



D1.3 Tailored Scenario Exploration System for Circular Economy Scenarios

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Authors: Katarina Haluskova¹, Karolina Sobczak¹, Tommaso Calzonari², Abiye Tob-Ogu², David Johnny Peres³, David Soto Oñate⁴, Brais Suárez Eiroa⁴, Aitor Alonso Rodríguez⁴, Josep Pinyol Alberich⁵

¹ABIS, The Academy of Business in Society, Brussels, Belgium

²Management School, University of Sheffield, Sheffield, UK

³University of Catania, Department of Civil Engineering and Architecture

⁴Post-growth Innovation Lab, Universidade de Vigo, Pontevedra, Spain

⁵Ramboll Management Consulting



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1. Introduction

Both in Circular Economy (CE) literature and practice, there is common agreement that the transition towards CE could foster more sustainable futures. However, there is a lack of discussion about how a truly (viable, feasible, and desirable) circular economic system should be organised. Most of the current literature on CE fails to recognise this, presenting the transition towards a CE as a straightforward, neutral, and apolitical process, implicitly characterised by a techno-optimistic and eco-modernist stance (Genovese and Pansera, 2021; Bauwens et al., 2020). In practice, most CE work is currently conducted at practical and technical levels, mostly focusing on material and energy flows. Against this backdrop, the ExPliCit project aims to reconsider and reconstruct the vision and implementation of CE, looking at a plurality of plausible CE futures, involving a wide set of stakeholders and discussing implications in terms of organisation of production and distribution networks.

An important (and under researched) ally in this endeavour are Techniques of Futuring¹ (ToFs), which can help to examine the complex interplay of economic, environmental, and social factors within the CE, fostering a holistic understanding of its transformative potential. By leveraging the insights and knowledge generated through ToFs, individuals, organisations, and societies can explore different alternatives and develop strategies towards the most desired futures.

There is a variety of ToFs available, that can be used in the CE context to explore future landscapes characterised by different ideas beyond conventional predictions. Pinyol Alberich et al., 2023 provide an extensive overview of various techniques employed in *futures* research and classify them according to 4 relevant categories: *paradigm shift* (the extent to which ToFs enable us to envision evolutionary or revolutionary futures), *method* (qualitative, quantitative or mixed), *control* (their objective in terms of adapting to or shaping the future), and *participation* (the audience involved, ranging from expert-driven, including relevant stakeholders or the wider public). Suárez Eiroa et al. (2024, forthcoming) go further by expanding the concept and use of ToFs as *dynamic tools capable of nurturing innovation, resilience, and sustainable practices within the CE*. They also identify scenario-based planning and role-playing as ToFs offering the widest scope for exploring CE future i.e. they allow to explore both the current scenario and alternative scenarios.

In light of this, the Scenario Exploration System (SES) - a serious gaming and foresight tool that helps participants to engage, explore and understand futures in less than 3 hours – is uniquely positioned to help meet the objectives of the ExPliCit project by envisioning and exploring alternative visions of circularity. The SES can in fact be considered as a mix of ToFs - scenario-based planning, interactive scenarios and role playing -, all characterized by a high paradigm shift, qualitative approach, and involvement of stakeholders (the tool also allows for engagement of a wider audience depending on the context, scope and issue addressed).

¹ Techniques of Futuring (ToF) is the word selected by Hajer & Pelzer (2018) to refer to transdisciplinary experiments from different contexts that enable the envisioning of alternative models of economic and social development, hence, suggesting alternative imaginations of the future (Pinyol Alberich et al., 2023).

While employing the SES on its own does not enable a particular future nor actualizes a specific set of actions (it is based on ToFs with the highest level of control), the scenario building process behind the tool as well as the dynamic, participatory SES experience provide a wealth of knowledge, insights and inspiration that can challenge dominant ways of thinking and bring about transformative actions within the CE and beyond.

This deliverable presents the tailored version of the Scenario Exploration System to Circular Economy. The tool will be further used in the organisation of SES workshops, run in different locations, to engage the ExPliCit consortium members and supply chain stakeholders in systemic and long-term thinking while exploring the identified, alternative CE future scenarios. A second round of workshops will be explicitly focused on supply chain configurations linked to the identified futures. The SES will be also freely available and accessible for broader use by the wider public under a Creative Commons licence.

This document presents the concept, origins and aims of the Scenario Exploration System (Section 2), the Circular Economy Scenarios developed by the ExPliCit team and employed in the tailored version of the SES (Section 3) and lastly, the Circular Economy SES booklet, containing all the elements and explanations which can be used by any group and organization interested in exploring circular economy futures (Section 4).

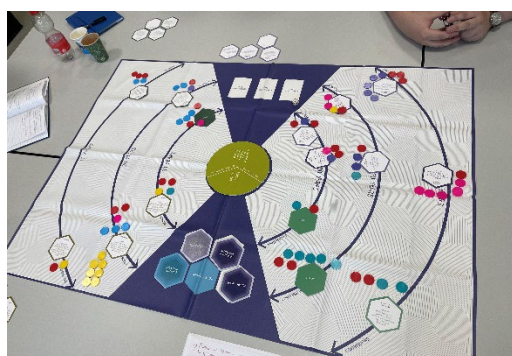
2. The Scenario Exploration System so far

The SES is an interactive foresight serious game - in the form of a board game - that was developed by the European Commission's Joint Research Centre (JRC) to facilitate the practical use of scenarios from foresight studies (Bontoux et al., 2016). The original motivation behind the creation of this tool was to create a platform through which EU policymakers and other stakeholders could explore and engage with scenarios in a quick and interactive process making it easier to apply foresight to policymaking. The game was designed to enable participants to develop a long-term perspective and consider vision and strategies of different stakeholders, including policymakers at different governance levels, business and civil society representatives and the general public.

As an engagement platform, the SES helps to imagine plausible futures, to understand what opportunities and challenges lie ahead and what they could mean for individuals, organizations and society. Ultimately, it encourages to think and experiment with what decisions need to be taken in order to shape the future we want.

Over the years, the tool has proved to have a wide range of applications that appeal to diverse audiences ranging from EU policymakers, civil society and business representatives, academics and university students. It was played in different institutional settings with participants from all around the world with a variety of purposes, including awareness raising, educational purposes, increasing preparedness, strategy development or anticipatory governance.

Illustration 1. Use of Scenario Exploration System by ABIS



Several adaptations have been developed by the JRC as well as by external partner organisations and independent third parties. Since the development of the SES on Sustainable Lifestyles for the [EU InnovatE project](#), ABIS – The Academy of Business in Society, a member of the ExPliCit consortium, has organized over 30 SES workshops across 10 countries and has developed significant expertise in using the tool, facilitating workshops as well as adapting and developing new versions.

The Circular Economy SES is a newly developed edition based on four scenarios built via a foresight exercise within the ExPliCit project. After a series of SES workshops and several follow up briefings led by ABIS, that aimed to make the project team experience the game and understand the SES platform, a team of core experts - including SES practitioners and academic researchers in the field of circular economy - built four alternative scenarios for the Circular Economy in 2050. The following section describes the scenario building methodology and process followed.

3. Circular Economy Scenarios

Methodology

The development of scenarios is a central approach in foresight and future studies, and a common objective among the most known and widely used ToFs. Scenario-based planning,

for instance, are one of the most frequent ToFs used within CE literature (Suárez Eiroa et al., 2024, forthcoming). As mentioned in the previous sections, scenarios are also an essential feature of the SES. Therefore, a scenario building approach was chosen to define alternative CE futures.

The process was adapted from the scenario building methodology presented by the Institute for Futures Research of the University of Stellenbosch in their “Workshop on Scenario Planning” in August 2021. The methodology is based on the 2×2 scenario matrix method, an established method combining scenario based-planning and GBN matrix (Pinyol Alberich et al., 2023; Smith and Saritas, 2011; van Asselt et al., 2012):

- Scenario-based planning involves “creating multiple scenarios to explore and understand future possibilities. These scenarios combine creativity with analytical methods to provide diverse perspectives. Constructing four to eight scenarios is typically recommended for a manageable yet comprehensive set. [It] helps decision-makers navigate uncertainty, explore alternative futures, and develop adaptable strategies” (Pinyol Alberich et al., 2023, p. 22)
- The GBN matrix is a ToF that “uses two dimensions of uncertainty to create a matrix with four cells. Each cell represents a different combination of uncertainties and offers a plausible future scenario with its own internal logic. These scenarios are then further developed and discussed to understand their implications for the focal issue or decision at hand. The GBN matrix is widely utilized for exploring alternative futures and their potential impact” (Pinyol Alberich et al., 2023, p. 26)

Figure 1 represents the steps of the scenario building process followed.

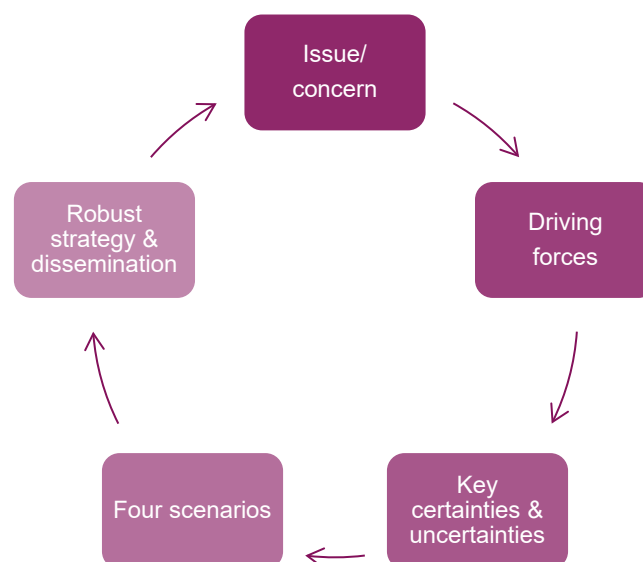


Fig. 1. Steps of a scenario creation process (adapted from Roux, 2021)

The first step aims to clearly define the issue of concern for which possible future trajectories are to be developed. The next step involves identifying the underlying drivers of change (or driving forces) for the issue considered, and especially the two with the most uncertain and greatest potential impact over the time horizon considered. These two drivers also need to be

mutually independent. The intersection between the two most uncertain yet impactful drivers of change, represented by two axes, defines four distinct scenarios, which are then developed into scenario narratives. The scenarios depict multiple, plausible and alternative combinations of developments of a system.

