


<p>Project Partners:</p> <ol style="list-style-type: none"> 1. AQUALIA 2. DESAH 3. SLU 4. LEAF BV 5. LEITAT 6. NSVA 7. USC 8. WE&B 9. WU 10. ZFV 11. JETS 12. ISLE 13. CEIP 14. 4F 15. ASB 	 <p>RECOVERY AND UTILIZATION OF NUTRIENTS 4 LOW IMPACT FERTILIZER</p> <p>H2020-CIRC-2016TwoStage</p> <p>Collaborative project</p> <p>Start date of the project: 01/06/2017 Duration 48 months</p> <p>Authors: Cristina Gómez, Beatriz Medina, Jose Manuel Sabucedo, David Smith, Jeremiah Obed,</p> <p>Initial Mapping of Stakeholders and Expectations</p>
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WP	6	Social Innovation and Stakeholder Engagement
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List of acronyms and abbreviations:

BW	Black Water
CE	Circular Economy
Demo-site	Demonstration Site
EC	European Commission
EU	European Union
GW	Grey Water
K	Potassium
KW	Kitchen Waste
N	Nitrogen
P	Phosphorous
SNA	Social Network Analysis
WP	Work Package
WW	Waste Water
WWTP	Waste Water Treatment Plant
SEP	Stakeholder Panel
SAB	Stakeholder Advisory Board
ZAWENT	<i>Zero AfvalWater met Energie- en NutriëntTerugwinning</i>
BIC	Business and Entrepreneurial Initiative Centre
PSOE	Partido Socialista Obrero Español
PP	Partido Popular

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EXECUTIVE SUMMARY

This report is part of the Run4Life project Task 6.1 *Understanding social context and Social Engagement Strategies* to generate a greater understanding of the social context of the project through a stakeholder analysis of how people, groups, organisations and networks, influence, interact and show potential interest in the proposed technologies on nutrient recovery and water reuse. In order for this to take place, it is important to firstly understand who the stakeholders are and how we could potentially engage with them. This analysis has taken place across 4 project demonstration sites in Europe (Ghent, Belgium; Vigo, Spain, Helsingborg, Sweden and Sneek, the Netherlands).

According to the literature review undertaken in this process, the psychosocial factors associated with water resources, wastewater treatments and their impact as facilitators or barriers were identified as the main factors for the acceptance of recycled wastewater, nutrient recovery practices, and bio-solids for fertilizer production. An overview to explore the notion of “success” in effective engagement is also provided in this report to give clarity on the authors’ conceptualisation of successful engagement and interaction of stakeholders in the context of the Run4Life project.

In order to achieve a first stakeholder map of each site and to gain an understanding of the strength of the connections of stakeholders the following three (3) research phases were implemented: **Phase 1:** Contextualisation, to review the social context at each demo site and the identification of the stakeholders; **Phase 2:** Initial approach to the demo site community, this involved the implementation of questionnaires to key stakeholders at the demo sites and two focus groups, one held in Vigo and the other Helsingborg; **Phase 3:** Results processing and visualizing where the results could be integrated following the questionnaires. The end result is to obtain a first stakeholders map of each site and to know the level of risk perception related to nutrient and water reuse. In each map the following aspects are highlighted and delved into deeper in each site: target group composition; Centrality metrics (Social Network analysis) including the degree centrality, and the betweenness centrality and finally the description of each of the stakeholders identified and their potential level of engagement. These initial maps will grow through the lifetime of the project as further stakeholders are identified and added to these initial maps from each site in a snowball fashion. The maps are available online for general open source use, and their links are included in section 4.2 of this document.

According to the analysed results, this report investigates the factors that shape the attitudes towards water reuse and nutrient recovery. In this section of the report differences from the stakeholders were discovered in their expected benefits, with regards to the perceived risks of water and nutrient reuse, although some of the stakeholders answered that they did not see any risk in water reuse, it can be seen as a biased point of view (as the stakeholders that answered the questionnaire are experts of the different sites) and that the public perception could be less clear with regards to these risks, therefore it is important to address in the further stages of this project the “unaware community” of the Run4Life technologies and the general public. The discussion generated from the results addressed the importance of a lack of an elaborated conceptual model from previous studies. Therefore we conclude by mentioning that it must be a priority for the next steps to try to integrate all analysed variables (sociodemographic, perceived risks and benefits, costs, notion of environmental benefit and innovation, etc.). There is a need for a theoretical background to help to better understand public acceptance

The main key messages can be summarised as follows:

- Reinforcing the environmental and efficiency benefits of the systems, as well as the multiple advantages of the circular economy perspective, can make this new technology attractive to potential users, at least from the stakeholders’ perspective.

- The general population need to frame water and nutrient recovery as something that needs to change, that is, they need to perceive that the way the water and waste is currently treated is not optimal or not as optimal as it should be.
- In terms of the availability and engagement level of the stakeholders in the Run4Life project, the demo site stakeholders on the whole are keen to be engaged at a fairly high frequency (whenever necessary or at least once every 3 months) and that they would prefer to be engaged through assisting in engagement processes such as discussion groups and workshops

Finally, this report provides the next steps in order to further explore the social context of the Run4Life project at the demo-site level and at a general public level. Also, the next steps provide guidance on actions to interface science- and society knowledge, to assess the uptake of the technologies and producing inputs for improving the technology usage through social engagement actions.

1. Introduction

1.1 Project Background

Domestic (household) wastewater (WW) is an important carrier of nutrients that are generally not taken advantage of by current decentralised WW treatment processes (WWT). The Run4Life project proposes an alternative strategy for improving nutrient recovery rates and material qualities, based on a decentralised treatment of segregated black water (BW) (wastewater originating from flush toilets that includes faeces urine and pathogens), kitchen waste (the solid organic waste originating from kitchens including all food waste) and grey water (wastewater originating from all other water uses in the household other than toilets, including kitchen water, bathing water, clothes washing etc.) combining existing WWT with innovative ultra-low water flushing vacuum toilets for concentrating BW, hyper-thermophilic anaerobic digestion as one-step process for fertilisers production and bio-electrochemical systems for nitrogen recovery. It is foreseen that up to 100% of nutrient (N, P and K) will be recovered (2 and >15 times greater than current P and N recovery rates) and >90% of water reused.

The obtained products will be >90% reused thanks to prospective end-users in the consortium and a new business model based on a cooperative financial scheme. Run4Life impacts are to be evaluated on safety and security, from an environmental, economic and social point of view (considering social perception of the technologies). Run4Life is a large-scale demonstration project involving 4 demo-sites in Belgium, Spain, the Netherlands and Sweden, that adapts the concept to different scenarios (market, society, legislation). The information obtained in the 4 demo-sites will be used for process simulation to conceive a unified Run4Life model which will be applied in a fifth demo-site in the Czech Republic, allowing new business opportunities and providing data for critical raw material policies. The RUN4LIFE project embraces the concept of Circular Economy, which according to the European Commission is defined as: *the value of products and materials is maintained for as long as possible. Waste and resource use are minimised, and when a product reaches the end of its life, it is used again to create further value. This can bring major economic benefits, contributing to innovation, growth and job creation* ("Circular economy - European Commission," n.d.).

This report is framed within Work Package 6 (WP) on social acceptance. The main objective of this WP is to develop the social, institutional, legal and technological features of the Run4Life technology, as well as achieving wide acceptance among the final consumers, the end-users, the public authorities and political bodies.

1.2 The Purpose of the Document

This report is part of Task 6.1 *Understanding social context and Social Engagement Strategies* to generate a greater understanding of the social context of the project through a stakeholder analysis of how people, groups, organisations and networks, influence, interact and show potential interest in the proposed technologies on nutrient recovery and water reuse.

The initial mapping of the Run4Life stakeholders, as part of Task 6.1, aims at gaining a better depiction of the key organisations working in the area of water reuse and nutrient recovery in the context of the Run4Life project, and to identify where there may be potential areas of collaboration between them. This first exercise establishes what will be a continuous process over the project lifetime of stakeholder mapping and perception analysis that will support the analysis of the social acceptance of the RUN4LIFE proposed technologies. This initial analysis is based on the Run4life social network and its connections mainly associated with the areas of the demo-sites, further analysis will look to widen this first approach in the forthcoming years.

Therefore task 6.1. has five main objectives:

- To identify key stakeholders' expectations from the project with different roles and different levels of impact (regional, national, global impact)
- To map the stakeholders' network at each of the project demo-sites, to show levels of interaction.
- To gather information on attitudes, opinion and behaviour of the concerned stakeholders
- To provide recommendations on the communication of the risks for WP8,
- To provide recommendations on the creation of engagement and social empowerment strategies in WP6 (Task 6.1.2).

1.3 The Structure of this Report

The first section of the report introduces the social context of the Run4Life project. This entails a description about who the stakeholders are in this task and also an overview of the social context at each of the analysed demo-sites.

The second section of the report provides a literature review regarding the analysis of available information about those variables which have been studied related to the enablers or barriers for the acceptance of reuse, which must be taken into consideration in the course of project. Also, an overview of the notion of effective stakeholders' engagement in projects like Run4Life.

The third section of the report focuses on the methodology of the empirical research. Analysis takes place at two levels: (1) desk research of existing stakeholder analysis available in the literature and the analysis of secondary sources from other project activities, (2) field work gathering the empirical data.

The fourth section of the report presents the integration of the results through an analytical framework. The results from the fieldwork, includes questionnaires and secondary data sources. This section explores the outcomes of identifying the factors of success and failure.

Finally, the conclusions and next steps sections integrates the results gathered and discusses the forthcoming steps for the next three years of the project with regards to communication practices and engagement mechanisms in the Run4Life context.

1.4 Who Are the RUN4LIFE Stakeholders

The Run4Life Stakeholders are defined as those organisations that can show interest and/or influence in the context of nutrient recovery and water reuse technologies developed through the lifetime of the project, especially in the nearby communities of the project demo-sites.

The Run4Life stakeholder analysis also considers the following attributes of stakeholders, as defined by the World Bank the stakeholders position/power, the level of influence (power) they hold, the level of interest they have in the specific context, and the group/coalition to which they belong or can reasonably be associated with.

Therefore, the RUN4LIFE stakeholders are organisations represented by individuals that can influence, have an interest, knowledge and/or skills in:

- Working together in the areas of circular economy approaches of domestic wastewater.
- Minimising social rejection (organisational, consumer and market) towards decentralised treatment of segregated black water (toilet wastewater), grey water (other domestic wastewaters) and organic kitchen waste.
- Connecting and interacting for creating/ fostering the use of circularity solutions for establishing effective wastewater treatment and nutrient recovery
- Expressing interest in getting engaged with Run4Life activities.

Stakeholders in the context of Run4Life might also refer to individuals, however in the case of the stakeholder's analysis and mapping, individuals/persons are identified and referenced to their respective organisation to which they belong.

Aware community

Actors directly involved in the implementation of the project, affected by it, or will benefit directly from its results



DIRECT STAKEHOLDERS Fully engaged in RUN4LIFE:

- Project Partners
- Stakeholder Panel (SEP)
- Advisory Board (SAB)

INDIRECT STAKEHOLDERS Actors that could benefit or gain interest

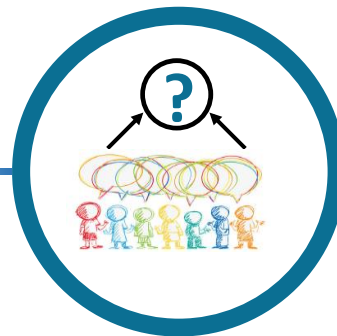
- Nutrient recovery community

STAKEHOLDERS AT EACH OF THE DEMO-SITES:

- Technology users: consumers, fertilisers, inhabitants
- Technology/systems developers – further analysed in WP7
- Media
- Civil society
- Public authorities
- Research
- Funding agencies

Unaware community

The community that lacks awareness of nutrient recovery process and/or about the RUN4LIFE. This community will need to be made aware of the project to drive awareness of circular economy needs in the area and the positive environmental and economic benefits.



- The General public at each of the demo-sites.
- The General Public

Figure 1. RUN4LIFE Stakeholders Categories

Stakeholder categories	Description
Note: one stakeholder can be part of different categories.	
Aware community	
Those individuals and organisations not directly involved in the implementation of the project, affected by it, or will directly benefit from its results	
Direct stakeholders	These are the partners and third parties that are more in daily contact with Run4Life and somehow an agreement of collaboration has been procured.
Indirect stakeholders	Nutrient recovery and water reuse community that is not related to demo-sites.

Demo-site communities	Stakeholders related to the demo-site of Run4Life: Ghent, Sneek, Helsingborg and Vigo.
Unaware community	
<p>The community that lacks awareness on nutrient recovery process and/or about the RUN4LIFE project. This community will need to be made aware of the project to drive awareness of circular economy needs in the area and the positive environmental and economic effects. Communication actions (in WP8) and engagement actions (mainly in WP6) have the responsibility to make these stakeholders be part of the "aware community"</p>	



Importantly, the aware community (specifically the demo site communities) will be engaged throughout the project. This ensures they remain aware of the project advances and results, thereby not only remaining aware throughout but also participating and providing information for the advancement of the project activities.

1.5 The Demo-Site Social Contexts

This section provides an overview about the social context at each of the Run4Life project demo-sites:

1.5.1 [Ghent](#)

Ghent, BELGIUM

Socio-Political Information

- Ghent is a medium-sized city in Belgium, it is the capital and largest city of the East Flanders province
- It has a surface area of 158 km².
- Approximately 250.000 inhabitants as of 2017.
- The ruling parties in Ghent are the Socialist Party Differently a social-democratic Flemish political party; Groen a green political party and Open Flemish Liberals and Democrats (VLD) a liberal and conservative-liberal Flemish political party.

Pilot Site

- The pilot site is at Schipperskaai in De Nieuwe Dokken, Ghent, Belgium.
- The Run4Life concept to be implemented in 430 houses in 2019.
- Schipperskaai includes a diverse range of sustainable housing as well as flexible, multipurpose office and recreational buildings.
- Resource recovery of nutrients (such as struvite), energy (in the form of heat and electricity) and water (process water)

The demo-site in Ghent, Belgium, will implement the Run4Life concept in 430 houses. The infrastructure will be ready to be installed within the first years of the project. The project actions are planned to be undertaken in Schipperskaai in De Nieuwe Dokken, Ghent, Belgium. Ghent is a medium-sized city in Belgium, with a surface area of 158 km² and with approximately 250.000 inhabitants (1.506/km²). The promoters of the project are Schipperskaai Development, City Development Agency of Ghent; and actions are being

coordinated by DuCoop CVBA (cooperative) and CEIP (Clean energy innovative projects), that are part of Run4Life consortium.

The idea of the district started in 2012, when CEIP and E-STER (a consultancy that conducted a feasibility study with other stakeholders from environmental agencies, the city of Ghent, universities, and companies). The outcome of the feasibility study was positive and CEIP teamed up with a consortium of real estate developers 'Schipperskaai Development'. This consortium was established to develop the Nieuwe Dokken site in Ghent, Belgium. DuCoop was created to fund and operate the sustainability services in the new district. It was started, with several private equity investors on board to fund the initial technologies as well as with the support of different European programs.

Schipperskaai includes a diverse range of sustainable housing as well as flexible, multipurpose office and recreational buildings. The district was an industrial area till the end of the 20th century. The city decided to use this to enlarge the city with a new and future oriented district, complying with the climate action plan-ambitions. Therefore, the city allocated for the area a budget housing (10%), Social housing (10%), and flats from 1 sleeping room to 3 sleeping rooms, cohousing project and penthouses

Resource recovery of nutrients (such as struvite), energy (in the form of heat and electricity) and water (process water) will be central to its functioning along with the participation of the inhabitants in its management. The district will apply the 'trias ecologica' concept for the management of water, energy and material use. This concept contains three steps to be followed in the same order: reduce demand, use alternative sustainable options and finally, to use the primary resource more efficiently. The goal is to be successful enough with the first two steps to minimise the necessity of the third step as much as possible (THV DOK9000, 2015).

The site will use the ZAWENT (*Zero AfvalWater met Energie- en NutriëntTerugwinning*) technology approach. This installation is a more technical decentralised WWTS that revolves around resource recovery. This system has already been applied in Sneek, in the Netherlands. Black and grey water are collected separately in this system to allow black water to undergo specific treatment before being combined with the grey water for further treatment. Additionally, kitchen waste can be added to the black water stream to increase energy content and to provide an energy recuperative pathway for this waste stream (Tuts, A., 2017).

The Nieuwe Dokken is a well-known project in Flanders². The city of Ghent recently made an informative video about the project, spoken in Dutch but with English subtitles.

² <http://denieuwedokken.be/nieuws>

<https://www.youtube.com/watch?v=d8nU25zx010&t=2s>

<http://sogent.be/projecten/de-nieuwe-dokken>

<http://www.flanderstoday.eu/innovation/new-ghent-neighborhood-heated-waste>

<http://deredactie.be/cm/vrtnieuws/regio/oostvlaanderen/1.2942949>

1.5.2 Vigo

VIGO, NIGRAN SPAIN



- Vigo is a municipality and Nigran is a municipality very close to Vigo in the province of Pontevedra .
- Surface area of 109,1 km².
- 17622 inhabitants as of 2017.
- **POLITICAL SITUATION:** PSOE (Partido Socialista Obrero Español), a center-left party governs in Nigrán (local), while the regional government in the Xunta de Galicia is the PP (Partido Popular), a center-right party

- 3 Office Buildings, with a greywater recycle system feeding a black water collection system. In this building there are 300 employees working in 52 enterprises (according to the Porto de Molle webpage).
- **The technology** applied is to recover nutrients from the office building wastewater streams for fertilizer production as ammonium nitrate using Bioelectromechanical systems.

In 2011 the Porto do Molle Enterprise Park (874,195 m² surface) (Porto do Molle, 2018) was opened and it since become a reference in sustainable architecture. The first example of sustainability was the building of the Bioclimatic Industrial Premises and then the Business and Entrepreneurial Initiative Centre (BIC). The Business and Entrepreneurial Initiative Centre building has a built surface of 13000 m². A Geothermal Heat Pump that covers most of the Acclimatisation System together with the Photovoltaic contribution for Electric Energy brings about the use of Removable Energies. The Building is equipped with Energetically Efficient Lighting that includes a system for optimizing the better use of natural light, so as with a system that allows for the segregated collection of black water and grey water. Aerobically treated greywater is reused for toilet flushing and harvested rainwater is used for irrigation. The technology applied in Vigo demo-site is to recover nutrients for fertilizer production using bioelectromechanical systems aimed at nutrient recovery from black water as ammonium nitrate.

Nigrán is a village in Pontevedra (Galicia). In 2017 it had a registered population of 17622 inhabitants, 50.93% of which were women. The majority of the population (11.584) are between the ages of 17-64 years old. After the elections held on May 24, 2015 the party that governs in Nigrán (local) is PSOE (Partido Socialista Obrero Español), a centre-left party, while the regional government in the Xunta de Galicia is the PP (Partido Popular), a centre-right party. There also exists the govern of Pontevedra deputation which is also of the PSOE.

For the Run4Life purposes, the infrastructure and technologies were already available in the 3 office buildings, with a greywater recycle system feeding a black water collection system. In this building, there are about 200 employees (up to 300 depending on daily activities) and 68 institutions located in the office building.

In Galicia, the region which could benefit directly from the outcomes of the project, agriculture has a critical economical relevance. Critical to the acceptance of the nutrients produced by the system, there are several groups and companies involved in the agricultural and fertilizer sectors that could be interested in the products derived from the RUN4LIFE processes. These have been already identified and are the following: Pereira Jordao, Agroquimicos Carballa, Agroteibe, Fertiberia, Idainature, Aviporto, AEFA - Asociación Española De Fabricantes De Agronutrientes, RECOMSA, Biofalco, Fertieuropa, Aresa, Soaga, Ecocelta, Verdefondo, Fertiabiol, Cultiagro, Agroamb, Comporence, Agroval, Agroquimica Antelana, Zoonort, Sipcam Iberia.

There are also farmers associations and cooperatives interested in the nutrient recovery proposed by the RUN4LIFE processes: AGACA (Galician Association of Agrifood Cooperatives), ASAJA (Agrarian Association of Young Farmers). And also, the farmers Unions: Unións Agrarias and Sindicato Labrego Galego.

Considering the awareness about the pilot plant, people both in Nigrán and in the building where the plant is installed are not aware of the implementation of this system yet. Especially the workers in the Portodemolle building don't know that the pilot plant is working in the building. They have no knowledge on how the water is being treated in the building.

Although there have been some attempts to advertise the technology implemented, general public are still unaware of the possibilities of this technology and the working of a pilot plant in their city³ (below are presented a couple of links with some news that have come out in the press about the Vigo site).

Other aspects that needs to be considered in the context of implementation of the pilot plant is the amount of water available, as this can affect the perception that the population has for the need for the better use of this resource. Taking this into account, one thing that must be noted is that in 2017, when the project started, Galicia was suffering from water scarcity, as recognized by the Ministry of Agriculture and Fisheries, Food and Environment. The year 2017 was one of the driest years in the last ten years. The Xunta (government of the Galicia region) and the Hydrographic Confederation Miño-Sil declared the pre-alert due to drought the past November of 2017⁴. However, currently, April 2018, the situation has reversed. The Xunta has identified 1,200 kilometres of rivers and coast lines that are at risk of flooding. Given this dramatic change in the water situation in Galicia, this could potentially affect the perception of the general population regarding water reuse.

