

**Circular
Festivals**



Radboud Universiteit

Festival solutions' contributions towards urban circularity transitions

Through deepening, broadening, and scaling-up

Research report

In collaboration between

Green Deals Circular Festivals & Radboud University
Master's program in Corporate Sustainability

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- Peter Scheer
- Linda Vermaat
- Rob van Wegen
- Kees Lamers
- Hanna Winters
- Tessa Groenen
- Mark Stoevelaar
- Helen Harland
- Tijl Couzij
- Laura van de Voort
- Alzira Schaap
- Christiaan Elings

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1. Introduction

Urbanization is one of the biggest global trends of recent decades, and it brings along with it grand challenges to sustain the livelihoods of urban populations across the globe. With an estimated 56.5% of the world population in 2021 (UN DESA, 2019), cities are responsible for almost 75 % of total resource consumption (Madlener and Sunak, 2011) and the primary source of greenhouse gas (GHG) emissions (Grimm et al., 2008). Recognizing their importance, the United Nations (UN) has created Sustainable Development Goal (SDG) number 11: ‘Sustainable cities and communities’, and specifies resource efficiency and waste management as critical to improving urban sustainability (United Nations, 2022). Thankfully, societal searches for solutions towards sustainable livelihoods are already underway, referred to as *urban sustainability transitions* because they will require radical, deep or transformational changes to complex societal systems (Loorbach, 2010). The circular economy has emerged as an alternative approach to the ‘throwaway economy’ that offers promising solutions to urban sustainability problems, with cities all over the world have introduced initiatives such as *eco-cities*, *circular cities*, and *zero-waste cities* (Dong et el. 2021). These go hand-in-hand with Green Deals, or climate pacts, through which national and municipal governments have begun introducing sustainability into their core development values and implementing circular strategies. With the majority of the people in the world currently experiencing the effects of urban sustainability problems, it is imperative that new ways of thinking and acting are developed and solutions scaled-up to mitigate these effects.

Situated in the Green Deal for Circular Festivals (GDCF), this research project, developed as a Master’s thesis for Radboud University, aims to explore how the festival sector can contribute to circularity transitions in cities, by following circular solutions (or innovations) from festivals and how they scale-up to cities. Using Semilla Sanitation as a concrete example, it will analyze how the scaling-up process takes place in the GDCF context, and what lessons can be learned from other successful (and unsuccessful) solutions. Furthermore, GDCF is in the midst of developing a joint Scale-Up project with European cities in their network, aiming to scale circular and climate neutral good practices from festivals to cities and regions. To support the project, this research has tried to develop an understanding of both the supply-side (the solutions), to begin an inquiry into the main challenges on the demand-side (cities), and to outline the process of demand-driven matchmaking between both. The report will be structured following the sub-questions below, and will conclude with some recommendations for GDCF on how to facilitate scaling-up processes and demand-driven matchmaking to maximize their contribution to urban circularity transitions.

Research question: How can circular solutions from music festivals contribute to urban circularity transitions? (Analyzed through the Deepening, Broadening, and Scaling-up framework)

Sub-questions:

1. What makes **festivals good testing grounds** for urban circularity transition experiments?
2. Can **open-city events be a stepping-stone** between festivals and cities?
3. Can circular solutions from music festivals be considered **transition experiments**?
4. How can transition experiments be **deepened, broadened, and scaled-up** within the festival industry?
5. How should these experiments be **steered to maximize their contribution** to circularity transitions?

2. Methodology

This report was developed using a multi-method approach for qualitative data- using van den Bosch and Rotmans (2008) “Deepening, Broadening and Scaling-up Framework for Steering Transition Experiments” (DBS framework) to analyze how individual circular solutions have scaled-up, and then an Innovation Systems Analysis to analyze the broader context of GDCF. A mix of desk research, interviews and participatory observation in GDCF meetings and thematic groups have been used to collect data (specified in more detail in Figure 1 below). The research project took place from March to October 2023.

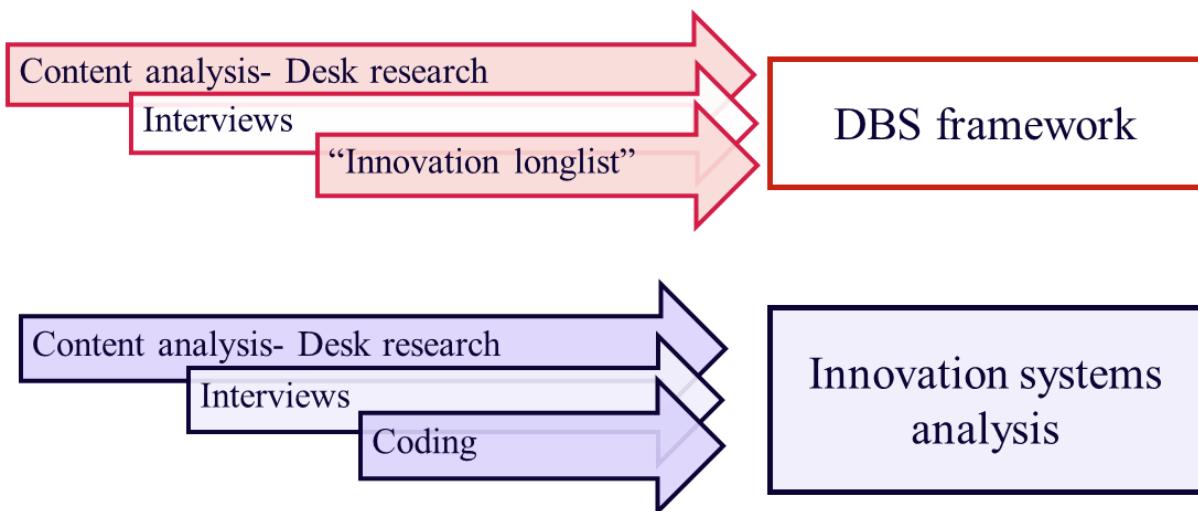


Figure 1. Methods and main sources used for data collection and analysis

The research follows an inductive approach to analyzing primary data, and an abductive approach to developing and presenting results, as it balances observed data with existing theory and literature. For the desk research, a content analysis was performed mainly on online articles & websites, GDCF presentations and documents, and most importantly, GDCF’s existing “Festivals Innovation Long-list” (about which recommendations are made to improve it for future use). For the interviews, 11 semi-structured interviews were conducted to innovators, organizers of festivals and of open-city events, municipalities, sustainability consultants and facilitators which work with GDCF (their names and organizations are found in Table 1 below).

Role	Name	Organization
Innovators	Peter Scheer	Semilla Sanitation
	Linda Vermaat	Innofest
Festivals	Rob van Wegen	ESNS
	Kees Lamers	MOJO Events
Open-city events	Hanna Winters	SAIL Amsterdam

	Tessa Groenen	Vierdaagse Feesten
Municipalities	Mark Stoevelaar	Gemeente Amsterdam- Innovatie
	Helen Harland	Manchester- Zero Carbon team
Sustainability consultants	Tijl Couzij	Lab Vieland & ITGWO
Facilitators	Laura van de Voort Alzira Schaap & Christiaan Elings	GDCF & Green Events GDCF & RHDHV

Table 1. Detailed information of interviews conducted to various members working with GDCF

To analyze data collected through interviews, the 'Gioia methodology' (Gioia et al., 2013) was used to code and analyze the content of the interviews. A coding structure was created, made up of first-order concepts (informant-centered code definitions), second-order themes (theory centered code themes) and aggregate dimensions (code groups). The coding structure was initially developed from academic literature, specifically Michalina et al.'s (2021) list of thematic categories from the fifty most relevant global frameworks, key concepts from the DBS framework and the main themes employed by GDCF. Using the data analysis software Atlas.ti, the interviews were transcribed and went through two rounds of open coding for first-order concepts, with new codes being added to the structure as new concepts were mentioned by the interviewees. Next came a process of axial coding, where critical reasoning was applied to review the first-order concepts and refine them into related second-order themes. Finally, links between second-order themes were identified and these were grouped into aggregate dimensions, a process known as selective coding. The final coding structure resulted in 54 second-order themes divided into 11 aggregate dimensions (it can be found in Appendix A). An inductive grounded theoretical model was used to analyze each theme after coding, which enabled the identification of trends and patterns in the data.

The study's findings have been presented in an online meeting of GDCF and collaborators on October 26, 2023. This evidence-based report serves as a written support, where more details on the findings, theory and academic frameworks used, and existing literature can be found and referred to for further studies and future reference.

3. Festivals as spaces of experimentation

The role of festivals as testing grounds for circular climate-neutral models for organizing cities and societies has already been explored by practitioners working in the festival industry, and in the past few years it has gotten the attention of governance actors engaged with the sustainability transition (ADE Green, 2022). Tijl Couzij, sustainability consultant from Lab Vlieland and organizer of Into the Great Wide Open festival, explains it best:

“Festivals are good for 3 things:

- as laboratories - to test and learn
- as mini-cities - catalyzing for circularity in urban systems
- as stages- to inspire others to engage in circularity.” [Tijl Couzij]

Although academic research has not covered it specifically in this transition context, festivals as testing grounds have been studied in the fields of: media arts (Huisman & van Mechelen, 2019); innovative architecture and design (Liuti & Bessabava, 2017); and even as grounds for demographic social experimentation for future societies (Quental, 2019). Within the more relevant field of music festivals, Browne et al. (2019) recast the camping music festival as a ‘rehearsal for change’ in their analysis of water use practices, emphasizing the ideal circumstances these events present to examine adaptive capabilities in the practices of festival attendees. Fellow scholars have concluded that music festival spaces have the potential to act as *cultural laboratories* (Jaimangal-Jones et al., 2010), even identifying them as *niche experiments* (Caniglia et al., 2017) in alternative ways of living. Building on these bases, this thesis hopes to make the connection between practitioners and academics in exploring the role of festivals as testing grounds for urban circularity experiments.

Festivals have been equated to temporary mini-societies that have to cover the same basic needs for their people (Arnback & Härtel, 2022). These needs align with the main themes addressed by GDCF- energy, food and drinks, plastics, resource efficiency, travel and transportation, and water-, which have been deliberately structured around the main principles of the CE. Like cities, festivals should focus on functioning within their local carrying capacities, regulating patterns of consumption, and restoring resources in order to achieve circularity (Williams, 2019). Nonetheless, Williams (2019) problematizes current circular approaches to urban resource management, claiming that they fail to recognize the complex ecosystems and consumption practices present in cities, and overlook the need for adaptive infrastructure to truly solve urban challenges. Browne et al.’s study on water climate adaptation in UK festivals (2019) highlights the value of the flexibility and adaptability present at temporary festival spaces, both in terms of infrastructure and of social practices. Following these arguments, it can be contemplated that festivals offer the perfect setting for urban circularity experiments, as they face similar challenges and levels of complexity, but can act as a sort of stepping stone to tackle them in a smaller and more controlled scale, with more flexible social and physical structures (Arnback & Härtel, 2022).

Other arguments to support these claims refer to the potential influence festivals have on their environment- on both the production (supplier) and consumption (visitors) sides. Scholars have studied the multidimensional spaces that get created at festivals, or *festivalscapes*, finding they have strong effects on visitors' attitudes and behaviors (Yang et al., 2011). This power of influencing behavior can be linked to the unique temporary nature of festivals, which take place in a predefined time and space where

cultural norms can be temporarily suspended and social experimentation can occur, and enable intense embodied engagement of the visitors with both the unusual physical environment of the festival and with their peers who share similar values (Hottle et al., 2015). Links between festival attendance and learning have also been established in relation to environmental behavior in China by Yan et al. (2021), who found significant impacts on the environmental attitudes of festival attendees, although they point out that this should be supported by explicit efforts of festival organizers to engage their visitors in their sustainability-related systems and communications. Simultaneously, de Vrieze et al. (2022) highlight the importance of consumption practices in realizing circular cities, as social practices can reinforce social realities and lifestyles, but therefore also have the potential to change them. Given their ability to influence citizen's consumption patterns, festivals can therefore be seen as strong tools for accelerating urban sustainability transitions.

On the production side of this equation, arguments have been made regarding the ability of festivals to act as catalysts for urban supply-chains. One of the founding scholars on festival studies, Getz (2010) established the role of these events as catalysts for other forms of development in tourism. This mainly refers to the economic resources that these events bring to a region, evidently due to the vast number of visitors they attract, but also to the revenue and business relationships they generate through sourcing their operational necessities from local suppliers. In transition theory, it is understood that niches are prime spaces of experimentation due to their ability to foster learning processes and social networks towards innovation (Foxon et al., 2010). Festivals, as niches, can therefore have a huge role in developing transition pathways by influencing local supply-chains and user-producer relationships. These relationships become increasingly relevant within the concept of circular supply-chains. As Franchina et al. (2021) warrant, integrating circular principles into supply-chains can and is in fact necessary to progress toward more circular cities, and they recognize this can be achieved through everyday industry practices and the harnessing of smart technologies and innovation.

The main theoretical rationales for considering festivals as prime opportunities for urban experimentation are thus laid out as:

- their adaptive infrastructure due to their temporality and flexibility;
- shared needs with cities;
- and the power to impact both suppliers and consumers in urban environments.

This largely coincides with what practitioners who were interviewed for this research had to say about this topic. Even more interesting, is the confirmation of the industry belief that events can act as a sort of stepping-stone to test out urban solutions, which will be explored in the following section.

4. Open-city events as stepping-stones from festivals to cities

4.1. GDCF examples

Another well recognized phenomenon in the sustainable events field is the recognition of open-city events (large-scale events which take place within cities and are open to the public, as they are not fenced or bounded) as key grounds to advance circularity transitions. To understand the particularities and potential of open-city events, two examples from the GDCF context will be presented: SAIL and the Olympic Games. SAIL Amsterdam is a sailing event where sailing fleets and tall ships from all over the world gather in the port of Amsterdam for a five-day exposition (SAIL Amsterdam, n.d.). It has been happening every five years since 1975, and is now the largest nautical event in the world and largest freely-accessible event in the Netherlands, attracting over two million visitors. The 10th edition will take place in 2025, celebrating 50 years of SAIL and the 750th anniversary of the city Amsterdam, so it is an especially relevant event for the city. SAIL is not yet an official member of GDCF, but they are actively involved in the meetings and workshops the group hosts, and are benefiting from knowledge sharing networks and acting as a host to circular solutions that work with GDCF. The Olympic Games is a worldwide sports competition that has taken place every four years since 1896. In 2024 they will take place in Paris and it will be the biggest event ever organized in France, with over 9.7 millions visitors expected (Paris 2024, 2023). They are not directly involved with GDCF yet, but contacts with the Paris municipality are being actively pursued to collaborate with them, and there is already an initiative to implement Dutch solutions, some which work with GDCF, in the event (*Missie Sport naar Parijs*). Both are prime examples of events that not only take place in and are open to the city's public, but take over and have immense power over the city. The main arguments of how these can be used as stepping-stones for scaling-up circularity transitions from festivals to cities will use examples from these two events.

4.2. Theory

The Amsterdam Innovation team has identified the potential of these sort of events, and has in fact made it a key part of their Innovation Cycle (*Innovatie Estafette* in Dutch), a methodology through which they aim to make the city more resilient and climate-neutral by scaling-up socially relevant innovations in an iterative manner, from 2023 until 2025 (Stoevelaar, 2023a). This practical methodology (visible in Figure 2 below) highlights the importance of open-city events as spaces to advance circularity in both cities and the events industry, by offering the perfect setting to test and develop innovations, and the municipality supports this by providing tools and resources to scale them up.