Using a 2 × 2 scenario matrix produces a clear structure that is easy to communicate, allows the comparison among the scenarios and facilitates a deep understanding of the logic of various possible future developments.

Drawing on the goals of the project, the issue of concern pertains to circular economy futures (step 1). Next, we searched for driving forces likely to influence the pace and the direction of a transition towards CE (step 2). We included dimensions from existing academic literature on

Driving forces from existing literature	New suggested driving forces
• Governance (with extremes top-down – bottom up) • Technology (with extremes high-tech – low-tech) • Innovation (with extremes market-based - convivial) • Business models (ranging from classic long-life models to sufficiency-based models) • Scale of production (with extremes small/local -large/global)	• Access/Ownership of final goods (with extremes collective - private) • Property of means of production (with extremes collective - private) • Limits to economic growth based on ecological boundaries (with extremes unrestricted - restricted)

Table 1. Driving forces influencing circular economy developments

CE scenarios (e.g. Bauwens et al., 2021) as well as new, previously underexamined dimensions challenging the underlying relations of production and distribution implied by existing CE scenarios (Lowe and Genovese, 2022; Calisto Friant et al, 2020; Genovese and Pansera, 2021). These are listed in Table 1.

The two top high impact-high uncertainty factors identified to define the axes (Step 3) are, on one hand, the type and structure of governance in a CE and, on the other hand, the existence or not of limiting institutions to economic scale based on ecological boundaries.

1. Type and structure of governance, with extremes “Centralized, Top-down society” vs “Decentralized, bottom-up society”

In a centralized, top-down society, economic activity is concentrated in few hands, be it the state or a few large corporations. They hold decision-making power and will lead the transition to circularity. Information and command flow vertically, with less powerful actors having little to say nor autonomy to decide on transitional matters. The state exercises control over the most important resources or establishes very restrictive regulations on their use. Due to the scale of the actors of change, most loops occur within the range of control of the state or large corporation, restructuring the production process in a command-and-control fashion. Strict obligations are imposed on consumers who just accept/obey/act according to the established terms. Low-scale

actors (like households or local administrations) might perform small loops but are separated from the main decision-making on the transition.

In contrast, in a bottom-up society, economic activity is dispersed across low-scale actors and territories with a wide range of autonomy. They are the actors of change, guiding and structuring the circular transition. Although there is a set of overarching public institutions, society self-governs through patterns of coordination, competition, and conflict resolution. Circular structures occur within the range of control of small-scale actors or within loops built along with others. Market exchanges assist to loop certain elements, but huge efforts in horizontal coordination among actors and/or federal structures might be needed to circularize the economy.

2. Existence or not of limiting institutions to economic scale based on any identified ecological boundaries, with extremes “Growth-based society” vs “Limits-to-growth society”

Both extremes recognize the undesirability of environmental degradation and attempt to establish a CE, but a growth-based society maintains the fundamental objective of economic growth. It might try to decouple economic growth from material and energy throughput, but the existence of environmental concerns does not necessarily entail limits to economic growth.

In contrast, a “limits-to-growth” society aims to decouple the flourishing of societies from economic growth, as it considers it unlikely that technological or organizational transformations will permit endless economic growth within planetary boundaries. It questions the indefinite recycling of materials, the existence of perfectly clean technologies allowing for endless growth, and the replaceability of ecosystem services by human-made capital. This society establishes limits to the scale of economic activities, allocates scarce resources and eases the social transition to a steady state economy.

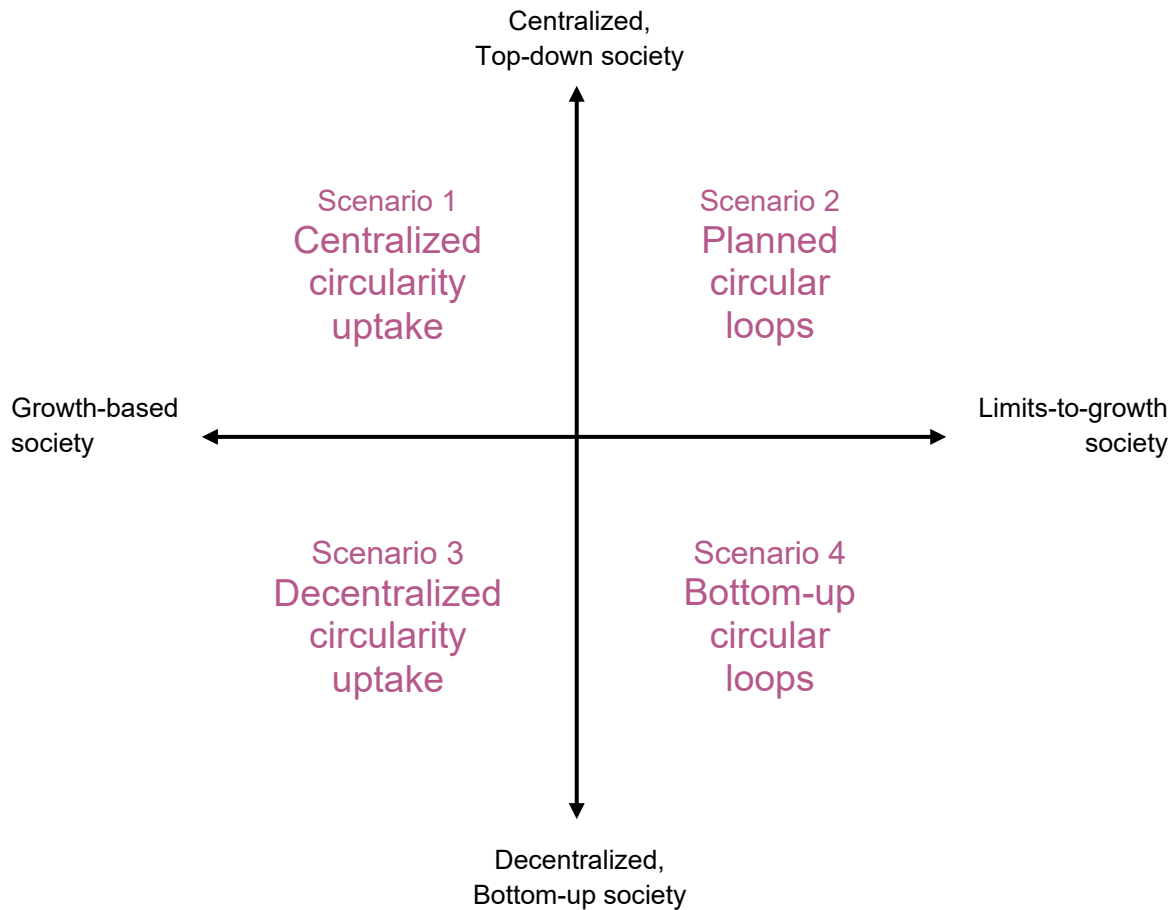


Fig. 2. Circular Economy Scenarios (source: constructed by authors)

The crossing of the axes based on the identified driving forces results in the identification of four scenarios (step 4) represented in Figure 2:

- **Scenario 1: Centralized circularity uptake**, characterized by concentrated economic activity in large private and public entities as well as unrestricted growth under top-down governance;
- **Scenario 2: Planned circularity loops**, characterized by concentrated economic activity in large private and public entities as well as strict limits to growth under top-down governance;
- **Scenario 3: Decentralized circularity uptake**, characterized by unrestricted growth under a very dispersed economy structured and governed bottom-up;
- **Scenario 4: Localized Circularity**, characterized by strict limits to growth in a very dispersed economy structured and governed bottom-up.

In all scenarios:

- societies depart from business as usual. We imagine European mixed economies and key jurisdictions being nation-states;
- societies know that environmental degradation is undesirable, so they will try to circularize the economy;

- circularity is achieved, but it is guided by different meanings that entail different outcomes across social and environmental realms.

Four authors then developed a narrative for each scenario using an iterative approach. These narratives were then critically assessed by the other co-authors to check for consistency and unsound arguments and mitigate any biases leveraging the collective intelligence. The final versions of the scenario narratives are presented in the following section: first, an overview is provided, and then developments in three successive decades are described.

These narratives constitute an integral part of the Circular Economy Scenario Exploration System developed by the authors and presented in section 4. In particular, two core elements of the tool - the scenario discs and the scenario detail cards – were extracted from these scenario narratives. The new adaptation was performed by a core team of authors and then reviewed by the rest of the ExPliCit team and will be tested before utilization in the planned SES workshops within the project (step 5).

Scenario narratives

All scenarios begin in a context of environmental degradation, drought and water scarcity, causing profound social damage. Governments level of action on climate change does not match the warnings of scientists. Legislation keeps focusing on influencing consumer demand towards more sustainable products and the advancement of voluntary circular practices. Growing social discontent threatens the legitimacy of existing social systems and raises hopes for new grassroots political movements and collective agreements capable of addressing environmental and social challenges. Societies have heightened concerns about new technologies and Artificial Intelligence as drivers of most industry strategies.