³ <http://www.farodevigo.es/sociedad/2017/06/23/tecnologia-gallega-tratamiento-aguas-residuales/1704336.html>

<http://www.farodevigo.es/comarcas/2017/02/02/nigran-ensaya-primeras-depuradoras-aguas/1615668.html>

⁴ <https://www.chminosil.es/es/chms/comunicacion/nuestras-notas-de-prensa/1598-la-reserva-hidraulica-en-la-demarcacion-mino-sil-se-encuentra-al-37-9-por-ciento-de-su-capacidad>

<http://www.farodevigo.es/galicia/2017/11/03/seis-zonas-galicia-costa-continuan/1779204.html>


<http://www.europapress.es/galicia/noticia-galicia-abandona-prealerta-sequia-vuelve-normalidad-lluvias-ultimos-meses-20180406131755.html>


<https://www.20minutos.es/noticia/3214735/0/galicia-sequia-frecuente-cambio-climatico-consecuencias-agricultura-turismo/>

https://www.elconfidencial.com/espana/galicia/2017-12-09/sequia-vigo-galicia-agua-potable_1489876/

1.5.3 [Helsingborg](#)

HELSINGBORG, SWEDEN





Socio - Political Information (2018)

- Helsingborg is a city in the region of Scania.
- Surface area of 1,353km².
- 104,250 of inhabitants as of 2016.
- POLITICAL SITUATION:** The city is run by a coalition of 5 political parties: Moderaterna (conservative party), Liberalerna (liberal party), Centerpartiet (center party) and Miljöpartiet (environmental party) and the "kristdemokraterna" i.e christian democratic party.

Pilot Site

- The demo-site is called H+ .
- H+ urban renovation project has 320 apartments for the first phase including 1800 people. It will start with a showroom building.
- The technology is based on source separation system from blackwater and grey water as well as kitchen waste for their treatment by means of anaerobic digestion.
- Effluents will be converted into fertilisers (ammonium sulphate and struvite).

The demo-site in Helsingborg, that is named as H+ is based on source separation system for blackwater and grey water for their treatment by means of anaerobic digestion, which effluents will be converted into fertilisers (ammonium sulphate and struvite). This process of source separation systems takes place within the H+ urban renovation project in 320 apartments for the first phase including 1800 people- adapting Run4Life concept to Swedish legal requirements. The decision to implement source separation systems was made by the city in 2013 and has been ongoing since. No people have moved in to the H+ area yet, since it expected to be inhabited in Autumn 2019.

The design of the nutrient recovery is being undertaken by NSVA in cooperation with LEAF and DESAH to incorporate results and experiences from previous projects as well as from on-going development at the other demonstration sites within the Run4Life consortium (the three institutions are partners of the project).

The issue to include source separation systems in the H+ area was of course debated internally by the city. But the suggestion to implement the system was presented by an internal group of the city and its utilities for water, waste and energy (after performing several technical analyses).

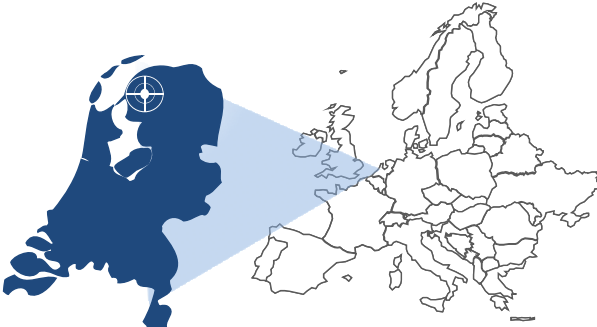
The city of Helsingborg is run by a coalition of 5 political parties from the political centre/right wing. These are: Moderaterna (conservative party), Kristdemokraterna (Christian democratic party), Liberalerna (liberal party), Centerpartiet (centre party) and Miljöpartiet (environmental party) The city of Helsingborg has 104,250 of population. The area of H+ is located in an older port and industrial areas in the city of Helsingborg. This area covers 100 ha in central Helsingborg and it is planning for houses for about 10 000 inhabitants and office areas expected to be finished by 2035. The H+ area for example had specific goals to maximize recovery of resources and to optimize the connection between the city and the farmland which heavily influenced the later choice to implement source separation systems (City of Helsingborg, 2011).

The decision to implement this treatment system in this area of H+ was born out of the environmental profiling of the area (City of Helsingborg, 2011). The H+ area was expressed as a realized need, by the water utility, to get hands-on experience on operation and impact of wastewater systems possibly better adapted to future climate change and a growing need for recycling of resources. In this sense, also several Swedish municipalities have shown interest in the system, and the NSVA and the city of Helsingborg have given several informative speeches to delegates from these municipalities.

In terms of the analysis of public perception, *Skambraks, A. et al 2017* conduct an empirical study based on in-depth interviews in the pilot areas where the municipality and the municipal utilities were involved. The interviews showed a greater level of municipal cooperation for H+ pilot area, which existed prior to the decision to implement source separation systems.

1.5.4 [Sneek](#)

SNEEK, NETHERLANDS



Socio - Political Information	Pilot Site
<ul style="list-style-type: none"> Sneek is a municipality of the Súdwest Fryslân region. Surface area of 34.04 km². 84037 inhabitants as of June 2017. POLITICAL SITUATION: Christian Democrats holds 22,8% of the votes closely followed by the Liberal party with the 18,7% . 	<ul style="list-style-type: none"> 32 houses at the Lemmerweg neighbourhood in Sneek and at the Desah offices (3 toilets for 30 people). Parameters to be measured: nutrient recovery, degradation of organic matter and energy recovery/biomethane production, pathogens, micropollutants, and heavy metals.

The demonstration of Run4Life concept in Sneek will take place in 32 houses at the Lemmerweg in Sneek and at the Desah office building (3 toilets for 30 people). The concept focuses on the production of hygienically safe solid and liquid fertiliser in a one-step process by means of treating waste water coming from vacuum toilets, since highly concentrated biodegradable waste streams are required to sustain the energy demand of this process. The results are verified and optimized in the Wageningen University with the collaboration of the company *4Farmers*.

Parameters to be measured in Sneek include: nutrient recovery, degradation of organic matter and energy recovery/biomethane production, pathogens (bacteria, viruses and helminth eggs), micropollutants, and heavy metals.

Sneek is a municipality of the Súdwest Fryslân, with a population of 84037 inhabitants as of June 2017 (Statline, 2017). The education level in the municipality accounts for 21% of the population with a higher education (BSc and associated levels and MSc and associated levels).

Concerning politics, in the last elections the Christian Democrats party was the most voted option with 22,8% of the votes closely followed by the Liberal party with the 18,7% of votes

The project was started in a form of a project phase implementing decentralised sanitation at the Lemmerweg in Sneek at the end of 2004. The planning process of the project was dominated by institutional cooperation of actors involved in the project based in a networking conceived before in previous related projects (Hegger, D., 2017). The pre-existing network created and acknowledged shared interests in developing more sustainable wastewater management systems which has made it considerably easier to reach consensus over the goals of the project and to reach the actual implementation phase (ibid).

In Sneek, the municipality is responsible for wastewater collection, the Water Board is responsible for the treatment of the collected material and the residents are 'passive' users of the technological system (ibid). The main interest of the municipality in the project was to promote itself as a progressive municipality contributing to sustainable development. Both housing corporations involved expected that considerations of water and energy efficiency became increasingly important selection criteria for house seekers and saw the first pilot project as a way to promote themselves as progressive housing corporations (ibid).

The project followed an information strategy with the residents for the use of the technologies based in meetings and dissemination materials. The residents received information regarding the implemented innovations on two occasions: in a plenary meeting for all new residents where the sanitary system was explained to them (as part of the whole process of informing the inhabitants about their new dwelling). Also, at the moment the inhabitants received the key of their new house the sanitary system was included in the information procedure together with a stock of allowed detergents (Ibid).

In 2012, immediately following the launch of Waterschoon, Noorderhoek, in Sneek, a satisfaction survey was conducted among the residents (60+) and the professionals working in the nursing home (Stowa, 2014). The purpose was to determine to what extent the residents were satisfied with the use of the facilities and the implementation of the project. The survey showed that residents generally were satisfied with the project. The majority found it a convenient and a hygienic system, especially the grinder as a replacement of the green container. They felt proud to be part of the project and to contribute to a better environment. Trust with the managing actors was also high and the information provision was perceived to be well-organized.

The rental house company seems crucial for the success of the project. The housing foundation is "close" to the residents and serves as a contact point and information provider. The utility building in the middle of the neighbourhood is considered an important symbol representing transparency of the project. It is therefore good to use the symbolic value of this building to kindle enthusiasm for residents, visitors and the media.

Some negative factors observed in their houses were the noise of the vacuum toilet during the 'rinse' and the absence of a plateau in the toilets. Concerning the lack of understanding, it was difficult for the residents to imagine how such a system works in daily practice. Additionally, the residents perceived some ambiguity about the costs of operation, management, etc. as shown in their bill.

2. Literature Review

The purpose of this review is to identify the psychosocial factors associated with water resources, wastewater treatments and their impact as facilitators or barriers for the acceptance of recycled wastewater, nutrient recovery practices, and bio-solids for fertilizer production. Additionally, to explore other factors related to public engagement in the context of the project, i.e. a circular economy project.

The study protocol is registered on PROSPERO: the international prospective register of systematic reviews (ID: CRD42018086970). This work was performed in accordance with the PRISMA statement (Moher et al., 2010). More information about the protocol followed for the literature review can be found in Annex 1.

2.1 Factors Conditioning Public Perception in the Related RUN4LIFE Technologies

The sub-sections below summarise the relevant findings identified in the literature review organised according the sociodemographic variables.

2.1.1 Sociodemographic Variables

In general, the work on public acceptance for recycled water or new technologies (as it could be the case of decentralized plants), take into account sociodemographic variables. Although the results show mixed evidence, they take into account the differences that may exist in terms of age, gender, educational level, income, religion, race and political affiliation.

However, if we focus on **age** there seems to be a disagreement. On the one hand, some studies such as Bennett, Mcnair, & Cheesman, (2016); Buyukkamaci & Alkan, (2013); Lyu, Chen, Zhang, Fan, & Jiao, (2015) or Dolnicar, Hurlimann, & Grün, (2011), find that younger people are the least reluctant to accept recycled water and the technologies associated with their treatment. Conversely, other studies, for example (Bruvold & Cook, 1981); and Gallup Poll, (1973) have find the complete opposite trend to be true.

According to Fielding et al. (2018), there could be contextual factors that are influencing this age aspect, since the most recent studies, conducted in Australia, have found that there is a greater youth-acceptance trend. While the older studies, from America, have found the opposite trend. Given this contradiction and the possible contextual influence, it is important that the Run4Life project takes into account this sociodemographic variable to establish if it is a determining factor in the public acceptance in a European context where these pilot plants are being tested.

Regarding the issue of **gender**, many studies have not found any significant differences. Although, for those in which differences were identified, the conclusion is that men generally accept better water recycling and the technologies associated with water reuse (Baghapour, Shooshtarian, & Djahed, 2017; Bakopoulou & Kungolos, 2009)

Regarding the **geographical scope** of the reviewed articles, the majority of the studies have been undertaken in Australia. The rest have been undertaken in the USA, Europe and Asia and specially, in regions with water scarcity, except for a few studies which have been developed in the UK. Therefore, given where these studies have mainly taken place, it implies that we would need to be cautious when using the geographical scope variable that are generally used to study the acceptance of new technologies (such as those used in the Run4Life project), since the perception of water scarcity from different countries may be a critical facilitating factor conditioning the public attitudes in water issues. In this case for those regions of the project not facing water scarcity, the results of the project can be very revealing. This implies that great efforts need to be undertaken in communication actions in order to put water issues at the forefront so that people will be less reluctant to accept any changes.

When the **educational level** is taken into account, the tendency is that the better educated, the greater the acceptance (Alhumoud, Behbehani, & Abdullah, 2003; J. Alhumoud & Madzikanda, 2010; Baghapour et al., 2017) However, most of the reviewed studies did not find any significant differences in relation to public acceptance and the education level variable.

Concerning the variable of **income**, there has been little work undertaken in this area and thus mixed results are found here. A relation amongst the variables income and acceptance is not frequently found, but in those

for which a correlation is identified, the tendency is that a higher level of income results in greater water reuse acceptance (Bruvold & Cook, 1981)(Garcia-Cuerva, Berglund, & Binder, 2016).

Religion and race also seems to be a question that has focused on the study of acceptance, especially in those countries where different races and religions coexist. Although it is not the objective of this work to take these variables into account, it is worth noting here that the relationship between religion and race and acceptance is less clear and there are no conclusive results (Fielding, Dolnicar, & Schultz, 2018).

Finally, **ideology** could be a factor influencing public acceptance. The few studies that have taken into consideration this issue, only the one of Haddad et al. (2009) has shown that extreme positions (both right and left) are more reluctant to accept reuse. Therefore, it would be an innovative aspect to also address this variable within this project, since studies in other social and psychological areas find that the ideology determines attitudes in many aspects of daily life.

2.1.2 The problem of water management (costs, maintenance pricing, etc.)

A recurrent factor found in this literature review is related to the **costs** associated with the implementation of new technologies in water treatment. As long as the implementation of the new technology does not involve a direct cost to the consumers, the perception of no cost to the consumer helps their acceptance (Mankad, Tapsuwan, Greenhill, & Malkin, 2011) In general, people are reluctant to adopt behavioural changes, but if these changes imply an additional personal cost, then the level of rejection is higher (Chen et al., 2013)

The studies that found that the perceived costs of implementation were high showed that it was related to equipment **maintenance and construction work costs**. To overcome this barrier, the reviewed studies have shown that public policies proposed different financial instruments (public aid, public financing, etc.) in order to cover partially or fully the maintenance costs in order to favour public acceptance to implement water recycling and the use of alternative technologies (Garcia-Cuerva et al., 2016).

2.1.3 Perceived benefits

The perceived benefits include the savings on household water usage bills (Garcia-Cuerva et al., 2016) delaying or eliminating the augmentation of new water supply sources (i.e. eliminating the need to construct new water treatment plants or desalination plants in favour of reusing treated wastewater); mitigation of the effects of imposed water restrictions on lifestyle and property value (i.e., the benefits of being able to maintain green lawns); and increasing the sense of environmental responsibility and community mindedness (Marsden Jacob Associates, 2007).

2.1.4 Factors related to the final use of the treated water, level of contact, level of comfort, and public health.

Public health is one of the key factors most studies have focused on for public acceptance of new technologies and especially for water reuse. Society is generally more prone to reuse as long as it is guaranteed that it will not affect public health (Hurlimann & Dolnicar, 2016; Fielding et al., 2018).

Acceptance is more likely when the use of recycled water is for instance for irrigation and/or cleaning purposes (shower, laundry, etc.). This means that the level of comfort experienced by water reuse is higher when the level of physical contact of the reused product is lower, and also depending on the final use of the recycled product.

2.1.5 [Psychological Factors \(risk perception\)](#)

Studies show that the perceived risk related to health issues is consistently and negatively associated with acceptance (de Franca Doria, Pidgeon, & Hunter, 2005). Separate from the role of risk perceptions is the role of emotions, which also show consistent findings of negative emotions related to water reuse. Research has particularly focused on the emotion of disgust or the so-called **yuck factor**. The studies reviewed show that experiencing negative emotions such as disgust in relation to recycled water is related to lower levels of acceptance (Fielding et al., 2018).

Trust is another variable which has shown to be critical in previous studies. This current review has also highlighted that public reluctance to adopt alternative water systems is related to the public's mistrust in the organisations that operate and manage the water systems and the poor perceptions of ownership relating to water supply decisions, which were both reported as being crucial issues that can facilitate acceptance.

Social norms must be also taken into consideration. Social norms are referred to aspects that are approved of or are common practice in groups, and they can be powerful influencing factors in group members attitudes and behaviour. Consistent with this proposition, people are more accepting of recycled water for laundry use if they read about others using recycled water (Chen et al., 2013), and perceiving that important members of the community or close others support recycled water schemes. These aspects significantly and positively influence the acceptance of potable recycled water (Nancarrow, Leviston, & Tucker, 2009, 2008). Respondents own level of support is also associated with their perceptions of how much others support recycled water schemes (Friedler & Lahav, 2006).

Higher environmental concern (reflected by more pro-environmental actions, greater obligation to protect the environment, more water conservation actions, privileging the environment over economy, or pro-environmental attitudes) is related to higher acceptance of non-potable recycled water uses (Dolnicar et al., 2011; Hurlimann, 2008; Jeffrey & Jefferson, 2003).

Variables that have attracted less research attention but have emerged as consistently associated with acceptance of recycled water include perceived fairness of the recycled water scheme or the scheme management and procedures of local and national authorities (Fielding et al. 2018).

Knowledge and information seem to also be relevant for acceptance. Most studies examining the relationship between self-reported knowledge/awareness of recycled water and acceptance conclude that greater knowledge or awareness is associated with greater acceptance (J. Alhumoud & Madzikanda, 2010; Hurlimann & McKay, 2006).

2.1.6 [Specificities for nutrient recovery in the literature review](#)

Most of the reviewed literature has concerned water reuse practices and less about nutrient recovery. Forty-two (42) papers were identified regarding the topic of nutrient recover, including related topics such as biosolids recycling, urine reuse fertilizers, organic manure, nutrient recycling, human excreta, excreta reuse, biosolids, humanure, sewage sludge (Richardson, 2012; Duncker, Matsebe, & Moilwa, 2007).

The vast majority of the studies have been undertaken in developing countries. Which is an indicator than in developed countries there is still a reluctance in using recovered nutrients, and it could be very much dependant on the necessity of the society to use the recycled nutrients.

In general, it's been found that there is a lack of awareness of the fertilizing value of nutrient recovery (Mugivhisa, 2015). One conclusion derived from this literature review is that given the current perceptions and knowledge, respondents felt that the benefits derived from nutrient recovery do not offset the perceived health and safety risks (Robinson, Raup, & Markum, 2012). However, as it happened with wastewater reuse

and with decentralized water systems, as the level of physical contact with the reused product increases, the level of acceptance decreases.

The study of Robinson et al. (2012), which has been carried out in North America, shows that participants taking part in a survey process, were dissatisfied with the level of stakeholder involvement in research and decision-making processes concerning nutrient recovery. Their results pointed out that decisions and risks were not sufficiently communicated to the general public.

In a recent study from Roma (2013) there is a table summarizing the main obstacles to acceptance of re-use in agriculture: poor knowledge of the potential of nutrient recovery, lack of understanding, concerns for health risks, sensorial perceptions (odour), lack of knowledge regarding the methods of nutrient recovery and social stigma.

Several articles (Usman, Abdullahi, Qasimu, & Adamu, 2016; Simha, 2016; Nimoh, Kwasi, Kofi, Flemming, & Robert, 2014; Gelgo, Mshenga, & Zemedu, 2016; Mariwah & Drangert, 2011) have focused on the socio-demographic characteristics of acceptance and some insights can be collected from these: Farm size and membership to farmer groups influenced the intensity of positive adoption while farm income and frequency of organic fertilizer application influenced the use intensity of organic fertilizer negatively. The more the farmers increase their farm size, the more the tendency of using organic manure.

Studies such as Usman et al. (2016) maintain that the youth are more willing to use recovered nutrients in agriculture. Gender also emerges as an important predictor of acceptance. Female respondents are more negative to the use of human excreta for agriculture than male respondents.

The respondents with higher formal education are much more positive about the use of human excreta.

An important insight from the study from (Appiah-Effah et al. (2015) is that the health risk is not the main reason why most of the respondents have a negative attitude towards the use of faecal sludge compost, rather it is related to the perception that faecal sludge is total waste and therefore must not be used. In this line the work, Tyson (2002), concludes that labelling sewage sludge as "waste" is likely to hold back any improvement in public opinion. It is necessary to prevent the invasion of privacy by making sure that sludge reuse activities do not smell. But it also is important to have good communication with those affected to solve their concerns directly.

Furthermore, research into public acceptance of recycled water use provides insights into some key determinants of how the public is likely to view alternative biosolids management practices, as shown by this literature review. The research from (Cubed, 2009) has shown that public acceptance increases when:

- The degree of human contact is minimal;
- Protection of public health is clear;
- Protection of the environment is a benefit of reuse;
- Promotion of resource sustainability is a benefit of reuse;
- The community has high awareness of waste management issues;
- The perception of the quality of the biosolids products is high; and
- Confidence in local management of public utilities and technologies is high.

Furthermore, malpractices with the final product can negatively affect the public perception of nutrient recovery. According to Obour et al. (2015) the lack of access to information on fertilizer management and high prices has constrained their usage among farmers, where additionally the lack of proper management of fertilizers among the farmers increases the cost of production.

Goven and Langer (2009) stated that to overcome these barriers in public opinion, scenario workshops and related methods represent an opportunity to enhance sustainable waste management through their ability to elicit widely distributed relevant knowledge; facilitate learning by all stakeholders; acknowledge the role

of social, cultural and political values in 'technical' decisions; and involving the public in decision-making in a way that encourages more than just a simple 'not in my back yard' response.

2.1.7 A Summary of concerning factors

In concluding this section, public opinion and attitudes with regards to water reuse and nutrient recovery shows higher levels of acceptance when:

- The degree of human contact is minimal
- Protection of public health is clear
- Protection of the environment is a clear benefit from water reuse
- Promotion of water conservation is a clear benefit from water reuse
- The cost of treatment and distribution technologies and systems is reasonable
- Awareness of water supply problems in the community is high
- Perception of the quality of reclaimed water and nutrient recovery is high
- Trust in local management of public utilities and technologies is high

2.2 Effective Engagement for Circular Economy

In this section, we provide an overview to explore the notion of "success" and to provide clarity on the authors' conceptualisation of successful engagement and interaction of stakeholders in the context of the Run4Life project. It is important to contextualize engagement in the scope of Circular Economy due to the fact that the Run4Life project embraces the concept of the Circular Economy and creates a sustainable strategy for nutrient recovery and water reuse and ensuring its market success, by integrating all key players along the value chain including the end-users. We aim to deepen the understanding of the principles and mechanisms of engagement, our mechanisms such as the factors the project should look to analyse as to how the stakeholders interact and show interest and influence in the Run4Life related technologies.