De Innovatie Estafette – een gericht innovatie portfolio

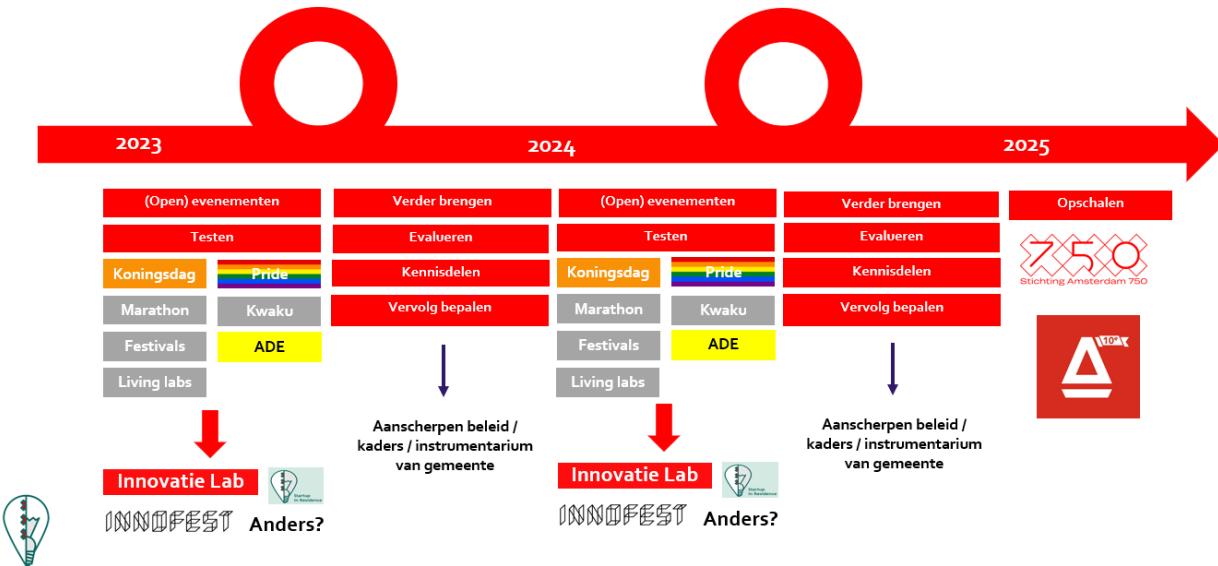


Figure 2. Amsterdam's Innovation Cycle (Stoevelaar, 2023b)

The Innovation Cycle proposes to first test at events that take place in the city of Amsterdam- like Pride, King's Day, ADE, Kwaku, the marathon, other festivals and living labs- to develop them to be implemented in SAIL Amsterdam (SAIL), in order to be further scaled-up into the city's infrastructure after 2025. The particularities of SAIL as a large-scale open-city events will be discussed below, but it is first relevant to establish whether or not transition theory would agree with this use of open-city events as stepping-stones for innovations between smaller festivals and cities.

Situated in Multi-Level Perspective theory, as was previously explained, festivals can be seen as *niches*, where experimentation alternative to mainstream practices is taking place through innovative circular solutions, and cities can be seen as the *regime*, large-scale systems which perpetuate mainstream and usual ways of doing things. The gap between these two levels has long been identified as a challenge towards transitions (which can also be seen in practice in the festival industry where many innovations stay at the festival-scale and fail to make larger impacts) and scholars argue that much of the transition dynamics takes place in between the niche and regime levels (Rotmans and Loorbach, 2010). The concept of having a step in between niches and regimes, proposed as *niche-regimes*, has therefore already been considered. Due to their larger size and their situation at a higher-level, closer to the regime, niche-regimes have more influence over regime-level practices, and so they enable a two-step process for cementing practices which facilitates transitions (Grin et al., 2011). The DBS framework also recognizes the importance of niche-regimes, pointing out that scaling-up happens in gradual steps through which initially small practices from niches can grow to wider systemic changes (van den Bosch and Rotmans, 2008). With this theoretical backing of the concept of using stepping-stones in transitions, why open-city events can be considered niche-regimes will be explored below, based on the interviews with practitioners.

4.3. Arguments supporting open-city events as stepping-stones

Open-city events can improve relationships with municipalities

One of the biggest strengths of open-city events is that they require and lead to stronger connections with their local municipalities, mainly because they are locally embedded, have shared needs, and have the potential to improve the city's image. They tend to have better relationships with municipalities than independent festivals because they are locally embedded into the city. Since the events generate business and employment for the wider urban environment, they are intrinsically interlinked with local businesses, networks and communities. They must ensure they share values and visions with local stakeholders, which means they require constant collaboration with municipalities in order to operate. Both SAIL and the Vierdaagsefeesten highlight that the alignment with respective municipalities, particularly in terms of sustainability, is what made their collaborations so successful. The benefits of maintaining a good relationship are both ways however, as cities can improve their image through open-city events. The cities of Nijmegen, Paris and Amsterdam all recognize this potential: Vierdaagsefeesten is a key part of the city's image and attracts millions of first-time visitors every year; the Olympic Games are seen as an opportunity to make Paris "the centre of the world" and "go down in history" (Paris 2024, 2023); and Amsterdam is not shy about using SAIL as a showcase for the city. Events can invest in and capitalize on these relationships to further their circularity agendas, as SAIL does brilliantly:

"They really want to use SAIL as a platform to show Amsterdam and to put it in the map, so it is very important for the city that SAIL is sustainable" [Hanna Winters]

Open-city events have even more similar needs to cities

Since they take place within and throughout the city, open-city events are more directly intertwined with city systems, and have to face the same challenges that arise from these. Innofests emphasizes that broadening solutions into societal institutions is easier where infrastructure is similar, citing the example of implementing hard cups in libraries, stadiums and open-city events. Since they are open to the city's public, they also have to provide for the same functional needs of citizens. While this is also true at closed festivals, these provisions are at a much smaller scale than that of cities, which makes it relatively easier to implement solutions. Open-city events offer a unique setting between the two extremes to perfect the large-scale implementation of solutions, since they attract huge amount of visitors that are more similar to massive city populations, but these shared needs and challenges are concentrated within a smaller area than a city and a limited time frame, so variables are relatively easier to control. In fact, after their first conversation with the Amsterdam municipality, SAIL decided to develop their sustainability program directly with the city, since they realized that:

"Our challenges were so similar actually, because the amount of people that come to SAIL puts pressure on the city that actually zooms in on the challenges that the city has." [Hanna Winters]

Open-city events can change the infrastructure of a city

Open-city events can use their unique positioning to influence broader city infrastructure. They rely on existing infrastructure to service their visitors but they also have the funds and opportunities to improve them, evidenced by the Olympic Games venue concept in which Paris' iconic landmarks are being

transformed into sporting arenas. It is harder to define scopes at open-city events, since there are no strict boundaries of where the city ends and where the event begins, so there is confusion regarding who is responsible for emissions and socio-environmental impacts. Fortunately, that leads more and more organizers of these events to take more ownership of the solutions; spurred by positive relationships with their municipalities, they strive to find solutions that won't only solve operational problems for them, but also improve the city's infrastructure. The sustainability manager of ESNS, which is a semi-open event that takes place all around Groningen, declares:

“I'm just searching together with the municipality: How can we change things that actually benefit throughout the year, throughout the system? It's already happening in the city, so how can we further align with society, instead of just fixing our small problem?” [Rob van Wegen]

Furthermore, open-city events can act as catalysts by broadening solutions and sustainability visions into other city industries. In ESNS, to continue the example, they also consider the hotels where artists and visitors are staying in the scope of their influence, and they try to influence the city's hotel industry by monitoring and making sustainability demands from their hotel providers. The bigger the events, the stronger the influence they can have on other suppliers in urban society.

Open-city events can influence citizens and act as showcases for sustainability

It has been proven how festivals can influence their visitors' behavior by creating subconscious connections to sustainable choices. The same atmospheres of fun and excitement get created at open-city events, and because they are so linked to city identities, the positive behavioral effects they create can be longer-lasting. The Olympic Games state clear ambitions of “leaving a legacy”, they want the event to help sport values become a key part of the lives of the citizens of Paris and to champion sustainability (Paris 2024, 2023). They are doing so by embodying sustainability values in the organization of the event and communications, recognizing the potential open-city events to showcase sustainable and circular practices to their massive audiences. Fortunately, this is a trend that is becoming increasingly popular as the event industry, and society in general, recognizes the responsibility it has to further the transition towards more sustainable urban systems.

“One of the bigger goals of this sustainability project for us is indeed to have an impact on the entire event business and to actually bring that together, and therefore also we want to work with the Green Deal because we want them to be able to use SAIL as a showcase for everything that they've learned and for all the knowledge and expertise.” [Hanna Winters]

5. Circular solutions as transition experiments

Having established the value of festivals as spaces of experimentation and of open-city events as stepping-stones between them and cities, the focus must now zoom into the mechanisms through which change comes about. In the context of circular festivals, change is achieved through *circular solutions*. The researcher finds it important to note that this category shouldn't be limited to *practices* or *innovation*, since solutions- answers to practical challenges- can come from new technologies, creative processes, or existing ideas that are in use or that may have been overlooked. In order to affect a transition and achieve real change solutions must be experimented with, refined and then scaled-up, and how to do so will be explored below.

5.1. Theory

Transition experiments are a popular instrument used by governance and researchers to advance sustainability transitions in many fields. The term refers to practical, small-scale experiments that have significant potential to contribute to a transition (Rotmans, 2005). Although it has been used in different ways by different fields of research, like Strategic Niche Management or Transition Management theory, van den Bosch and Rotmans (2008) give a more precise definition of a transition experiment as “an innovation project with a societal challenge as a starting point for learning aimed at contributing to a transition” (p.13). In this definition 3 key criteria are identified which determine if an experiment can have a potential contribution towards a transition: they must have the aim to solve a societal challenge at heart (also called a *societal transition goal*), they must be *innovative*, and they must contribute to the transition through *learning*.

Societal challenges- Refers to complex, persistent and wicked societal problems, where the solutions are not clear or easy to reach and the effects of them can be very uncertain and hard to measure; with a societal transition goal as a starting point, an experiment begins from a desire to solve such problems and should keep that as its main driver for development.

Innovation- In this case, refers to anything perceived as new, whether that be a completely new technology, product or service, or simply a new way to implement existing technologies in new ways or new sectors to solve existing problems (called *systemic innovation*); innovation can allow an experiment to break free from mainstream ways of doing and create novel and possibly more efficient solutions.

Learning- The way in which the experiment contributes to the transition would be by allowing space and mechanisms for the system to learn (referred to as *social learning*), not only to perfect the solution but also in order to keep improving the process of finding that solution.

Since societal problems are by definition complex and ever-changing, a mix of these three characteristics is essential to advance transitions towards the solutions to these wicked problems.

By taking individual transition experiments as the scope of analysis, the “Deepening, Broadening and Scaling-up Framework for Steering Transition Experiments” of van den Bosch and Rotmans (2008), places the experiments as the arenas in which potential contributions are occurring. Studying the deepening, broadening and scaling-up (DBS) trajectory of specific experiments allows for a more focused analysis, where instead of trying to tackle an overwhelmingly complex society-wide problem which is

inconceivably interlinked and fail, one can bound it into a scale that is manageable. This allows for a better understanding of the context- the geographic, political and social conditions that might affect the experiment in question, and to apply complicated theory into a practical, real-world example, and thus learn from its mistakes or successes. This research recognizes the value of studying transition experiments as an illustrative part of the bigger whole, taking real circular solutions from music festivals as the scale to study their contributions towards urban circularity transitions.

5.2. GDCF example- Semilla Sanitation

One of the circular solutions selected as examples for this research are the water treatment toilet units by Semilla Sanitation. This solution has been tried and tested by GDCF festivals, which means they have already engaged in a DBS process and therefore have had successes and failures which this study can learn from. In order to consider this solution a transition experiment, however, it must first be established if it fits the criteria explained above.

Semilla Sanitation (Semilla) began around 2014 as a spinout project of the MELiSSA space research consortium of the European Space Agency, which is advancing the circularity transition both in space and on Earth by developing closed loop space technology for Earth-based systems (Semilla Sanitation, n.d.). Targeting the basic human rights systems of clean water and sanitation, the Semilla Sanitation module was first conceived with the intention of providing relief in disaster areas and refugee camps. They developed a toilet and washing module that uses advanced space technology to treat urine, gray and black water, turning them into clean water, fertilizer and compost which can then be used and sold. By providing this durable unit to remote places and disaster areas, waste and emissions can not only be reduced and humanitarian needs addressed, but they can be turned into financial opportunities to develop and sustain the communities in those areas, making it socially, environmentally and financially sustainable.

Although after engaging in their DBS trajectory they have developed into different areas and made their business model a little more robust, the company was born with a clear societal transition goal in mind. This can be evidenced by their tenacious mission statement:

“By 2030, everyone should have access to clean drinking water and hygienic sanitation. This is the crux of the UN’s sixth Sustainable Development Goal (SDG). It is especially important since access to clean water is a prerequisite for achieving other SDGs, according to Geeta Rao Gupta, Executive Director of UNICEF. Semilla helps meet that goal, module by module.” (Semilla Sanitation, n.d.)

They view themselves as providers of clean water, sanitation, and income opportunities for communities in need, and have been deepening and broadening through testing in festivals and other industries as a means to this end. In the Netherlands, they have connections to water boards (*waterschaap*) in the regions where they work, and they share a higher social ambition to redesign the country’s water waste treatment system to recapture value from waste. This shows they have circularity as one of their main principles, clearly reflected in their business model, which functions around *reusing* water for flushing and irrigation, *reducing* costs, water usage, diseases, and pollution, and *recovering* waste into irrigation water, fertilizers, and compost. These core beliefs, as well as their emphasis on spreading CE principles through innovation,

research and outreach programs, points to a recognition of their role in accelerating the circularity transition in the areas and industries where they work.

Their use of space technology for Earth-based systems is a perfect example of how Semilla embraces innovation pathways to find solutions to help further the transition. In fact, their modules perfectly embody systemic innovation, which is characteristic of transition experiments, by applying existing space technology to an innovative Earth-based setting to solve existing and persistent social challenges. This penchant for innovation is present since their origin thanks to their parent company, SEMILLA IPstar, who declares innovation as one of the four core principles in their mission statement (SEMILLA IPStar, n.d.). Working as a research partner, business developer and connector of knowledge and stakeholders, the consortium supports the development of innovative companies, products and solutions that share its principles. With this sort of innovation hub and through their outreach programs, they spread awareness of the CE and support the adoption of circular solutions in the market, and it is through these channels that Semilla Sanitation was born.