Scenario 1: Centralized circularity uptake

Overview

In this scenario, the state and large corporations are in a coalition to promote circular innovations and technical fixes to linear production and consumption systems. Through these fixes they aim to increase economic growth, while trying at the same time to decouple economic growth from environmental impact, but only from specific elements (GHG emissions mainly). In this scenario, most decisions are made at the large-scale level since the economic activity is very concentrated in few actors: the state and large corporations. These few actors control specific strategic resources (e.g. critical raw materials for green technologies, Artificial Intelligence powered infrastructure to fuel global logistics flows) and govern and plan products and material flows. This also sparks some geopolitical conflicts among different countries that defend the interests of their national corporations. Because of the influence of large corporations, governments do not put in place hard restrictions on fossil fuels or polluting products, just some compensations for some externalities (carbon cap and trade, Extended Producer Responsibility programs and right to repair regulations). Also, governments, and not corporations, make the necessary large investments for the recycling and energy recovery infrastructure. The type of CE promoted preserves the status quo within the economic system

and is mainly based on improving efficiency through massive recycling and energy recovery plants and using recycled materials instead of primary ones. Corporations use AI bots and personalised advertisements to push citizens to consume ever growing quantities of environmentally friendly and circular commodities for newly created needs. Global supply chains deliver products very fast and are constantly optimised by very advanced technological infrastructure, which deals also with recovering them at the end of their short life to fuel “circular” but unsustainable supply chains. There is no control on planned obsolescence, which is actually used as a tool to fuel economic growth. Despite GHG emissions being partially decoupled from economic growth, this does not happen for most of the other impacts and ecological boundaries. As a consequence, there are worsening effects of the ecological crises, which put human existence at risk.

During the first decade, the population faces the challenge of limited water availability, triggering a surge in environmental activism protests targeting oil companies and banks. Significant advancements in technologies like Artificial Intelligence, Machine Learning, and 3D Printing begin to reshape production and work methods, guiding a phase of dynamic experimentation. This revolution favours the entry of new influential tech companies into the market, reshaping its landscape. Amid this shift, workers and unions rally against the perceived 'dehumanisation' of work, raising ethical concerns. The evolution of work triggers debates over pay and ethics, especially concerning the widespread integration of automation into production processes. To address this, some hurried legislation increases the responsibilities of manufacturers.

Resource scarcity increases prices which makes tensions between nations grow. Nations adopt protectionist measures to help their large companies be more competitive. This partially encourages the use of alternative resources and triggers technological innovation toward more efficient production processes. When markets do not work well, the state intervenes by providing incentives toward the transition, for instance, introducing eco-taxes on carbon and subsidies towards recycled materials, laws on carbon cap and trade and repair policies and/or obligate to take responsibility for their waste (Extended Producer Responsibility).

Within the CE dimension, governments create regulations that oblige firms to offer the possibility of repairing products or oblige them to take responsibility for their waste (Extended Producer Responsibility, for instance). Despite progress, large corporations keep exploiting gaps to avoid accountability where feasible (tax heavens); also, pollution and environmental damage are still not part of market transactions and product prices.

The agricultural sector faces production limitations tied to water scarcity, resulting in elevated food prices and subsequent socio-economic challenges. As countries importing food gain more influence over drought-affected regions, geopolitical dynamics shift. States adopt a stance that economic growth is the key solution to the climate crisis. They invest in education and drive public communication efforts to disseminate political messages revolving around economic advancement and social progress. States take the lead in funding the establishment of recycling facilities as well as climate technology projects such as sunlight mirroring, carbon capture, nuclear plants, and desalination facilities to address water scarcity.

After two decades, geopolitical conflicts expand, and world powers wage some wars to secure key critical raw materials (in Morocco for phosphorus and in Chile for copper) for the transition towards “greener” economies.

Governments’ laws on carbon cap and trade and Extended Producer Responsibility have positive but limited impacts. Corporations find ways to keep polluting by trading carbon emissions, paying a price to an organisation that is in charge of collecting waste and distributing it to recycling companies. Right-to-repair policies incentivise a centralisation of repair in the hands of manufacturers, meaning that there are huge hidden costs of production, linked with increasing consumption of cheap products made of recycled materials.

A new wave of AI technology giants emerges, establishing even more control over society and citizens compared to Amazon, Meta, and Microsoft. These entities have the ability to acquire key technologies developed in previous decades and operationalise super-efficient global supply chains that incorporate recycling facilities, AI infrastructure and modern transports innovations, as well as a fully automated workforce. To address these shifts, initial taxes are levied within carbon markets and on mined materials. Recycled materials become the norm and for the first time the amount of primary materials extracted from mines decreases.

The other side of the coin is that they also establish a system of “Surveillance Capitalism”, where data-driven insights are exploited to manipulate consumers’ behaviours and buying decisions. Collaborations are formed to create technologies that shape consumption patterns, channelling behaviours and purchasing choices of citizens. Large corporations employ personal assistants and AI bots to nudge people towards embracing circular products for new needs. The consumerist and materialistic lifestyle prevalent in the Global North extends its dominance to the Global South, leading to detrimental environmental consequences. Earth Overshoot Day advances to January 30th.

Of course, efficiency gains are not effective in decoupling production from environmental harm, because of the huge rebound effect of increased global consumption. Decoupling is successful only on some of indicators (GHG emissions), and not in others. Small businesses struggle in the face of limited competitive opportunities. Governments respond by increasing taxation for organisations and implementing a basic income scheme. The primary objective is to maintain steady demand for output. While SMEs bear the brunt of increased taxes, large corporations seize the opportunity to acquire struggling SMEs unable to automate their supply chains and compete.

After three decades, the state and major tech giants control every key resource and key technology, resulting in a complete convergence of industry and state power. Planned obsolescence of products is harnessed to intensify the frequency of circular loops, emphasising recycling and recovery. Corporations produce ever growing quantities of products that are made with recycled materials but have shorter life cycles. Automatised end of life recovery systems unlock very efficient reverse supply chains that inspect every product that is discarded and automatically disassemble it into the different components and materials, fuelling the existing recycle and recovery systems.

This period witnesses the full integration of global production and distribution systems, characterised by outsourcing and specialisation. The wars of the previous decade produced

more colonial relationships with China and the US controlling weaker countries under threats. The Global South and poorer areas of the world also specialise in recycling the waste generated by the Global North and more affluent countries.

Governments globally converge on compensation mechanisms for externalities and the creation of a worldwide carbon market. The absence of throughput limits has catastrophic effects on material scarcity and environmental deterioration. The lack of competition halts technological advancement, while states grapple with astronomical costs associated with climate change. Scientists predict catastrophic effects due to climate change.

Average households, in their roles as consumers, citizens, and workers, mostly abide by public laws and internal directives issued by corporations. These entities have gained unprecedented predictive and manipulative capabilities, effectively shaping individuals' actions.

Corporations use part of their accumulated resources to build Welfare states through corporate social responsibility (CSR) initiatives, albeit with the condition that access to these benefits requires substantial engagement within their metaverse. This era witnesses an accentuation of income inequalities and the commodification of various aspects of life. To establish equilibrium in resource usage, a resource balance scheme is introduced. Citizens are incentivized to earn extra income through recycling, reusing, repairing, and repurposing, with reducing and refusing behaviours not being taken into account. A purposeful policy of reverse migration is orchestrated, with citizens offered lump sum payments to relocate to other continents upon reaching a certain age.

Scenario 2: Planned circular loops

Overview

In this scenario, a collaboration between states, major corporations, and the UN leads to the establishment of limits to growth society. The system is centred around throughput rights, and aims to ensure human activities remain within safe ecological limits, and also that no one is left behind. This transformation occurs gradually and employs an authoritarian approach, placing ecological boundaries and equity at the forefront over private profits. Over time, traditional markets give way to a more technocratic and scientifically guided economic framework focused on socially desirable throughput (authoritarian environmentalism). The Circular Economy is an integral part of this paradigm shift, prompting a radical rethinking of production and consumption. Product-as-a-service models and the sharing economy proliferate. Products reach their end of life within local spheres, under the control of decentralised divisions of large corporations. This localised control contributes to resource conservation at heightened levels. Large corporations retain ownership of products while leasing them to consumers, resulting in earnings through user fees. Citizens do not own smartphones, computers, cars, and appliances and develop a new form of dependence on these large corporations that provide these essential items. Strategic materials, pivotal to these products, evolve into a novel form of capital for these corporations and nations. As a consequence of these evolving strategies, supply chains undergo a transformation, shifting towards more localised structures due to the escalating costs associated with global supply chains. A notable feature of this system is the imposition of high taxes. These taxes serve a

dual purpose: firstly, to finance a universal basic income, and secondly, to guide consumers towards non-detrimental products and services. The outcome is a society that is less free, more constrained but more equitable.

During the first decade, younger generations initiate more radical lifestyle shifts, employing very effective boycott campaigns of linear products (for example fast fashion) on social media platforms. Also, massive environmental activism protests emerge, accompanied by a rise in instances of climate-related terrorism, leading to the targeted destruction of oil pipelines, mining machines and logistics infrastructures across the globe.

In response to these wake-up calls, the UN establishes a novel decision-making body: a panel of eminent scientists is tasked with formulating comprehensive top-down policies aimed at mitigating climate change effectively, integrating also the concept of equity. This approach leans toward technocracy and there is a growing favouritism toward enhanced economic planning.

