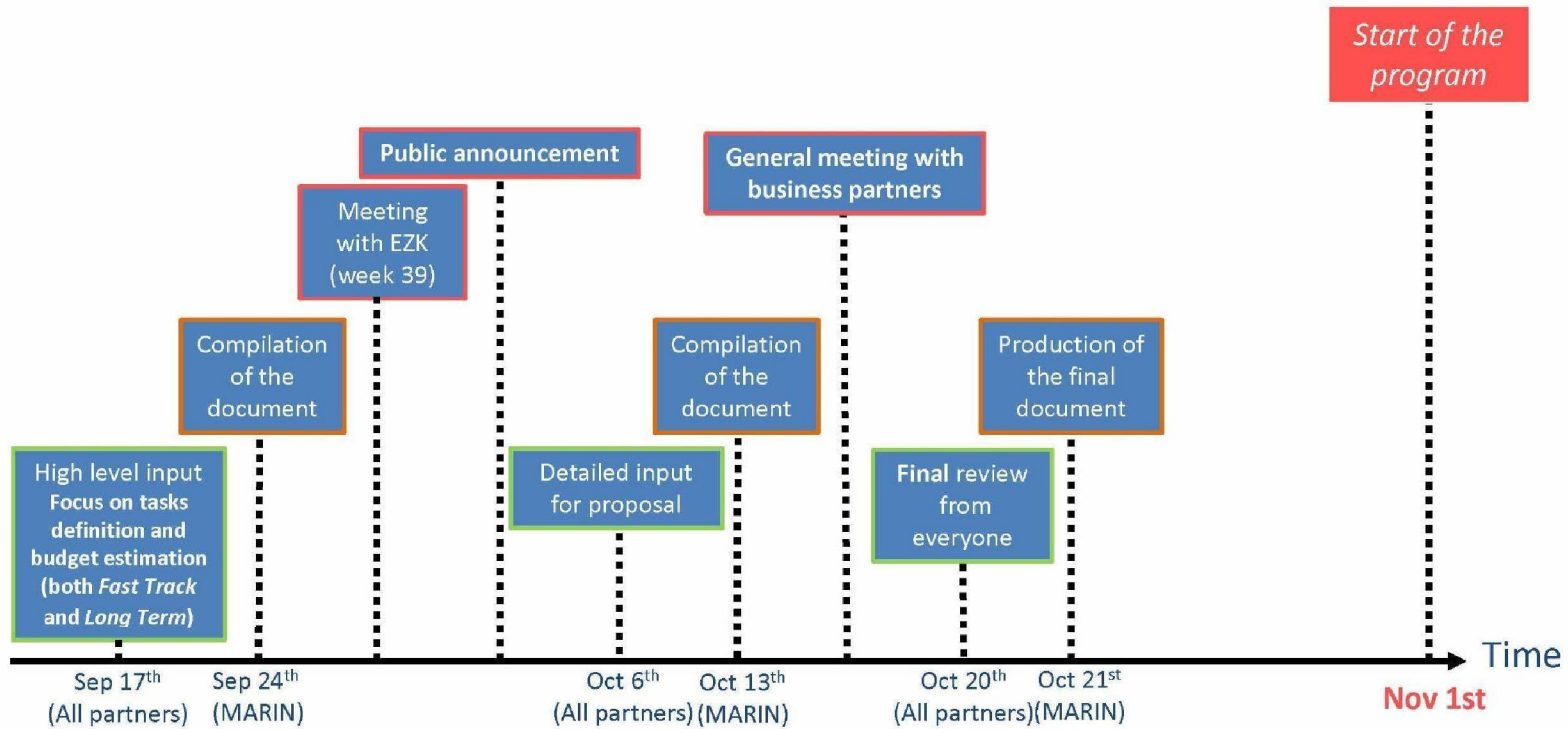
We propose the following timeline



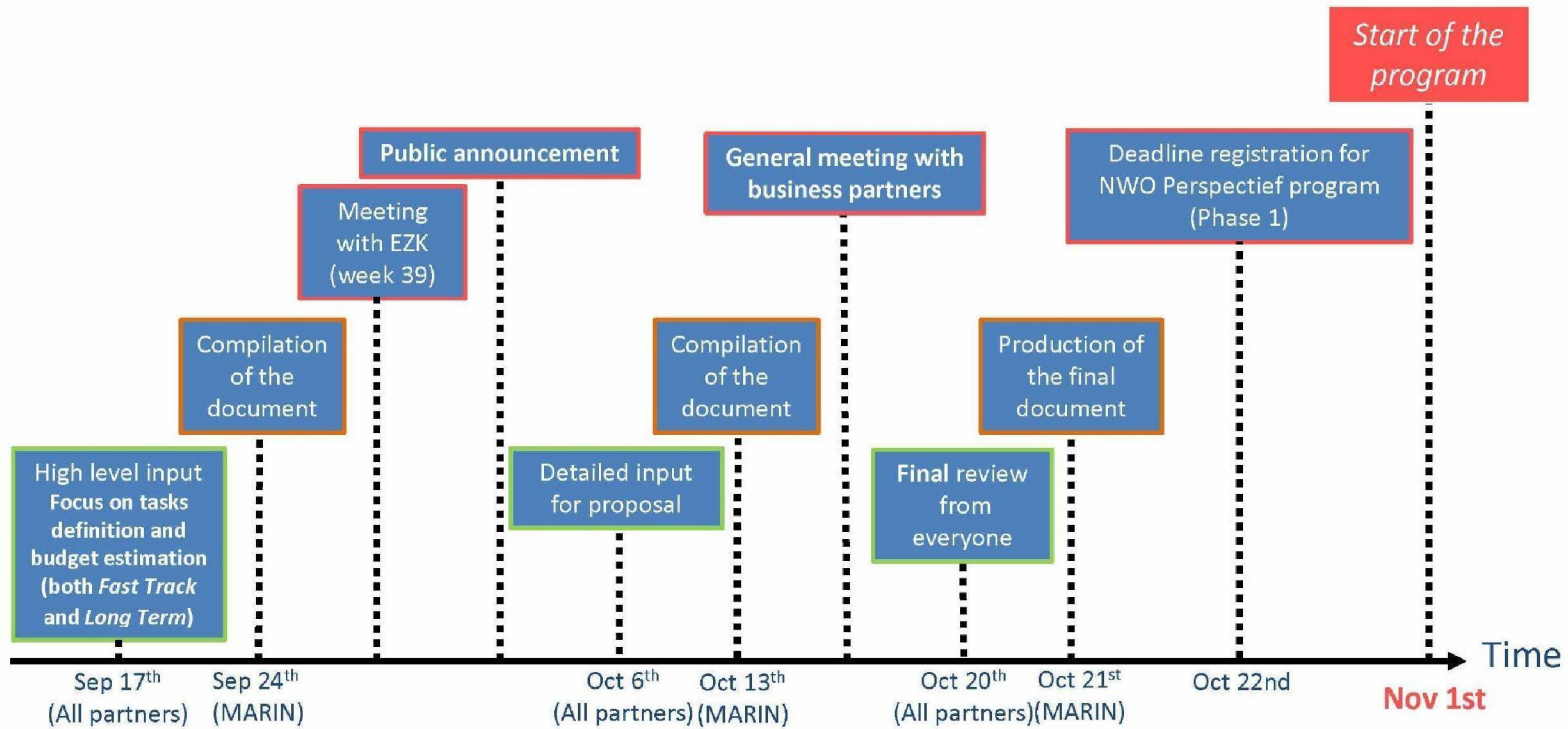
We propose the following timeline



We propose the following timeline



We propose the following timeline



Agenda

- Short introductions (per person)
- Short description of the programme
- Ongoing and future actions:
 - Funding
 - The research proposal
 - Involvement of business partners: use cases
- Introducing the research team (one person per research group)
- Room for Discussion
- Overview of actions

Agenda

- Short introductions (per person)
- Short description of the programme
- Ongoing and future actions:
 - Funding
 - The research proposal
 - **Involvement of business partners: use cases**
- Introducing the research team (one person per research group)
- Room for Discussion
- Overview of actions

Use cases



- The use cases are used to test and illustrate the ventilation strategies for representative real life applications.