The development trajectory of Semilla will show how the innovators have embraced learning in every step of the project. Their conception was itself a result of learning from closed-loop water treatment space technology, taking what worked and adapting the concept to a module that would function on Earth and serve many more people than six astronauts. When they had a working prototype and began testing with Innofest, a company which facilitates innovation testing at festivals in the Netherlands, they followed the reliable Innofest Method. This methodology reads like a loop of evaluating, testing, preparation and expert checking, and Semilla employed many of their methods throughout their two years of testing: MVP (Minimum Viable Product), A/B Test, Stress test, Try-out, Observation, Expert review, User Interview amongst others (Innofest & Visser, 2020). Treating the festivals as living labs and having the chance to repeat tests at some locations in consecutive years gave them the chance to learn from their mistakes and improve the technology to their current needs. This was a dual learning opportunity, as their experience as innovators also taught Innofest valuable lessons about the process of testing and developing itself, thus enabling a wider *social learning*. Now in its more stable development phase next to Nijhuis Industries, Semilla continues to embrace learning as a method to keep improving their technology and product offering to ensure business sustainability in the short run, and to achieve their ultimate goal of supplying refugee camps and disaster areas in the long run. With these three important criteria met, this study can safely consider this solution as a transition experiment in the rural and urban water circularity transitions, at least in the Netherlands, Ghana and Uganda, where they have worked so far.

6. DBS analysis of circular solutions

6.1. Theory

This research takes its theoretical bases from Geel's Multi-Level Perspective (2002), which describes transitions as changes from niches through niche-regimes to regimes; and Transition Management theories, situated in the third phase of Loorbach's Transition Management Cycle (2010) which emphasizes experimentation and the mobilization of transition networks. Building on those bases, van den Bosch and Rotmans (2008) developed a conceptual framework to analyze small-scale experiments and influence their impact on sustainability transitions. To understand how experiments contribute to transitions, the framework studies three change mechanisms of transitions- deepening, broadening, and scaling-up (visualized in Figure 3), and it explores the conditions necessary for transitions to occur. This framework was selected for this research project because it offers a good mix of theoretical perspectives, which have all been developed and previously applied in the Netherlands (where this research mostly takes place), and because it is designed for practitioners, so it connects its theoretical approach with practice-oriented management guidelines for project managers to increase the contribution of experiments to transitions. Both parts of the framework will be briefly explained below.

DBS framework for transition experiments

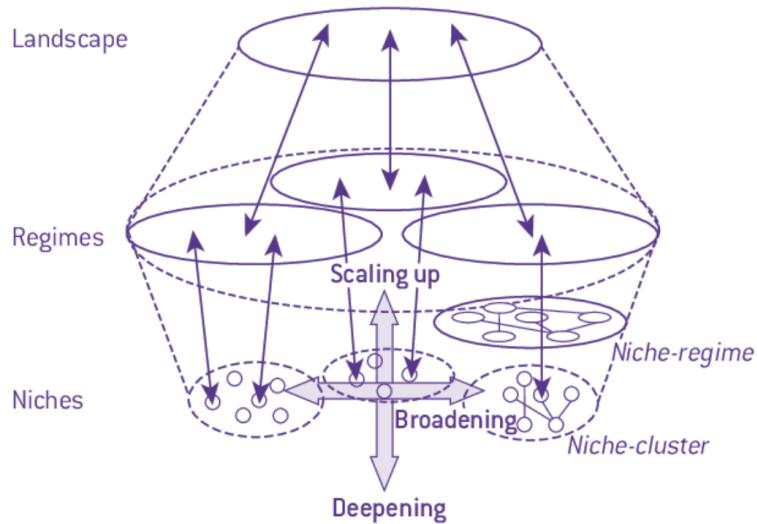


Figure 3. Deepening, Broadening & Scaling-up transition experiments in niches in relation to Multi-Level Perspective (taken from Van den Bosch and Rotmans, 2008)

Deepening- Deepening refers to the learning process through which innovators can learn as much as possible about a transition experiment within a specific context. This should take place in niches separate from the regime and iteratively over time, to ensure that the experiment is effective and that lessons learned are applied to drive further progress toward sustainability goals.

Broadening- Broadening is defined as repeating a transition experiment in different contexts and linking it to other functions or industries. The goal is to make the experiment more inclusive and adaptive, making it more relevant to engage a larger community of actors.

Scaling-up- Scaling-up is the process of embedding a transition experiment from niches to mainstream practices in the regime (or niche-regime). It refers to the application of practices (ways of thinking, doing, legislation, institutions, etc) from the experiment to a larger scale, to drive transformative change by making sustainable solutions more mainstream and accessible.

Key stakeholders and niche-related conditions for the success of transition experiments

The framework recognizes that transitions are so complex that no individual is able to fully control a transition process from top-down. Therefore, examples of stakeholders that could play key roles in the scaling-up processes are identified and three niche-related conditions for the success of transition experiments in which they could act are derived:

1. Alignment within the niche - connecting actors that can align vision are key
2. A high level of power of the niche that locally exceeds the power of the regime - (locally) powerful actors (like governments, protocols and standards setters, policy makers, etc.) can increase the power of niches
3. Alignment of the niche and the mainstream environment or regime; mainstream actors with power and visions (such as sustainability organizations, front-runners in a sector or policy domain, large business directors, etc.) can help stimulate adoption of niche practices into mainstream practices

Steering guidelines for transition experiments

In the second part of their DBS framework for transition experiments, van den Bosch and Rotmans (2008) address the conditions necessary for experiments to contribute to transitions and how managers can support this process. Expanding on a transitioning method developed by the Dutch Knowledge Network on System Innovations and Transitions (KSI), they translate different transition management theories into practical strategies that managers can use to steer experiments through the deepening and broadening trajectory, to the scaling-up phase. Differentiating between substance (the end goal, more practical) and process characteristics (the journey, how to get from the current situation to the end goal), they identify the 6 main challenges in managing transition experiments. The full management guidelines they propose for practitioners to address those challenges are included in Appendix B. Summarizing, actions under the deepening dimension target learning processes, those under broadening cover processes of interaction to the broader context (different functions and/or settings), and those under scaling-up address processes of embedding the experiment to higher levels (from niche to regime) to increase its impacts. Like cyclical innovation processes, the three dimensions are non-sequential since learning, interacting and embedding can happen simultaneously. Although these strategies were created to increase the transition potential of diverse transition experiments, it is important to keep in mind that they are very context dependent. Using the strategies as guidelines, rather than strict instructions, managers can analyze their specific context, always considering timing and being aware of barriers and opportunities they can take advantage of to

create more concrete and SMART actions that can maximize the contribution of their experiments in their transition arenas.

6.2. DBS analysis of Semilla Sanitation

In order to understand how the DBS framework can be useful for GDCF and cities in the context of circular festivals, it will be applied to the circular solution introduced above, Semilla Sanitation. All past projects that Semilla has done were analyzed and mapped; Figure 4 shows a visualization of Semilla's DBS trajectory. Future projects were also included (outlined in yellow), specifically in the realm of scaling-up, the long-term stage in which the solution finds itself now. The arrows (designated in different colors according to the phases) are of particular interest in this analysis, as there is a lot to learn from Semilla's experience as they deepened in festivals, broadened to different industries, and attempted to scale-up. The summary & analysis of their DBS trajectory and steering practices will be discussed below (a table with more details about each experiment can be found in Appendix C).

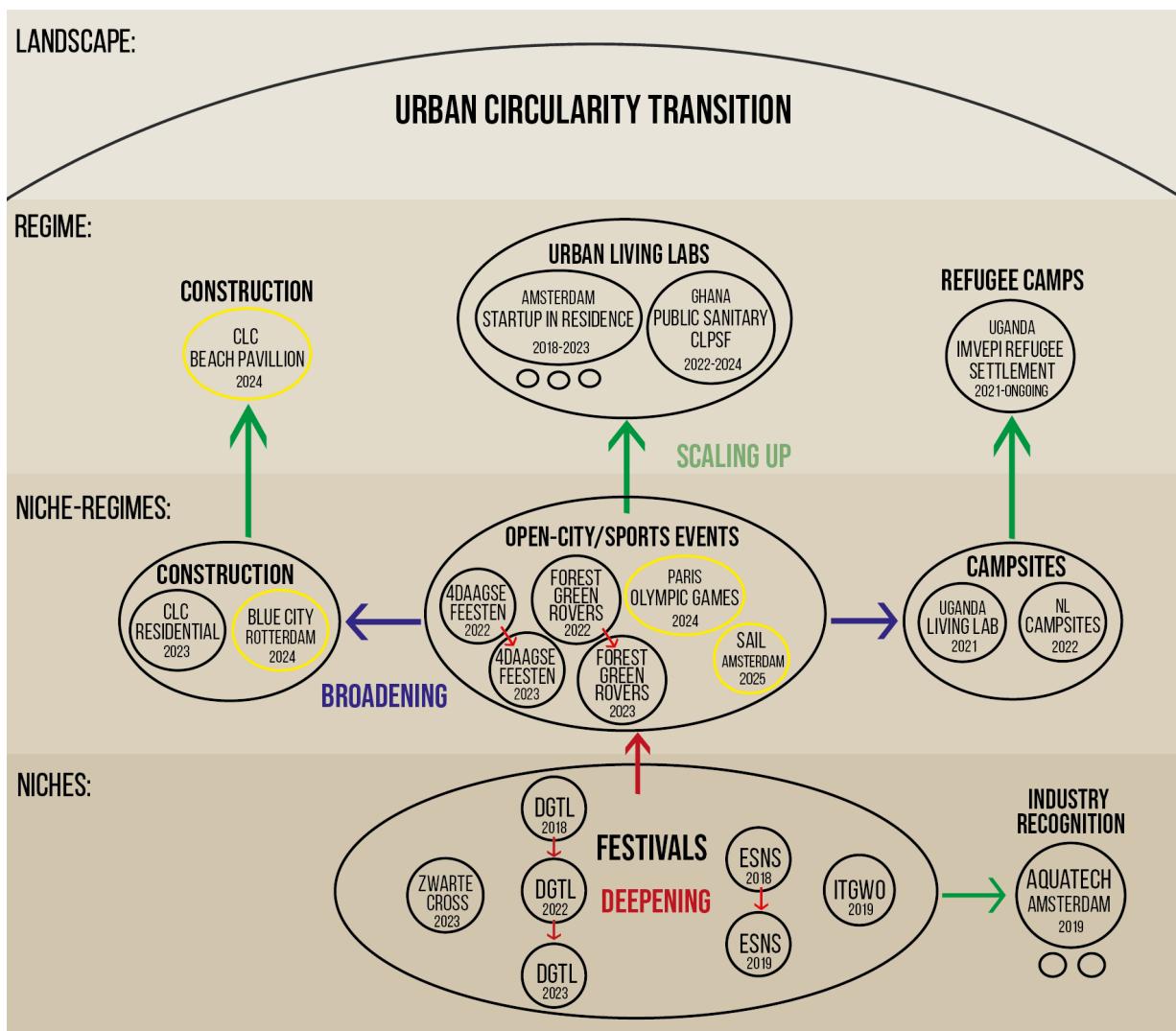


Figure 4. DBS trajectory of Semilla Sanitation (adapted from Van den Bosch and Rotmans' (2008) framework)

Summary of Semilla's DBS trajectory

Through Innofest, Semilla was able to start testing at festivals to improve their technology, eventually coming up with 4 different systems (based on water color treatment- yellow, gray, black water) that can be adapted to each client's needs. The first few pilots were the most valuable, because they could recognize and learn from problems with the testing process itself- in ESNS they were located outside the bars and venues where people could use real toilets, so they didn't get many people to use the prototype, something they fixed in further editions. Furthermore, they were able to receive feedback from partners as well as users- in DGTL 2018 the Red Cross could see the solution in action and helped them identify logistical issues they might have when implementing it in refugee camps- it was too big and too expensive. This feedback led them to develop the separate systems and to simplify the infrastructure. After deepening at festivals for a couple of years, they broadened into open-city and sports events, testing their hand at handling different capacities and different demographics of users. They were able to refine their business model, identifying new markets for their product, now made up of 3 target industries-construction (buildings), events (festivals), & humanitarian (refugee camps). Learning from these new challenges, they are now ready to scale-up to campsites and urban buildings with more permanent infrastructure. They have been testing this scaling-up process through living labs at the Imvepi refugee settlement in Uganda since 2021, and are being supported by municipalities to further develop urban projects in the Netherlands (several projects with Amsterdam's Startup in Residence program) and in Ghana (installing closed-loop public sanitary facilities in Nkawnkaw, through the Netherlands Enterprise Agency (RVO)). In this way, a long trajectory of innovation, testing and learning has allowed them to begin addressing their original humanitarian goals and take steps towards tackling the urban water circularity transition.

Unfortunately, the process of scaling-up remains complex and is a daunting task for an innovator alone. Certain challenges need to be addressed and this must be supported by different governance actors throughout the arena. For Semilla's scale-up into the city of Amsterdam, these concrete challenges are:

- Capacity in terms of physical ability to treat large amounts of water, investment & staff- they still only handle side-streams at big festivals, as they are not able to be the main sanitation solution.
- Physical infrastructure- They want to focus on the water treatment systems, but need someone to provide the actual urinals; they partnered with Nijhuis Saur Industries to be their provider.
- Contracts- Nijhuis Saur Industries (Nijhuis) is ready to be their provider of the infrastructure, but they need fixed contracts (from festivals and other customers) for the coming years to make sure the investments are worth it.
- Legal- Current non-circular regulations forbid turning waste into usable products (like compost, fertilizers & clean water); but they are currently working to get this approved through a circular chain research grant from the Dutch government, supported by DGTL festival (Rijksdienst voor Ondernemend, 2020).

Evaluation of Semilla's steering practices

To understand how these management guidelines can be put in practice, the case of Semilla Sanitation will be analyzed. This solution has a particularity which makes it a bit more complicated but more realistic, since, like most companies in the real world, they didn't consciously start off as a transition

experiment, although they fit the categories to consider it one. As such, they have not been strategically steered by an external manager, but have rather organically been moving through their DBS trajectory and, deliberately or not, engaged in some of the steering strategies described by van den Bosch and Rotmans (2008). By retrospectively analyzing their actions, successes and failures can be identified and lessons can be drawn on how to further the transition potential of the Semilla Sanitation experiment. Footnotes with more details about their steering practices can be found in Appendix D.

In terms of the more concrete process criteria, Semilla seems to have leadership that organically engage in the recommended strategies, but struggle with formalized processes. Since their launch, they have been very open to **learning and testing** through the Innofest methodology¹. They have guaranteed the adaptability of their solution through broadening and interacting with other domains and partners, which has made them discover new target markets. They have been able to raise resources by relying and investing in various **partnerships**², working hard to strengthen relationships with key government and industry actors who can help them at key strategic levels³. They have actively sought spaces which offer them opportunities to make new **connections**, in their field of water treatment systems⁴, in the GDCF network, and with markets abroad⁵. On the other hand, they seem to struggle with formalized processes, which would indicate that their DBS trajectory has not been strategically designed or managed. In terms of **experimentation**, some experiments are abandoned after one edition of an event or seem disconnected from each other; they should work on having better follow-up for individual experiments and develop a long-term strategy to build on past experiments and connect them to each other. Semilla's **internal assessment mechanisms** and their **strategic learning goals** also seem to be lacking, or no information is posted publicly about it; this would be a great point to focus on improving moving forwards.