As these dynamics unfold, a first wave of taxes and prohibitions is imposed on international trade, in an uncoordinated manner, resulting in a surge of protectionist measures. The traditional global supply chains struggle with issues stemming from these disruptions and recycling locally becomes a strategy to face these disruptions. Both local and international suppliers have to deal with redundancy as their products lose relevance.

The workforce confronts substantial job cuts attributed to a combination of technological advancements and production limitations. Businesses are compelled to undertake profound transitions, necessitating an extensive overhaul of their infrastructural setup. This includes the downsizing of factories and an overall reduction in operational capacity. The answers of countries is to re-establish some social security funds similar to COVID era and also to organise massive requalification programs.

After two decades, Nation-states agree to delegate a portion of their decision-making authority as a response to climate emergency and social unrest. In line with UN guidelines, stringent restrictions and bans on production and throughput are systematically enforced by law. States are incentivised to place the respect of ecological boundaries at the heart of their economic strategies. Consequently, consumption in the Global North begins to contract.

In the Global South, substantial reparation funds are received from the Global North. Parallel to the UN's scientific committee, an autonomous reparation committee is established to determine the allocation of these funds. However, after enduring decades of influence and pressure from the Global North, as well as grappling with issues of corruption and wealth concentration, countries in the Global South have formulated a profoundly progressive economic development plan that surpasses even the ambitions of their counterparts in the North.

In general, in a bid to foster self-reliance, governments incentivise state-owned enterprises to relocate production domestically, implementing self-sufficiency policies. Large corporations adapt to the altered stringent regulatory landscape and the impediments to global movement: they curtail rapid product obsolescence and expand their Product-as-a-Service (PaaS) models, which prove to be profitable. Large corporations retain control of products in this

context. The same firms also establish remanufacturing plants. These new production systems are supported by more local and responsive supply chains, developed in the previous decade.

A shift is observed as individuals predominantly consume services rather than owning products, necessitating payments of fees to retain access. Social shaming becomes common towards those who own products and do not adapt to the change. Simultaneously, a large-scale acquisition initiative is rolled out to absorb small and medium-sized enterprises (SMEs), which struggle to keep up with restriction and additional costs. This makes it easier for states and regional authorities to plan the economies and reduce waste.

After three decades, international agreements on throughput rights allocation are finally signed. This framework includes stringent limitations on production for each country, including what can be produced and the quantity. This system works through licences based on equitable criteria to recalibrate domestic ecological footprints and production systems. These measures extend to various facets, encompassing greenhouse gas emissions, water consumption, land use changes, and more. Under the umbrella of these agreements, companies are closely supervised not to exploit tax or ecological heavens (spaces once used to perpetuate uncompensated environmental externalities like carbon leakage and offshore pollution).

The decision-making realm is within the domains of states and major corporations, orchestrated from the top down. This amalgamation of power characterises the essence of authoritarian environmentalism. Economic concentration is fostered, which also facilitates economic planning.

Carbon emissions are now accounted for at the consumption points, advocating for reduced consumption through education and promoting radical Circular Economy practices, fostering a renewed appreciation for sustainability and increasing self-sufficiency. As a result, industries embrace more localised supply chains.

Citizens find themselves subjected to an intricate web of control and enforcement mechanisms, ranging from public use of private data previously protected by privacy, to social shaming in communities against those who do not adopt socially accepted behaviours. The consumption of meat, for example, undergoes meticulous regulation. To enforce socially responsible conduct, rigorous restrictions and bans are directed at those who fail to uphold communal norms. Initiatives span from proper household waste separation and water conservation measures to the outright prohibition of high-pollution activities. Legislation also addresses planned obsolescence, placing restrictions on minimum usage periods and lifetime designs to minimise waste. Even autonomous or community-based solutions for repairing become illegal, partly due to concerns about potential environmental impacts and quality requirements. The whole set of CE activities (remanufacturing and repair) have to be taken care of by law by companies.

In parallel, legislative measures are implemented to manage population growth by controlling birth rates, particularly in the wake of full automation across most industries. This transformative landscape gives rise to a novel payment system related to the 6Rs - Reduce, Reuse, Recycle, Remanufacture, Repair, and Rethink - as an alternative to traditional work-based compensation structures.

Scenario 3: Decentralized circularity uptake

Overview

In this scenario, although environmental limits are recognised, there are no strict constraints imposed on throughput or ecologically responsible restrictions on economic activities. The state opts for mild regulations aimed at altering demand through measures like subsidies and eco-taxes, and hopes companies develop cleaner and circular innovations and technologies. Circular Economy is interpreted as a system that retains essential materials and energy within their economic domain and is motivated by concerns regarding supply security and social efficiency, which considers the costs of waste and the direct impacts of pollution on various stakeholders. Societies are increasingly resisting the dominance of large corporations, which have benefited an exaggerated share of economic benefits and profits within the financial and economic sectors, also managing to circumvent taxes for an extended period by utilising offshore tax havens. Social movements claim back the ownership of personal data tech companies have been using to accrue their power. After implementing targeted economic measures aimed at reestablishing local competition and countering the dominance of large corporations, economic activity becomes significantly more diffused throughout society and decentralised within various organisations. This shift away from large corporations' hegemony not only restores more market freedom but also reinvigorates the overall economy's capacity for innovation. Despite facing significant organisational transaction costs, small-scale actors play a pivotal role in driving change. The processes of commodification continue to explore fresh avenues for economic growth. Circular business models become increasingly prevalent, often facilitated by government incentives. However, smaller organisations often lack the economies of scale enjoyed by larger counterparts, resulting in reduced efficiency. Coordination challenges persist, especially for larger circular initiatives. In the long term, this system struggles to prevent environmental degradation, which adversely affects overall human well-being. Many negative externalities remain unaddressed, as inexpensive transportation encourages long, global supply chains involving numerous actors.

During the first decade, the evolving nature of work sparks intense debates surrounding the increasing adoption of automation across production processes, as well as pay and ethics. Workers and labour unions protest against what they perceive as the 'dehumanisation' of work. Citizens also raise questions on the ownership and utilisation of data by major tech companies. Simultaneously, apprehensions arise regarding the dissemination of biased information to the public and the freedom of press.

Entrepreneurship is vibrant - new start-ups, new businesses emerge and create new business cases through the employment of new technologies (AI, Machine learning, Blockchain). While consumption continues to rise, wages remain stagnant, compelling small social businesses to step in and create affordable welfare solutions. Local artisans and trade associations introduce specialised pension plans, and communities delve into remote healthcare service options. Protests and riots erupt due to limited water availability, rallying support for climate change activists. Farmers collaborate to seek remedies for water scarcity issues, while displaced workers come together in associations to explore converting businesses into more profitable ventures.

Businesses are concerned about the financial implications of reengineering their processes for sustainability and data security. In response, the EU introduces a new package aimed at fostering more equitable markets and curbing the influence and hegemony of major corporations. To fund the transition to alternative manufacturing, a 3% tax is introduced for five years, applicable to both organisations and individuals. Concurrently, governments seek to enhance peaceful cooperation with other countries. As a significant shift, representatives of fossil fuel companies are excluded from the UN Climate Change Conference (COP), with governments increasingly prioritising the interests of smaller organisations. Communities advocate for collaborative local initiatives, albeit with a cautious eye on costs and implications for craftsmanship. Scientists intensify their quest for less water-intensive farming techniques.

However, public authorities lack incentives to enforce ecologically responsible restrictions on activities that could hinder economic growth, raising questions about the system's ability to prevent long-term environmental degradation. Despite the proliferation of innovative technologies, opportunities for circularity remain underexploited. This is largely attributed to the high costs associated with establishing extensive circular loops, and the contentious debate between government and private businesses regarding responsibility.

After two decades, governments are grappling with the complex task of financing the transition to a more sustainable economy while balancing current costs and supporting businesses in their transformation.

To address the challenges posed by this evolving environment, communities have taken proactive steps. They have established health and income schemes funded by local workers and residents, although this poses greater challenges in economically disadvantaged neighbourhoods. Communities have also implemented education programs to develop automation skills at the local level, helping to mitigate unemployment issues and promoting youth and women entrepreneurship. Moreover, they have adapted technology to cater to their diverse populations, reducing conflicts between demographics and improving access to remote healthcare services.

More stakeholders advocate for an inclusive and environmentally conscious approach to economic and social policies. The prevailing opinion is to grant healthy competition while ensuring equitable regulations that account for all negative externalities. A great resistance to economic monopolies and external impositions is becoming prevalent. Communities are asserting their authority to shape more robust policies that not only redistribute unproductive resources to younger generations but also foster the realisation of innovative ideas. Start-ups are now the primary object of private and public funding, facilitated by very advanced support systems that can predict their success rate and by crowdfunding initiatives. Furthermore, there is a trend of reallocating sizable spaces from influential entities, such as the church, to communities. In this evolving landscape, competition still prevails, but it is guided by equitable rules.

The state introduces an inheritance tax to create a large CE fund with the objective of funding CE businesses. Ethical concerns regarding the accountability of AI and 3D printing innovators have intensified, including cases of faults, economic sabotage, and monitoring. The state

invests in systems that grant the traceability of supply chains. This is a condition to helping markets to work better and promote green innovation.

After three decades, the new CE fund gives some results. Many of the founded solutions help building more transparent supply chains and help policy makers design more effective taxation, in such a way it is granted to pay for externalities and pollution. Circular business models become more and more common. Community crowdfunding supports social enterprises and local cooperatives, which find new ways of becoming part of the supply chains of new products, for example 3D printing. Policies also promote patronage, revamp local health systems with an emphasis on local treatments, and establish regional schemes to support the elderly. These communities are prioritising environmental activities, linking pay to environmental performance, and actively engaging in social education and recycling efforts.