2.2.1 Effective Engagement in Knowledge Exchange

Stakeholder engagement commonly refers to the relationship and interaction between institutions and those who are impacted by the activities of that institution (Sloan 2009). Knowledge exchange refers to the process of 'one organisation learning from another', the emphasis on the integration, and absorption transfer of knowledge by the recipient organisation.

Attempts to identify successful engagement and factors for successful engagement include the work conducted by Measham et al. (2009). They detail a range of factors that contribute towards successful engagement from various perspectives, such as governmental and community-focused activities; these include developing trust, effective communication, being inclusive and being transparent, among others.

Engagement is similar to participation in regard to its broad meaning, describing the various ways in which information, views or opinions flow multi-directionally between the public and decision-makers (Cass, 2006). We agree with Sloan (2009) in that it is important not to conceptualise stakeholder engagement too simplistically, but rather "distinguish between different forms of stakeholder engagement". Knowledge Exchange can take different forms (information-sharing, learning, shared decision-making, consultation, etc.), depending on the breadth of stakeholders involved and the depth of their involvement. Knowledge sharing is described as essential for the development of people as well as organisations (Nwagwu and Ahmed, 2008), and especially through the involvement of significant actors, in this case: water users such as local communities, is essential for the adaptation of climate change (IPCC, 2007).

In the context of the Run4life project, we consider stakeholder engagement as referring to the activities of, and the interactions between stakeholders involved in the general context of the project and within the areas of the selected demsites. The factors that make actors show interest, influence and interact on water and

climate related issues leading to the effective engagement to work in a coordinated manner are aimed to be explored during the course of the project. Therefore, in the context of this report we will aim to identify what is the willingness of stakeholders to engage in the knowledge exchange process.

2.2.2 Attributes of Stakeholder Analysis

The following attributes for stakeholders' analysis is defined by the World Bank (2007) through the stakeholders' position/power on the reform issue, the level of influence (power) they hold, the level of interest they have in the specific context, and the group/coalition to which they belong or can reasonably be associated with. For the stake of this report, three qualitative aspects of the attributes of Run4Life stakeholders can be addressed:

- Interest or willingness shown from the stakeholders who may affect or be affected by the Run4Life activities, or to articulate their particular interest without being affected.
 - Ways of Interaction: In order to identify how to better spread information, and to exchange knowledge.
 - Influence of those stakeholders that have an organisational/legal mandate, a high political legitimacy, and/or those who have control over economic resources in the context of the Run4Life and the demo-site areas.
- ***The importance of the interest shown in knowledge exchange***

The degrees of engagement can influence the levels of support, the willingness to engage or the **interest** shown to engage. According to When (2016) the drivers, incentives and disincentives for inter-organisational knowledge exchange can be substantially different, and even conflictive. Knowledge exchange requires the interaction and engagement of people; thus, it is expected that these drivers will be changing over the course of time. Understanding the dynamics of knowledge transfer and exchange requires an approach that encompasses the exploration of the behaviour of selected key players involved in the process (*Ibid*). The 'interest' to engage in knowledge exchange can be considered the first driver of a potential partner organisation to perform such behaviour. Barnett et al. (2012) note that when stakeholders feel marginalised or perceive their concerns and priorities to be ignored, negative emotions can also result, which can contribute to the lack of willingness to collaborate.

- ***The variety of ways of interaction***

Within Run4life we seek to promote meaningful and effective engagement as a tool to encourage acceptance towards the proposed technologies. Effective engagement demonstrates several benefits: enhances inclusive decision-making, promotes equity, enhances local decision-making, and builds social capital. Strengthened coordination between stakeholders to work together in the demo-sites areas can lead to maximising the impact of the ways of interaction. In this sense, a combination of modes of communication are required from vertical to horizontal.

The ways in which knowledge exchange takes place is, sometimes based on behavioural motives, needing meaningful stakeholder engagement (conducted 'for the right reasons'). Positive perceptions are associated with the involvement of communities (Devine-Wright, 2005; Loring, 2007). Wolsink (2007) asserts that local support may turn to opposition if the concerns of local stakeholders are not considered and incorporated into decision-making process.

- ***Factors of influence of stakeholders***

The 'level of influence' can be defined as "a relationship among social actors in which one social actor, A, can get another social actor, B, to do something that it would not have otherwise done" (Aaltonen, 2010). In the

context of Run4Life, we can explore “influence” with the capacity of stakeholders to take action and use influencing strategies as well as the project management’s willingness to take into account different stakeholders’ requests.

Power and influence studies have been viewed with renewed relevance as of late, due to the proliferation of climate change adaptation funds, projects, and programmes. (Middtun, A. 2009) As these processes evolve, they bring up questions of equity, justice, and fairness surrounding the origins and distribution of climate change adaptation resources. In so doing, they have shed light on the persistent inequalities in status quo development regimes and asymmetrical power balances between stakeholders.

The role of power is highly dependent on the context it is applied to (Sova et al, 2013). Important considerations include the uncertainties and imperfect information related to the impacts and timing of climate change and sustainable issues. Therefore, improving our understanding of power and influence can help support development towards how to create fair and sound decisions in resource allocation.

Moreover, the issue of **trust** is another important factor that positively influences the self-efficacy and compatibility towards knowledge sharing (Chowdhury, 2005; Williams, 2001). According to Nelson & Coopridge (1996), it has been realized that knowledge sharing behaviour occurs through the mechanisms of mutual trust and the influence between groups.

3. Approach and Methods

3.1 Overall Approach

Given the experiences in other jurisdictions where some reuse projects have been quickly stigmatized by adverse media coverage and/or special interest group opposition, this investigation into stakeholder/public attitudes is designed to gauge the reactions in relation to the technology proposed by the RUN4LIFE project. There are three steps designed to approach this question: first (1), gather information from the stakeholders directly related to the project; second (2), gather information from other stakeholders not directly related to the project but whom may be interested in the outcomes of it (fertilizer companies, farmers, etc.), or the ones who can be critical for the acceptance (NGOs, press, associations, inhabitants, etc.); and third (3), based on the previous steps, design a questionnaire to find out the opinions that the general population has on this matter.

At this moment this deliverable is approaching of the first step and partially the second step, which means that stakeholders that are involved in the project or in the development of the demo-site are being contacted in order to gather their opinion and knowledge about the social context. Moreover, some stakeholders not related to the demo-sites have been approached, as well as the organisation of two focus groups in order to further deepen on results gathered in the first questionnaire.

In parallel to this process it is also important to identify whom the relevant stakeholders are and map them through a process of social network analysis.

Figure 2 delineates the purpose of this research in an analytical framework that combines the variables from the theoretical context (literature review) together with the empirical work to achieve the outcomes.

The analytical framework starts with the aims of understanding how stakeholders “perceive and behave towards the project technologies through the following questions: How people, groups, and organizations, influence, interact and show potential interest in the proposed technologies on nutrient recovery and water reuse?” and “How can stakeholders effective engagement lead to effective knowledge exchange and understanding on the use of Run4Life technologies?” These aims lead to the two (2) main concepts that are tackled in this research (i) factors conditioning public perception in the context of Run4Life and (ii) factors influencing the effective engagement of stakeholders in the project. The analysis of these two aspects investigates the “context” as well as the “stakeholder and behavioural analysis”. Following this analysis, the



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factors of success and failure in engaging effectively towards acceptance of the technologies will be highlighted which in turn feeds into other aspects of the Run4Life project such as the communication actions and exploitation.

Investigating social attitudes towards the Run4Life technologies

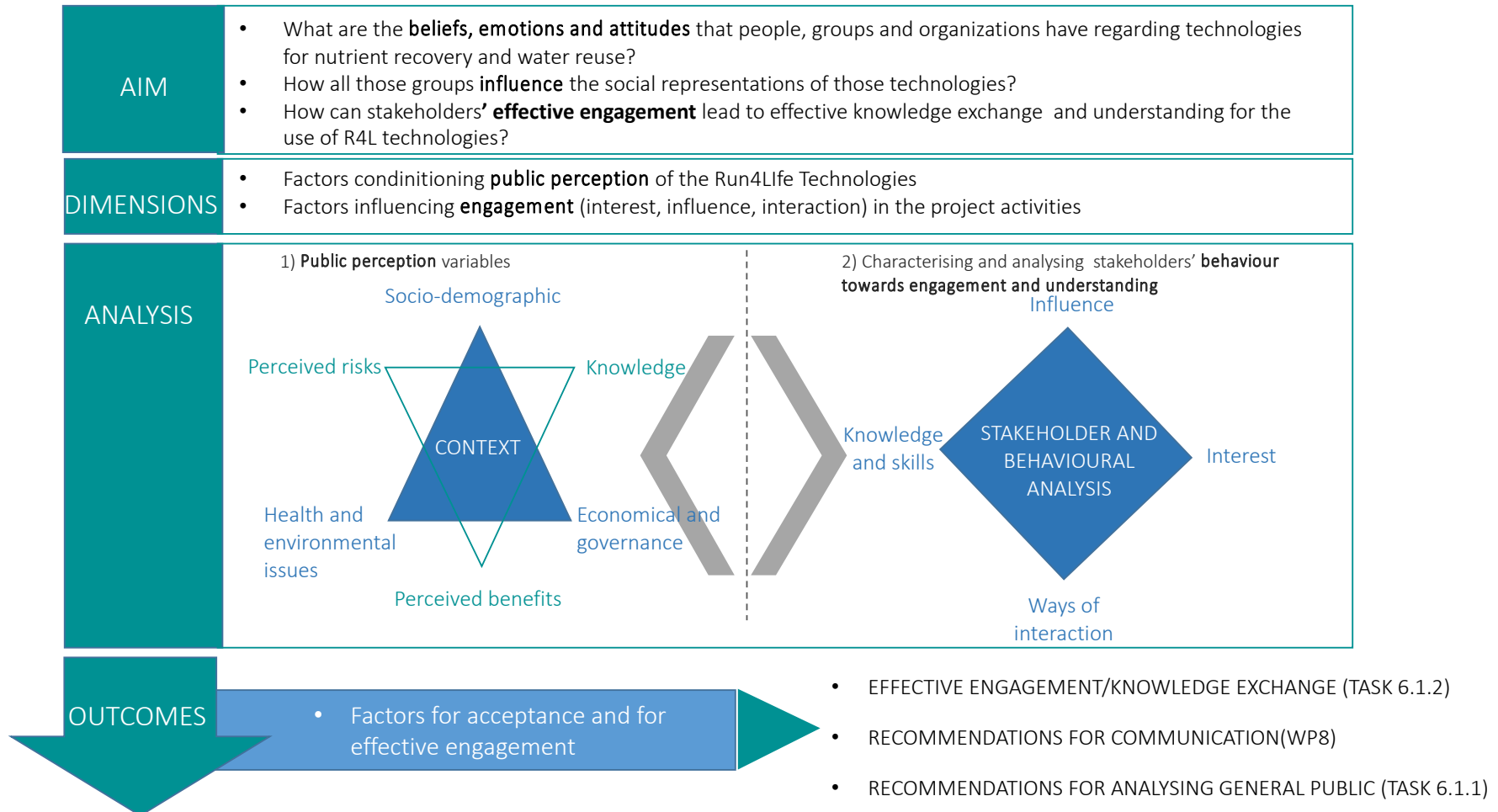


Figure 2. Analytical framework

3.1.1 Investigating social attitudes towards the Run4Life technologies

For completing this task, we undertook an exploratory research survey of stakeholder/public awareness, attitudes and opinions regarding the acceptability of the technological concept for wastewater treatment and nutrient recovery proposed by the RUN4LIFE project, as well as to check the level of knowledge regarding the project itself referred to by the stakeholders linked to the Run4Life. Currently it is important to gather information or evidence ascertained as a preliminary step before deciding on a course of action.

The survey questionnaire was designed to elicit information on the following themes and issues:

- Levels of stakeholder awareness and knowledge of the sites linked to the project
- Stakeholder attitudes, perceptions and opinions towards the development of the project.
- Identify acceptable and unacceptable uses of the products derived from the RUN4LIFE process.
- Stakeholders awareness of wastewater reuse and nutrient recovery.
- Types of risk identified by the stakeholders regarding the RUN4LIFE technology.
- Method of engaging stakeholders in an on-going dialogue about the RUN4LIFE project.
- Degree of commitment of stakeholders to the project.

3.1.2 Identification and mapping of stakeholders through Social Network Analysis (SNA)

The stakeholder identification and mapping process followed the Social Network Analysis (SNA) technique, which is based on the analysis of the structure of a social network. SNA is used to analyse structural characteristics of social relationships and provides measures to analyse communication networks within and between organisations. It helps to identify information pathways, spreaders (knowledge brokers) and gatekeepers (knowledge controllers); and supports the process of knowledge sharing within and between organisations (Kar-Hai-Chu et al, 2013).

SNA views social relationships in terms of the network theory⁵ consisting of nodes and ties (also called edges, links, or connections) (Wasserman, 1994). In the Run4Life context the nodes are the individual organisations/institutions, and the ties are the relationships between them in the context of the project demo-sites.

Research in a number of academic fields has shown that social networks operate on many levels and play a critical role in determining the way problems are solved, organisations are run, and the degree to which organisations might succeed in achieving their goals (Stanley, et al, 1994). The SNA results are presented in the form of a graph-based structure. The structure and complexity of the nodes and ties will evolve over the lifetime of the Run4Life project as more stakeholders are added to the analysis.

The way in which SNA has been approached in this project task is based on a snowball network study⁶ where Run4Life partners were first consulted. The results from this first consultation allowed, in turn, for a further consultation to stakeholders beyond the project consortium to the first step of stakeholders (experts). Thus, this process is planned to take place as a periodic exercise in the forthcoming years to achieve the final stakeholder mapping at the end of the project.

A number of metrics are used in SNA to explain information flows within a network, they are based on centrality concepts (graph theory), a deeper description of each of the metrics can be found in Annex 3 Centrality metrics measure the issues concerning the level of prominence of the elements/nodes (organisations) that responded to the survey or were identified through the consultation process. Centrality

⁵ Network analysis is the study of social relations among a set of actors. It is a field of study -- a set of phenomena or data which we seek to understand. In the process of working in this field, network researchers have developed a set of distinctive theoretical perspectives as well.

⁶ A snowball network refers to the idea that the elements identified in an egocentric survey then become egos themselves and are able in turn to nominate additional elements.

metrics also pursue the measurement of the level of involvement of the identified organisations within the social network.

Expected results of the SNA:

A map of stakeholders based on the current interactions from the Run4Life network and beyond, in the sectors of waste water. The map will serve as the initial starting point for further updates during the project

3.2 The Research Phases

This section provides a detailed description of how the results have been achieved according to the task phases as depicted in Figure 3.

Research Steps

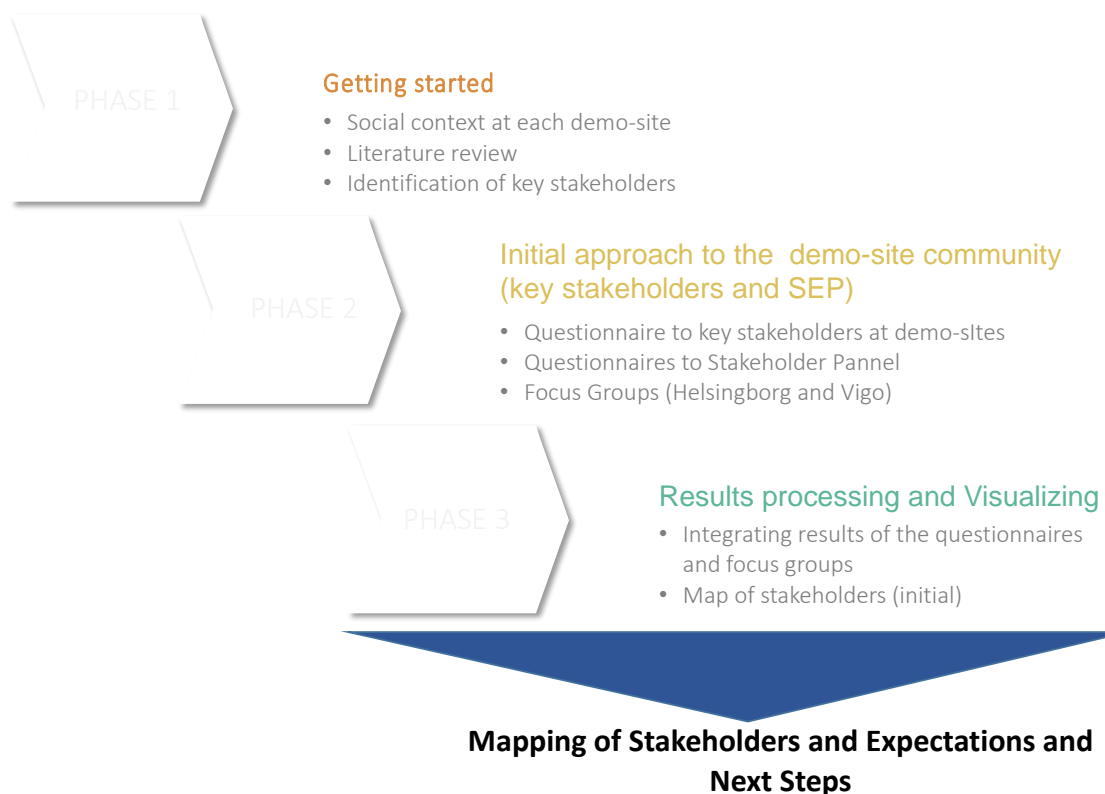


Figure 3. Research phases in Run4Life task 6.1.1

3.2.1 Phase 1. Contextualisation

This first approach was to identify and set the social context at each of the demo-sites as well as in general for the nutrient and water recovery community. A review on existing literature at each of the demo-site as well as a profound literature review about factors conditioning stakeholder's attitudes and behaviour was done to frame the methodological initial approach and to build the first questionnaire.

A first identification of stakeholders was undertaken in the second project meeting held in Vigo in November 2017, in a group-building discussion process in order to generate a first stakeholder database

This first analysis was used as a basis and a point of discussion in order to establish the next steps about the process of contacting the stakeholders and how to go about it. This was done through bilateral discussions with USC and the coordinators of each demo-site (DESAH and WU in Sneek, NSVA in Helsingborg, and DuCoop in Ghent).

[3.2.2 Phase 2. Initial approach to the demo-site community \(key stakeholders and SEP\)](#)

This phase started with an initial contact with the key stakeholders identified at each of the demo-sites in order to further explain to them the need to obtain their opinions. This was done through bilateral interviews with them to provide clear details on how to fill out the survey and to gather further relevant information concerning their networks.

After this initial contact through emails and phone calls we launched a questionnaire (Annex 2). This was done through Qualtrics (online) to 75 key selected stakeholders from the demo-sites in Spain, Belgium, Sweden and The Netherlands.

Additionally, two focus groups were organized, in order to further explore the reasoning behind the results obtained from the questionnaire. The first focus group was held in Helsingborg on the 30th of May 2018, and the second was held on the 25th of June 2018 in Vigo.

[3.2.3 Phase 3. Results processing and visualising](#)

After having developed the empirical work explained in the previous section. In the Run4Life context the following list of aspects were used in the analysis of the data: re-formulation based on the research questions: questionnaire, and focus groups transcriptions, data coding according to the variables identified in the theoretical framework, aggregation of the data through a constant comparison, an analytical memoing and the construction of the final theories as provided in section 4.

Visual representations of social networks are important to understand network data and convey the results of the analysis. Visualisation is used as a standalone data analysis method. Therefore, a database needs to be created accordingly. The interpretation of the results and the SNA metric relies on how they are processed from the surveys. With respect to visualisation of the data, network analysis tools are used to change the layout, colours, size and other properties of the network representation. For the purpose of this project we used Kumu, a web-based application the main criteria for selecting an SNA software was:

- Free data availability (no ownership) of the produced results
- Easy to process the data - not dedicated for academic or social research.
- Friendly visualisation that can be easily understood
- Web-based visualisation.
- Allow collaborative updates

The following map types can be created with the KUMU software:

- **Stakeholder mapping** – to explore the complex web and alignment of key players around the Run4Life project. Within this map, the main connections of the network can be seen overall, as well as specific information for each of the organisations. The specific views created for the analysis of the stakeholders are detailed in the sections that follow.
- **Social network mapping**- to capture the structure of the networks and to reveal who the key players are. Informal networks can be visualised, as well as the representation of results of SNA metrics: Degree Centrality, Betweenness Centrality, Closeness Centrality, Centralisation, Network Reach, etc. (see more info of them in Annex 3).

3.3 The Constraints of the Data Gathering

The complexity of the analysis of social and psychological factors led to the description of some limitations and uncertainties found in the methodological processes.

There was also a significant time constraint in contacting one by one each stakeholder to run through the questionnaire and to motivate them to participate. In one site we had to marry up the existing initiatives from an ongoing project with those of the RUN4LIFE objectives which made the entire data gathering process laborious, less effective and overly time consuming.