Regarding the more conceptual substance criteria, Semilla has shown clarity in their sustainability vision and a strong connection to their societal challenge, but seems to be less aware of their strategic learning goals and system analysis. They have never lost the redline with their **societal challenge** of refugee camps, as they have kept working on their living labs and projects outside of the Netherlands. By connecting the SDG to their mission statement, they ensure internal and external transparency for their **sustainability vision** and strategically connect to the global water circularity transition. However, the urgency of scaling-up in disaster relief areas seems to be getting lost to the **business reality** of making a young company become financially stable. Like many start-ups, they often find themselves too preoccupied with dealing with bureaucracy, networking and financing⁶ to focus on the technology behind their solution and on making the impact they envision. They also seem to be lacking a thorough **system analysis** in the contexts of refugee camps in Uganda, urban sanitation in Amsterdam, and festivals in the GDCF context; they don't seem aware of other experiments⁷ in the sector from which they could learn from to foresee unexpected obstacles⁸. They need to prioritize **systems analysis as a learning goal**, as this will help them better understand the barriers and opportunities in their context, and any others they might enter in the future.

Their contributions to their circularity transition can be evaluated by their **engagement to regime practices**, where they excel at using their partnerships to realize shared goals⁹. Semilla was recently able to advise the municipality on circularity regulations for city-wide public toilets¹⁰ which sets up the support needed for the transition to urban water circularity to take place, not only stimulating results for their own company, but to improve the transition in all of Amsterdam (and inspiring other municipalities). They could further contribute by more actively **sharing results** and lessons from their experimentation, which

seem to stay **very internal** at the moment; in a partnership with GDCF, they would have an opportunity to strategically share their results and learn from the group's accumulated knowledge, which is recommended to advance their transition in new contexts.

Overall, Semilla has made great strides engaging in the deepening and broadening dimensions, and has begun a tentative exploration into scaling-up, but they have failed to do so with deliberation and purpose. Their boldness in searching for the right partners, taking advantage of opportunities, and asking for help is undoubtedly what has led them to be considered a successful example in the arena of circular solutions from music festivals. They have been really open to experimenting and learning, and should remain active in pursuing connections with actors that can help them on their development trajectory. They could benefit from these partnerships to get a better systems understanding of the new contexts they are experimenting in, which would allow them to more proactively take advantage or prepare for opportunities and obstacles as they arise. This would also enable them to identify the support they need to pursue a strategic scaling-up strategy, which should allow them to achieve financial stability without losing the societal transition goal that drives them.

6.3. Lessons from other successful solutions

This research aims to support the joint Scale-up project of GDCF by developing a clear understanding of the supply-side of urban circularity transitions. The analysis from the DBS framework thus far is completely contextual, so in order to be able to make some generalizations that could apply to a broader context, it is useful to look at conclusions that can be taken from other examples. In this arena, there have been several solutions that are already considered scaled-up by practitioners, from which we can learn a few lessons. Reusable cups, mobile batteries like Greener, and HVO fuel are some "successful solutions" considered staples in the sustainable festival industry, which will be discussed below. Lessons that might be learned from *unsuccessful* solutions, like Uppact, will also be explored. Conclusions are then drawn in order to identify characteristics of scalable solutions and conditions necessary for scaling-up, which can be useful to practitioners to select which solutions, with the highest 'transition potential', they should focus their scaling-up efforts on.

Reusable cups

Reusable cups might be the first example that comes to mind when thinking of a circular solution, as it has been made visible by the sheer amount of festivals to implement it. This refers to the usage of hard reusable plastic cups instead of disposable soft cups, reducing plastic waste and therefore the negative environmental impacts of festivals, taking into account the emissions emitted in the creation and disposal of the disposable alternatives. This might be the most widespread solution in the festival industry, having been adopted as a standard practice by event industries worldwide. It is also increasingly common in urban hospitality institutions like schools, offices, food courts, cafés and restaurants at large, especially in places that outlaw single-use plastics, like the Netherlands recently has. In Manchester, the Zero Carbon team tasked with advancing circularity in the city have implemented a project to reduce single-use plastics and deliver sustainable events (Manchester City Council, n.d.). Under the Sustainable Procurement plan of Manchester's sustainability strategy, they have scaled-up the solution directly into the city's mainstream systems. Reusing some city-branded reusable cups from the Christmas markets that sat unused during the year, the city offers them free of cost for all kinds of events around Manchester to use,

minimizing in turn the city's emissions and consumption of single-use plastic. This initiative was inspired by Shambala festival, another *sustainability champion*, and showcases how mutually beneficial a collaboration between municipalities and sustainability-minded event organizations can be. Although this initiative does have some practical challenges, such as the initial investment cost or organizing washing facilities on temporary events, this would be considered a case of a completely scaled-up solution in the GDCF context, where scaling-up would be understood as: the stage at which all festivals can easily replicate a system or solution to implement it themselves, cementing widespread circular practices.

Greener (mobile battery)

Greener is a green-powered mobile battery solution that was born in the festival industry in 2018. They tested and perfected the technology in the festival industry with Innofest, and have since broadened and become common-place in many other industries like construction, recreational and sports events, offshore, grid services, temporary EV charging solutions and more. In fact, in 2021 they became the worldwide market leader in their niche, with their fleet of batteries and their unique control and monitoring software making them "truly scalable" (Akkerman, 2021). This is a particularly interesting example which showcases the potential of deepening in festivals, through pilots which the company used to test their unique software and peak-shaving technology to make them "real-world proof" [Tijl Couzij]; and broadening processes, which the company capitalized on very rapidly making strong links with the construction industry. It also proves how important collaborating with governments can be; the success of Greener was in a large part because it coincided with regulations from the Amsterdam municipality which required all events to use renewable energy by 2020. This drove the adoption of the mobile battery within the events industry, which allowed it to develop their solution in this innovative environment and finally make emission-free mobile power a reality in places that might not have ever taken that leap. They have now started scaling-up by partnering with large renewable energy companies, and going forward they are focusing on flexible energy storage to accelerate the energy transition in the Netherlands even further.

HVO fuel in generators

A different type of solution that has become popular within the festival industry is the use of HVO fuel for generators and energy provision. Hydrotreated Vegetable Oil (HVO) is a second-generation biofuel that can be produced without fossil resources by processing renewable waste lipids, and it can be used in any diesel engine, reducing greenhouse emissions by up to 80% (Morgenstern, 2021). This technology was not developed in the festival industry, but festivals have been instrumental to its mainstream adoption in temporary energy provision, since they were amongst the first to experiment replacing regular diesel with HVO biofuel in generators in 2017 (Clift, 2022). It has since been gaining traction as a solution towards circular energy in all kinds of temporary contexts, like construction and transportation, accelerated in the UK by a ban on 'red' diesel in 2022. Although it is not the end-solution for the energy transition, it is accessible, affordable (in some places subsidized), and easy-to-implement into existing (diesel) systems in the festival industry and beyond, which makes it an attractive immediate solution for many organizations. This example highlights the importance of systemic innovation with a reminder that many technological solutions already exist, they just have to be applied in creative ways to solve operational problems. It also showcases how festivals can make them more accessible for the rest of society through deepening and being key early-adopters of circular solutions.

Uppact- Lessons from non-successful solutions

As is common with innovation and transition paths, for every successful solution in the GDCF context, there are many more which have failed, in this case, to become scaled-up. These non-successful examples can still teach valuable lessons, however, so GDCF would do well to study them as part of their learning mechanisms. One such example is Uppact, a circular solution which aims to recycle all plastic and textile waste, of which about 70% are currently incinerated in standard waste processing systems, through their innovative 'UnWastor' machine which simplifies the sorting and transformation process, making it more efficient and turning previously 'unrecyclable' plastic and textile waste into new materials and recyclable products (Uppact, 2023). The technology they developed can be adapted to many different uses due to its flexible input & output options, and they have already broadened to work with maritime plastic waste, hospital waste, and other sources of mixed waste. They tested with Innofest as a solution to camping waste at Lowlands 2022, and the festival was thrilled with their performance, wanting to implement them again at Lowlands 2023. Unfortunately, Uppact was unable to service them again, recognizing their limitation to growth as machinery capacity, since they only have one large machine in northern Netherlands. Although they are now working to create a smaller machine which could also be taken to events or permanently installed in urban recycling systems in order to continue their growth, this case highlights the risks related to working with brand-new innovations and start-ups. Sometimes solutions are just not ready to be scaled-up, and from the perspective of the festivals, who agree to host pilots in the hopes of finding long-term operational solutions, this makes it seem like a waste of their investment. CIOs like GDCF and Innofest can work hard at motivating festivals to participate in the deepening and broadening phases to stimulate innovation, but when solutions themselves don't have the ability to follow-up, this can demotivate them from participating in such projects in the future. Therefore, it is important for this context to be a little more selective in terms of which solutions this scaling-up process is directed at.

Characteristics of scalable solutions

In order to assess and select the most promising solutions, a profile of scalable solutions has been developed, taking an abductive approach based on the previous analysis of GDCF solutions, coding from the interviews, and theory on the characteristics of transition experiments from the DBS framework. For solutions in the context of GDCF to have the potential to be successful in the scaling-up process and therefore to be able to contribute towards circularity transitions (here termed 'transition potential'), five key characteristics have been identified (visualized in Table 2).

Characteristics of scalable solutions:

1. Operational
2. Adaptability
3. Innovative
4. Business reality
5. Societal vision

Table 2. Characteristics of scalable solutions

Operational- Solutions must be relevant and useful to the host organization (whether that be a festival, open-city event, or the city itself) in order to be implemented; they need to be able to solve operational problems, be compatible with existing systems, and be ready to increase their capacity as the solutions grow, given that practitioners found this to be the main obstacles for implementation.

Adaptability- Solutions must be adaptable to the specific contexts where they are implemented and to evolution over time; in transformative governance research, Visseren-Hamakers et al. (2021) agree that adaptation and flexibility enable learning, experimentation, reflexivity, monitoring and feedback, all imperative criteria for transition experiments.

Innovation- Solutions must embrace (systemic) innovation to solve existing problems; taking advantage of experimenting in niches makes it possible to break free from mainstream ways of doing and create novel and possibly more efficient solutions, which can then scale-up to influence regime-level practices.

Business reality- Solutions must prioritize and enable the financial needs of host organizations in our market-driven society, to whom balancing each facet of the triple bottom line is equally as important; practitioners are usually unable to invest in those who fail to recognize their existing business realities (due to high costs, unsustainable business models, or lack of practicality). Innovators must also have, or be ready to rapidly raise, the investments and infrastructure necessary to scale-up their capacity.

Societal vision- Solutions must have clear visions of and connections to the societal challenges they want to contribute to in order to advance those transitions; this is what sets transition experiments apart from regular

This application of existing theoretical and practitioner knowledge on the specific context of GDCF aims to let the consortium identify which solutions have more potential to achieve their transition goals. It is therefore recommended that they focus their efforts to scale-up those that they deem the most likely to succeed. More specific recommendations on how to operationalize these characteristics will be covered in the Conclusion section below. Having identified internal factors of the solutions that might define their scaling-up success, it is also important to look at the external conditions that best enable this process.

Conditions necessary for scaling-up

It is beneficial for GDCF to understand the external conditions that facilitate scaling-up processes between solutions and host organizations, in order for them to identify and foster them within their own ecosystem. Using the same abductive approach and sources, three main conditions have been identified (visualized in Table 3), which will be discussed in more depth below.

Conditions necessary for scaling-up:	
1. Alignment between the solution and the host organization	Values & visions Intrinsic sustainability motivations
2. Financial and organizational support	Solutions need investments to grow Host organizations need resources (staff, time & budget) to implement solutions
3. Regulatory support for innovators	Policies that promote innovation & sustainability Connections to local governments & investment-ready programs

Table 3. Conditions necessary for scaling-up circular solutions

Alignment between the solution and host organization

When the values and visions of both stakeholders align, their individual actions are directed towards the same goals, so the likelihood of success of their shared strategies is augmented. As previously mentioned, theory consistently signals visioning as the first step towards advancing transitions; practitioners in the GDCF context support this, evident by the fact that Amsterdam and Manchester, both cities which have circularity as one of their core values, have been successful in scaling-up circular initiatives. Intrinsic sustainability motivation from both the innovators and host organizations has also been found to be vital to successful scaling-up of sustainability-related solutions, because leadership that intrinsically believes in sustainability and pushes the solutions forward is necessary for successful start-ups, but also for organizations who manage to successfully work sustainability into their systems.

“I always say there are three things necessary to reach your goals. There is knowledge, there's action, and there's feelings. Because if your feelings are not in line, if you don't believe in it and trust and support it, you won't fight for it.” [Rob van Wegen]

Financial and organizational support

Organizations on both sides are bound by business realities, so financial and organizational support is critical for the successful implementation of solutions. Innovators need financial investments to grow their businesses; they can either come from governments (through subsidies or having municipalities as launching customers), sustainability- or innovation-related investment-ready funds, or (as has been highlighted by the case of Semilla Sanitation) can be facilitated by market players through contracts which help them raise money from investors. On the side of the host organizations, they need organizational resources to be able to implement solutions; staff, time and budgets mentioned as the biggest obstacles by practitioners. In fact, most front-runners studied in this project come from organizations that have the resources available to make change happen, based on which having a staff member purely dedicated to sustainability can be suggested as a solution to these obstacles. On a positive

note, this demand for financial and organizational support is expected to diminish, as solutions get more affordable and easier to implement as they scale-up.

Regulatory support for innovators

Support from powerful government structures and a regulatory environment conducive to circular innovations are key for small-scale innovators and their solutions to achieve scalability. Previous examples (FOOTNOTE) illustrate how regulations can either make or break new solutions that are trying to scale-up, and how partnerships with governments to evaluate and adapt anti-circularity regulations can contribute to that process. Miscommunication with and within municipalities, however, has been found to be one of the biggest obstacles, particularly around circularity since “the circular economy is not really owned by one department” [Mark Stoevelaar], having a circularity team in the municipality (with a dedicated circularity budget) has been suggested to facilitate this. Another internal challenge is that innovation policies tend to be very divided by regions, which silos and limits resources dedicated to supporting upcoming innovations. Practitioners recognize that scalable change will only be achieved if regions come together and call for policy-related collaboration at national and international (European) levels. Finally, innovators consistently struggle with trying to push their solutions through complicated bureaucratic networks over which they have very little understanding, connections or influence. In order to solve this ownership/leadership imbalance, governments should take a more active approach in simplifying these support pathways and connecting innovators to innovation- and investment-ready programs that already exist.

7. Innovation System Analysis of GDCF context

Through the joint Scale-Up project, GDCF recognizes the importance of scaling-up solutions to advance transitions to achieve lasting change.

“We want to make things scalable and show things to the world because [...] it's not about the examples, it's about that you can transform it and you can multiply it.” [Rob van Wegen]

We have already explored which solutions have the highest transition potential, and what conditions they need to scale-up. Now, to help GDCF facilitate this process, it is imperative to map and understand their specific scale-up ecosystem, which will be attempted through a thorough system analysis below. This will be structured by first featuring the group's function as a collaborative intermediary organization, then defining DBS trajectories within this context and evaluating their steering practices, and finally highlighting the roles of key actors in the process.