However, in the long run, sustaining sustainability remains challenging. Circularity primarily occurs when private organisations find it profitable or when the state intervenes for strategic resource security or to prevent immediate social damage from environmental degradation. This lack of exploitation of sustainable circular opportunities persists because only individually profitable loops are materialised without legal restrictions or demand pressures. Large potential loops are costly to build, and the push for growth dilutes the sustainability gains achieved through resource recycling. The maintenance of sustainability within these limits remains uncertain.

GDP is at its highest ever and there is significant propaganda about community resettlements to cope with the surging population and consumption. Severe climate change consequences are forcing communities to relocate, exacerbated by external immigration, which is driving consumption and affecting the quality of life in parts of Europe. There are still huge inequalities between Global North and Global South. However, financial actors find more and more profitable investing in African megalopolis, which now are vibrant economic centres, at the forefront of innovation and youth entrepreneurship. Overall, there are still a lot of problems coming from differences between peripheries and urban centres.

Synthetic meat production has led to a new disease outbreak, increasing criminality as the program for eco-anxiety has not completely resolved the issue. Businesses are advertising the benefits of raising a family on social media, contrasting the demographic recession. The pandemic is resolved by reintroducing natural meat consumption from foreign countries, and pharmaceutical companies cooperate to discover a cure for eco-anxiety.

Scenario 4: Bottom-up circular loops

Overview

In this scenario, citizens become increasingly aware that growing consumption is the source of many current and future problems and does not lead to happiness. Consequently, they demand for the establishment of a sufficiency-based system that ensures economic activity remains within the boundaries of the ecosystem while providing sufficient living conditions for all. GDP ceases to be a measure of progress, initiating a reverse commodification process aimed at fostering more convivial societies. The economic activity is very dispersed, and the agents of change are low-scale actors and new local communities autonomous organisations

that emerge and are attentive to levels of sufficiency and ecological and social respect. These organisations autonomously decide what to produce and use circularity as a tool to lead to sufficiency, where “refuse, reduce, and rethink” strategies are prioritised over recycling strategies. Local jurisdictions self-organise and self-impose a maximum resource usage (for every limited resource) through a fair share calculation supported by scientists and youth organisations. Also, Circularity is not only understood in energy-material terms, as it includes biogeochemical cycles in connection to economic-based cycles, as well as care cycles (people caring among them and valuing care in society) or power cycles (through the distribution of power, i.e. the committee) and wealth, income and capital cycles. Supply chains are shortened and within a proximate range to the consumption locations. Production systems in the long term adapt to the available resources nearby. The loops are established from the micro and, especially, the meso level, which implies greater self-structuring needs (figuring out how to identify circularity opportunities, how to build functional agreements, how to share resources and with whom, how to reach agreements and enforce them). After some initial difficulties, during which coordination challenges cause waste and unemployment, there is a prevalent trend toward federalism and democratic practices, leading to the proliferation of models and alliances rather than hierarchical scaling-up organisations. These developments emphasise collaborative efforts over market-driven transactions, shaping a transformative landscape rooted in sufficiency and ecological harmony. Some CE committees (meso-level governance structures) assume responsibility for these functions at regional levels.

During the first decade, extreme forms of activism emerge, targeting the symbols of capitalism. Oil and gas pipelines are systematically blown up worldwide by activists. In parallel, many lawsuits find oil companies responsible for lying about the dangers of fossil fuels for decades and oblige them to pay municipalities for the damages. As a reaction, governments take substantial measures: making offshore companies illegal and cracking down on large corporations to prevent tax evasion.

Moreover, many countries abandon GDP as a measure of economic performance. The Global North stops promoting further globalisation, specialisation, which are viewed by people as forms of colonialism. Consequently, poorer states are no longer pressured by financial markets and global institutions like the IMF and World Bank, and gain greater autonomy in determining how to allocate their finances.

Many governments incentivise the transition to a circular economy founded on sufficiency, enhancing economic resilience. Communities lead negotiations for establishing environmentally driven consumption, fostering cooperation between citizens and businesses to reshape demand dynamics.

However, this shift results at first in additional costs for businesses and reduced state income, impacting local economies and leading to job cuts in various sectors. For-profit businesses face a significant transition, necessitating changes in infrastructure, including downsizing factories and overall capacity due to demand-driven limitations. Workers face substantial job losses stemming from a combination of technological efficiencies, cost considerations, capacity constraints, and demand restrictions. Suppliers, both within and outside the EU, grapple with the redundancy of their outputs, while large companies experience Bullwhip effects due to localised demand regulation. Cyclical production chains pivot towards proximity

as a key metric for output and distribution of new materials and products, enhancing demand visibility and sales.

Nevertheless, governments gain greater freedom to invest in education and long-term qualitative growth. The democratisation of education ensures that people are equipped with the new knowledge and skills they deem necessary to confront emerging challenges. Calls for collaborative local Circular Economy (CE) practices gain momentum, focusing on sufficiency and craftsmanship. Repair shops, makers' clubs and DIY shops become hubs of activity and professional education.

People seek alternative forms of organisation and resist working for capitalists. In response, communities take charge, with unemployed workers forming associations to explore water conservation and solidarity measures. Also finance is democratised, with some countries nationalising banks. Communities actively participate everywhere in deciding where banks should invest locally. Sustainable and circular lifestyles begin to gain traction, marked by extensive learning experiences and experimentation. Overconsumption of affluent lifestyles gradually loses its appeal and social acceptance. People increasingly prioritise autonomy in energy production and consumption and strongly boycott large corporations and their greenwashing. Farmers gather in associations in order to explore profitable community-oriented land use and to address water scarcity issues.

After two decades of learning and experiences with frugal innovations, universities and civil society organisations join forces to scale up a novel economic system grounded in scientific limitations to growth. Democratically elected scientists and youth representatives from individual countries oversee global guidelines and national laws for the distribution of environmental rights and responsibilities. Governments are requested to deal with a just distribution of rights within their context, however they leave a lot of autonomy to regions.

CE committees are established to coordinate equitably within and among regions, fostering bottom-up federal agreements that allocate fair shares of limited resources within specific territories to individual organisations or to groups of them. These decision bodies are democratic and exclude the very wealthy and large corporations due to their historical influence on policies. CE committees figure out how to identify circularity opportunities, optimising CE loops by aligning demand and supply of waste. They also work on building functional agreements, resource sharing protocols, and dispute resolution mechanisms, primarily at the meso level. Their efforts result in the establishment of more effective and sufficiency-oriented CE practices such as repair, reuse, and sharing.

Some businesses attempt to collaborate to contrast the promotion of this circular economy, but societal sentiment toward capitalism grows increasingly critical, leading to the closure of many enterprises and economic challenges. On the other hand, more genuine and innovative forms of organisation emerge. They are localised, integrated/participated in, by, and for local communities, and attentive to levels of sufficiency and ecological and social respect. In general, these structures empower production and consumption stakeholders to actively participate in shaping the conditions of the process, including what is produced, how much is produced, how it is produced, how it is distributed, how the inputs are provided, what happens after consumption.

Communities create opportunities for local SMEs within various industries, allocating space for new factories and granting licences to boost demand and sales. Shared community kitchens are very common, fostering healthy food practices, reducing meat consumption, and providing spaces for social interaction. These events often evolve into arenas for communal decisions and democratic deliberation, with people rejecting unhealthy products and leading to economic challenges for, for instance, industrial soft drink corporations, which are eventually declared illegal. Communities also take a proactive role in environmental education, and a global wealth tax is introduced to curb laundering of commonwealth & resources. Nationwide social enterprises are established to take over bankrupt private businesses and localise production and distribution in affected areas, mitigating unemployment concerns. A revamped social fund is introduced to support workers during these transitions.

After the wave of violence, wealthier individuals reconsider their living conditions, which are deemed immoral, unfair, and the result of privileges. Communities actively implement measures to redistribute resources, with landowners subject to high community taxes or encouraged to sell their land to communities at reasonable prices. Some of them decide to dedicate their private properties to communities and autonomous activities with social value (culture, agriculture, education). Wealthier groups accept to share wealth with communities.

After three decades, communities are redefining the concepts of work and enterprise, with a strong focus on ecology and equity. Traditional firms have completely exited the markets as the population becomes increasingly aware of the critical importance of water and climate change, leading to reduced consumerism.

Efforts to reduce waste generation and promote upcycling initiatives, transforming waste materials into valuable products, gain traction. Governments and community organisations collaborate to reassess environmental targets and impose adaptable production constraints. Communities prioritise local production and cooperate on acquiring local resources.

The concentration of CO₂ in the atmosphere dramatically declines thanks in part to reforestation initiatives undertaken by communities after reclaiming land from private landowners. Knowledge sharing between communities and countries facilitates the replication of successful self-sufficiency measures and innovations, reviving traditional knowledge systems.

Reverse migration becomes a trend, with urban residents moving to rural areas in pursuit of opportunities in Small and Medium-sized Enterprises (SMEs) that offer better prospects. People have more free time and often volunteer in their communities or just spend more time in their homes.

Agri Photovoltaics are implemented but internal energy production remains insufficient to meet energy demands. Challenges persist with large Circular Economy (CE) projects and global technological advancements. Low-emission, small-scale renewable energy plants are constructed, although some environmental issues remain unresolved. At school a new definition of “developed world” is taught and the Anthropocene is described as a dark era in history in which an oligopoly of firms and powerful countries was destroying the planet, perpetrating modern forms of injustice, colonisation and exploitation. Life is characterised by authenticity, and problems are addressed through solidarity in communities.