Regarding the nature of the method used to gather responses from the key stakeholders identified at this stage, i.e the questionnaires, also raised some constraints:

- Lack of completed questionnaires
- Lack of support to the respondent if any questions were not fully understood.
- Difficulty to control and verify responses

Regarding the respondent attitude, some constraints and risks are also identified as follows:

- *Sincerity*: while there are many positive aspects with questionnaires, a lack of sincerity can be a problem. The respondents may not be 100% honest in their answers. This can happen for several reasons, including the social desirability bias and the desire to protect privacy. To avoid the lack of sincerity, respondents have been informed that the process does not allow personal identification.
- *Conscientious answers*: Every administrator expects to obtain conscientious answers, but there is no way of knowing if the respondent has thought about the question before answering. Sometimes the answers are chosen before reading the whole question or the possible answers. Sometimes respondents move from one question to another quickly, or make decisions in a fraction of a second, affecting the validity of the data.
- *Understanding and interpretation*: The problem of not asking questions to face-to-face users is that they can be interpreted differently. Without someone to explain the questionnaire and make sure that each individual understands the same, the results can be subjective. Respondents may also find it difficult to understand the meaning of some questions that are clear to the creator. This lack of communication can lead to biased results.
- *Feelings and emotions*: A survey or a questionnaire cannot fully capture the emotional responses or feelings of the respondents. Without administering the face-to-face questionnaire, there is no way to observe facial expression, reactions or body language. Without these subtleties, important information may go unnoticed
- *Respondents' own motivation*: as with any type of research, bias can be a problem. The participants of the survey may be interested in your product, idea or service. Others may be participating because of the questionnaire theme. These trends can lead to inaccuracies in the data, generated by an imbalance in the respondents who think excessively positively or negatively on the subject.

4. Results

This section has gathered the results from this first phase regarding the identification of stakeholders in the demo-site, and the identification of factors influencing public attitudes towards the use and development of the Run4Life technologies.

Twenty-five (25) people have answered the Stakeholders questionnaire, seven (7) from Ghent, four (4) from Vigo, six (6) from Helsingborg and eight (8) from Sneek.

These results have led to an outline in the planning on how the next engagement phases with them can be planned and implemented.

4.1 The Initial RUN4LIFE Stakeholder map

At this initial point of the project 4 stakeholder maps has been created related to each of the project demo-sites, each of these maps have databases associated to them. In the next phases of this process these maps will be updated, and an additional map of the nutrient recovery community will also be created. These maps represent a dynamic visualisation of the stakeholders identified so far and how they are connected to each other. As a sort of database some attributes can be also identified detailing them (main contact person, description of the organisation, target groups they used to work with, type of involvement in the project and level of interest to be engaged in the project activities. According to the ethics requirements these databases is used for internal purpose and not available for public use.

4.2 Description regarding the Stakeholder Visualisation

This section provides an overview of the stakeholder maps that have been initially created for each of the Run4Life demo-sites during the first year of the project. For each demo-site a screenshot of the map is provided as a figure and a link to the dynamic interactive web-based map where more detailed and specific information can be found.

Basic Tips to read the Run4Life Stakeholder map

- There are two essential figures: the nodes (identified stakeholders) and the edges (the connections between them).
- The **connections** represent the current relationships between the organisations if they exist. These connections are in the context of the projects (not that for other purposes the connection might exists)
- The **colour key** is displayed for each map in the legend, normally organised by the type of the target groups
 - Coloured elements are the identified stakeholders for which contact has been somehow been established. A colour code is provided for the target groups differentiation
 - Grey nodes are the other stakeholders that have been identified in this step, i.e. key stakeholders related to the development phase of the project and other stakeholders identified in the questionnaire, but they remain in a general context because no specific name has been identified yet.
- By clicking on each of the nodes further information (attributes) on the specific stakeholder is displayed based on the main database.
 - Description about the stakeholder
 - Main contact
 - Website
 - Type of target group
 - Contribution to the site
 - Needs identified from the site
 - Location
 - Expertise

<ul style="list-style-type: none"> - Collaboration level with Run4Life (private information according to property rights) - Contact details (private information according to property rights)
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4.3 Ghent: Initial Stakeholder Map

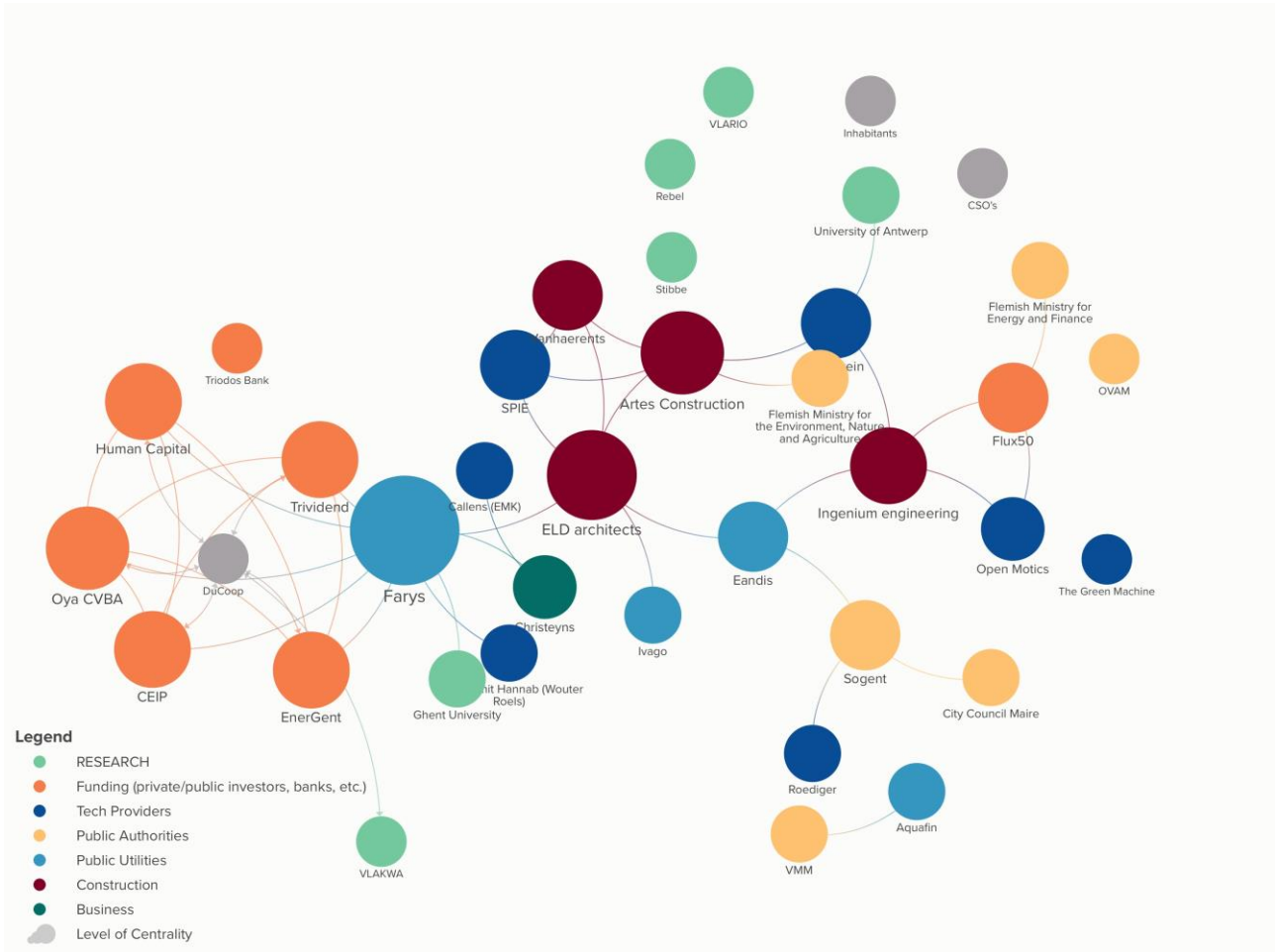


Figure 4. Initial stakeholder map in Ghent. Link to the web-site map: <https://embed.kumu.io/2422fcf1d13e9f4915dbd5092c34df0e>

- **Target group composition**

At the Ghent site, most of the target groups are well represented and already engaged in the project. Stakeholder's that have answered the questionnaire stated that potential inhabitants, farming associations, housing companies and CSO's could be potential players that should be aware of the project and engaged in next phases of the project. Technology developers are well identified and engaged in the different processes of development of the project.

- **Centrality metrics (Social Network analysis)**

When looking at the SNA parameters related to the social structure represented in the Stakeholder's map, *Degree Centrality* is the simplest of the centrality metrics, counting the number of connections an element has. In general, elements with a high degree are the local connectors / hubs, but aren't necessarily the best

connected to the wider network. The three elements that have the highest value for the degree centrality are: Farys (the public water company), ELD architects and Artes Construction.

Betweenness Centrality measures how many times an element lies on the shortest path between two other elements. In general, elements with high betweenness have more control over the flow of information and act as key bridges within the network. They can also be potential single points of failure. The three elements that have the highest value for the betweenness centrality are: Farys, ELD architects and Eandis (the public utility for electricity network).

Therefore, these four institutions: Farys (the public water company), ELD architects, Eandis (the public utility for electricity network) and Artes Construction have been identified as key institutions for the communication actions and for the guaranteed flow of information.

- **Description**

The stakeholders that have been identified are engaged in the project at different levels of interaction:

- Identified as very relevant but without interaction as yet: inhabitants
- Capital investors for the site coordinator (DuCoop): CEIP, Trividend, Energent, Human Capital, Oya Cvba, and Triodos bank.
- The main areas of interest that have been described to engaged in Run4Life are with regards of engaging potential inhabitants and developers in order to create communication materials

4.4 Vigo: Initial Stakeholder Map

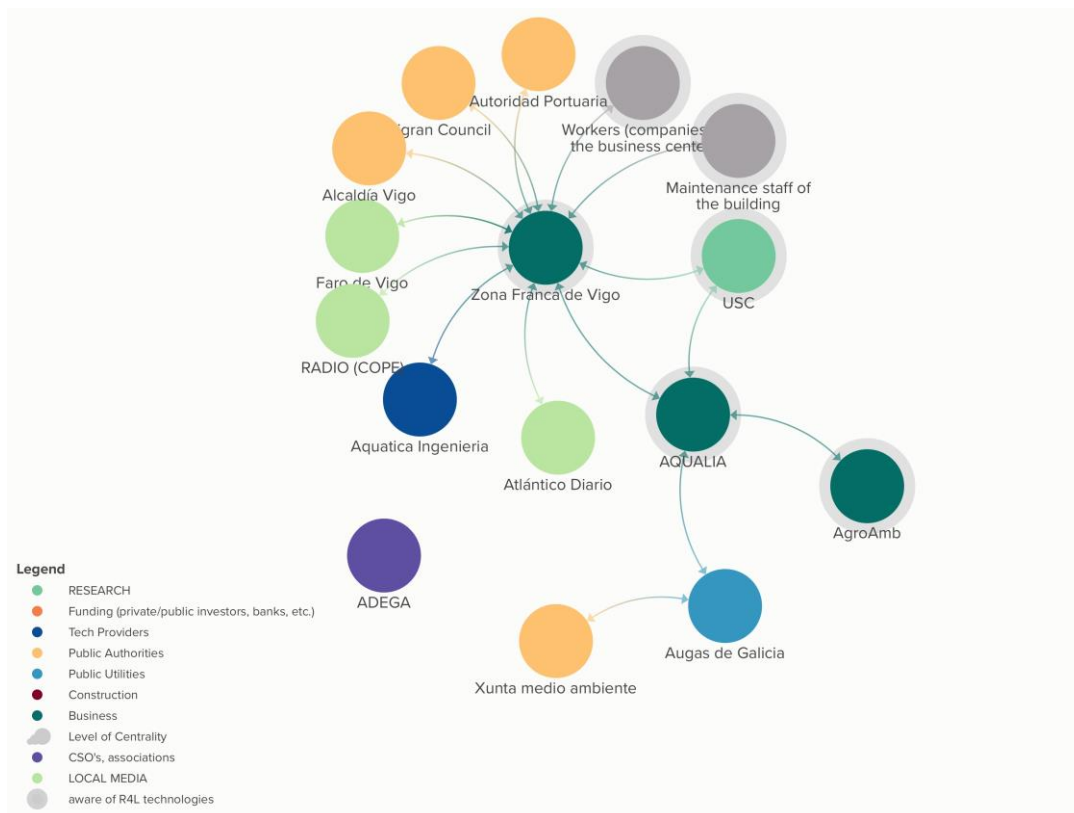


Figure 5. Initial stakeholder map in Vigo. Link to the web-site map: <https://embed.kumu.io/7f0ac4f6c0537574d08aa2b14447ef23>

- **Target group composition**

At the Vigo site, as in the Ghent site, most of the target groups are well identified, but only a few of them are already engaged in the project. Knowing the social context of the demo-site, i.e. a business office block run by a public organisation, the situation is slightly different from the other sites. For instance, the public utilities and agencies dealing with water and waste management are not involved in the project. However, there is consideration to have them included for future collaborations. The social structure is a bit different from the other sites due to the nature of application. Stakeholder's that have answered the questionnaire stated that workers in the building are a potential stakeholder that should be aware of the project and engaged in the next phases of the project, including the maintenance staff. It has also raised the importance of engaging in further phases with the local media with which the promoter (Zona Franca de Vigo) has good contact.

- **Centrality METRICS (Social Network analysis)**

Concerning the centrality issues, the major actors are the two key Run4Life partners close to the demo-site, Aqualia and Zona Franca de Vigo. The workers (in this demo site there are not inhabitants) and the maintenance staff of the building, are the general users of the systems and furthermore as the system has already been installed, they form part of the "aware community" that is actually raising some concerns and doubts regarding the system.

Concerning the unaware community (the municipality, local media), it was identified as strategic to engage and communicate with them in order to be cautious in how they perceive the risks.

- **Description**

The site in Vigo is smaller when compared to the other pilot activities additionally it is located in a business building, therefore the social structure differs somewhat from the rest. On the one hand the main users of the technologies are the workers themselves as well as the maintenance staff. On the other hand, the promoters, Zona Franca de Vigo and Aqualia, are the Run4Life project partners, therefore in this current scheme it is unlikely that there would more influential actors. However, the results of the Focus Group that was held in Vigo in June 2018, showed that other type of actors should also be involved in this study in order to assess the scalability of the system to other sites close by. Therefore, it is proposed to include various local and regional authorities, other business buildings, some printed media, etc. in order to analyse their perceptions in the future and seek engagement.

4.5 Helsingborg: Initial Stakeholder Map

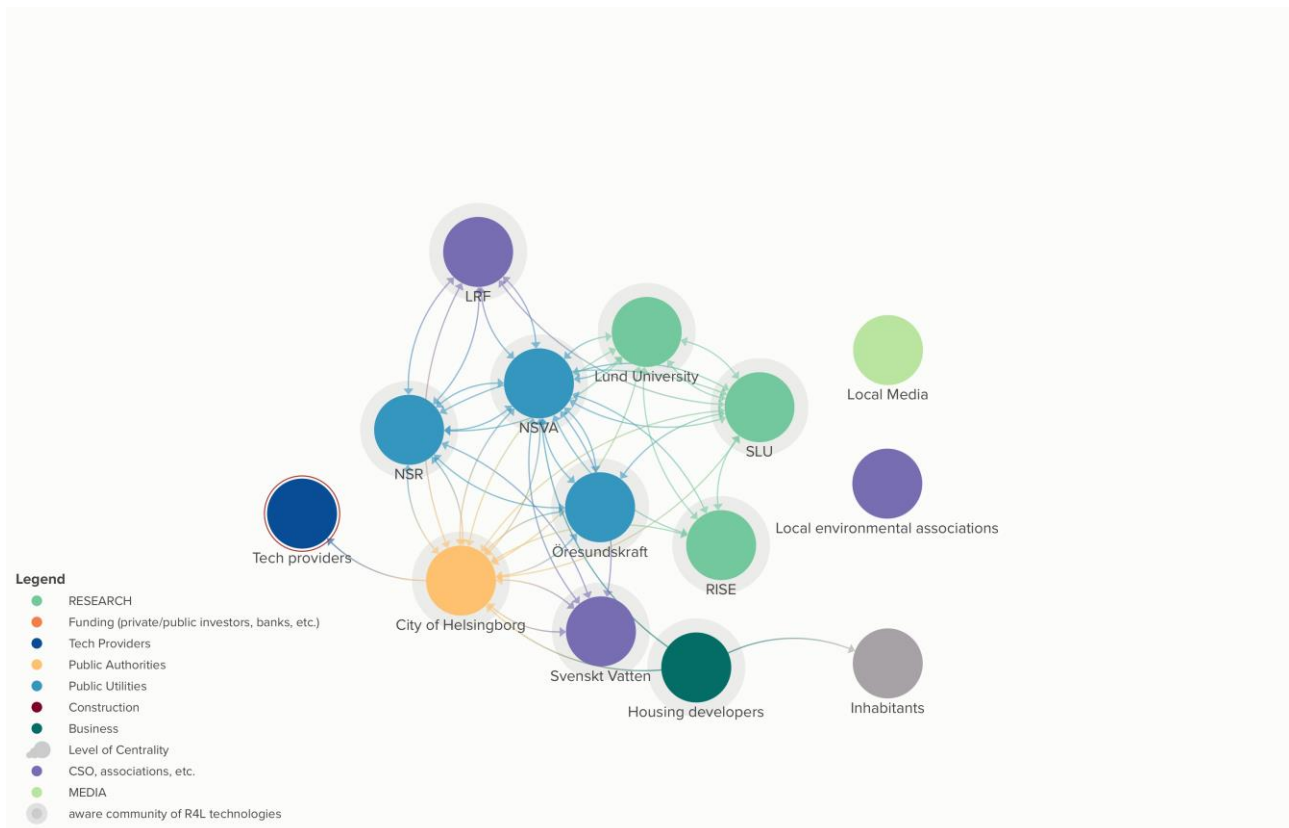


Figure 6. Initial stakeholder map in Helsingborg. Link to the web-site map:

<https://embed.kumu.io/ca506cf46783f009c47eabb081d5ff18>

- **Target group composition**

Stakeholder's in Helsingborg that have answered the questionnaire stated that the future building inhabitants along with associations of farmers and other CSO's could be potential stakeholders that should be aware of the project and engaged in the next phases of the project. Following the results of the focus group held at end of May 2018, the idea of including, at some point, the organic farming sector and the local environmental organizations was also mentioned. Additionally, the importance to be active at regional level was also raised.

- **Centrality METRICS (Social Network analysis)**

When looking at the SNA parameters related to the social structure represented in the Stakeholders map, the social structure is much closed (i.e. most of the elements are well connected), most of the organizations are connected to the others, and the social structure is well interrelated not showing elements with predominant level of centrality in the network.

- **Description**

The stakeholders that have been identified are already engaged in the project with different levels of interaction, however the core members of the public institutions and research centers (the City of Helsingborg, NSVA, NSR), that are managing the H+ area, are well coordinated. The interest shown in

stakeholder engagement will become evident in the next phases through the showroom that the H+ project is planning to undertake in a short-term period.

4.6 Sneek: Initial Stakeholder map

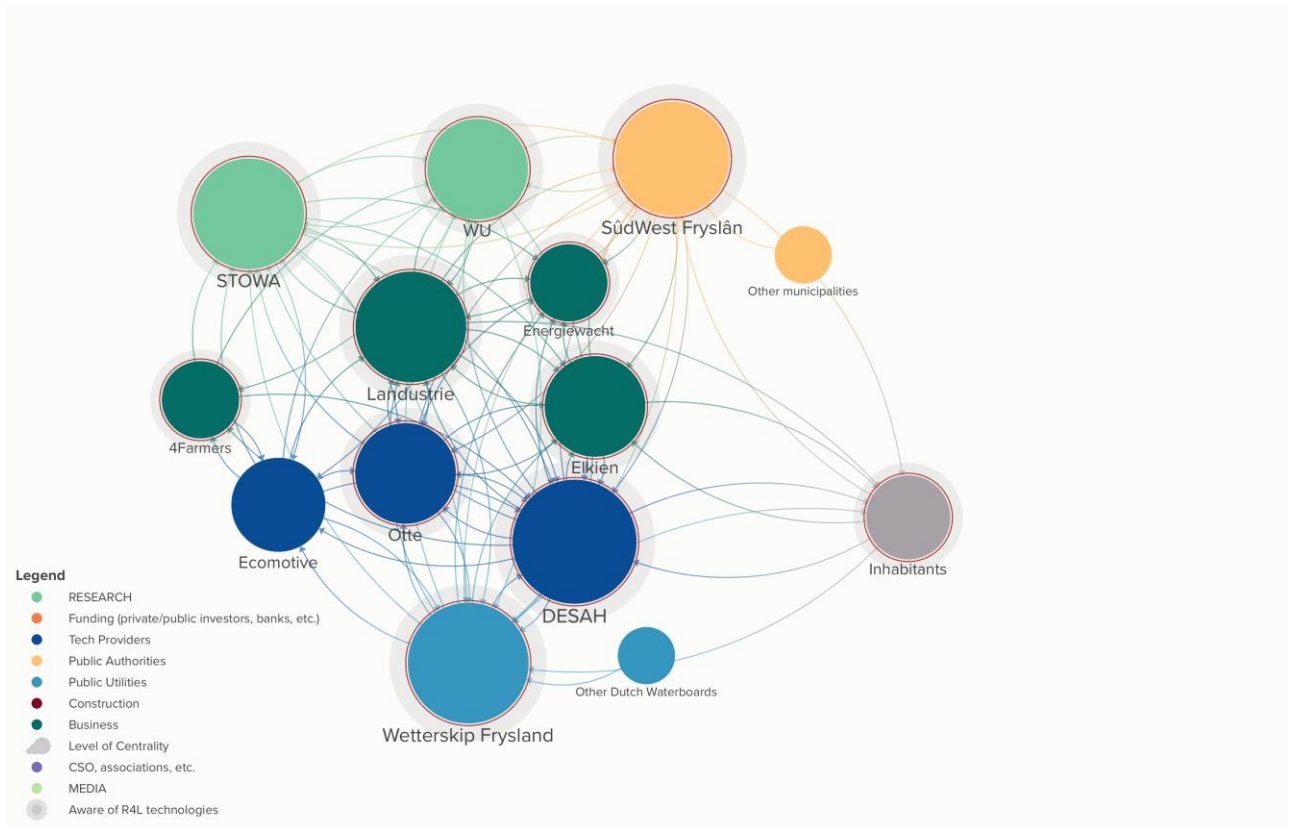


Figure 7. Initial stakeholder map in Sneek. Link to the web-site map: <https://embed.kumu.io/86c47285a910c9ee0dd33a8199d6e1d2>

- **Target group composition**

In Sneek, groups of stakeholders identified are mainly the local authorities, public utilities, technology developers and companies dealing with the maintenance of the equipment. The inhabitants that have already been engaged in previous activities and other municipalities with interest in the project have also been identified as potential stakeholders that should be further engaged in next phases of the project. In this case as the technologies have already been implemented in the residential buildings, the stakeholders represented here are aware of the technologies that are in use.