7.1. GDCF as a Collaborative Intermediary Organization (CIO)

GDCF is structured as a consortium made up of different stakeholders working together to advance ‘green growth’ in the industry of European festivals. As such, the role of the GDCF facilitating team, composed of sustainability and transition consultants and led by the Dutch Ministry of Infrastructure and Water Management, is to create and maintain platforms for discussion and collaboration between their diverse stakeholders, something Hamann and April (2013) would term a *collaborative intermediary organization* (CIO). Upon examination, it is not uncommon to find these types of organizations in the festival industry: Innofest is a CIO concentrated on the testing and deepening process to advance innovation; GROENN is a CIO founded by major event organizers and the municipality of Groningen to inspire other events in that region to become more sustainable; while GDCF engages more with processes of connecting, networking, and knowledge sharing in order to advance shared visions for the industry at large. These types of organizations are also extremely common in government structures, and it is precisely in the connection and streamlining between CIOs in the events sector and municipalities that the potential of these partnerships, and initiatives like the joint Scale-up project, lie.

7.2. DBS trajectory and steering practices within GDCF

In order to make this framework applicable to the facilitators of GDCF, for them to identify at which phase their solutions are at and to learn from their trajectory, it is important to understand what DBS means within GDCF. In this context, the scaling-up process looks somewhat different to that presented in the DBS framework, with the different phases defined as:

- **Deepening-** The process of repeated testing and learning from experiments in individual festivals; this usually covers pilot programs or those who are still engaged with improving the technical aspects of their product; Innofest is a key partner and CIO to guide solutions through this phase.
- **Broadening-** When a solution expands from one festival to another or when it is implemented in other types of events or industries; this continues to further the resilience of the solution by

testing it in different contexts; GDCF can be a key actor in connecting the innovators to external actors to make this change, particularly in the jump from festivals to open-city events.

- **Scaling-up-** The process of a solution being adopted at higher-impact levels than individual festivals; when solution is a staple in the festival industry, meaning that all organizers can easily replicate it, it would be considered fully scaled-up; large-scale suppliers and municipalities are key actors in this phase, since their adoption of particular solutions or practices can facilitate their implementations into larger-scale supply networks.

Using van den Bosch & Rotman's (2008) steering guidelines to analyze successful solutions in the GDCF context, patterns of steering behaviors of GDCF as a facilitator can be identified (visualized in Table 4). The analysis below will shape recommendations for this group to continue supporting and scaling-up solutions.

Steering successes:	Steering failures:
<ul style="list-style-type: none"> • Connecting • Knowledge sharing • Visioning • Visibility • Promoting relationships with municipalities • Embeddedness in local context while maintaining autonomy for experimentation 	<ul style="list-style-type: none"> • Formalizing learning mechanisms • Engaging their members Offer organizational support • Involving key stakeholders 'Innovation tables' • Balancing the business reality Offer financial & practical support to potential solutions

Table 4. Evaluation of steering practices of GDCF

Steering successes of GDCF

Transition scholars have identified capabilities of successful CIOs: connecting, knowledge sharing, learning, visioning, visibility, embeddedness in local context, embedded autonomy, and organizational stability (Hodson & Marvin, 2010; Hamman & April, 2013); many of which GDCF already engages in successfully. These will be discussed in detail below, with the theory and real-life examples backed by the findings from the interviews and desk research conducted in this study.

Connecting

The facilitating team of GDCF excels in developing and sustaining networks and platforms for communication between their members. They currently host (bi)monthly thematic group meetings, quarterly working groups, and a few larger conferences throughout the year (like ADE Green or Eurosonic Noorderslag), where they bring together festival organizers, municipality representatives, and

innovators to develop shared visions and common definitions, share knowledge and mediate between different key stakeholders to further the circularity transition in the events sector.

Knowledge sharing

They have realized that connecting and maintaining social networks are crucial for developing niche experiments, because if “an active network is no longer present, a trajectory dies out and experiences and lessons can be lost” (Kemp & van den Bosch, 2006, p.32). This is why, in addition to their working groups and meetings, they provide a year-round online database of case studies, monitoring tools and information about projects and solutions in order to stimulate knowledge sharing, one of the pillars of GDCF. Most of the members recognize knowledge sharing and networking as the biggest benefits of being involved in GDCF, especially for the implementation of pilots to solve operational problems at events. This has even extended beyond the industry, as the GDCF network has already motivated cities to share and replicate solutions, like the grid-power pilot in Manchester which was inspired by the Amsterdam model from a panel the municipalities were on together.

“Sharing where you're at is just so useful, isn't it? Because it means people can short-cut a little, learn from other people's successes, and from other people's mistakes as well.” [Helen Harland]

Learning

Learning is in the DNA of GDCF, as evidenced by their identification as a Living Learning Network (van den Berg & Schaap, 2023). This approach creates an organizational culture that prioritizes learning and adaptability to changing circumstances. They have used this emphasis on learning to develop different tools for others to replicate and begin their circularity journey, such as the monitoring tool or the 'Event Template', based on their experiences with Nijmegen 'Green Capital' and RHDHV. They motivate the members to learn from each other through their active networks and knowledge sharing. However, the organization doesn't seem to have formalized learning mechanisms for the individual circularity experiments they are carrying out, which is a point they could work on to increase the contribution of the experiments towards the transitions.

Visioning

The leadership of GDCF, as well as those of the organization's members, display certain skills that are characteristic of successful CIOs. They are aware of the importance of systems thinking, evident in their understanding of the broader context of festivals and how important they find it to involve actors from different spheres of governance, as only together can large societal problems be solved. They are comfortable with complexity and ambiguity, as explained above in the organization's affinity for learning and ability to adapt; and have been able to successfully frame operational conflicts from events, and even the crisis of climate change in cities, as an opportunity towards innovation. Relevant to all of these characteristics is the ability to create and communicate one shared vision.

Transition theory constantly highlights how crucial visions are: problem framing is phase one of Loorbach's transition management cycle (2010); Hodson and Marvin's framework for purposive urban transitions (2010), emphasizes the need to develop a shared vision and the need for intermediary organizations ensuring action towards it; Kemp & van den Bosch's management guidelines (2006) specify CIOs can help broaden transition experiments by continuously linking them back to their long-term

sustainability vision, connecting them to other experiments with similar societal transition goals, and ensuring that the vision and definitions are clear, scalable and shared by the group of front-runners. This is something that GDCF excels in. Their first steps in the thematic groups were to develop clear definitions that everyone shares and to decide on concrete goals and next steps collectively, ensuring that all the members have a clear understanding of the vision and priorities of the organization. They are aware that all stakeholders in the network must share the overarching vision- from festivals to municipalities, as was pointed out by several GDCF open-city events in recognizing that their success was due to them sharing the sustainability “DNA of the city” [Tessa Groenen]. They also encourage their members to work on their own individual visions and strategies within their teams, providing *canvases* and *roadmaps* as tools to structurally align and guide their sustainability actions. Inspiring the intrinsic sustainability ambitions of their members has also proven to help GDCF communicate the big picture that drives the consortium- promoting circularity transitions in Europe from the festivals and events industry.

“I’m starting to focus less on getting my own festival sustainable, but focusing more on the impact we can have on things that are bigger than us” [Rob van Wegen]

Visibility

Visibility is key to enhancing the influence of CIOs, and GDCF has been successful in bringing immense visibility to circularity efforts in the festival industry. Conferences like ADE Green serve as great platforms to showcase their accomplishments and convey their ambitions, receiving international media attention and a significant fraction of the 400,000 attendees of Amsterdam Dance Event (ADE) each year (Green Events, 2023). Their strong links to governance organizations like the EU, national and municipal governments, particularly cities like Amsterdam who want to be “front-runners in the field of circularity” [Mark Stoevelaar], solidify their public image. In this way, GDCF acts like a sustainability champion in the circularity transition, bringing visibility to the issues and actions needed.

GDCF members also contribute to the CIO’s reputation, as they are front-runners in circularity themselves. This is beneficial to the transition, since they have intrinsic motivation and more resources available for experimentation and developing innovation, which helps push the curve of adoption of circular solutions. The group’s visibility is enough to create social pressure to push some large players in the industry to join GDCF and begin thinking and acting towards their circularity goals, as MOJO Events rationalizes: “You rather talk with importance within important networks instead of them talking about you or without you.” [Kees Lamers]. Visibility has also been found to be vital to inspire others to act towards sustainability, both within and outside the member organizations, as ESNS’ sustainability manager nicely portrays:

“If I walk around [the festival], I have a cap on that says SUSTAINABILITY. So people think about sustainability when they see me, so they take it into their own work. Because ‘Hey, there’s Rob from sustainability… What am I doing right now? Is there anything sustainable about this?’ So even just walking by sometimes, it gives ideas.” [Rob van Wegen]

Embeddedness in local context

CIOs need to be embedded within the local context to develop good connections with governance and strengthen their influence on the transition. In GDCF this is hard to pinpoint since they don’t only work in

one place or localized context, but they are constantly encouraging the development of good relationships with key actors, particularly advocating for the potential of festival's relationships with municipalities. A good example of how they prioritize this is their work in Amsterdam, where they collaborate with all kinds of governmental representatives (Amsterdam municipality, *Rijkswaterstraat*), innovation (Amsterdam Innovation team, Innofest) and transition experts (Royal Haskoning strategy and management consultants), and large industry partners (SAIL, ADE, DGTL, etc), which has resulted in an increased ability to scale-up solutions and launch city-wide experiments (like Semilla's Startup in Residence living labs, and their upcoming project with SAIL). Furthermore, the open-city events already present in the GDCF network are another great platform that confirms the importance of being locally embedded to be able to develop a circularity agenda, as the organizers of the Vierdaagsefeesten in Nijmegen highlight:

“If you are not as a festival organization in the DNA of the city it's also more difficult to connect. We are in different networks locally, we participate in, we are connected with the local entrepreneurs who organize, like all local bars and restaurants are connected to us. So naturally, we are connected and really linked to the city.” [Tessa Groenen]

Embedded autonomy

Critics highlight that CIOs shouldn't be too dependent on the context, however, as this can limit them to existing industry-regime practices and hinder innovation processes (Geels, 2005); in order to achieve transformational rather than merely incremental innovation, GDCF needs to develop a space for experimentation that is free from the rigidity of governmental regulations. This has already emerged as an obstacle to scaling-up for Semilla Sanitation, with the end-of-waste regulation prohibiting them to commercialize their by-products of fertilizer, compost, and clean water. GDCF actors have nonetheless been successful in helping Semilla solve this setback: Innofest by creating a pilot environment, where the regulations do allow them to work with these byproducts for the sake of innovation; and DGTL by supporting them with the RVO's Circular Chain subsidy for research to overcome this end-of-waste regulatory status. Furthermore, the Amsterdam Innovation team has an ongoing *CircuLaw* project, which aims to identify current policies and regulations that are obstacles to scaling-up circular innovations and how to get around them to advance the transition to a circular city (Amsterdam Innovation team, n.d.). By fostering relationships with these key actors, GDCF is creating safe space for innovative niches to explore alternative pathways and hopefully scale them up to regime level, accelerating the circularity transition.

Organizational stability

Finally, their link to the Dutch Ministry of Infrastructure and Water Management ensures the CIO's long-term organizational stability and financial support, and their focus on improving relationships between festivals and municipalities shows they value these governance relations. Furthermore, they are constantly encouraging members to develop strong relationships with their municipalities to be able to increase their impact on the cities' circularity transitions (developing the relationships further than simply dealing with permits and regulations). Good examples of the collaboration between festivals and municipalities that have resulted from these efforts are:

- Vierdaagsefeesten and Nijmegen city;
- ESNS and GROENN and Groningen city;

- SAIL and Amsterdam city;
- Body and Soul festival and Dublin city;
- We Love Green festival and Paris city;
- Roskilde festival and Copenhagen city;
- Shambala and the Welsh and UK governments (developed the Green Events code).

Steering failures of GDCF

It is evident that GDCF is on the right track to contribute to the urban circularity transition, as an intermediary organization who succeeds in the above-mentioned capabilities. Their fast growth since the deal was signed in 2019 attests that their successes are not just theoretical, but resonate in practice with the more than thirty member festival organizations. However, the interviews and the analysis also identified aspects in which they have not performed so well, namely: formalizing learning mechanisms, engaging their members, involving key stakeholders, and Balancing business realities. These challenges will be discussed in more detail below and some initial recommendations will be given to overcome these, in order to best support the scaling-up process for circular solutions in the context of GDCF.

Formalizing learning mechanisms

Learning is a key characteristic of the GDCF network, being open to experimentation and knowledge sharing, and they constantly engage with it as a means to stimulate innovation. However, when it comes to individual experiments, such as the pilots they organized with Innofest at Lowlands festival, this study found that they have no formalized learning mechanisms in place. The findings from the interview reflect this as well, although all the members seemed to be aware of the importance of learning from past experiments, nobody was sure how this learning process was taking place, usually only aware that a report had been written up but not if anything further was done with it. Open-city events seem to be a little bit more aware or better at engaging with formalized learning processes (for example, the extensive evaluation and report the Vierdaagsefeesten developed on their circular cup system in Nijmegen), but this seems to come more from the initiative of the municipalities that support them. Therefore, GDCF would benefit from developing a more formalized learning methodology, so that all its members and its partners can have a more clear and effective way of learning and take the most out of the deepening phase of transition experiments. Innofest has a very good learning methodology described in their 'Innofest Whitepaper' (Innofest & Visser, 2020); although it is only for the initial testing phase, GDCF might find inspiration in it to develop their own for later stages in the scaling-up process.

Another way learning mechanisms can be improved is through the iteration and repetition of experiments over time. Festivals offer a unique opportunity to do this, since they usually have several editions, occurring yearly or even more often. However, the research found that many experiments are abandoned after only one edition, so solutions many times stay in the pilot stage. That means that the festivals are not benefitting from what they learned about working with the solution, and the solutions are not being able to use those lessons to improve performance in future editions. As MOJO expressed, the fact that they have to look for new solutions to solve their operational problems every edition is also demotivating some member festivals from continuing to invest time and money into this experimentation for innovation. GDCF should therefore plan in more continuous experimentation (in several editions) and develop

follow-up mechanisms to make the most out of the experimentation process. SAIL, inspired by the innovation cycle of the Amsterdam Innovation team, further recognizes the importance of repetition and evaluation for scaling-up festival innovations towards cities:

"In the past it was indeed like, we run it once and then we see how it works and then for the next edition, we will try to look at it again. But now, we really want to incorporate the evaluation and iteration of the innovations in the event, to work on that with our partners and to develop the innovations before the next edition of the event already. Also, to have a deep evaluation afterwards, together with the municipality of Amsterdam, to see how we can actually implement the innovations afterwards in the city." [Hanna Winters]

Engaging their members

One of the main challenges identified by GDCF facilitators is the engagement of their members. Although there are some front-runners who take the lead in this network, they have struggled so far with keeping the majority of the festivals active in the meetings. They recognize that there are different levels of engagement, and see festivals being more involved as long as the scope is more relevant to their own operations. First is internal sustainability, where luckily most festivals are very engaged to become circular themselves. Engagement within the GDCF community is a little bit sparser, with only about one third of members active in efforts to make the festival industry more sustainable. Finally, engagement with the scaling-up of solutions to cities is where they struggle the most, since only a few front-runners (like ESNS, Shambala, DGTL and ITGWO) have the capacity and the personal interest to advance the transition beyond the festival industry. Particularly regarding the implementation of circular solutions, there is difficulty in passing from thoughts and words to actions, such as initiating pilots and continuing to implement tried and tested solutions in further editions.