4. The Circular Economy SES

SES Instructions



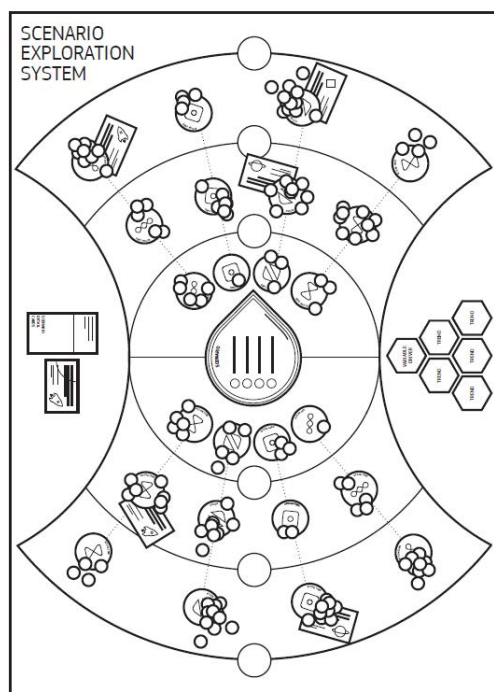
6
participants



1
facilitator



3
hours



DESCRIPTION

The Scenario Exploration System (SES) is a tool to enable participants to simulate their possible paths towards the future in relation to an issue of their choice around an exploration board. It operates as a board game. It engages six participants to develop and take up roles to chart their own courses towards their long-term objectives. This is taking place under the judgement of a fifth person representing the public. In the course of a 3-hour session, participants do this journey twice, holding the same roles under contrasting scenarios. The SES can be applied to any scenario, any issue and any role. This can be performed individually or in teams of up to three people a fifth person representing the public*.

The Circular Economy edition of the SES is based on four scenarios built in a foresight exercise within the ExPliCit MSCA project.

The SES is available to any interested party under a Creative Commons licence (CC-BY-SA) that lets users use and transform it based to their needs.

REQUIREMENTS

Facilitation

1 Scenario Exploration Facilitator

Participants

- Established business
- Policy maker
- Circular SME
- Circular NGO
- Consumer organization
- Public opinion

Material

- Board
- 4 Scenario discs
- set of megatrend cards
- set of variable drivers cards
- 1 set of Action cards per scenario explorer
- 6 Scenario detail cards per scenario
- Set of tokens:
 - 30 red tokens for the public opinion per scenario
 - 40 resource tokens (10 each of different colours for the scenario explorers per scenario)
- 1 dice
- 1 Public opinion record sheet
- 5 Scenario explorer record sheets
- 1 Scoring sheet for the Scenario Exploration facilitator

The role of the scenario exploration facilitator



Scenario
exploration
facilitator

1. ENSURING THE OVERALL QUALITY OF THE EXPERIENCE

- To be a pleasant, stimulating host
- To explain the rules
- To guide the participants, help create ownership
- To be the guardian of the exploration

2. PRESENTING THE ELEMENTS

- Use megatrends to engage future thinking
- Present them in connection to current events
- Explain the use of the variable driver

3. CREATING THE STORIES

- Based on the Scenario Detail cards, start from today and connect to current events
- State date/year at each round
- Build on outcome of each round

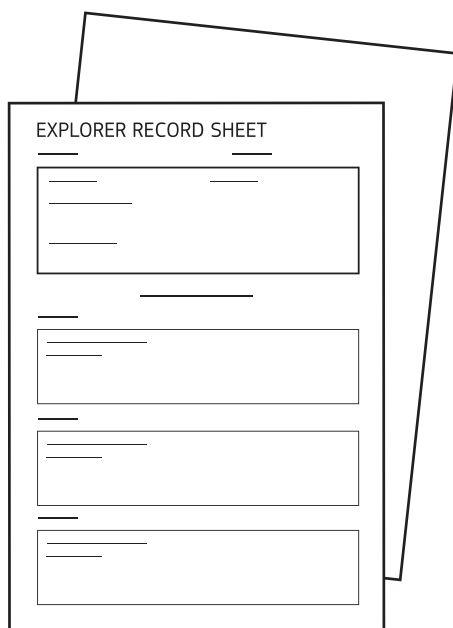
4. MANAGING EXPLORATION DYNAMICS

- Engage in the conversation
- Ensure smooth transitions between participants
- Ask clarifying questions if needed
- Volunteer suggestions if someone lacks ideas
- Take the story seriously

5. MANAGING TIME

- Important for session dynamics
- Session starting time impacts dynamics
- Participants must be on time
- Break(s)?

Phase 1 Preparing the exploration



GOAL

Prepare the specific scenario exploration session

1. WELCOME

Welcome participants

Tour de table, make people feel at ease

Ask participants for a theme of interest (if needed)

Select two contrasting scenarios (if not decided previously)

2. DEFINING THE ROLES

Explain the various roles available

Make participants choose their role

Explain how they must develop their role and define their long term objectives

Explain the specificities of the public opinion

Distribute the record sheets

Give participants time to build their roles

3. DISTRIBUTING THE ELEMENTS

Put the scenario disk in the middle of the board

Distribute the tokens

- 30 tokens to the public voice

- 10 resource tokens to each scenario explorer

Distribute the action cards

4. CREATING THE EXPLORATION COMMUNITY

Let each participant explain his/her role to all

Make sure this is detailed enough

Explain the resources to the scenario explorers and the red tokens to the public voice*

Explain how scores are calculated

Distribute and explain real life cards



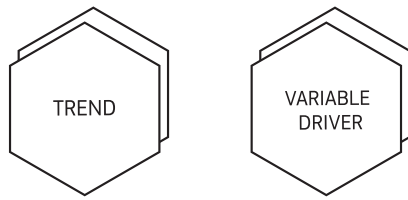
* RESOURCE TOKENS give strength to the actions taken by the scenario explorers. Scenario explorers receive one set of tokens per each scenario being explored.

- These are all the resources that the scenario explorer will have until the end of this exploration.

- The scenario explorer is free to decide how to use his/her resources to support his/her actions.

RED TOKENS are used by the public opinion to express its stance. The public voice can spend up to 10 tokens per round. It is free to allocate the tokens as it wishes with a minimum of one token per action.

*Each action gets a score by multiplying the number of resource tokens used by a scenario explorer to support his/her action by the number of red tokens attributed to the action by the public voice.



5. CREATING THE CONTEXT FOR THE SCENARIO EXPLORATION

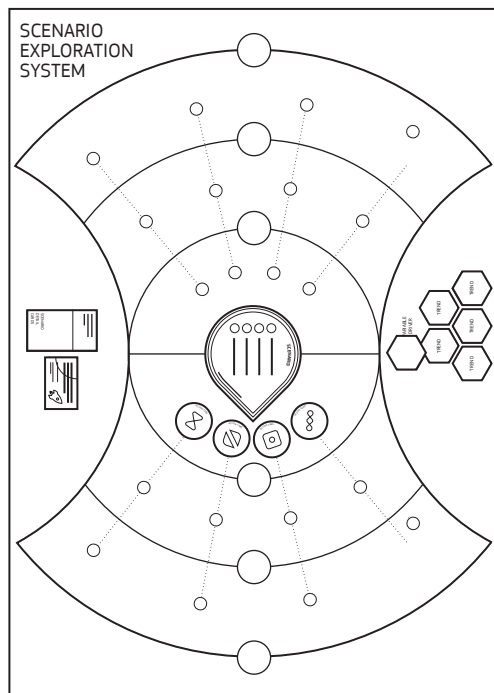
The scenario exploration facilitator lays down the megatrend cards one by one face up, explaining how each megatrend is likely to affect the scenario exploration over the selected time horizon. The scenario exploration facilitator then lays down the pile of variable driver cards face down and reveals the first one. This first variable driver will influence the first round of the scenario exploration.

Phase 2 Exploring the first scenario



GOAL

To explore the first scenario



1. FIRST ROUND

We are now in the first time horizon (in the zone furthest from the scenario disk).

The Scenario Exploration facilitator lays down the pile of variable driver cards face down and reveals the first one. This first variable driver will influence the first round of the scenario exploration.

The Scenario Exploration facilitator tells a story based on the variable driver and the first scenario detail card. Then scenario explorers roll the dice:

- the scenario explorer who gets the highest score starts,
- the other scenario explorers then take action clockwise.
- *scenario explorers are asked to consider more particularly the elements of the scenario detail cards corresponding to the number they rolled on the dice*

Scenario explorers then take one action in turn clockwise. They put one action card on the board in the zone corresponding to the time horizon.

They support their action with own resources of their choice by putting resource tokens on the action card.

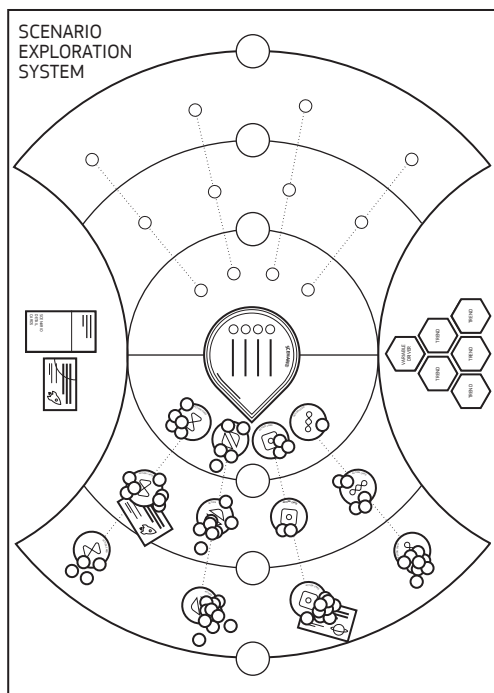
Once all five scenario explorers have taken action, the public opinion reacts by attributing red tokens. The public voice can spend up to 10 tokens per round. It is free to allocate the tokens as it wishes with a minimum of one token per action.