- **Centrality METRICS (Social Network analysis)**

When looking at the SNA parameters related to the social structure represented in the Stakeholder's map, the community is also very closed, i.e. most of the organizations are connected to the others, and the social structure is well interrelated. The elements with a predominant level of centrality metrics (degree and betweenness) are Desah (main technology provider) and the water board of Wetterskip Frysland.

- **Description**

The stakeholders that have been identified have already been engaged in the project through different levels of interaction. As they have been engaged in different phases of a previous project, they are known to each other for some time now, however they are still willing and interested in becoming engaged in the Run4Life activities.

4.7 Factors shaping attitudes towards Water Reuse and Nutrient Recovery

The first step for conducting an analysis of key stakeholders was to analyse the insights on the factors shaping attitudes and behaviours towards the Run4Life technologies dealing with water reuse and nutrient recovery schemes. Questions were formulated with two main objectives:

- 1) To investigate opinions of the stakeholders responding to the questionnaire,
- 2) To further explore with them how the unaware community (general public and stakeholders not yet aware about the project, such as the potential inhabitants) perceived the related risks and benefits.

Most of the key stakeholders that were identified with the support of the coordinators of each demo-sites showed interest to answer the questionnaire and get further involved in the project.

The sub-sections below further explore the results gathered from the questionnaires in an aggregated way (general observations) and specific for each of the demo-site (specific observations), but not at an individual level according to our ethics procedures established in WP8. Although the aim of the questionnaire was to gather qualitative information and not quantitative representation, some figures are additionally displayed in order to support the reasoning of the resulting observations. They are located on the left side of the tables.

The sub-sections are broken down into different factors as identified in the Literature Review (section 2): knowledge regarding the project and technologies, perceived benefits by the stakeholders and by the general public, perceived risks by the stakeholders and by the general public, the level of interaction foreseen, the potential foreseen problems by the stakeholders and their interest to get engaged in the project.

Other factors that have not been identified in the literature but could also be of interest for Task 6.2 and Task 6.3 regarding governance and legal aspects are related to needs with regards to regulation procedures, acceptability factors for water reuse, nutrient recovery, and decentralized water systems.

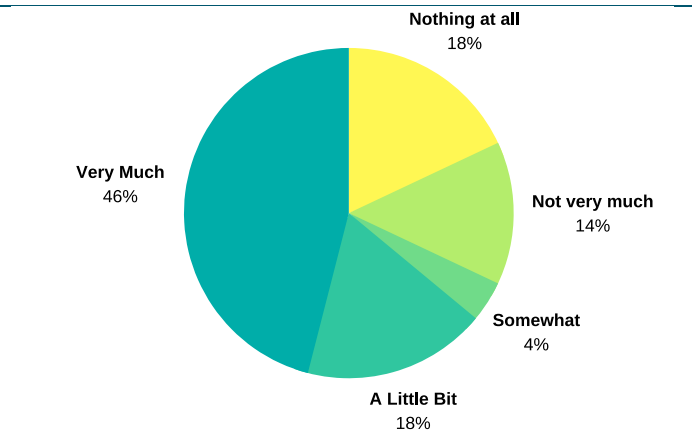
4.7.1 Knowledge about the project and the related technologies from the stakeholders

<i>Knowledge about the project and the related technologies</i>		Figures
General observations	Although respondents for this first stage were carefully selected as stakeholders close to the project, a surprising fact is that less than half have little or no knowledge about the project. This is an indicator that before approaching the general population it is necessary to undertake intensive work of approaching the stakeholders linked to the	Awareness shown about Run4Life before answering the questionnaire

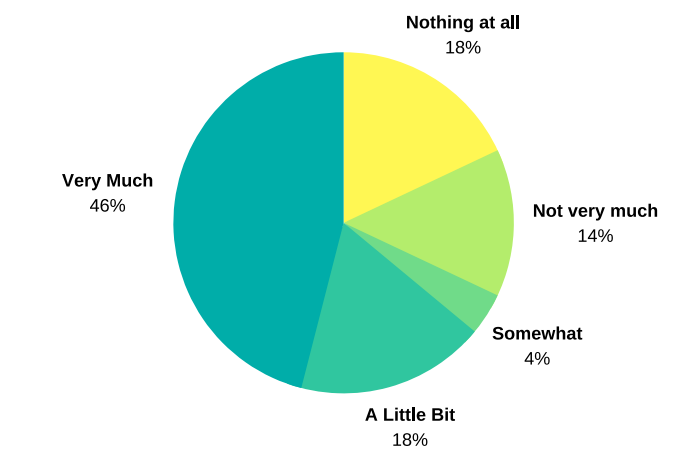
project. However, this may be a result of nomenclature, as the demo-sites have normally another name for the current programme going on the area and they are not connecting it to the specific Run4Life context (for instance the demo site in Helsingborg is called H+).

The second and third figures show that although most of the stakeholders were not aware of the project itself, they are aware of the treatments that are implemented with it giving more strength to the nomenclature argument.

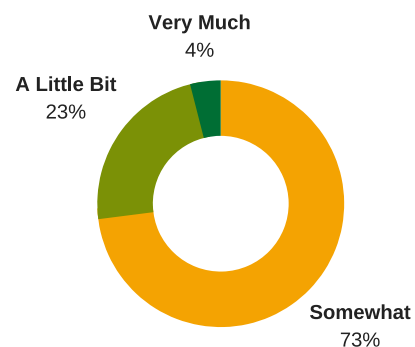
When asking stakeholders about the main purposes that they considered for the demo-site, here is also evident to deal directly with the stakeholders. The objective of the pilot plants, although similar, is not perceived in a similar way among the different sites. It would be interesting to raise dissemination strategies among the stakeholders themselves so that they know what is done in each of the demo-sites and what they intend to achieve with them.



Knowledge about new technologies for wastewater treatment and nutrient recovery



How much do you know about the demo-site?



Specific observations	Quotes about the question "What is the purpose of the demo-site?"
Sneek	<ul style="list-style-type: none"> - Decentralized reuse - Resource recovery - Nutrients recovery - Energy recovery - Sustainability

Vigo	<ul style="list-style-type: none"> - <i>Developing a pilot for testing the treatment before implementing in big scale.</i> - <i>Waste water treatment.</i> - <i>Optimization of wastewater and recovering resources.</i>
Ghent	<ul style="list-style-type: none"> - <i>Sustainability</i> - <i>Pilot for innovative technologies on energy & waste cycles</i>
Helsingborg	<ul style="list-style-type: none"> - <i>Treatment for enhancing the environmental performance in waste and wastewater services.</i> - <i>Source separation system.</i> - <i>Environmental sustainability</i> - <i>Recovering nutrients as resources</i>

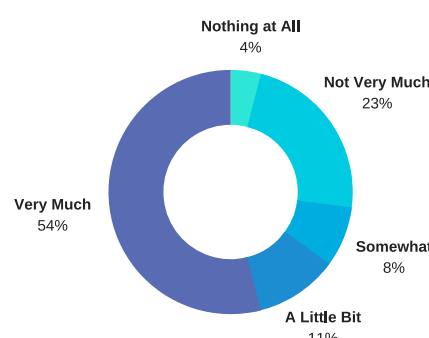
4.7.2 Expected benefits observed by the stakeholders

Expected benefits for the respondent's organisation	
General observations	In accordance with the previous question, if the stakeholders of each demo-site have differences regarding the main objective, it is obvious that what is expected from the pilot plants will also differ and a consensus is not shown. Although it is totally acceptable to have different responses according to individual motivations or organisational purposes, a general trend for the objective of Run4Life project should really be transmitted to the stakeholders.
Specific observations	Quotes about the question "What is the benefit expected for your organization from the demosite?"
Sneek	<ul style="list-style-type: none"> - <i>Helping tenants to use less water - save costs</i> - <i>Demonstration of innovative techniques</i> - <i>Large quantities of nutrients being recovered from human excretions.</i> - <i>Lower the footprint</i> - <i>Water-clean contributes to the brand awareness of the municipality</i>
Vigo	<ul style="list-style-type: none"> - <i>Improve the environmental conditions of the area</i> - <i>Technological and strategic development for improving water services</i> - <i>Avoiding sea contamination</i>
Ghent	<ul style="list-style-type: none"> - <i>Sustainable city development, an exemplary project for other city developments</i> - <i>Technical knowhow</i>
Helsingborg	<ul style="list-style-type: none"> - <i>Knowledge</i> - <i>Clean resources</i> - <i>Raise environmental awareness</i> - <i>New solutions for household waste</i>

Expected benefits for the society observed by the respondents	
General observations	The stakeholders have identified nutrient recovery as a benefit in itself for society as a whole. They highlighted that the innovative character of these technologies implying a more sustainable way of treating wastewater, attractive to create green cities. With the consequent benefit for the environment in general. It even points to a question of citizen pride in the use of technologies like this one.

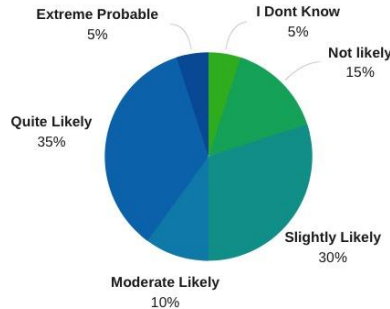
Specific observations	Quotes about the question <i>“In your opinion, what would you say are the most important benefits of the demo-site to the society?”</i>
Sneek	<ul style="list-style-type: none"> - Closing the nutrient cycle - Innovation and proud users - Nutrients recovery - More sustainable society
Vigo	<ul style="list-style-type: none"> - Recovery of resources: nutrients, water and energy from wastewater treatment - Improvement of environmental conditions - Energy and water savings. - Greater sustainability
Ghent	<ul style="list-style-type: none"> - Urban and sustainable and modern - To make the treatment of sanitary wastewater more sustainable
Helsingborg	<ul style="list-style-type: none"> - Cooperation between the city and different companies - Benefits for the environment - Nutrients recovery and energy efficiency - Sustainable nutrient recovery from wastewater

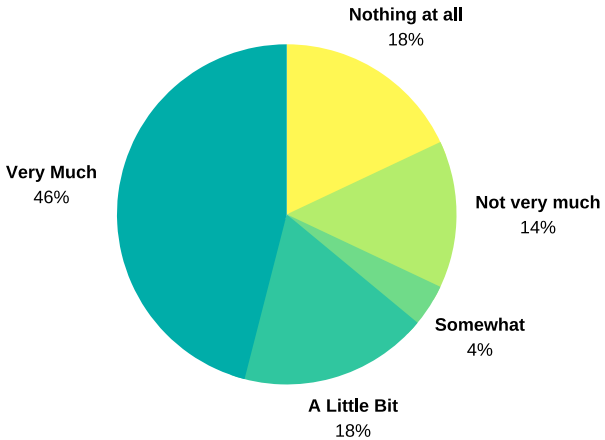
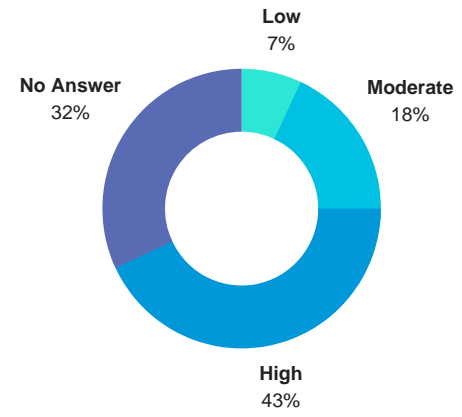
4.7.3 [Level of implication](#)

Level of implication in the demo-site development of the stakeholders		Figures												
General observations	<p>This question allows us to know to what extent the stakeholders are committed to the demo-site project development. Although more than half of those who answered the questionnaire say they are very involved, we must pay special individual attention to those who have answered the questionnaire and yet are not especially connected to the sites.</p>	<p>Level of implication in the demosite</p>  <table border="1"> <caption>Level of implication in the demosite</caption> <thead> <tr> <th>Level of Implication</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>Very Much</td> <td>54%</td> </tr> <tr> <td>A Little Bit</td> <td>11%</td> </tr> <tr> <td>Somewhat</td> <td>8%</td> </tr> <tr> <td>Not Very Much</td> <td>23%</td> </tr> <tr> <td>Nothing at All</td> <td>4%</td> </tr> </tbody> </table>	Level of Implication	Percentage	Very Much	54%	A Little Bit	11%	Somewhat	8%	Not Very Much	23%	Nothing at All	4%
Level of Implication	Percentage													
Very Much	54%													
A Little Bit	11%													
Somewhat	8%													
Not Very Much	23%													
Nothing at All	4%													

4.7.4 [Perceived risks](#)

Likelihood of occurrence of problems in general		Figures
General observations	<p>According to the results, stakeholders are aware of the potential problems related with the site. More than half recognize that there is a good chance that the performance of the demo-site will be difficult and with the next question, what kind of problems will be analysed. It will be necessary to consider how to solve them or prevent them before they happen.</p> <p>Principally, stakeholders considered that the problems are determined by technological</p>	<p>How likely do you think there could be possible (“management”, “technological”, “human health risk”, “financial” etc.) problems with the demosite?</p>

	<p>issues inherent to the operation, use and maintenance of the technologies. They also mentioned their concern for legal and bureaucratic issues of the implementation of the new technology. Finally, coinciding with findings of the literature review, stakeholders also raised the issue of the associated costs of the use of technologies (maintenance, billing, etc.).</p>	
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Likeliness of occurrence of problems during operation		Figures	
<p>General observations</p>	<p>Related to the previous issue of potential problems that might occur. In this case, stakeholders had to estimate the probability of their occurrence. In this case they were more cautious when it comes to predicting their occurrence and many of them (32%) prefer not to make any kind of estimation. Only 18% are convinced that any significant problem will take place in the operation of the pilot plants. While 50% have recognized a more likeliness for problems appearance. Therefore, we should try to get ready to foresee communication and engagement actions if they problems take place, and whenever possible to prevent them.</p> <p>With regards to the general public opinion, as asked to the stakeholders, Again, a significant number of respondents did not provide opinion about the impact of problems in the functioning of the systems in the public opinion. 61% of respondents recognize that if something goes wrong, the</p>		<p>From your own criteria, how likely do you think it is that something could go wrong with the operation of the demo-site?</p>  <p>From your own criteria, what impact do you think would have on public opinion if something went wrong with the operation of the demo-site?</p> 

	<p>impact would be important. Therefore, it is recognized the importance of managing the information provided to public opinion about what is done and how it is done in the project.</p>	
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Perceived risks (individual) of water reuse

General observations	<p>Although some of the stakeholders answered that they do not see any risk in the water reuse, it should be treated as a biased point of view (as experts of the different projects) and that the public perception could be less clear. Respondents acknowledge that some risks may occur, although they could be relatively controlled. Therefore, some guarantees must be provided to users and to the general public in order to not cause any rejection.</p> <p>In general terms, stakeholders recognized that misuse of the systems could lead to problems, therefore it seems critical to ensure the process of making users aware. They also highlight the importance of having a control mechanism to avoid situations of risk that could lead to a total rejection by the population.</p> <p>Public perception in general has pointed out as a very important risk as well as, again, the difficulty of pricing final products of the systems.</p>	
Specific observations	<p>Quotes about the question <i>What would you consider to be the main risks of water reuse?</i></p>	
Sneek	<ul style="list-style-type: none"> - Contamination with pathogens - Image to the consumers - Human health 	
Vigo	<ul style="list-style-type: none"> - Malpractice in resource management - Poor quality control - Perception by users 	
Ghent	<ul style="list-style-type: none"> - Getting the same quality as more 'standard' systems. - (biological) contamination - public perception - health and monitoring of quality - perception by consumers and also production managers legislation - Valorisation of the end product 	
Helsingborg	<ul style="list-style-type: none"> - Blocked pipes because of biological growth. - Human pathogens, zoonoses and medicine residues if not treated in a good way - Pollution affecting technology, health etc - Public perception 	

Perceived (individual) risks of nutrient recovery

General observations	<p>Respondents raised again the importance of proper quality controls and the adequate use of technologies. However, they do not foresee any health risks. Respondents also expressed the need to involve users in order to foster acceptance in the reuse of nutrients, and how the final product is considered by the market.</p>
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Specific observations	Quotes about the question <i>What would you consider to be the main risks of nutrient recovery?</i>
Sneek	<ul style="list-style-type: none"> - Lack of control at source system for hazardous substances - Heavy metal pollutants, biohazards, pharmaceuticals - Waste of energy - pathogens and micro-pollutants contamination - Legislation consumers image
Vigo	<ul style="list-style-type: none"> - The abusive use of fertilizers in agriculture - Users perception
Ghent	<ul style="list-style-type: none"> - Getting the end-users full cooperation. - (biological) contamination - Lower quantities - Valorisation at the end
Helsingborg	<ul style="list-style-type: none"> - Concern about contagious spread, drug, etc among the society - Expensive and non-efficient processes

Perceived risks of of consuming food grown from fertilizers produced with nutrients recovered from treated wastewater

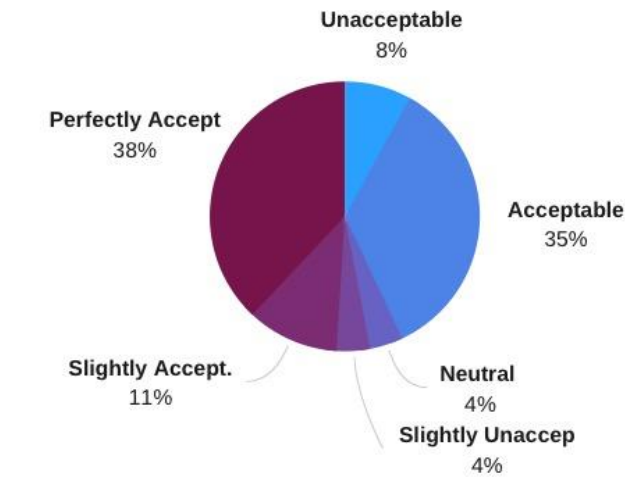
General observations	Similarly, as above, it is very important that there are strong quality control systems and that the technologies are operated correctly. It is also important to involve fertilizing companies or farmers in the process in order to make the final product marketable.
Specific observations	Quotes about the question <i>What would you consider to be the main risks of consuming food grown with fertilizers from nutrient recovery?</i>
Sneek	<ul style="list-style-type: none"> - If the process is robust (checks for pathogens) there aren't any risks - Micro-pollutants
Vigo	<ul style="list-style-type: none"> - None if operated correctly - Lack of appropriate controls
Ghent	<ul style="list-style-type: none"> - (biological) contamination
Helsingborg	<ul style="list-style-type: none"> - Followed by laws and recommendations, there is a low risk. - Getting acceptance from public (and food industry) - Heavy metal pollutants, biohazards, pharmaceuticals

Elements influencing the risk perception of general public in terms of reuse practice

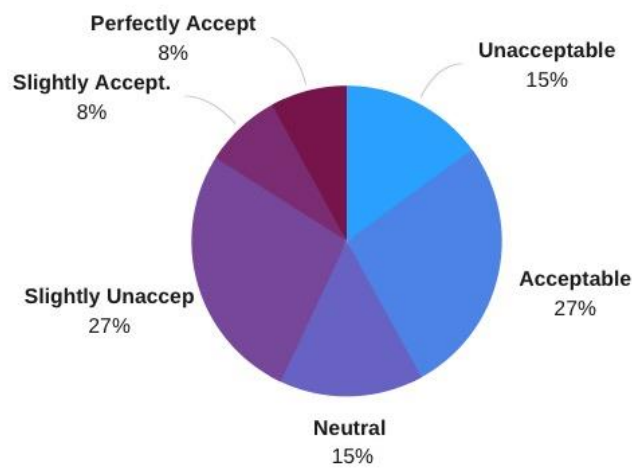
General observations	Trends observed in the literature appear in this issue. For instance, the <i>Yuck Factor</i> and problems with regards to aesthetic issues are risks that would need to be taken into account. Thus, the issues related to "moral" can potentially affect public perception. It also raised the importance of quality controls, and the related image shown to the public that everything is under control. Therefore, again, there is a need to take good care of communication and how the benefits and risks of this new technology are presented to the "unware community". However, it should be recognized that this is the opinion of "experts" and can be biased or just not coincide with the general public perception.
Specific observations	Quotes about the question <i>What elements do you think may influence the public perception of risk in terms of reuse practice?</i>
Sneek	<ul style="list-style-type: none"> - People forgot how fertilization was done a century ago