This research found that resources for change are a major barrier to engagement, as many festivals (about two thirds of GDCF members) struggle to find time, staff and money to dedicate to sustainability within the organization. In fact, a characteristic of the front-runners in the group is that they have dedicated sustainability teams or sustainability managers who have the time, headspace, and intrinsic motivation to lead their circularity efforts. Aware of these structural challenges, GDCF has adapted some of the tools they offer their members in order to make them easier to use for those who are struggling with limited resources. For example, seeing that most festivals weren't filling in the Roadmap Canvas tools developed with ESNS to help organize their sustainability strategies, they created adapted mini-canvases that take less time to fill out. These were more successful, which shows that GDCF understands the needs and challenges of their members and is making the right kinds of moves towards helping them overcome them, and should continue these in the future. However, the group must also develop stronger support measures for the member festivals to have the space and resources to improve their sustainability actions. These could be, for example: creating a role within the GDCF facilitating team with the sole focus of supporting the festivals with staff and time to organize their strategies in the beginning of the year; or launching a monetary fund intended to support the implementation of circular solutions at festivals that might not be able to afford it themselves. In this way, GDCF would be fostering an environment of collaboration with and active involvement of the festivals themselves in creating their circular futures; the importance of which has been nicely highlighted by the sustainability manager at ESNS:

"Tell me and I'll forget, teach me and I'll remember, involve me and I will learn." [Rob van Wegen]

Involving key stakeholders

Although GDCF is great at creating space for their members to communicate, share visions and strategize together, they have so far excluded outside actors from these spaces. Of course, they do have connections to different actors to external stakeholders in the urban circularity transition, as has been shown before, and have even begun to invite certain innovators to thematic meetings to present their circular solutions. However, they can greatly benefit from capitalizing on their connections by more actively involving suppliers, innovators, and municipalities within the group as GDCF members. The Amsterdam Innovation team advocates for the inclusion of all stakeholders in the identification of main challenges, priorities, and the collaborative development of circularity strategies, as this creates shared visions throughout the whole supply-chain and sets up the key actors to work together. They are testing this methodology at SAIL, bringing the different stakeholders together around so-called 'innovation tables', which GDCF might do well to imitate:

"We're trying to set up sort of innovation tables where we're trying to get the main stakeholders around the table: So it's us with the events that we're testing with, we share knowledge about what we have been testing and what we're doing. But then also, for example, related to mobility, we're trying to get the NS involved, the RAI arena and the big venues, and then SAIL, for example, and other open events. So we are really trying to see: 'what are the things that you have been testing, and what are the issues that you face, and then how can we cooperate and share knowledge and really see how we can work on the topic together?'" [Mark Stoevelaar]

There are definitely opportunities that GDCF is missing out on by not currently inviting these stakeholders into the group. It is widely recognized that large-scale urban changes can only come when supported and pushed forward by the largest actors in a supply-chain. Unfortunately, in their urban circularity transition, GDCF has identified that "[suppliers] are hardly engaged in the process of the Green Deal, but they are engaged with the festivals" [Christiaan Elings]. One of the unique aspects of the festival industry are the long-standing relationships between large-scale suppliers and events that recur over the years, yet it seems that these relationships are not being capitalized on by GDCF. By incorporating large-scale suppliers, like Heineken, into the consortium directly instead of indirectly through their work with member festivals, they will allow them to participate in the development of goals and visions, empower and educate their sustainability motivation, and even more practical, it will allow GDCF to hold these powerful stakeholders accountable and demand more action towards the transition. On the other end of the supply-chain lies another missed opportunity, in the entrepreneurial drive of innovators and owners of circular solutions. Innovators must have the passion to push their solutions up to the mainstream against an array of challenges; the founder of Innofest agrees that resilience is one of the most important characteristics of successful innovators:

"[The success of start-ups] has to do with how good is the founder at attracting talents, how good is the founder at attracting finances, and how good is the founder at keeping their heads up themselves. The ability of bouncing back, of selling your story to the media, to marketing, for example, this can only be done if you have a certain belief in yourself, but also if you can pitch your story well." [Linda Vermaat]

This resilience is also vital in scaling-up actions towards the circularity transition, so GDCF facilitators should try to harness this human capital within their group. Bringing innovators in as members and making them active partners in the joint Scale-up project can therefore: help cement partnerships with the innovators; foster communication between all stakeholders, which helps identify challenges and opportunities, and speeds up the process of scaling-up; and allow GDCF to channel innovators' existing entrepreneurial energy towards their shared goals. Overall, involving and engaging different stakeholders into the group will let GDCF shorten the supply-chain and channel existing capabilities to further their transition, so they should extend the invitation to all the champions in their network.

Balancing business realities

Finally, there is a real divide between developing promising sustainability visions and putting them into practice, specifically in terms of (infra)structural and financial support- here called *business reality*. In today's capitalism-based market, business reality is something that binds all stakeholders- from municipalities bound by their budgets for circularity policies, to festivals concerned with financial survival from year to year and open-city events struggling to turn a profit, and especially for hustling innovators who need investments to grow their new businesses. Although GDCF are good at visioning, like many CIOs they struggle with identifying and addressing implementation issues that impede scaling-up niche solutions. They should therefore improve their support mechanisms and offer more practical and economic aid so the innovators can achieve financial sustainability and focus on scaling-up processes. This support is of course contingent to each case, but in the example of Semilla Sanitation, whose main challenge was found to be securing investments to grow their infrastructure, this support could be as simple as helping them secure contracts with GDCF festivals so that their partner finalizes the investment:

“If we could have contracts for three or five years, then we will build the systems and we will supply, we will operate, we will maintain. But there should be a contract there for the long-term because [...] the money has to come back, of course, after investment, because otherwise it will not run. So we need contracts for more festivals.” [Peter Scheer]

Having this simple structural support will allow Semilla to scale-up their operations and be able to service larger events, with more capacity. This safety will allow them to worry less about their performance in the events sector, a target market added solely for business survival, and give them the funds and energy to advance their scaling-up to refugee camps, their original target.

Another common concern is funding; as several event organizers express, implementing solutions takes a big initial investment, particularly when it concerns innovative solutions that have not hit economies-of-scale yet. This is a challenge for festivals, which have short-term thinking because of their lack of long-term investments and the urgency of surviving financially after every edition; and a bigger challenge for open-city events, who have no income from ticket sales and are under even more pressure to be profitable. The lack of appropriate funding therefore hinders innovation, as the financial bottom-line takes priority over sustainability. A fund for implementing pilots and more established circular solutions at GDCF festivals would also help tackle this obstacle. Supporting and balancing the business realities of their stakeholders will thus allow them all to focus on scaling-up solutions, a necessary step to advancing the transition, which a good facilitator should enable:

“You need to facilitate, to throw some money at these supplier companies or these festivals that want to make the step early. That's how you make the market go faster, by making the necessary investments.” [Tijl Couzij]

7.3. Roles of actors in scaling-up

Having evaluated how the consortium has performed as a facilitator of DBS processes, the next step is to identify what the roles of individual actors are in the context of this circularity transition. The main actors and the roles they should take in the scaling-up process have been found to be:

- Innofest- as tester of solutions (facilitating deepening in festivals)
- Innovators- as drivers of solutions (throughout the whole process)
- GDCF consortium- as a connector of actors (to align visions throughout the whole process and facilitate broadening to open-city events)
- Municipalities- as supporters of scaling-up processes (through legal and infrastructural support) and launching customers of solutions;
- Suppliers- as adopters of solutions (scaling them up to the mainstream).

Figure 5 visualizes these roles in respect to the DBS phases. Their main responsibilities, challenges and some recommendations will be outlined below to extract lessons on how these types of actors can further these transitions (exception Innofest, which is exclusively limited to the context of Dutch festivals and thus not-generalisable).

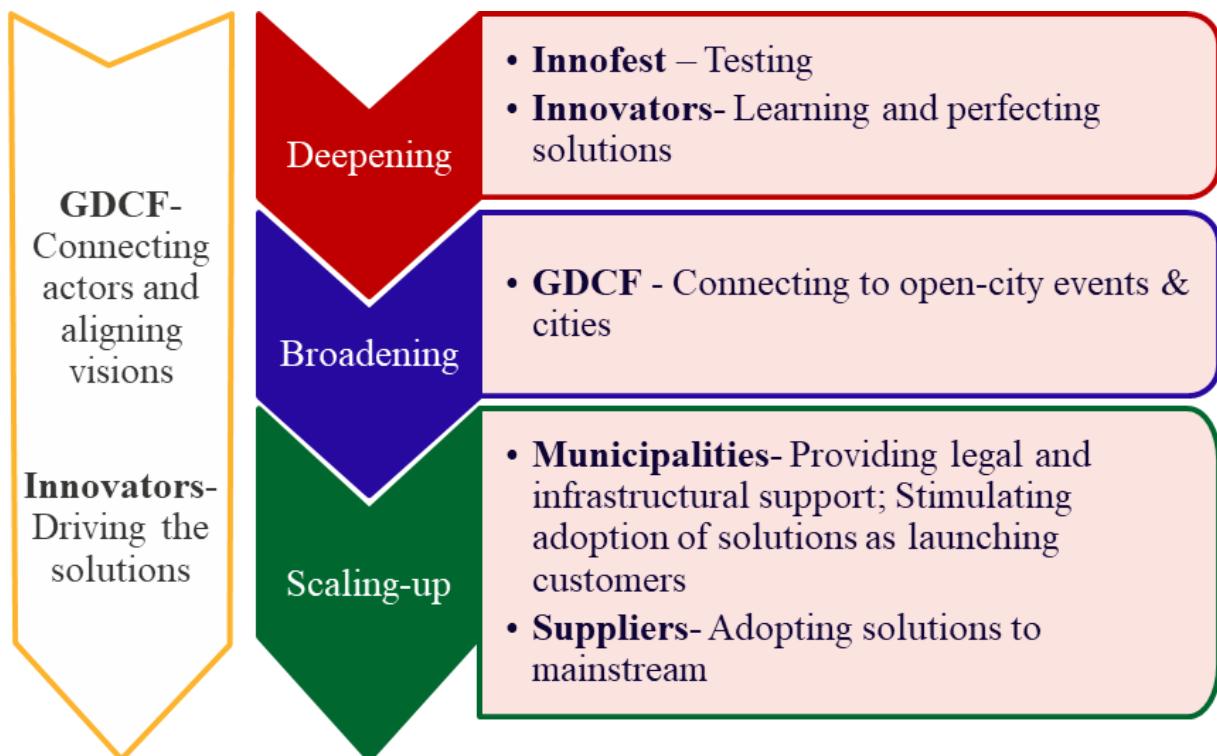


Figure 5. Roles of main actors in GDCF context in scaling-up

Innovators

As has been mentioned, passion, entrepreneurial drive and resilience are key characteristics of innovators and owners of successful circular solutions. Given the complex structures and social networks in cities, they are also vital in scaling-up these solutions in urban contexts. Although they are the smallest and relatively least powerful actors in the scaling-up process, innovators are the ones with the most personal stake and the most to gain from its success. Therefore, innovators have the responsibility, or rather the need, to be the ones to take on the role of drivers of the development of their solutions throughout the whole DBS process. However, one of the main challenges to scaling-up has been identified as an ownership/leadership imbalance; where people pushing the solutions (ownership) are not the people in contact with those who can help (leadership). This is another reason why the personal traits and soft skills of innovators, which contribute to successful collaborations with all other actors in the process, are key.

Innovators can take on a more active role during the deepening process, where they are responsible for utilizing lessons from the experiments to perfect their solutions. As this relates to more technical and operational aspects, which innovators are usually experts at, they tend to prefer and excel at this phase, like the CEO of Semilla has expressed, while struggling with the networking which is further out of their element. Keeping energies high throughout these diverse phases can be a challenge, so a recommendation is to involve innovators more actively into overseeing roles that allow them to better understand the process (through direct involvement in CIOs or investment-ready programs), which can help them foster the right connections and channel their drive to accelerate the scaling-up of successful solutions.

GDCF consortium

The extensive evaluation above has established the main strengths of GDCF as a facilitator and connector. They have been quite successful in furthering circularity within the festival industry, but have been somewhat excluding the 'outside world' from their efforts. The integration of the whole arena is vital to developing shared visions throughout the supply-chain and carrying them out, however, as it enables van den Bosch and Rotmans' (2008) first niche-related condition for success: alignment within the niche. Therefore, the first recommendation is to welcome external actors into GDCF. Currently only festivals and the Dutch government are official members, but they should extend this invitation to innovators, large suppliers, other CIOs (like Innofest and investment-ready programs), and municipalities (specifically the innovation departments). They have already attempted to include them in some meetings and conferences, but this research proposes that a more direct approach can benefit the consortium by bringing in outside knowledge, improving engagement amongst its members and increasing external visibility. The GDCF team recognizes the potential of capitalizing on its role as connector:

"[The festivals] are trying to invent the wheel themselves, but what we are now trying to do is that they look a bit broader also outside. [We are trying] to bring in the outside world, because there it will happen- there's the knowledge, there's the innovation. It's not within the festivals [...] Our ambition is that those thematic groups will go a bit more outside and make those connections in the coming year." [Christiaan Elings]

To maximize the effectiveness of their connection-building, the second recommendation for GDCF is to create a role in the facilitator team specifically dedicated to the joint Scale-up project. This human capital can help engage members and external actors, motivating them to implement circular solutions and

providing the strategic organizational support they need. At the same time, this person can become an expert on the solutions being implemented in the GDCF network, in charge of carrying out demand-driven matchmaking and working hand in hand with other actors to scale-up the most promising solutions. This role would essentially be the applied continuation of this research project, working towards the realization of the potential contributions of festival solutions towards urban circularity transitions.

Municipalities

Governments are major actors in any sustainability-related challenge and, in the arena of urban circularity, municipalities have the best overview and influence over local supply networks, as they control regulations, permits, and have working connections to market actors. They can be the powerful actors needed for van den Bosch and Rotmans' (2008) second niche-related condition for success: increasing the power of niches that locally exceeds the power of the regime. GDCF has long recognized the importance of developing good relationships between local event organizers and municipalities, and encourages its members to cultivate these relationships. From these efforts, different sorts of interesting collaborations have emerged:

- Festivals acting as consultants for municipality's sustainability programs, like Body & Soul festival helping Dublin on citizen engagement;
- Open-city events, like ESNS in Groningen, implementing innovations that not only solve their operational problems but also change the infrastructure of the city to make existing systems more sustainable
- Even the creation of new sustainability-related consortiums, like GROENN which was born from an initiative of 5 event organizers in Groningen (including festivals, open-city and sports events) to reduce single-use plastics in events, and escalated to a collective which links the cultural sector and the municipality together to advance the sustainability transition in the region.