At the end of the round, the facilitator creates a wrap up story of the round and collects the scores*.

An easy to use scoring spreadsheet can be freely accessed and downloaded at the following link:

https://docs.google.com/spreadsheets/d/1kovF9m_fZdpu7r5iGmx6QCYIVueq1xM/edit?usp=drive_link&ouid=112412427629408744936&rtfpof=true&sd=true

*SCORES: the scores result from the multiplication of the resources allocated to each action by the number of red tokens attributed to the corresponding actions by the public voice.



2. SECOND ROUND

The Scenario Exploration facilitator reveals the next variable driver card and continues the story based on the next scenario detail card (next time horizon). Scenario explorers roll the dice and the one who gets the highest score starts. The other scenario explorers take one action in turn clockwise*.

They put one action card on the board in the zone corresponding to the time horizon.

They support their action with own resources of their choice by putting resource tokens on the action card. Once all five scenario explorers have taken action, they are allowed to collaborate. They do so by first offering opportunities of collaboration to each other, and then, if a collaboration is agreed, the scenario explorer who wants to engage in a collaboration puts some of his/her own resources tokens on the action(s) he/she wants to collaborate with.

In the case of collaborations, each collaborating partner receives the total score obtained by the card. This is the sum of all resource tokens played by all players multiplied by the red tokens attributed by the public opinion.

The public opinion reacts by attributing red tokens. The public opinion can spend up to 10 tokens per round. It is free to allocate the tokens as it wishes with a minimum of one token per action.

At the end of the round the Scenario Exploration facilitator creates a wrap up story of the round and collects the scores**.



3. THIRD ROUND

The third round is identical to the second round

4. CONCLUSION

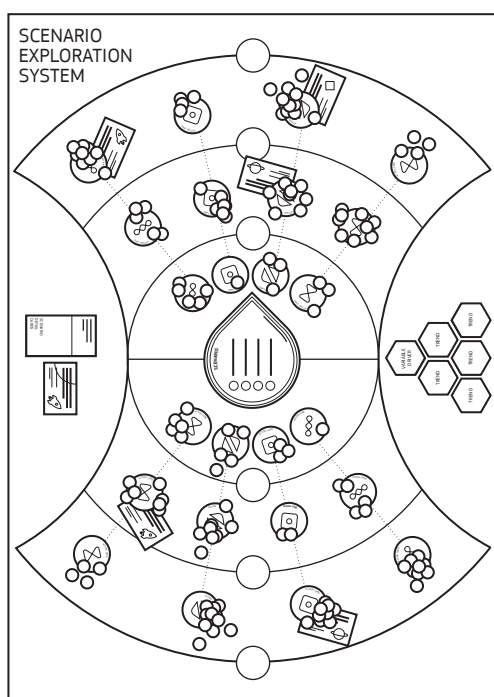
At the end, the Scenario Exploration facilitator summarises the scenario exploration, calculates the overall scores on the scoring sheet and asks the scenario explorers to assess how well they have managed to reach their long-term objectives (this can be expressed on a scale on 1 to 10) and the opinion of the public voice.

**Depending on the scenarios and the objectives of the session, the minimum cost for collaboration can be made to vary between the two scenarios being explored." (optional)

Phase 3 Exploring the second scenario



45
minutes



GOAL

To explore the second scenario

The exploration of the second scenario takes place on the other half of the board. It is carried out in an identical fashion to the exploration of the first scenario.



All the participants keep the same roles and long term objectives. However, their actions and resource distribution might change according to the characteristics of the new scenario.

Please note that playing only one scenario (i.e. skipping Phase 2) is possible, but not recommended. It is by playing the two scenarios that the SES can provide the highest benefits and learnings.