Use cases



- The use cases are used to test and illustrate the ventilation strategies for representative real life applications.
- The selected use cases will be as much as possible representative to “typical” situations.

Use cases



- The use cases are used to test and illustrate the ventilation strategies for representative real life applications.
- The selected use cases will be as much as possible representative to “typical” situations.
- For each use case the scope of work includes:
 - Assessment of current situation
 - Screening of various solutions in the reduction of the aerosol levels
 - Choice the best solution in terms of effectiveness, cost and functionality
 - Implementation and assessment of new situation.

Use cases



- The use cases are used to test and illustrate the ventilation strategies for representative real life applications.
- The selected use cases will be as much as possible representative to “typical” situations.
- For each use case the scope of work includes:
 - Assessment of current situation
 - Screening of various solutions in the reduction of the aerosol levels
 - Choice the best solution in terms of effectiveness, cost and functionality
 - Implementation and assessment of new situation.
- Use cases will be carried out with research partners, technology providers and end-users

Use cases (partners we have been in contact with)

Research team



All research partners are invited
to work on the use cases

Use cases (partners we have been in contact with)

Research team



All research partners are invited
to work on the use cases

Technology providers

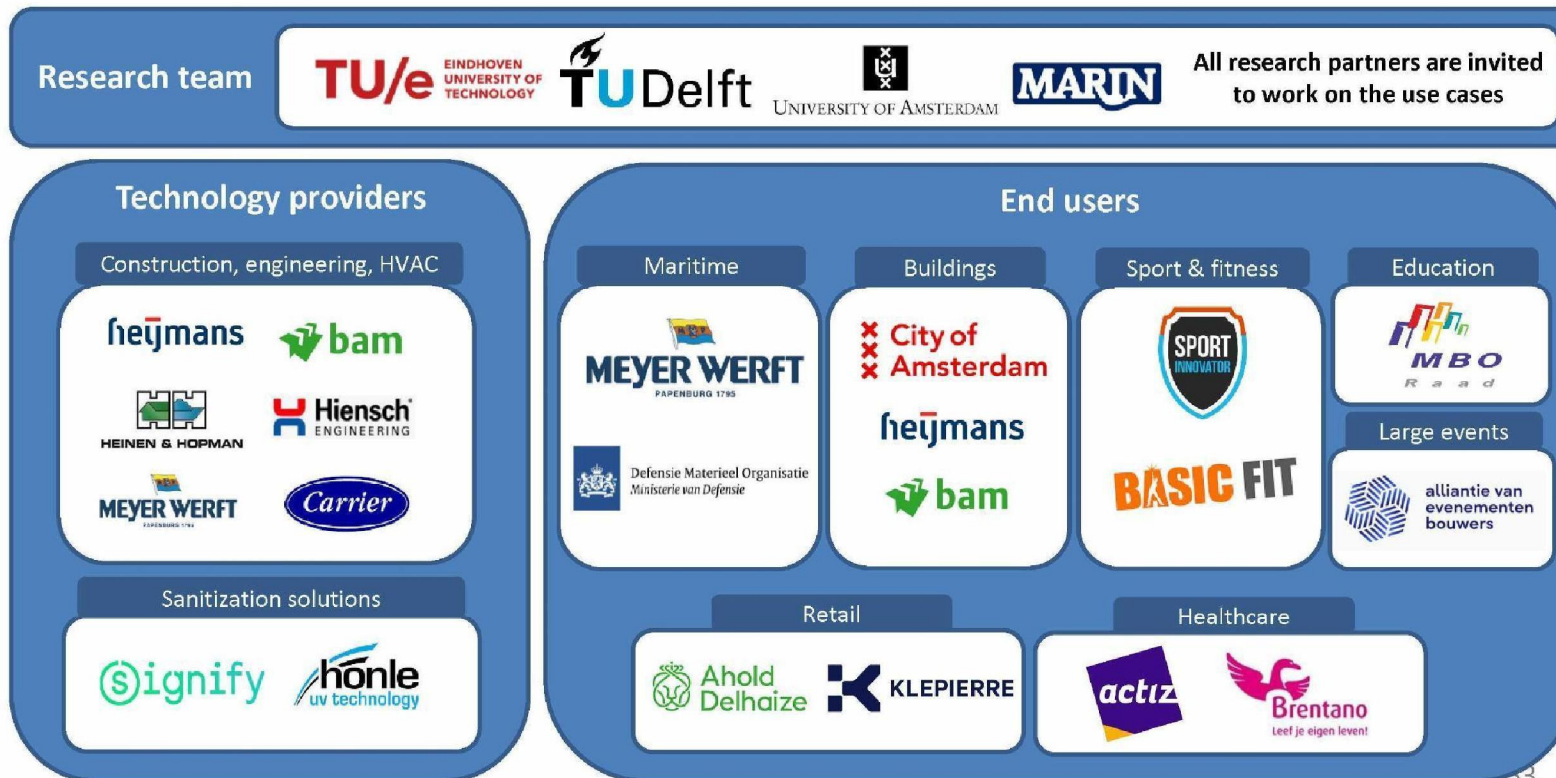