An analysis of the different municipalities involved with GDCF identified some things they have been doing which support or hinder circularity transitions. Many municipalities have created environmental criteria for specific industries, like Amsterdam's 'Guidelines for Sustainable Events 2020' or the UK's 'Green Event Codes'; they vary in their strictness, but are a good way to influence procurement chains and guide businesses towards sustainability. Some of the more proactive municipalities have realized that simply providing circular infrastructure can organically make events and other city-dwellers act more sustainably; Manchester excels at identifying and working towards these opportunities, like they have in their grid-power pilot:

"We're particularly trying to focus on and help make the power situation better. So looking at how we can improve grid-power access so that it enables people to use less generators." [Helen Harland]

It was found that when municipalities have circular visions and policies which align with those of solutions, the scaling-up process goes much easier; Amsterdam is a great example, self-identifying as a "doughnut city" with ambitious circularity goals, expressed in the first task of the agenda of the Amsterdam Metropolitan Area (AMA), and it has already made moves towards testing and scaling-up circular innovations in urban living labs. This relates to one of municipalities' most powerful instruments:

policies and regulations. Regulations can act as barriers to innovation but, like in the case of GROENN which began as a response to strict regulations on single-use plastic the municipality imposed on the events industry in Groningen, they can also be turned into opportunities for collaboration. Amsterdam recognizes the importance of managing regulations, and has started a program called Circulaw to identify and adapt existing policies that are obstacles to present-day circularity, like the end-of-waste status currently limiting Semilla Sanitation. Another big challenge is the issue of miscommunication with the municipality. Festivals find it very hard to connect to the right people in the municipality to pursue circularity solutions, since each solution falls under different departments (per theme), but because they are events they automatically get rerouted to the permit department, who knows nothing about circularity efforts or investment-ready programs in other sectors. Internal miscommunication is also a problem, as municipalities can have thousands of staff members siloed into different departments, who are usually bad at communicating with each other; this confusion creates a lack of accountability for circularity projects within the municipality. This doesn't mean municipalities are oblivious to those needs, since many investment-ready programs for scaling-up solutions already exist, like the Startup in Residence program in Amsterdam. However, the complicated bureaucratic structures make it hard for innovators to get connected to existing programs that could help scale-up their solutions. Finally, since municipalities have access to substantial public funds, they also have the possibility to be those who stimulate the scaling-up, acting as huge 'launching customers'. As Manchester recognizes, sustainable procurement is both the most efficient way a city can reach sustainability for themselves, but it also has the potential to boost the adoption of circular solutions down the supply-chain.

Thus far, municipalities have acted more as administrators and controllers of negative behavior, rather than enablers of positive actions. Learning from these strengths and weaknesses, some recommendations can be made to maximize their influence in the role they should be taking: supporter of scaling-up processes. Their main focus should be to connect innovators and owners of solutions to investment-ready programs, many of which already exist and are managed by municipalities or large private funds. Creating dedicated teams charged with identifying and helping scale-up circular solutions in different industries would provide the human capital necessary to advance these connections; Manchester has done this with the Zero Carbon team, and Amsterdam with the Amsterdam Innovation team. Furthermore, having a dedicated circular program manager would clarify to outside parties who the right person to contact is, and they could be charged with delegating to the correct actors within the municipality. On more practical terms, municipalities should prioritize providing circular infrastructure which can be adapted to facilitate different kinds of circular solutions, enabling other industry and civil society actors to adopt solutions with lower implementation barriers. They should also review existing regulations and make sure that their policy arenas allow for innovation and circularity principles to achieve their transition goals. Governments more broadly should act as 'launching customers' to finance and stimulate the adoption of solutions further down in the supply-chain.

Suppliers

Finally, transitions require the collaboration of all stakeholders in a supply-chain, over which large commercial suppliers have the most direct power. They are in charge of creating the functional systems and products required to run cities, and can choose how to do it- relying on old fossil-fuel-based processes or engaging with more sustainable and circular methods. This power, however, also comes with responsibility; particularly in the festival industry, where organizers have no infrastructure of their own

but rent it from suppliers, they currently carry most of the burden to act sustainably. This generates pressure on suppliers, but can also be seen as an opportunity, since existing supplier relationships from the festival industry have the potential to catalyze change in the city's supply network. Suppliers are thus key actors that are capable of translating niche practices to mainstream practices, fulfilling van den Bosch and Rotmans' (2008) third niche-related condition for success: alignment of the niche and the mainstream environment or regime.

Due to suppliers' position of power over their own operations, GDCF festivals find it hard to control suppliers. That can be positive, when suppliers have intrinsic sustainability motivations that align with the festivals'; such as the food vendors in Music Meeting festival who launched their own initiative to recycle cutlery at their food truck. Unfortunately, it can also be a big challenge because many suppliers lack intrinsic motivation and only consider sustainability as a response to consumer demands. As ITGWO experienced with Heineken in their pilot for climate-neutral beer, in large companies in particular, it is hard to align internal visions throughout complicated staffing structures. so accountability over sustainable projects is hazy and greenwashing is commonplace. Engagement of suppliers in existing sustainability strategies of festivals is another challenge, as ESNS experiences when trying to engage their venues (suppliers) through sustainability questionnaires, but they struggle to even get responses. Furthermore, large suppliers are a big source of funding for many festivals (close to 15% of the budget in some cases) which can make individual festivals feel relatively powerless to demand change. However, this access to funds also presents an opportunity for large suppliers to launch or finance circular experiments themselves; Vierdaagsefeesten tries to foster supplier's ownership of these by linking them to specific sustainability targets and raising dedicated sustainability budgets from suppliers for sustainability-related pilots during their event. This benefits suppliers as well, capitalizing on the huge marketing value of festivals to improve their public image as proactive allies of circularity transitions.

The involvement of suppliers in the visioning and strategizing phase will further contribute to stimulate their intrinsic sustainability motivations and make them more aware of their role in the transitions. They can then turn from their current role, reactive to government regulations and consumer demands, to their new role as proactive adopters of circular solutions. Following the example of governments as launching customers, they should adopt innovations developed by the solutions into their practices, advancing their scaling-up into the mainstream (regime) through their extensive supply networks.

8. Demand-driven matchmaking

Having identified that the transition will come about by scaling-up circular solutions, their characteristics, external conditions necessary, and the role of key actors in the process, the last step is to specify how exactly this can be done. There is a real-world need to connect solutions to challenges, and this can be achieved through demand-driven matchmaking. The Amsterdam Innovation team follows this methodology in their Innovation Cycle (*Innovatie estafette*):

“With our innovation programmes we’re really trying to look for challenges that are demand-based. So we look for challenges that are indicated by our colleagues, collect them in the same place, and then from there we send them out to the market [...] Then the market players that can say “okay, I think I’ve got a solution for this” and they can apply. So that’s how we try to stimulate it.” [Mark Stoevelaar]

In order to perform this demand-driven matchmaking process in the context of circular festivals and cities, for the proposed joint Scale-up project, the following steps have been identified as necessary:

1. Develop an inventory of circular solutions available from festivals → supply
2. Collect a short-list of challenges of host organizations (cities or open-city events) → demand
3. Selecting and scaling-up promising solutions → matchmaking between supply and demand

Supply

The first step is to inventorize and understand the supply side, meaning circular solutions. GDCF has already attempted to do so in the “Festivals Innovation Long-list” developed by Lab Vlieland in 2023. This long-list gathers details about all innovations implemented at GDCF member festivals, including a description of the company, which problem it solves, when and at which festivals it was trialed in, the Lab Vlieland (LV) score (which is meant to show the transformation potential of solutions, for the festival sector and for broader society), the Technology Readiness Level (TRL), and finally the SDG it is connected to. The long-list is a great first attempt at mapping the supply, but after discussing with the consultants, a few points of improvement both on the list and on the process were identified (concrete recommendations on how to do it are included in the Recommendations section below). The areas that require attention are particularly around the development of the LV score, which has been developed without a scientific operationalization method, something this research can contribute with, and the frequency with which this list needs to be updated.

Focus on solutions rather than innovations

Another big adjustment that this research finds important to note is the use of the word, and concept, *solutions* rather than *innovations*. The interviews identified a pressing concern, shared by critics of Ecological Modernization perspectives, that there is too much focus on innovation, only for innovation’s sake. This is actually hurtful to scaling-up processes because it is spreading existing resources thin across too many new solutions, instead of focusing on tried and tested solutions that have high transformation potential. The definition of innovation differs from person to person, and this obsession on only new

innovations mean that established solutions that work (like Seavents) are not included in the long-list because they have existed for a few years already, and so they are overlooked by GDCF members looking for solutions to implement, hindering their possibility to continue scaling-up. Practitioners recognize that the solutions are out there, collective efforts just have to tap into them, therefore one main recommendation is to change the name (and focus) of the long-list to "**Festival Solution Long-list**", and include established solutions at different stages of scaling-up, since these have the best chance of survival.

"We don't have to come up with all kinds of new solutions anymore. It's nice, of course, to do pilots and all that stuff, but for the big steps, it's not necessary. We have everything, it's already there, it's just a question of accessibility, finding it basically" [Tijl Couzij]

Demand

The second part of the demand-driven matchmaking process is identifying challenges, which the Amsterdam Innovation team collects on "Challenges short-lists". Getting everyone from different departments in the municipality and the event organizers together to identify main innovation challenges related to events is key, because there is always more than one team working on a specific theme (for example, sustainable mobility can involve the teams of smart mobility, circularity, traffic maintenance, policy department, etc). This can be done through the innovation tables proposed at SAIL, to motivate stakeholders to develop a shared and holistic understanding of the challenges and main themes to focus on (which also reflects innovation systems thinking). The collaboration between municipalities has also been highlighted as important, since they tend to share similar challenges (particularly amongst northern European cities), and this can lead the project to generalizable conclusions to further accelerate urban circularity transitions.

Matchmaking and scaling-up solutions

The final step of matchmaking between solutions and challenges of the host organizations, whether those be cities or open-city events, should be relatively straightforward once the other two steps have been set in place. This research project can actually illustrate how it would work in practice, with two of the examples GDCF that have been covered. The process for SAIL was already taking place, and they identified circular sanitation as one of their operational challenges. During interviews with SAIL, the example of Semilla Sanitation was mentioned and suggested as a solution with high transition and scaling potential. Of course, the Amsterdam Innovation team was already familiar with Semilla, which contributed to its selection as a promising solution. It is a success to report that Semilla has recently signed on to be implemented at SAIL, contributing to their scaling-up, tackling circular sanitation at the open-city event and furthering the transition, and finally, proving that the methodology of demand-driven matchmaking works in practice.

Investment-ready programs

Another important point to note is that the phase following the selection and implementation of solutions is very important to their scaling-up, and this has been largely ignored in the GDCF context so far. In

order to support the scaling-up processes after solutions are matched there should be a much stronger focus on investment-ready programs (such as Amsterdam's Startup In Residence). The lack of attention to these sorts of programs was noticeable from the interviews with practitioners, who also identified that although these programs might exist, it is very difficult for small-scale innovators to be aware or connected to them. The latest trend report of Duurzame Dinsdag, an initiative that aims to advance sustainability in the Netherlands by informing policy-makers about the main trends and developments in the world of sustainable initiatives (Duurzame Dinsdag, n.d.), also highlights the need to work on fostering investment-ready support systems and connecting promising innovations. This will hopefully shape upcoming policies, but as a first step, it should definitely be the focus of GDCF moving forwards.

9. Conclusion

Blending theory and practitioners' insight together, this research project has explored how the festival sector can contribute to circularity transitions in cities, by following the scaling-up process of circular solutions from festivals to cities. Why the festival industry is a good setting to advance such transitions in urban spaces was first discussed, due to their three functions for experimentation: as laboratories, due to their temporality and flexibility; as mini-cities with similar needs and challenges; and as stages for circularity, given the power they have over consumers and suppliers in urban environments. Festival practitioners and actors involved with GDCF know this already, but it has largely been ignored by academia, so this report hopes to contribute to this conversation by delivering a sort of academic proof which can be used by GDCF to bring some scientific validity to their future projects. Academic justifications of considering open-city events as stepping-stones from festivals to cities were also drafted, summarized as: their ability to improve relationships with municipalities through local embeddedness and the influence on a city's image; the similarities in their needs and challenges to those of cities, but concentrated in vast spaces and huge audiences; their ability to change the infrastructure of a city, catalyzing other urban systems; and their ability to influence citizens and showcase sustainable practices.

The scope was then zoomed in to individual circular solutions, highlighting the benefits of studying them as transition experiments through van den Bosch and Rotmans (2008) "Deepening, Broadening and Scaling-up Framework for Steering Transition Experiments". The framework was applied to the cases of Semilla Sanitation and other successful (and unsuccessful) solutions from GDCF (reusable cups, Greener, HVO fuel for generators, and Uppact), and lessons from their DBS trajectories were drawn. Five internal characteristics of scalable solutions were identified, for solutions to have transformation potential they must be: operational, adaptable, innovative, address their business reality, and have clear societal visions. External conditions necessary for scaling-up were also prescribed: alignment between the solution and the host organization, in terms of values, visions, and intrinsic sustainability motivations; financial and organizational support for both parties, as solutions need investments to grow and host organizations need resources (staff, time & budget) to implement solutions; and regulatory support for innovators, since policies that promote innovation and sustainability, and strong connections to local municipalities and investment-ready programs.

Finally, an in-depth innovation system analysis of the broader GDCF context was performed. The group's function as a CIO was featured, and to operationalize the framework the DBS trajectories within GDCF were described, so facilitators can identify at which phase solutions are at and select the promising ones to scale-up. An evaluation of their steering practices found that GDCF excels at: connecting actors; sharing knowledge; creating shared visioning; bringing visibility to the efforts and challenges of the circular festival sector; promoting relationships with municipalities; and fostering embeddedness in local contexts, while maintaining autonomy for experimentation. Areas where GDCF can improve were identified as: formalizing their learning mechanisms; engaging their members, apart from the usual front-runners; offering organizational support, to both member festivals and solutions; involving key stakeholders, whether that be by inviting innovators and suppliers as members, or by hosting "innovation tables"; and balancing the business reality of solutions by offering them financial & practical support. To complete this system analysis, the main actors and the roles they should take in the GDCF scaling-up process were found to be: Innofest- as tester of solutions (facilitating deepening in festivals); innovators- as drivers of solutions (throughout the whole process); the GDCF consortium- as a connector of actors (to align visions

throughout the whole process and facilitate broadening to open-city events); municipalities- as supporters of scaling-up processes (through legal and infrastructural support) and launching customers of solutions; and suppliers- as adopters of solutions (scaling them up to the mainstream).

This research project has thus described how circular solutions from music festivals contribute to urban circularity transitions, through scaling-up to dominant city practices. The findings become more interesting as they advance the link between cities and the events sector, and they can indeed be generalized to different kinds of industries in the wider urban context. The importance of industry developing good relationships with municipalities has been made evident, not only to improve conditions for business themselves, but in order to facilitate scaling-up efforts in a strategic and streamlined way. The powerful role that municipalities can have, as actors with the power and willingness to influence regime-level practices and structures, highlights their responsibility to support scaling-up processes and act as launching customers of circular solutions throughout the whole economy. The demand-driven matchmaking methodology can be directly applied to solve city challenges, and the frameworks presented in this research could be applied to advance transitions experiments in urban environments. A recommended future study and logical next step to advance the urban circularity transition would be to launch and steer transition experiments in small and localized urban settings for example, with a circular neighborhood project that can test how circular solutions from music festivals perform at a higher city-level, thus advancing their scaling-up.