	<ul style="list-style-type: none"> - <i>Manure is regarded as normal for fertilisation</i> - <i>Disconnection between "the experts" and society</i> - <i>possibility of contamination with human pathogens</i>
Vigo	<ul style="list-style-type: none"> - <i>A misused slogan is very dangerous and it can create alarm. Transparency is key.</i> - <i>Bad praxis</i> - <i>Everything that supposes the ingestion of reused water or products made with it.</i>
Ghent	<ul style="list-style-type: none"> - <i>The fixation that the water is 'dirty'</i> - <i>health benefits long-term and/or social standing</i> - <i>communication</i> - <i>The safety and healthiness of the products</i> - <i>pathogens / micropollutants</i>
Helsingborg	<ul style="list-style-type: none"> - <i>The market has to be convinced that no risk will occur</i> - <i>Lack of information and no good practice/examples</i> - <i>Media</i> - <i>Mostly aesthetic and moral issues.</i> - <i>The "yuck factor"</i>

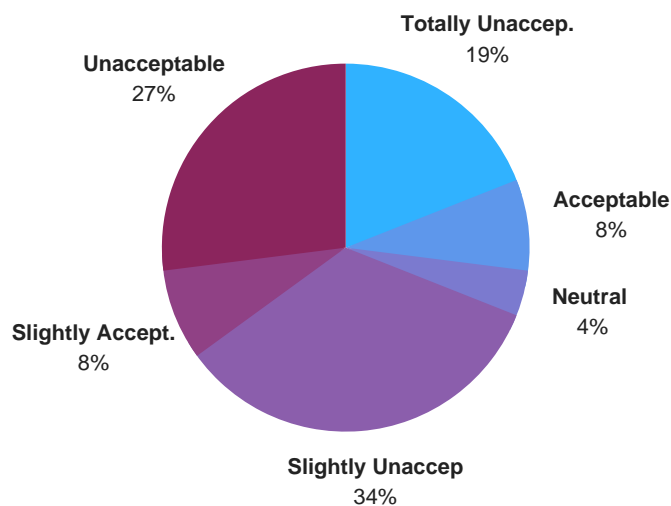
Acceptability perception in the general population	
General observations	<p>When asking about specific acceptability levels with regards of the use of the different reuse schemes, also similarities are found with the literature, stakeholders coincided in pointing out that those final uses of the product will be more unacceptable when more direct contact is had (showering or washing clothes), as opposed to the higher acceptance that would result in reusing the resulting product for flushing toilets, irrigation or as fertilisers.</p> <p>While it is true that a small percentage believe that even the general population would not accept using reused water to flush the tank or irrigate the garden, the data are critical when comparing them with the results obtained from the surveys of the general population to verify the gap that exists between experts and the general population. Since in many cases the perception is not coincident (here we will look for references of works in which this perceptive gap has been found between one and the other).</p> <p>From your own criteria, please rate how acceptable it would be for the general population to...</p> <ul style="list-style-type: none"> • Toilet flushing



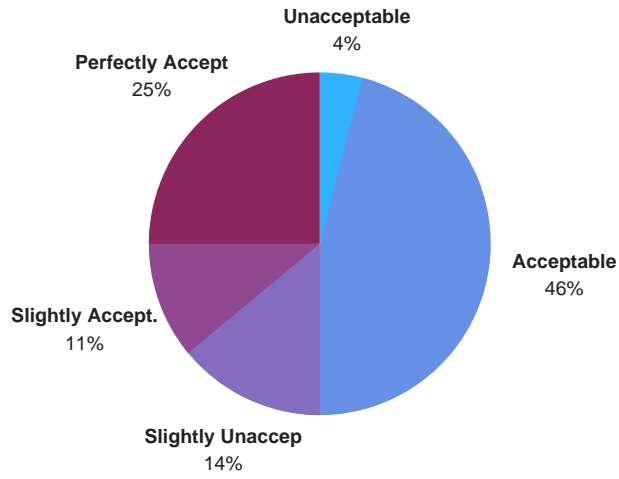
- Washing clothes



- Showering and bathing at home



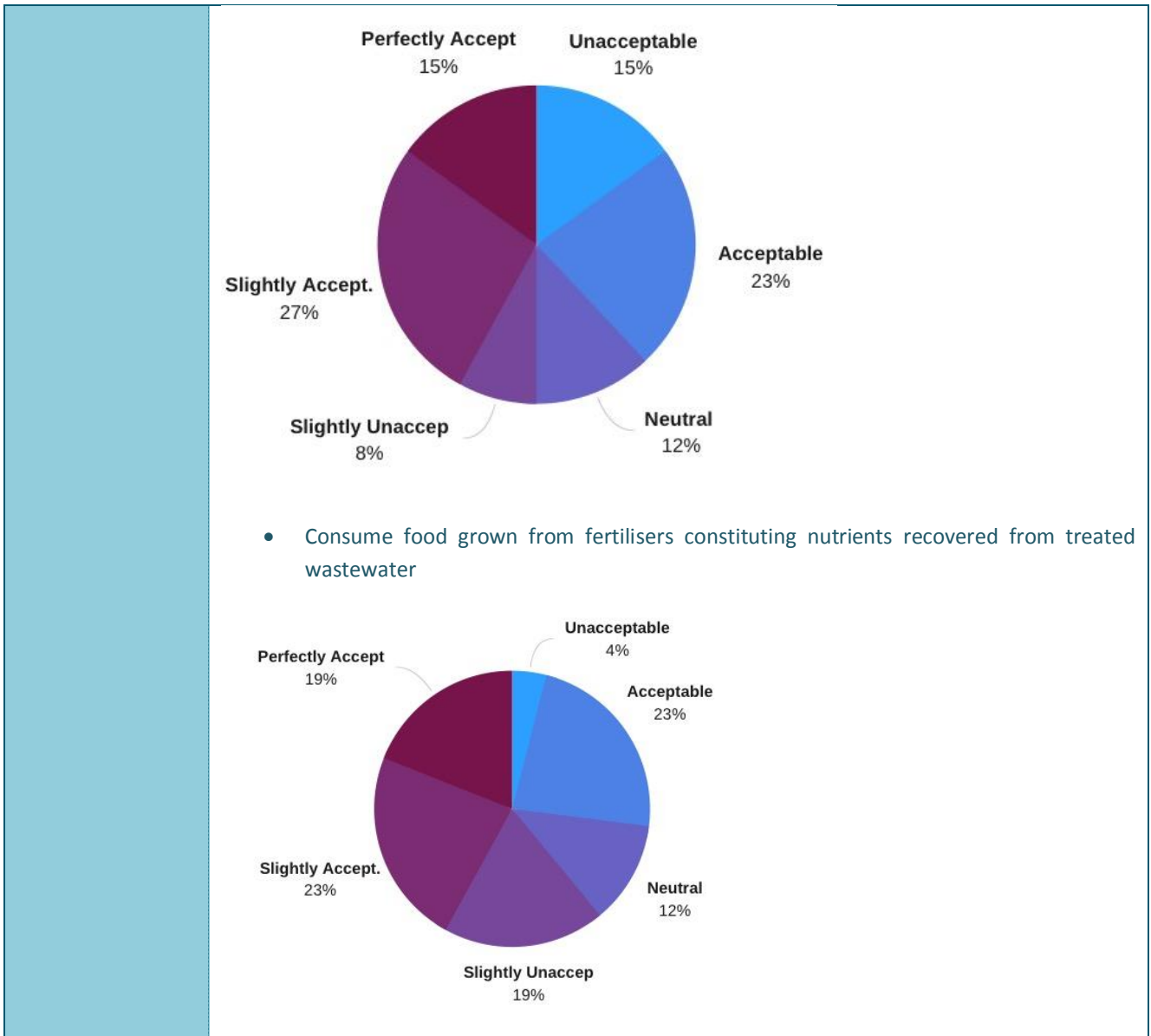
- Watering gardens



- Irrigating fruit and vegetables



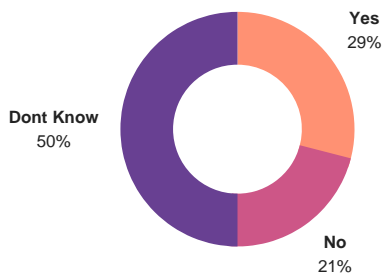
- Fertilizers



Perceived long-term risks (individual)	
General observations	The risks that the project fails in the long term are in line with those specified in the previous questions: communicating well, quality control including public perception, etc. The lack of economic support or over expected costs, are other types of risks perceived in the long-term. Moreover other issues are the lack of acceptance of the final product or not being sufficiently competitive can lead to the failure of the project. There is also a concern regarding a change in political influences.
Specific observations	Quotes about the question “From your own criteria, what are the risk factors with the potential to impact the long-term viability of the project?”
Sneek	<ul style="list-style-type: none"> - <i>Economical: lack of funding</i> - <i>Operational: Recovered nutrients have to compete with highly efficient affordable commercially available fertilisers</i> - <i>Regulatory/Legal: legislation may not to change to allow use.</i>

Vigo	<ul style="list-style-type: none"> - <i>Social problems related with public opinion</i> - <i>Bad slogan election</i> - <i>Economic: Evaluate the minimum size of the treatment station so that the implementation will be viable. If the economic balance between the cost of the installation and the corresponding savings supposes a very long-term amortization.</i> - <i>Legal: Facilitate the procedures for the regularization of facilities</i> - <i>Quality: Set safe but not extreme threshold values</i> - <i>Bad praxis that derive in mistrust of society</i> - <i>Political: if there are not quick results and its impact is not extraordinary enough to be able to sell it well.</i> - <i>Social: if there were unpleasant effects, although not harmful, for society, such as odours, waste, etc.</i>
Ghent	<ul style="list-style-type: none"> - <i>Change the ownership of housing</i> - <i>Political Changes (funding)</i> - <i>The operational follow up will be a key factor to success</i> - <i>The cost of the treatment</i> - <i>Regulation</i> - <i>Social: compete with the current comfort</i>
Helsingborg	<ul style="list-style-type: none"> - <i>If farmers acceptance is not obtained</i> - <i>Economic, legal and regulatory requirements, certifications, practices for building. If expenses are too high</i> - <i>Operational - that technical issues can be solved</i> - <i>Social - how to really explain the huge advantages of the reuse of wastewater and nutrients in agriculture compared to the afraid of the very small risks.</i>

4.7.5 Knowledge about Regulatory Issues

Knowledge about regulatory and legal issues		Figures								
General observations	<p>Half of the stakeholders responding to the questionnaire do not know if there are legal difficulties that prevent the implementation of the pilot. It seems here to be a discrepancy between respondents, since 29% consider that changes must be made in regulation, while 21% do not consider them.</p> <p>All the stakeholders answering this question agree that given the innovative character of these technologies, there is a lot to be done in terms of regulation to be able to implement them at a large scale. It is not only about changing the knowledge of the society, but about establishing norms and</p>	<p>The technology to be implemented at the demosite, could be incompatible with current regulation or that the existing regulation would require change/adjustment?</p>  <table border="1"> <caption>Survey Results</caption> <thead> <tr> <th>Response</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>Yes</td> <td>29%</td> </tr> <tr> <td>No</td> <td>21%</td> </tr> <tr> <td>Dont Know</td> <td>50%</td> </tr> </tbody> </table>	Response	Percentage	Yes	29%	No	21%	Dont Know	50%
Response	Percentage									
Yes	29%									
No	21%									
Dont Know	50%									

	laws that facilitate its implementation.	
Specific observations	Quotes about the question <i>Please specific which regulation and what change</i>	
Sneek	<ul style="list-style-type: none"> - <i>Disposal of kitchen refuse is not allowed</i> - <i>Permission for Household to grind bio-waste in kitchen sink</i> 	
Vigo	<ul style="list-style-type: none"> - <i>Simplification of procedures to install decentralized plants</i> - <i>Regulation to sell recovered products</i> 	
Ghent	<ul style="list-style-type: none"> - <i>Regulations are based on 'private ownership' on the one hand and 'super-collectivism' on the other hand. Initiatives like cohousing, local energy-production, share-economy are not yet sufficiently implemented.</i> - <i>Private distribution lines, water treatment and standard billing by water companies</i> - <i>Regulation of heat networks and local production of energy</i> 	
Helsingborg	<ul style="list-style-type: none"> - <i>Reuse of extracted nutrients is still considered a "waste" in law and thus very regulated.</i> - <i>It cannot be demanded that the waste of food be collected with disposers</i> 	

4.7.6 [Engagement sought](#)

This section highlights the level of potential engagement from the pilot site stakeholders in terms of their interest, availability and willingness. The graphs below give a good indication of the engagement level of the stakeholders to be involved, the frequency in which they would like to be engaged and their disposition to be involved in the different types of tasks.

Results are mainly based on the questionnaires and are also supported through the discussions held in the two focus groups in Helsingborg and in Vigo (June 2018).

Willingness level to participate in the project

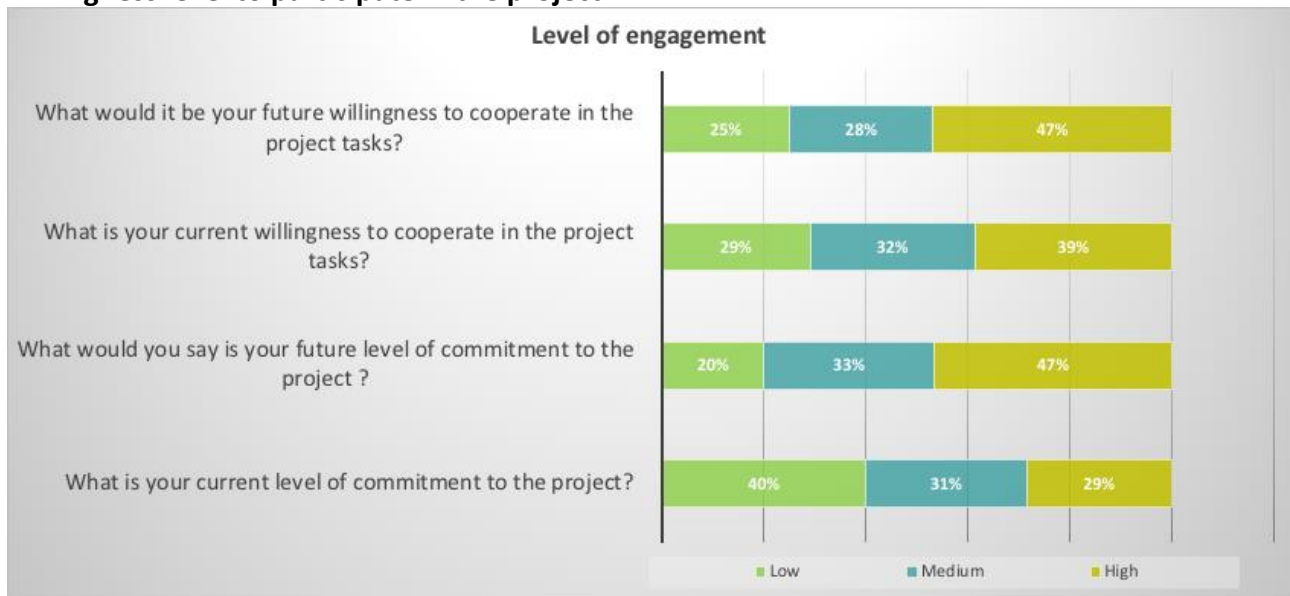


Figure 8. Willingness of stakeholders to participate in the project

In general, 47% of the respondents (34 responses to this question) favor the idea of high participation in the future as well as committing to related actions. This is in direct contrast to the current situation, where most of the participants have indicated that they current have low levels of involvement and commitment regarding the project and the specific site. However, it should be noted that some of the stakeholders are indeed already very involved in the project, since it was the type of actors that were sought to consult.

Availability to get engaged in Run4Life activities

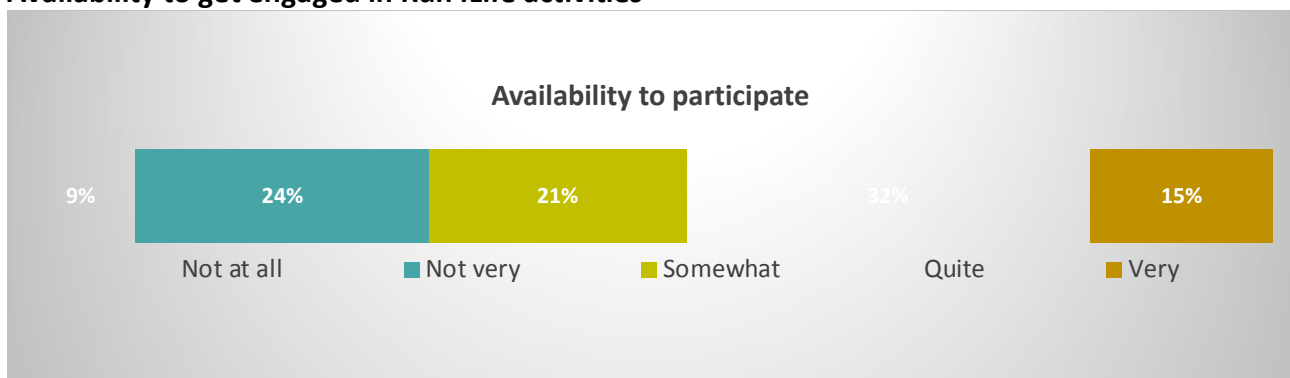


Figure 9. Availability of stakeholders to participate in the project (n=34)

Reviewing the availability to get involved in the various different activities at their demo sites, the demosite stakeholders where either very keen to be involved with 15% of respondents (34 responses to this question) saying that they would very much like to be involved in the activities at their demo site, while 24% of the respondents mentioned that they would like to be involved but that their level of engagement would only be “a little bit”. Positively only 9% of respondents said that he/she would not like to be engaged at all and 13% of respondents would not like to be engaged very much while 32% of respondents would like to be involved only somewhat. Overall the majority of respondents would like to have a high level of engagement

in the Run4Life activities at their demo site, however, it will be important to build the interest of the Run4Life activities in those respondents that have shown little or no interest to be engaged.

In terms of the types of stakeholders involvement in project activities in the demo-sites, the figure below provides an overview of the answers.

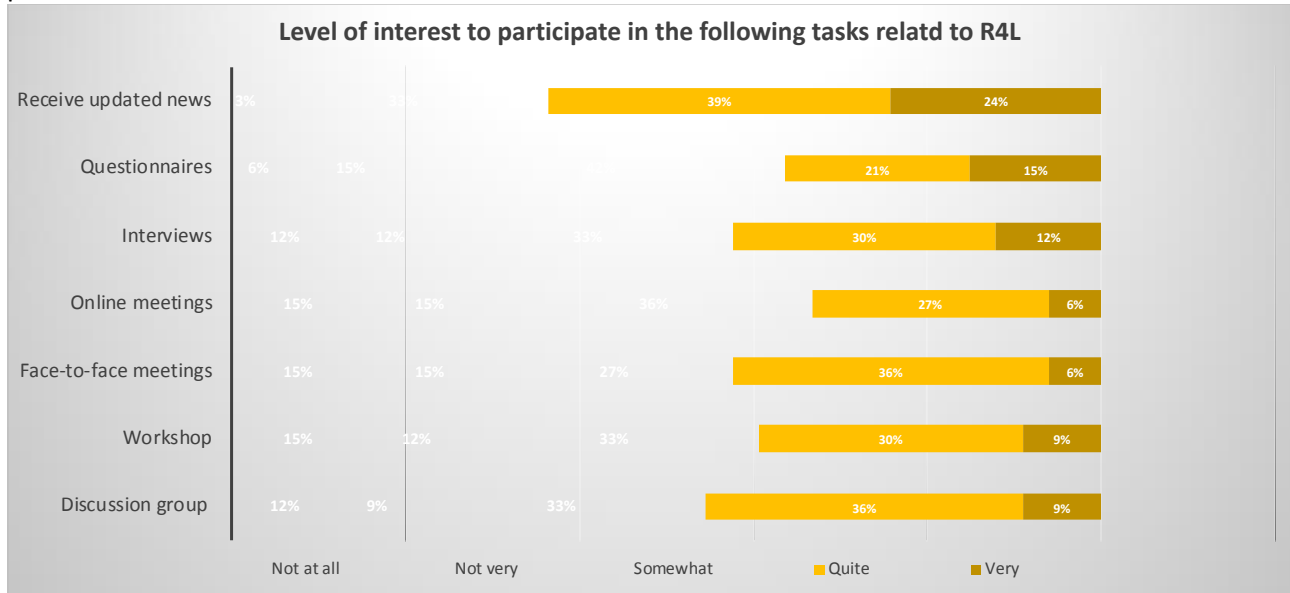


Figure 10. Level of stakeholders' interest to participate in project tasks (n=34).

With regards to face-to-face interactions (meetings, workshops and discussions groups) higher levels of interest are shown, the majority have quite (36%), somewhat (33%), or very high (9%) level of disposition to assist in running or undertaking discussion groups (34 responses to this question). This trend is repeated for workshops and face-to-face meetings, which makes sense as they are similar types of activities – bringing stakeholders together. However, for face-to-face meetings (in general) it showed also a highest response rate (15% of “not at all” and 15% for “not very”) for not having a very high disposition to hold face-face-face meetings.