Construction, engineering, HVAC



Sanitization solutions



Use cases (partners we have been in contact with)



Agenda

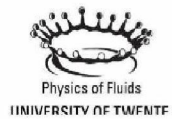
- Short introductions (per person)
- Short description of the programme
- Ongoing and future actions:
 - Funding
 - The research proposal
 - Involvement of business partners: use cases
- Introducing the research team (one person per research group)
- Room for Discussion
- Overview of actions

Agenda

- Short introductions (per person)
- Short description of the programme
- Ongoing and future actions:
 - Funding
 - The research proposal
 - Involvement of business partners: use cases
- **Introducing the research team (one person per research group)**
- Room for Discussion
- Overview of actions

Getting to know each other (one person per research group)

- Comments/remarks on the content?
- Comment on your role within the programme
- What is your vision of success for this programme?



5.1.2e



5.1.2e



5.1.2e



5.1.2e



UNIVERSITY OF AMSTERDAM



umcg



5.1.2e

5.1.2e
5.1.2e5.1.2e
5.1.2e
5.1.2e

Agenda

- Short introductions (per person)
- Short description of the programme
- Ongoing and future actions:
 - Funding
 - The research proposal
 - Involvement of business partners: use cases
- Introducing the research team (one person per research group)
- Room for Discussion
- Overview of actions

Agenda

- Short introductions (per person)
- Short description of the programme
- Ongoing and future actions:
 - Funding
 - The research proposal
 - Involvement of business partners: use cases
- Introducing the research team (one person per research group)
- **Room for Discussion**
- Overview of actions