9.1. Practical recommendations for GDCF

To support the theoretical findings of this research project, concrete recommendations that GDCF can follow in order to facilitate scaling-up processes will be offered. These recommendations should be generalizable for other CIOs to steer solutions towards scaling-up, thus finalizing this project's contribution to furthering urban circularity transitions. Concrete recommendations for GDCF are:

Actively support solutions to scale-up to open-city events

The theoretical and practical arguments for scaling-up solutions to open-city events as stepping-stones to cities are covered in section 4 above. Concrete recommendations for how to do this will depend on the context of each solution, but this can be generally achieved through connecting and demand-driven matchmaking. In the example of Semilla Sanitation, scaling-up to each event can be concretely achieved by:

- **GDCF festivals:** Offer long-term contracts to expand their business within GDCF festivals (so they can get the investment needed from Nijhuis Industries to supply the open-city events)
- **SAIL:**
 - Has already been matched through demand-driven matchmaking
 - Now they need to focus on facilitating the implementation and the learning mechanisms
- **Olympic Games:**
 - Follow-up on the connection made to the *Sports missie naar Parijs* program
 - Develop the relationship with the Paris municipality to open up that avenue for development (of Semilla and other potential solutions)

Demand-driven matchmaking

The methodology for developing the demand-driven matchmaking has been described above. The concrete steps GDCF needs to do to successfully implement demand-driven matchmaking are:

1. Redo the “Festival Solutions Long-list” every year, after the festival season (before ADE Green, so they can also be shared at the conference)
 - Operationalize the LV score to reflect transition potential of the solutions (by assigning a score scale of 1-10 on each the characteristics of scalable solutions, with established definitions so it is less subjective, and averaging the score)
 - Operational [x/10]
 - Adaptability [x/10]
 - Innovation [x/10]
 - Business reality [x/10]
 - Societal vision [x/10]

Average = LV score
 - 2. Make a “Challenges short-list” to identify operational challenges of host organization (involving as many stakeholders as possible)
 - 3. Match them to solutions (through informed demand-driven matchmaking)
 - 4. Set in place an investment-ready support system to move the solutions through the development pipeline

Set in place an investment-ready support system

The importance of offering financial and organizational support to innovators, and of fostering their connections to investment-ready support systems has been highlighted above. In the upcoming joint Scale-up project, GDCF can support this by:

1. Creating a role dedicated to the joint Scale-up project in the GDCF facilitating team
2. Creating a GDCF fund for scaling-up circular solutions which have high LV scores, and work with these kinds of solutions on the joint Scale-Up project

9.2. Limitations

Part of the scientific process involves recognizing the limitations of the researcher, research project and findings. Therefore, there is a need to point out that the recommendations above are only advice based on inductive secondary research and primary interviews with key actors, scientifically sound but not guaranteed. The findings of these sorts of analyses are very contextually dependent, so can only offer rough outlines of how to do the scale-up process (similar to limitations of DBS framework). This thesis was bound by the complexity of urban circularity transitions, the time requirement, and the available access to data. Finally, it feels important to point out the danger of “beautiful examples”, that relying on circular solutions to solve wicked societal problems can be like putting a band-aid on an open wound. The researcher believes that there is a real need for larger systemic (and infrastructural) changes to achieve real circularity, but hopes that studies like this can help further the journey.

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Appendix

Appendix A. Coding structure

	Code groups	Code themes	Code definitions
	<i>Aggregate dimensions</i>	<i>Second-order themes</i>	<i>First-order concepts</i>
1	THEMES	Water and sanitation	Themes of GDCF- Water and sanitation
2		Energy	Themes of GDCF- Energy
3		Food & drinks	Themes of GDCF- Food & drinks
4		Plastics	Themes of GDCF- Plastics
5		Waste (Resource efficiency)	Themes of GDCF (added)- Waste (Resource efficiency)
6		Materials (Resource efficiency)	Themes of GDCF (added)- Materials (Resource efficiency)
7		Travel & transportation	Themes of GDCF- Travel & transportation
8	ECONOMIC	Resources for change	Sustainability budget; time; staff; headspace
9		Business reality	Profit; target markets; financial sustainability (to survive for next year's editions); financial efficiency (from circular solutions); cost of innovations
10		Funding	For the festivals/innovations to run; from ticket sales; government subsidies, sponsors; sometimes specifically related to sustainability projects
11	SOCIAL	Relevance	Relevance of the solutions to wider society; replicability of a solution in several different places/scales (re: climate justice)
12		Behaviour	Demographics of visitors & staff; behavior change challenges; current vs ideal habits; subconscious decision-making; flexibility to try new things;
13		Digitalization and safety	Themes of SAIL- Digitalization and safety
14		Ethics	Can all solutions be applied everywhere equally?; Priorities, capacities, and responsibilities are different throughout the globe (and Europe); neocolonialism; Climate justice

	Code groups	Code themes	Code definitions
	<i>Aggregate dimensions</i>	<i>Second-order themes</i>	<i>First-order concepts</i>
15	GOVERNANCE	Innovation policies	Research & development; subsidies & grants to stimulate innovation
16		Sustainability policies	Incentives; institutional support; related to funding for festivals to implement solutions; circularity DNA of government
17		Communication	Internal & external communication with the right people in the municipality
18		Contracts	With suppliers; as a tool to achieve change
19		Regulations	As a barrier to scaling up; government-imposed; permits for events
20		Standards/guidelines	Set by governments to sectors (to enforce sustainability); developed by innovators through pilots
21	INNOVATION	Solutions	Pilots; innovations ; “beautiful examples”; solutions (even if they aren’t new or pilots)
22		Deepening	Learning mechanisms; development; testing & improving; lessons learned
23		Broadening	Related to open-city events (eg. SAIL, sports events); broadening to different industries
24		Scaling-up	To cities; to festival industry; institutionalization; capacity (of innovation) to handle large-scale implementation
25		Investment-ready programs	Guiding solutions through scaling-up (in municipality); connecting innovators to finance and management support
26		Criteria for selection	Of innovations to test; of solutions to implement
27		Technological / systemic	Innovations that use existing technologies in novel ways; technological capacity; flexibility of solution’s technology
28	TRANSITION	Transition	Transition paths; arguments for transition; value of festivals toward the transition
29		Societal ‘transition’ goal	A solution’s ambition to solve a persistent societal

	Code groups	Code themes	Code definitions
	<i>Aggregate dimensions</i>	<i>Second-order themes</i>	<i>First-order concepts</i>
			problem (here related to circularity)
30	STEERING	Connecting	Building a network; connecting with the right people
31		Engaging	Keeping actors engaged in process; teaching, not just showing; visibility of sustainability team within the organization; passing from thoughts and words to action (starting pilots and scaling-up)
32		Stakeholders	Relevant stakeholders; their involvement in processes; specific ones separated in ACTORS
33		Visions	Aligning visions of different stakeholders; longer-term strategies; intrinsic motivation; defining strategies and definitions
34		Collaborative intermediary organizations (CIO)	“intermediary organisations that create platforms for deliberation and collaboration between diverse stakeholders” (Hamann & April, 2013); Such as GDCF, Innofest, GROENN, Green Events
35		Knowledge sharing	Between festivals, sustainability managers, cities; stakeholders
36		Sustainability champions	Promoting sustainability in an organization; driving it outside the organization, in the sector, city, etc;
37		Front-runners	Promoting circularity ahead of the crowd; responsibility of those who can to set the example;
38		Demand-driven matchmaking	Demand-driven matchmaking process; connecting solutions to operational challenges
39	FESTIVALS	As testing grounds	Conditions necessary; why they are a good place to test; controlled environment; people's openness to trying new things;
40		As mini-city	Share same needs (themes): ability to influence city infrastructure; catalyst for change in city supplier network
41		Relationship with municipalities	Communication with municipality; a spectrum from permit-related to collaborating in projects;

	Code groups	Code themes	Code definitions
	<i>Aggregate dimensions</i>	<i>Second-order themes</i>	<i>First-order concepts</i>
			improving city's image through events; cities inspiring other cities
42		Huge reach	Huge audiences; media coverage; reputation; as an opportunity (to showcase) but also a challenge (volume of emissions)
43		Showcase	Innovation for PR; festivals as a platform for innovation; showcasing innovations so others then use them (helping to bring to the mainstream)
44	LOGISTICS	Scopes	Of what falls under their responsibility; of layout of organization; open vs. closed events
45		Data	Data collection; setting baselines; data analysis
46		Infrastructure	In cities, a barrier to scaling-up; of the innovation itself, being too bulky/complicated; physical capacity and flexibility of the innovation
47	WICKED PROBLEMS	Blurred ownership	Circularity is not just limited to one sector, so the ownership of problems, solutions and processes is blurred; it's not always clear who should drive (up-scale) a solution
48		Greenwashing	By big suppliers (like Heineken); by festivals using innovation; by government policies (that don't work in reality)
49		Climate change	CO ² emmisions; the growing threat of climate change
50		COVID	Changes/disruptions in strategies; financial and logistical repercussions; Covid measures/restrictions
51	ACTORS	Innofest	Pilot/testing CIO
52		GDCF	Connecting CIO
53		Semilla Sanitation	Innovator
54		Suppliers	As important partners, stakeholders; the responsibility they have; big companies; the innovators themselves

Appendix B. Management guidelines for transition experiments (from van den Bosch and Rotmans, 2008)

Table 3: Management guidelines for transition experiments [based on Van de Lindt and Van den Bosch, 2007]

Steering dimensions	Deepening	Broadening	Scaling up	
Success criteria	Actions aimed at learning as much as possible from the experiment in the specific context	Actions aimed at repeating the experiment in other contexts or connecting to other functions and domains	Actions aimed at embedding the experiment in dominant ways of thinking, doing and organizing	
Process				
Room in budget and planning	- allocating resources (time, money, knowledge, etc.) to an open search and learning process;	- allocating resources to interaction with other domains and partners;	- allocating resources to (early) involvement of key actors at a strategic level;	
Space in the process	- building in space for reflection on and adjustment of the vision and learning goals;	- building in space for reflection on the connection to the broader context;	- building in strategic reflection on barriers and opportunities in dominant ways of thinking, doing and organizing;	
Quality of learning process	- organizing a broad, reflexive and social learning process;	- focusing the learning process on how experiments can reinforce each other;	- focusing the learning process on how learning experiences can be embedded in dominant ways of thinking, doing and organizing;	
Supportive incentives / assessment mechanisms	- developing supportive incentives / assessment mechanisms that increase the quality of learning;	- developing supportive incentives / assessment mechanisms that stimulate interaction with other domains and partners;	- developing supportive incentives / assessment mechanisms that stimulate feeding back results to key actors at a strategic level;	
Competences of project participants	- selecting project participants with an open mind and willingness to learn;	- selecting project participants that are able to look outside the borders of their discipline and are strong 'connectors';	- selecting project participants that are able to communicate and 'anchor' project results at a strategic level;	
Strategic management	- the management guarantees that project results are related to the societal challenge;	- the management guarantees the interaction with other domains and partners;	- the management guarantees connection to key actors and developments at strategic level;	
Substance				
Connection to societal challenge	- connecting project goals explicitly to societal (transition-)goals;	- cooperating with partners and developing new partnerships to realize shared societal goals;	- adapting to sense of urgency with regard to societal challenge;	
Sustainability vision / future perspective	- project participants share a long term sustainability vision;	- developing an overarching sustainability vision to provide guidance to different experiments;	- drawing attention to the sustainability vision at a strategic level;	
System analysis (dominant culture, practices, structure in sector)	- project participants share perspective on dominant ways of thinking, doing and organizing in the sector (from which the experiment deviates);	- identifying similar experiments and potential new partners, application domains and functions;	- identifying key actors with power and willingness to influence dominant culture, practices and structure;	
Learning goals/ desired changes (innovation)	- formulating explicit learning goals with regard to desired (interrelated) changes in culture, practices and structures;	- repeating the experiment in other contexts and experimenting with new functions is part of the learning goals;	- anticipating and learning about barriers and opportunities in dominant culture, practices and structures is part of the learning goals;	
Intended results	- distinguishing results in generic and context specific;	- sharing results with other experiments and potential application domains;	- stimulating structural (regime) support and resources for results;	

Appendix C. In-depth table of Semilla Sanitation's DBS trajectory

Deepening	Broadening	Scaling-Up
Festivals ESNS (NL), 2018 (Black water) ESNS (NL), 2018 (Yellow water) DGTL (NL), 2018 (Yellow & Grey water) Into The Great Wide Open (NL), 2019 (Yellow & Grey water) DGTL (NL), 2022 (Black water) DGTL (NL), 2023 (Yellow water, Unisex urinals) Zwarte Cross (NL), 2023 (Grey water)	Open city/sports events Vierdaagse Feesten (NL), 2022 (Yellow water) Forest Green Rovers (UK), 2022 (Yellow water) Forest Green Rovers (UK), 2023 (Yellow water) VierDaagse Feesten (NL), 2023 (Unisex urinals) Olympic Games Paris (FR), 2024 SAIL Amsterdam (NL), 2024	Urban living labs Amsterdam Startup in Residence program (NL), 2018-2023 Closed-Loop Public Sanitary Facility (CLPSF) (Ghana), 2022-2024

Industry recognition	Construction	Construction
Aquatech Amsterdam (NL), 2019 - GreenPee unit & "From Waste to Taste"	Closed-Loop Concept (CLC) in residential areas (Silvolde NL), 2023 Blue City Rotterdam (NL), 2024	CLC at beach pavilion (NL), 2024
	Campsites Campsites (NL), 2022 (Grey water) Living lab Imvepi refugee settlement (Uganda), 2021	Refugee camps Imvepi Refugee Settlement (Uganda) 2021-ongoing

Appendix D. Footnotes with details about Semilla Sanitation's steering practices

Footnotes:

1. In DGTL 2018, for example, they got feedback from the Red Cross, who identified some logistical problems in using their solution in refugee camps (the hub was too big and too expensive) and they were able to adapt their solution for their original social context.
2. Partnerships like Nijhuis, the municipality of Amsterdam (through the Startup in Residence program), and governments abroad through the network of the Dutch government⁵.
3. They are working with DGTL festival and the RVO on a Circular Chain subsidy to help them overcome an end-of-waste regulatory status that is so far one of their main obstacles to scale-up.
4. They have been awarded industry recognition at Aquatech Amsterdam for their *GreenPee* solution, and met other important players at this fair
5. They explore markets abroad through the network of the Dutch government (for example, in Uganda through the Netherlands Water Partnership (NWP), in Ghana through the Netherlands Enterprise Agency (RVO) and in Paris through the trade missions organized by the Dutch embassy (*Missie Sports naar Parijs*)).
6. They are currently trying to secure longer-term contracts from GDCF festivals so that Nijhuis will finance the physical infrastructure (toilets) necessary for Semilla to scale-up.
7. Other experiments like the Cinderella urine-treatment toilet project, which has also been taking place at the Marineterrein Living Lab in Amsterdam.
8. Their goal is a fully-circular 4-system solution that can adapt to any setting, but they inevitably require some changes in standard practices in order to use it, which has lead them to unexpected obstacles (for example, the unisex urinal, which requires women to stand while they pee, and not to throw any other waste into the toilet).
9. Partnerships like the Circular Refugee Camp (CRC) consortium (a group of Dutch & Ugandan companies supported by the NWP, through which they make a part of the Imvepi project), and the Amsterdam Innovation team (which started in 2018 with the Startup in Residence program).
10. They were asked by the Amsterdam municipality to draw up a clause for contracts for public toilets that makes it possible to collect separate waste streams, with the idea that one day all these streams could be legally and systematically treated.