Considering the previous results together with these results, we can conclude that the demo site stakeholders on the whole are keen to be engaged at fairly high frequency (whenever necessary or at least once every 3 months) and that they would prefer to be engaged through assisting in discussion groups and workshops. A cautionary note must also be considered that a small number of stakeholders don't want to be engaged at all. It is indeed with these stakeholders that the Run4Life project would need to undertake greater communication and effort to aid in better engagement from these stakeholders.

It should also be noted that individual responses are very relevant because they give us specific information of each actor. For ethical and confidentiality issues, we can only analyze and show, aggregated answers in this report. However, for the organization of various engagement actions we will consider the individual answers.

Frequency in getting engaged in Run4Life

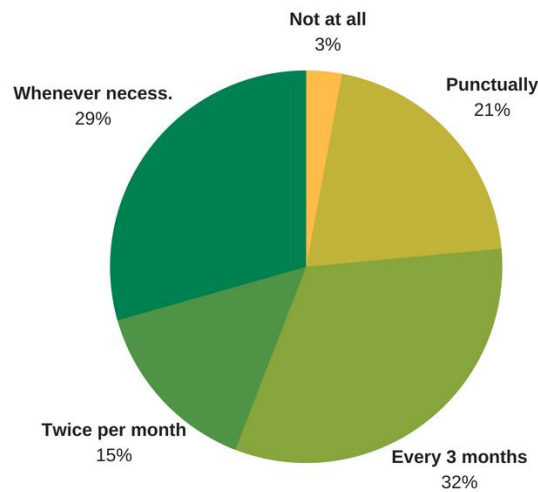


Figure 11. Frequency desired from stakeholders to get contacted somehow for the project (n=34).

With regards to the frequency of engagement (36 responses to this question), the majority would like to be engaged fairly often with 29% of respondents indicating they would like to be engaged “whenever necessary”, 15% a couple of times a month, 21% punctually and 32% said they would like to be engaged at least once every 3 months. This means that 92% would like to have “frequent” engagement in the Run4Life activities. Interestingly, however, nobody wants to be engaged a couple of times a week as no respondent chose this option. However, only 3% of respondents said that they would not want to be engaged at all. The frequency of engagement reveals interesting answers when compared to the availability to be engaged. Although the majority may have suggested that they do not want to get involved in the Run4Life activities, they are content to be engaged fairly frequently. Therefore, this suggests that they may just need to know what it means to be engaged in the Run4Life activities and how and what their input would be. Overall, it can be seen that the demo site stakeholders want to be involved and engaged but that they would just need to know what would be expected of them.

5. General discussion about factors for acceptance and effective engagement

5.1 Public perception of the Run4Life technologies

Public acceptance is a key component in the study of the feasibility of water and nutrient reuse technologies. This section seeks to integrate the findings of the literature review and the results obtained in the collection of data through questionnaires with stakeholders.

The aims were to:

- Identify the social factors perceived by the stakeholders that could potentially undermine the feasibility of Run4Life project.
- To provide baseline data to guide strategies for public acceptance with any future proposal for implementation of the Run4Life technology

In this first stage of data collection it is necessary to reiterate that the answers are focused on stakeholders that know the project to a greater or lesser extent and that this will not necessarily correspond with the consultation of the general population. Even so, it is necessary as a first step, to investigate which of the elements detected in the literature which were identified as relevant were also referred to by those involved in the project.

In a later step, the gap between the perception of the stakeholders and that of the general population will be verified. Some studies have found that this gap is not so big (Chen et al., 2015), and that the stakeholders concerns are not significantly different from those of the general public. However, in other studies, there is reference to the opposite being true, that the stakeholders have not been able to put themselves in the place of the laymen and this has had drastic consequences for the implementation of decentralized systems (Bagget, Jeffrey & Jefferson, 2006). Given the lack of clear results in this matter, there is a need to find out if there are differences among stakeholders perceptions and that of the general population.

Several variables have been discussed in the literature review. Regarding the sociodemographic variables, the stakeholders did not perceive these as determinants for the implementation of the Run4Life systems. The literature also does not find conclusive results, but it is a question that needs to be taken into consideration in the next steps, precisely because there does not seem to be a consensus regarding the effect they have on acceptance. In this sense, a variable that not frequently studied in the literature, but that may be relevant to be considered is ideology. There is evidence that a left self-location is associated with attitudes more respectful to the environment (Neumayer, 2004), among which could be the reuse of water. In this sense, the problem could be in the "politicization" of the technology.

With regards to the problems of cost and maintenance of the systems, which is referred to as a barrier in the literature, the different project stakeholders have also mentioned this variable, where they raised the issue of the associated costs of the use of the technologies (maintenance, billing, etc.). Therefore, this point is important to be considered when presenting technology to the general population, because it is a current challenge that must be overcome. Predictably, public acceptance for the Run4Life technology will be higher when costs of network installation and running are reasonable (Hartley, 2003). This relates to a potential for a return on investment (Woolston and Jaffer, 2005).

Public perception on the source of water and its end-use of recycled water is widely noted to impact public acceptance (Po et al., 2003, p.20). This refers to the emotional responses to the idea of using recycled water, including "disgust" at the perception of the proximity to 'waste' (Po et al., 2003). This has been cited as a key factor in the rejection of a number of reuse schemes globally (Hartley, 2003). According to Hartley (2003) and Po et al. (2003), people are more likely to accept reuse of water from their own home over a public source. This relates to the "yuck factor", noted across the literature (Jeffrey, 2002; Hartley, 2003; Bell and Aitken, 2008). Generally, acceptance is higher when human contact with water is minimal (Hartley, 2003). Application for industrial use therefore tends to be well accepted, which is the opposite to domestic use (Po et al., 2003). The answers from the stakeholders have confirmed this point where 73% of the respondents confirmed that they think that the general population would flush their toilet with recycled water, but only 16% would bathe in it.

Guaranteeing the health and correct operation of the treatment plants is a crucial element for acceptance, at least from the perspective of the stakeholders interviewed which has also been confirmed in the literature review. Public trust in local authorities and technology is widely noted as influential over the acceptance of reuse (Hartley, 2003). If the one who presents the technology and offers it is trustworthy, it can help to save the reluctance of its use. As well as providing information and solving doubts that users may perceive with these new systems.

Related to the potential concerns that users of the technologies may have, the stakeholders interviewed perceived that health risks could be a potential barrier to achieve acceptance. Health is a primary concern

for all proposed applications of reused water. Public acceptance is higher when perceptions of its quality are good and there are clear health protection efforts that are in place (Hartley, 2003).

Public attitudes towards the environmental impacts of water reuse are often seen as a lower priority (Po et al., 2003). The stakeholders interviewed have referred to this as a benefit derived from the Run4Life project. Public acceptance is higher when there are clear environmental and water conservation benefits (Hartley, 2003). This correlates to awareness and understanding of the environmental issues, with higher acceptance in locations where water scarcity issues are widely acknowledged (Dolnicar et al 2011; Hartley, 2003; Po et al., 2003). Reinforcing the environmental and efficiency benefits of the systems, as well as the multiple advantages of the circular economy perspective, can make this new technology attractive to potential users, at least from the stakeholder's perspective. However, as pointed out in during the focus group in Vigo, the issue of nutrient recovery is expected to have greater acceptance amongst the rural population than in people living in urban areas. This differential element needs to be considered when designing the perception questionnaires among the general population, because it can be a relevant variable in acceptance.

Despite of all these critical elements referred in the literature, which are also mentioned by the stakeholders, in general it is detected that there is a lack of an elaborated conceptual model in previous studies. Therefore, this should serve as a priority for the next steps, to try to integrate all these variables through putting them into a theoretical background, which can help to better understand public acceptance. Research in similar environmental topics can bring us some insights into how to group these different topics and to organize them to better predict what the public reaction would be.

For instance, it is strongly recommended to include a Diagnostic Framework in the public approach. Not necessarily for stakeholders which are already aware of the technology, but for the general population where there is a need to frame water and nutrient recovery as something that needs to change, that is, they need to perceive that the current way that the water is treated is not optimal or as optimal as it could be. For promoting change, there is a requirement to identify a situation as problematic (Grossi, Fernández, & Sabucedo 1998). Here we would need to consider the perception of the reuse of water and nutrients as a problem, highlighting the urgency of the topic, and that each person would need to perceive that they must be involved in its solution.

Another conceptual element that needs to be considered is the one of identity. Previous studies point that to trust that is needed, but this variable is also much related to identity. Trusting the promoters of the decentralized technologies is included in the identification with them, which includes not only how trustworthy they are but also how they are considered as a reliable source, competent and credible (Sabucedo, Durán, & Alzate, 2010).

All of these new approaches need to be included in a theoretical model that considers the variables, not in isolation, but as an integrated combination that finally explains the acceptance.

5.2 Effective engagement

This section analyses the results in terms of factors that the project should look to analyze as to how the stakeholders interact and show interest and influence in the Run4Life related technologies. In this sense, as explained in the section 2.2 of the literature review we frame this analysis in terms of seeking engagement of the stakeholders, as stakeholder engagement is referred to here as the relationship and interaction between institutions and those who are impacted by the activities of those institutions.

From the SNA analysis carried out so far, it can be observed that there are well connected **social structures** (the nodes, the actors, are connected to each other), which is logical since we have begun the consultation process through the actors that are involved in the case studies, and that most of them have previously been connected through other projects or activities. However, the SNA process would have only just started, and it

will continue with new identified actors into the next phase of the project. In this way, through the various consultations held, the actors have already been named which include other institutions that should be involved in the future both for their potential interest and their potential influence on the development of the case study. In this sense, **stakeholders** such as environmental associations, farmers associations, other regions or municipalities, and the local press have been mentioned, and therefore in the following phases of the Run4Life study they should try to involve these organizations in each of these areas.

With regards to how trust can be further be developed, stakeholders expressed several times that there is a need for more information as well as including successful ways of **communication**, even for them that they are somehow already engaged in the demo sites. In the results, this has been considered as an indicator that before approaching the general population it is necessary to undertaken intensive work of approaching the stakeholders linked to the project, in the form of focus groups, for instance, to further identify their needs of information. In the two focus groups held in Helsingborg in Vigo this was something that could be further explored, and it is suggested to follow up this process in the Ghent and Sneek sites.

In parallel to the process of contacting stakeholders close to the demo-site of the Run4Life project, it is also important to involve fertilizer companies or farmers in the process in order to make the final product marketable, they could be closely related to the sites or not. This action would undoubtedly need to be coordinated with WP7 (Exploitation)

The **interest** and willingness shown from the consulted stakeholders in the Run4Life activities is generally considered high, but more ways of interaction and involvement are required in order to achieve sound knowledge exchange as the following concern highlighted by one of the consulted stakeholders mentions:

"I would say as a researcher you would need to be involved in the evaluation of this new system when it is being implemented. And of course you have some sense of responsibility to disseminate your results in an understandable way to the public" [Quote from a participant of the focus group in Helsingborg]

Some stakeholders, expressed their **interest** in being involved in the demo-sites, especially those that were involved in previous phases of development of the demo-site and who are no longer actively involved. They show interest in both offering their opinion and knowledge and in continuing to receive information on the progress of the project activities. In this sense it is important to keep them engaged in a bi-directional communication process and to maintain a feeling of ownership with the project.

During the focus groups, stakeholders also discussed that for the general society, the "innovative" character of these technologies and approached generates interest. Knowing that they could take part of an innovative project that contributes to the common good and improves the environment is a benefit that generates public acceptance. The project communication should follow this line.

Themes related to communication activities that can create interest are the following:

- For the users of the technologies (inhabitants in this case), it is important to create workshops about the functioning, maintenance of the technologies, and it is crucial for the good operation of the systems.
- Also, workshops in order to identify the best communication processes, contents, involving stakeholders in co-creation workshops to develop communication materials through their experience.
- Dissemination strategies among the stakeholders themselves also need to take place so that they know what is done in each of the demo-sites and what they intend to achieve with them.

In order to identify how to better spread information, and to exchange knowledge. Stakeholders widely identified face-to-face actions such as workshops, bilateral meetings, focus groups etc. as a very effective way to be engaged much more than the consultation process such as questionnaires or interviews. It is also important to notify them of their potential participation with sufficient time in advance, this will result in improved engagement and participation from them including inputs related to their field of work. With

regards to online interactions, monthly interactions to keep them informed about project activities would be acceptable. However as expressed in their results this is a general trend however the individual results will be considered, and the desires expressed in the questionnaires. From the results, we can conclude that the demo site stakeholders on the whole are keen to be engaged at a fairly high frequency (and that they would prefer to be engaged through assisting in discussion groups and workshops. This suggests that they may just need to know what it means to be engaged in the Run4Life activities and how and what their input would be.

The stakeholders have also shown a disposition to undertake questionnaires during this process, however when asking them about the availability to be further consulted it is also important to note that the stakeholders also showed zero disposition to have any availability for all of these activities.

Overall the majority of respondents would like to have a high level of engagement in the Run4Life activities at their demo site, however, it will be important to build the interest of the Run4Life activities in those respondents that have shown little interest to be engaged

At this moment, the analysis of the stakeholders reveals that the most influential groups are associated with the promoters of the site, as well as the project partners that are more linked to the case in question. This is totally understandable, and as reflected in the literature review, higher level of influence is observed for those stakeholders that have an organizational/legal mandate, a high political legitimacy, and/or those who have control over economic resources.

As the literature review detailed, the influence of the interest groups is strongly related to trust mechanisms between the influential and interested actors. In this way, it has been identified through the focus groups that offering information and bi-directional communication is essential in this area, and also at the time required.

6. NEXT STEPS

The next steps with regards to the site stakeholders relates to the engagement procedure and further analysis of the factors shaping the social attitudes and behaviour with regards to the Run4Life technologies. In this sense specific strategies at demo-site level are created and also together with the work in WP7 and in WP8 at a more general level.

The following general scheme will be followed:

- At the demo-site level, further **focus groups** will be held in the forthcoming months with the aim to delve deeper into the results of the questionnaire specifically at the remaining demo-sites of Ghent and Sneek. These focus groups will follow a similar structure to the ones that took place in Helsingborg and in Vigo, they can will be undertaken with the stakeholders that have not yet been contacted: local media, and local CSO's. In addition, this activity will aim to further validate the stakeholder maps that have been created for each site and to gain further inputs. The activity of identifying stakeholders and enlarging the stakeholder's map will be also included in these activities as a transversal action.
- With the results from the demo-sites ready, specific **discussion groups (workshops)** will be organised as part of Task 6.1.2. "social engagement workshops" in each of the demo-sites. Workshops will be held with the involved stakeholders so that they understand the importance of the information that is generated and the messages that are sent to the general population and how the misuse of said information can potentially produce reluctance towards the project.
- The next stakeholder group to be tackled will be the "unaware community" and "users of technologies" following the stated methodology. The following activities have been identified in order to further address these groups:

- Elaborate a conceptual framework, which includes relevant variables and other relevant concepts which could potentially better predict public acceptance. In this sense, a pilot will be designed in order to controls variables that may interfere in how the message is delivered about the benefits of the technology used by the Run4Life Project. Type of message that is given, about what emphasis is made, who issues it, under what conditions it is received, etc. With pre and post measures.
- Design a general population questionnaire on the risks and perceived benefits of this technology and on the possible acceptance of its use, to compare with the existing results of the stakeholders.
- Questionnaires and workshops with fertilizers companies and other users of the generated Run4life solutions to know their perceptions about the reuse of nutrients proposed in the Run4Life.

The following tables give an overview of the above mentioned next stages for the forthcoming years of the Run4Life Project. These tables include the next actions for stakeholder engagement and for further analysis of the public perception of water reuse and nutrient recovery technology. The information in these tables is organized as follows: one for each of the 4 demo-sites, one for the fertilizers companies and farmers community, and one for the general project context. These actions will frame the basis of the actions of the Task 6.1.2.

The Ghent Demo-site		
The Main purpose for engagement/analysis	In Ghent the main aim concerning stakeholders is with regards to increasing the knowledge regarding how the target groups have perceived the Run4Life technologies	
Type of actions	<ul style="list-style-type: none"> - To further analyse perceptions: Through a focus group with key stakeholders and further in-depth interviews - To Update the stakeholders map - To Gather further feedback from the communication actions 	
Planning		
Action name	Expected time	Target group
Organise a focus group in order to further explore what the knowledge needs are.	October- November 2018	Key experts and some already engaged inhabitants
Discussion group with other stakeholders' groups (local media, local associations, tenants, etc.)	2019	Key experts and some already engaged inhabitants
Definition of the main components for a communication strategy	2019	Promoters of the Ghent site and the responsible persons for communication action for Run4Life and the Nereus project
Updating the Stakeholder Map	Yearly basis	All groups
Inclusion of a feedback questionnaire with key questions to be send after other events that might take place (as part of task 5.3 as well)	Periodically every time a social event takes place in Ghent	All groups

The Helsingborg Demo-site		
Main purpose for engagement/analysis	Engagement and communication activities in the context of the H+ project is very diverse. In the context of the Run4Life project the engagement sought will seek for harmonisation of these communication actions in terms of what is the information that is really required from the stakeholders. Also, to adopt the recommendations extracted from the other demo-sites	
Type of actions	<ul style="list-style-type: none"> - To further analyse about perception: To hold a focus group with the key stakeholders and to hold further in-depth interviews - To Update the stakeholder map - To gather further feedback from the communication actions 	
Planning		
Action name	Expected time	Target group
Discussion group with other stakeholders groups (local media, local associations, tenants, etc.)	2019	Key experts and some already engaged inhabitants
Definition of the main components for a communication strategy	2019	Promoters of the Helsingborg site and the responsible persons for communication actions
Updating the Stakeholder Map	Yearly basis	All groups
Inclusion of a feedback questionnaire with key questions to be send after other events that might take place (as part of task 5.3 as well)	Periodically every time a social event takes place in Helsingborg	All groups

The Vigo Demo-site		
Main purpose for engagement/analysis	The size of the demo-site in Vigo is quite small but it is recognised from the focus group organised that there is greater potential to develop further similar actions in the area. The idea would be to further explore this potentiality in terms of social perception, taking as a basis for the analysis the site in Vigo.	
Type of actions	<ul style="list-style-type: none"> - Explore perceptions of the unaware community beyond the context of the demo-site - Seek social engagement at the demo-site level in order to co-create communication materials and provide bottom-up recommendations for future communication actions - Updating the stakeholder map 	
Planning		
Action name	Expected time	Target group

Develop a general population questionnaire on the risks and perceived benefits of this technology and on the possible acceptance of its use, to compare with the existing results of the stakeholders	November 2018 – January 2019	General Public
Organise a workshop in the Vigo demo-site to look for key communication issues	November- December 2018	Workers of the Vigo demo-building
Updating the Stakeholder Map	Yearly basis	All groups
Inclusion of a feedback questionnaire with key questions to be send after other events that might take place (as part of task 5.3 as well)	Periodically every time a social event takes place in Vigo	All groups

The Sneek Demo-site		
Main purpose for engagement	The size of the demo-site in Sneek is already in place, however not many studies analysing perceptions of all stakeholders have been undertaken, and neither an analysis of what are the knowledge needs. Therefore, the idea would be to further explore social perceptions from other groups (nearby municipalities, local associations, taking as a basis for the analysis the site in Vigo.	
Type of actions	<ul style="list-style-type: none"> - To explore further perceptions of other stakeholders' groups: local media, local associations and inhabitants - Seek social engagement at the demo-site level in order to co-create communication materials and provide bottom-up recommendations for future communication actions - Updating the stakeholder map 	
Planning		
Action name	Expected time	Target group
Organise a focus group with other key stakeholders in order to further analyse perceptions, and knowledge needs.	2019	Local media, inhabitants, real state agencies, etc.
Organise a workshop to co-create best ways for communication actions of water reuse and nutrient recovery based in a serious games ⁷ methodology	2019	All groups

⁷ According to Susi et al. (2007) serious games are games that “engage the user and contribute to the achievement of predefined objectives”.