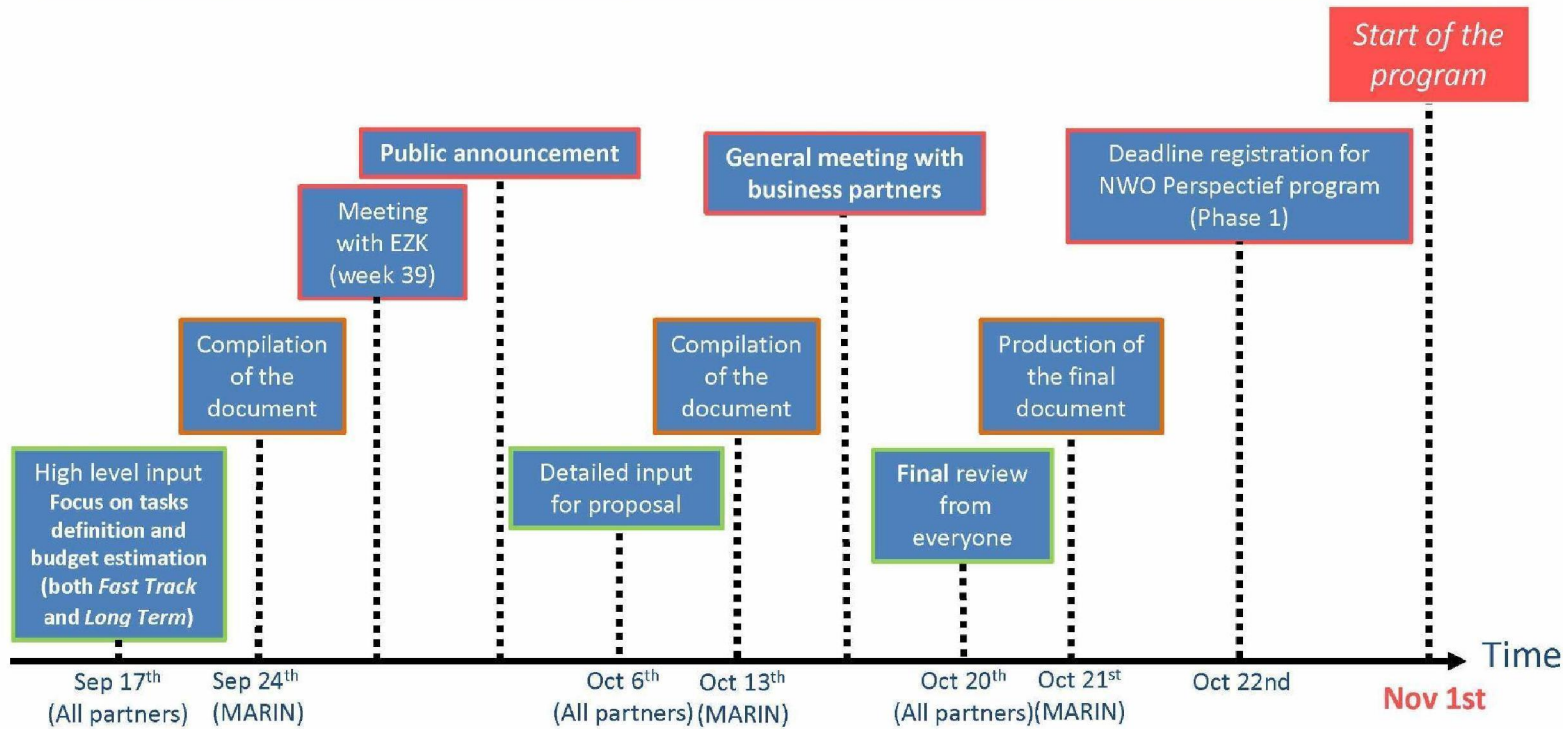
Agenda

- Short introductions (per person)
- Short description of the programme
- Ongoing and future actions:
 - Funding
 - The research proposal
 - Involvement of business partners: use cases
- Introducing the research team (one person per research group)
- Room for Discussion
- Overview of actions

Agenda

- Short introductions (per person)
- Short description of the programme
- Ongoing and future actions:
 - Funding
 - The research proposal
 - Involvement of business partners: use cases
- Introducing the research team (one person per research group)
- Room for Discussion
- **Overview of actions**

We propose the following timeline



Thanks for your attention!