Updating the Stakeholder Map	Yearly basis	All groups
Inclusion of a feedback questionnaire with key questions to be send after other events that might take place (as part of task 5.3 as well)	Periodically every time a social event takes place in Sneek.	All groups

Fertilisers and Farmers		
Main purpose for engagement	Although WP7 is looking for the exploitation of the Run4Life solutions and identifying the main users. The action foresees some engagement actions, which in parallel could look also at the analysis of perception of these groups as well as to identify other knowledge needs and best ways to interact with them.	
Type of actions	Questionnaires and a workshop with fertilizers and other users of the generated Run4life solutions to know their perceptions about the reuse of nutrients proposed in the Run4Life.	
Planning		
Action name	Expected time	Target group
Inclusion of a questionnaire with key questions to be sent after other events that might take place (as part of task 5.3 as well)	Periodically every time a social event takes place in the context of WP7	Fertiliser companies and other related groups
Co-organisation of a workshop in the context of WP7 to also analyse knowledge needs and perceptions from this group.	2019	Fertiliser companies and other related groups

General Context - Communication		
Main purpose for engagement	With regards to general actions, this can be framed in WP8 that is dealing with communication. Recommendations gathered from the WP6 analysis should be further addressed in the Communication actions.	
Type of actions	<ul style="list-style-type: none"> – Updating the communication materials – Providing support in the communication and content creation of the related WP6 events – Providing innovative engagement methods for the organisation of workshops, e.g. serious games 	
Planning		
Action name	Expected time	Target group
Create content for information (non-academic) for each of the	2019	All groups

demo-site adapted to the needs identified		
Collaborate in the methodology of the workshops	2019-2020	All groups
Adapt contents of the communication materials aiming at the general public with a lay nomenclature	2018-2019	All groups

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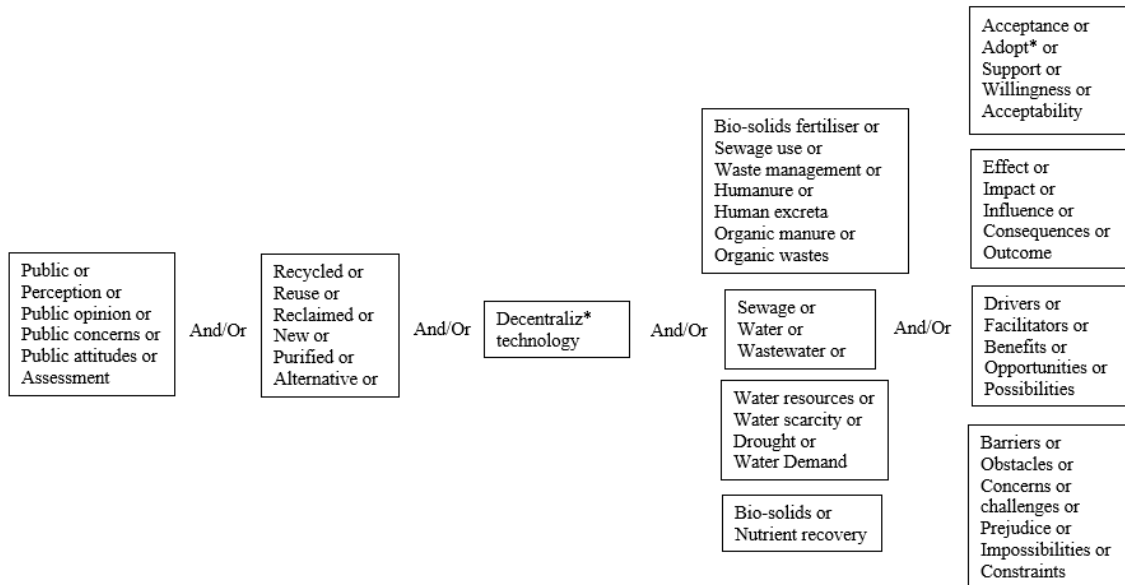
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8. Annexes

Annex. 1 Protocol for literature review

8.1.1 [Inclusion and exclusion criteria of the literature review](#)

To identify relevant literature, the following search terms were used:



The electronic bibliographic databases that were used on the search were as follows: Academic Search Complete, PsycINFO, MEDLINE, Psychology and Behavioral Sciences Collection, PsycARTICLES, ERIC, Web of Science, Scopus, SciELO, B-On, The Cochrane Library, Open Science Directory and Google Scholar. We selected those papers that related to human participants and environmental issues and psychology, sociology and social science research areas. We also included the volumes of journals indexed in ISI and Scopus related to the topic of the systematic review. There also were included peer-reviewed conferences and those papers included in the screening references of relevant studies in national/international government reports and non-governmental organization publications (via a Google search). To identify additional articles of interest, there were searched the reference lists of screened articles, the citation lists of where the article was referenced and, also, in registered protocols related to the aim of this systematic review. We also searched the reference sections of known authors in the field in Google Scholar and Research Gate.

The search was restricted to articles published between January 1970 to January 2018, in English, Portuguese and Spanish languages.

Those very technical studies on properties of the water and from fields of engineering and physics were excluded given in this moment we are focusing in public acceptance.

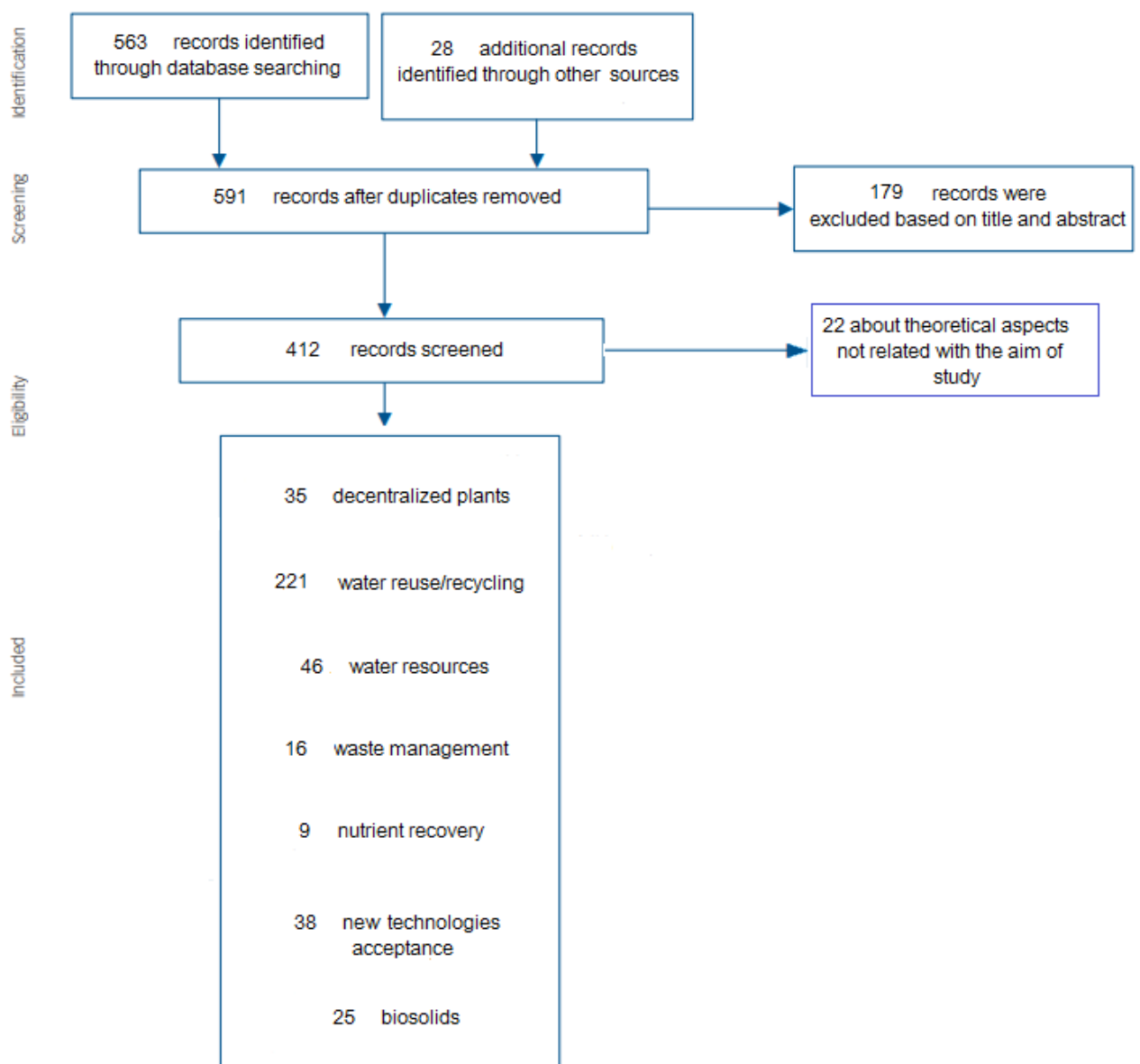
8.1.2 [Selecting appropriate sources](#)

Citations were downloaded into a Mendeley library. Their relevance was assessed against the predetermined inclusion and exclusion criteria by three researchers who independently screened all titles and abstracts. Forward and backward citation tracking complemented the database searches. Full-text manuscripts were obtained for all studies entering the review. Any uncertainties about entering the review were resolved by consensus and, when necessary, by an examination of the full text.

8.1.3 Data extraction, analysis and synthesis

Three reviewers extracted data directly to an Excel spreadsheet. A framework was developed which provides a basis for organizing the literature according to comparable study contexts and allows synthesis of the results. We contrasted topic (water resources, water reuse, acceptance of decentralized technology, nutrient recovery, bio-solids, acceptance of new technologies, waste management), context, sample size, level of analysis, variables studied, data collection and data analysis.

After the removal of duplicates, 591 potentially relevant articles were identified. 179 of these were excluded for being too technical or not directly related to the topic of study. At the full text review stage, 412 articles were reviewed (details summarized in the following figure):



Annex 2 – Questionnaire

Q1

This survey is part of the Run4Life Project (<http://run4life-project.eu>). The goal of the Run4Life project is to recover nutrients from domestic waste streams for application in agriculture. Run4Life proposes a new technological concept for wastewater treatment and nutrient recovery. The proposed solutions will also require a change in thinking from involved stakeholders and interested groups, considering not only technical but organisational, social and governance dimensions. In order to achieve these improved interactions, we need to generate an understanding of how people, groups, organizations, and networks currently interact and perceive in the context of wastewater management. The responses to this survey will allow us to gain a better depiction of the key institutions working in the areas where Run4Life will implement activities. This will enable us to better understand the social context to identify gaps as well as key connection points among stakeholders. Please help us by completing this questionnaire on behalf of your organisation. This will take only 15 minutes of your time. The information provided by you in this questionnaire is voluntary and will be used for research purposes only. It will not be used in a manner that would allow identification of your individual responses. Most participants will find the questions interesting and thought-provoking. If, however, you feel uncomfortable in any way during the completion of the questionnaire, you can decline to answer any question or to end the questionnaire. If you would like to continue with your collaboration press "next" if you do not agree press "leave". Once again, thank you very much for your cooperation.

Leave (1)

Next (2)

Skip To: End of Survey If

... = Leave

Page Break



Q2 Gender

- Male (1)
- Female (2)

Q3 How old are you?



Q4 Education Level:

- None, did not complete primary education (1)
- Primary or first stage of basic (2)
- Lower secondary or second stage of basic (3)
- Upper secondary (3)
- Post secondary, non-tertiary (4)
- First stage of tertiary (Bachelor) (4)
- Second stage of tertiary (master) (5)
- Post tertiary (PhD) (6)



Q5 Current employment Status

- I work full-time (1)
- I work part-time (2)
- I am freelance/self-employed (without employed staff) (3)
- I am self-employed with employed staff (4)
- I study full-time (5)
- I am unemployed/between jobs (6)
- I am (early) retired (7)
- I am a housewife / househusband (8)
- Other (9)

Page Break

Q6 In what setting do you live?

- Urban settings (1)
- Rural settings (2)



Q7 Location

- The Netherlands (1)
- Spain (2)
- Belgium (3)
- Sweden (4)
- Czech Republic (5)
- Other (6)

Display This Question:

If Location = Other

Q8 You have answered "other", please write down which location.

Page Break



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 730285.

Q9 Name of your organisation/institution (write "none" if you are not part of any organization)

Q10 Role in the organisation/institution (write "none" if you are not part of any organization)

Q11 Website (if any)

Page Break

Q12 In which of the following groups would you best fit?

- Consumers or users of the technology produced (inhabitants, tenants) (1)
- Farmer (2)
- Fertiliser company (3)
- Academia (researcher) (4)
- Technology provider (5)
- Regulator and/or policy maker (6)
- Implementer (Utility Provider, agencies, water utility, WWTP) (7)
- Civil society (CSO, association , etc.) (8)
- Media (9)
- Other (10)

Page Break

Display This Question:

If In which of the following groups would you best fit? = Other

Q13 You have answered "other", please write down which one.

Q14

Before this questionnaire, have you heard about the Run4Life project?

- Nothing at all/Never heard of it (1)
- Not very much (2)
- Somewhat (3)
- A little bit (4)
- Very much (5)

Q15 How much do you know about new technologies for wastewater treatment and nutrient recovery?

- Nothing at all/Never heard of it (1)
- Not very much (2)
- Somewhat (3)
- A little bit (4)
- A lot (5)

*Skip To: Q31 If How much do you know about new technologies for wastewater treatment and nutrient recovery? =
Nothing at all/Never heard of it*

*Skip To: Q31 If How much do you know about new technologies for wastewater treatment and nutrient recovery? =
Not very much*

Page Break



Q16 The technological solutions of the Run4Life project will be demonstrated in various large scale sites (i.e demosites). Which of the following demosites are you more aware of? (select the one you know the most)

- Gent, Belgium (1)
- Helsingborg, Sweden (2)
- Sneek, the Netherlands (3)
- Vigo, Spain (4)
- Czech Republic (5)
- None of them (6)

Skip To: Q31 If The technological solutions of the Run4Life project will be demonstrated in various large scale s... = None of them

Page Break



Q17 How much do you know about the $\{Q16/ChoiceGroup/SelectedChoices\}$ demosite?

- Not very much (2)
- Somewhat (3)
- A little bit (4)
- Very much (5)

Skip To: Q31 If How much do you know about the $\{q://QID61/ChoiceGroup/SelectedChoices\}$ demosite? = Not very much



Q18 In your own words, what would you say that is the purpose of the $\{Q16/ChoiceGroup/SelectedChoices\}$ demosite?



Q19 What is the benefit expected for your organization from the $\{Q16/ChoiceGroup/SelectedChoices\}$ demosite?



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Q20 What is your level of implication in the $\{Q16/ChoiceGroup/SelectedChoices\}$ demosite, which is part of the Run4Life project?

- Nothing at all (1)
- Not very much (2)
- Somewhat (3)
- A little bit (4)
- Very much (5)

Skip To: Q31 If What is your level of implication in the $\{q://QID61/ChoiceGroup/SelectedChoices\}$ demosite, which... = Nothing at all

Skip To: Q31 If What is your level of implication in the $\{q://QID61/ChoiceGroup/SelectedChoices\}$ demosite, which... = Not very much



Q21 What is your contribution to the $\{Q16/ChoiceGroup/SelectedChoices\}$ demosite?



Q22 How likely do you think there could be possible (“management”, “technological”, “human health risk”, “financial” etc.) problems with the $\{Q16/ChoiceGroup/SelectedChoices\}$ demosite?

- I don't know (1)
- Not at all likely (2)
- Slightly likely (3)
- Moderately likely (4)
- Quite likely (5)
- Extremely likely (6)

Display This Question:

If How likely do you think there could be possible (“management”, “technological”, “human health ris... = Slightly likely

Or How likely do you think there could be possible (“management”, “technological”, “human health ris... = Moderately likely

Or How likely do you think there could be possible (“management”, “technological”, “human health ris... = Quite likely

Or How likely do you think there could be possible (“management”, “technological”, “human health ris... = Extremely likely

Q23 Please specify which problems may exist

Q24 The technology to be implemented at $\{Q16/ChoiceGroup/SelectedChoices\}$ could be incompatible with current regulation or that the existing regulation would require change/adjustment?

- Yes (1)
- No (2)
- I don't know (3)

Page Break

Display This Question:

If The technology to be implemented at $\{q://QID61/ChoiceGroup/SelectedChoices\}$ could be incompatibl... = Yes

Q25 Please specific which regulation and what change.

Page Break



Q26 In your opinion, what would you say are the most important benefits of the $\{Q16/ChoiceGroup/SelectedChoices\}$ demosite to the society?



Q27 Do you know any organisation/person that may be interested or can influence in the $\{Q16/ChoiceGroup/SelectedChoices\}$ demosite, and with whom your organisation is somehow connected with? Policy makers, Farmers, Local/national media...

- Yes (1)
- No (2)

Display This Question:

If Do you know any organisation/person that may be interested or can influence in the ... = Yes

Q28 Please provide the name of other interested organisations that could be interested or can influence over the demosite development (provide the name of the organisation and a contact)



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Q29 From your own criteria, how likely do you think it is that something could go wrong with the operation of the $\{Q16/ChoiceGroup/SelectedChoices\}$ demosite?

- Very low (1)
- Low (2)
- Moderate (3)
- High (4)
- Very high (5)

Q30 From your own criteria, what impact do you think would have on public opinion if something went wrong with the operation of the $\{Q16/ChoiceGroup/SelectedChoices\}$ demosite?

- Very low (1)
- Low (2)
- Moderate (3)
- High (4)
- Very high (5)

Page Break

Q31 How much do you know about water reuse practices?

- Not at all (1)
- Not very much (2)
- Somewhat (3)
- A little bit (4)
- Very much (5)

Display This Question:

If How much do you know about water reuse practices? = Somewhat
Or How much do you know about water reuse practices? = A little bit
Or How much do you know about water reuse practices? = Very much

Q32 Could you please give some example of water reuse practices? (any technology, final usage of the product...)

Page Break

Q33 How much do you know about recovering nutrients from wastewater treatment for fertiliser production?

- Not at all (1)
- Not very much (2)
- Somewhat (3)
- A little bit (4)
- Very much (5)

Page Break

Display This Question:

If How much do you know about recovering nutrients from wastewater treatment for fertiliser producti... = Somewhat

Or How much do you know about recovering nutrients from wastewater treatment for fertiliser producti... = A little bit

Or How much do you know about recovering nutrients from wastewater treatment for fertiliser producti... = Very much

Q34 Could you please give some example of nutrient recovery from wastewater treatment for fertiliser production?

Page Break

Q35 What would you consider to be the main risks of water reuse?

Q37 What do you consider to be the main risks of nutrient recovery from wastewater treatment?

Q39 What do you consider to be the main risks of consuming foods grown from fertilizers produced with nutrients recovered from treated wastewater?

Q41

What elements do you think may influence the public perception of risk in terms of reuse practice?



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Q42 From your own criteria, please rate how acceptable it would be for the general population to...

	Totally unacceptable 1 (1)	Unacceptable 2 (2)	Slightly unacceptable 3 (3)	Neutral 4 (4)	Slightly acceptable 5 (5)	Acceptable 6 (6)	Perfectly Acceptable 7 (7)
Reuse treated waste water for home toilet flushing (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reuse treated waste water for washing clothes (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reuse treated waste water for showering and bathing at home (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reuse treated waste water for watering gardens (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Reuse treated waste water for Irrigating fruit and vegetables (5)

Use fertilizers produced with nutrients recovered from treated wastewater (6)

Consume food grown from fertilisers constituting nutrients recovered from treated wastewater (7)

Page Break

Display This Question:

If How much do you know about the $\{q://QID61/ChoiceGroup/SelectedChoices\}$ demosite? = Very much

Or How much do you know about the $\{q://QID61/ChoiceGroup/SelectedChoices\}$ demosite? = A little bit

Or How much do you know about the $\{q://QID61/ChoiceGroup/SelectedChoices\}$ demosite? = Somewhat

Q43 From your own criteria, what are the risk factors with the potential to impact the long-term viability of the project? It may be of different type: physical, social, political, regulatory, operational, economic, legal, etc. Please provide an explanation of each risk and the impact that it would have for the project.

Page Break

Q44 On a scale where 0 is “nothing” and 10 “a lot”, please rate:

	None 0 (1)	1 (2)	2 (3)	3 (4)	4 (5)	5 (6)	6 (7)	7 (8)	8 (9)	9 (10)	A lot 10 (11)
What is your current level of commitment to the project? (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
What would you say is your future level of commitment to the project ? (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
What is your current willingness to cooperate in the project tasks? (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
What would it be your future willingness to cooperate in the project tasks? (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q45 What is your availability to participate in the project?

- Not at all (1)
 - Not very (2)
 - Somewhat (3)
 - Quite (4)
 - Very (5)
-

Q46 How often can we contact you regarding the project?

- Not at all (1)
 - Punctually (2)
 - Every 3 months (3)
 - A couple of times a month (4)
 - A couple of times a week (5)
 - Whenever necessary (6)
-

Page Break

Q47 Please, indicate your disposition for the following tasks:

	Not at all (1)	Not very (2)	Somewhat (3)	Quite (4)	Very (5)
Participate in a discussion group on issues related to the project (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Participate in a workshop where project issues are discussed (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hold face-to-face meetings in relation to the project (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hold online meetings in relation to the project (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Respond to an interview on issues related to the project (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To fill questionnaires in relation to the project (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Receive updated news from the project progress (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



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Q48 Please, write your email (This has the unique purpose of contacting you in the different steps of the project development, always respecting the availability you referred in the previous questions).

Page Break

Q49 Do you have any additional comments about the Run4Life project?

Yes (1)

No (2)

Display This Question:

If Do you have any additional comments about the Run4Life project? = Yes

Q50 Please write your comments about the Run4Life project

Q51 Do you have any comments about this survey and the questions of it?

Yes (1)

No (2)

Display This Question:

If Do you have any comments about this survey and the questions of it? = Yes

Q52 Please write down your comments

Annex 3 – SNA METRICS

Degree Centrality	<p>Degree centrality is defined as the number of links incident upon a node (i.e., the number of ties that a node has). Degree is often interpreted in terms of the immediate risk of node for catching whatever is flowing through the network (such as a virus, or some information). If the network is directed (meaning that ties have direction), then we usually define two separate measures of degree centrality, namely indegree and outdegree.</p> <ul style="list-style-type: none"> - indegree is a count of the number of ties directed to the node and outdegree is the number of ties that the node directs to others. When ties are associated to some positive aspects such as friendship or collaboration - Outdegree measures the number of outgoing connections for an element. In general, elements with high outdegree can reach a high number of elements and spark the flow of information across a network (but may not be the most efficient at spreading the information).
Closeness Centrality	<p>Closeness measures the distance each element is from all other elements. In general, elements with high closeness can spread information to the rest of the network most easily and usually have high visibility into what is happening across the network.</p>
Betweenness Centrality	<p>Betweenness centrality measures how many times an element lies on the shortest path between two other elements. In general, elements with high betweenness have more control over the flow of information and act as key bridges within the network. They can also be potential single points of failure. This measure is used for finding the individuals who influence the flow around a system.</p>