Phase 4 Discussion



15
minutes



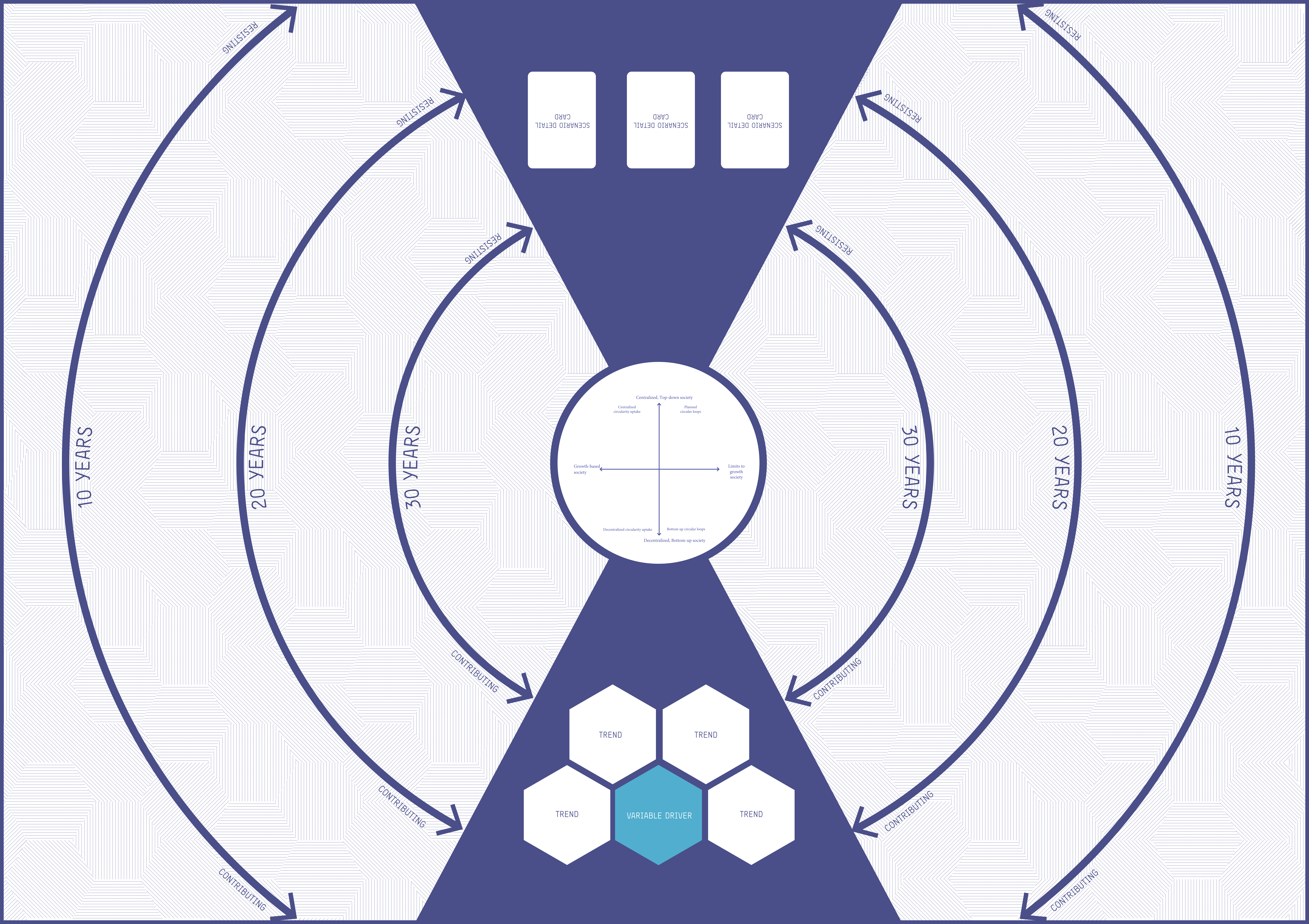
GOAL

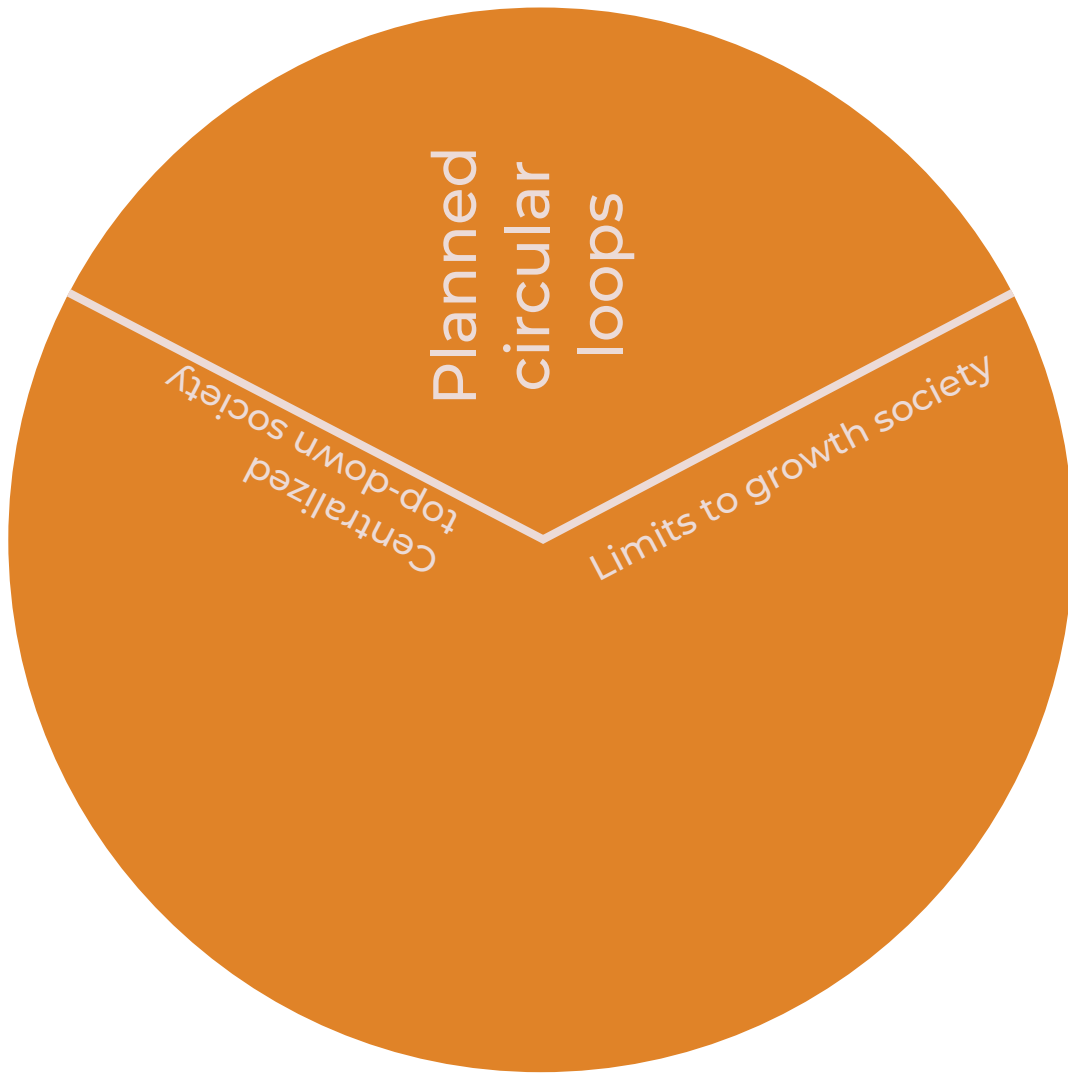
To reflect on the contrasted explorations.

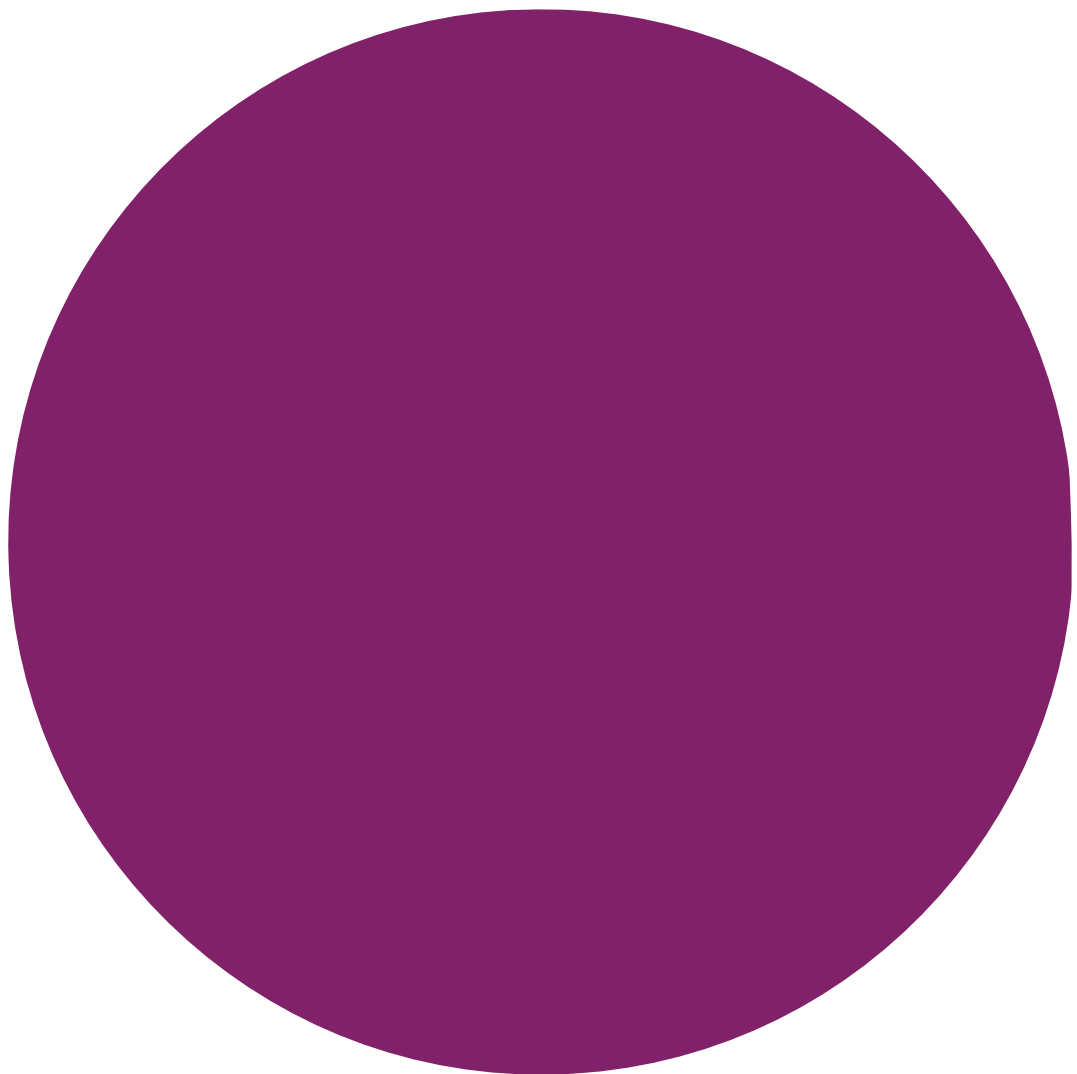
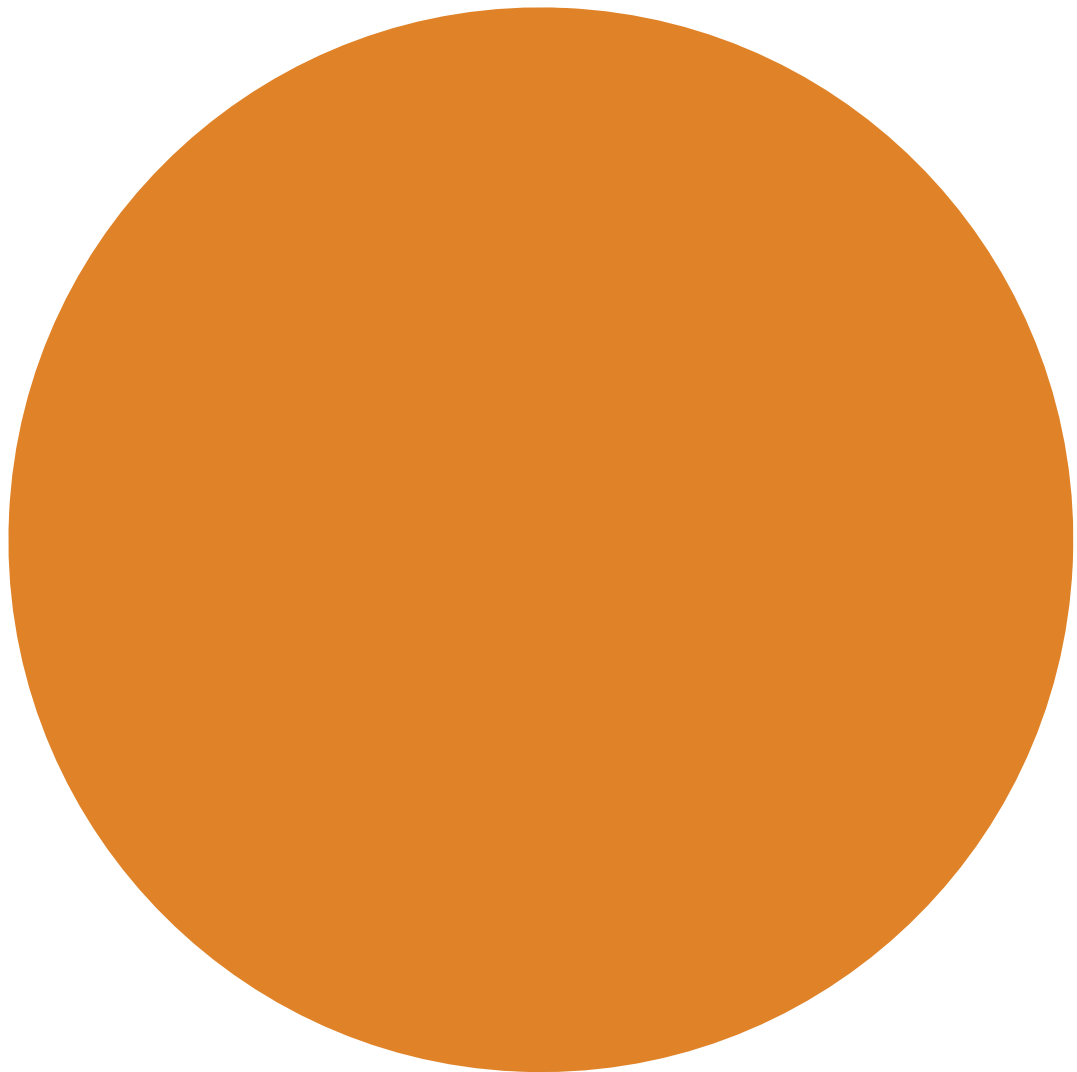
In this phase, participants are led by the facilitator to look at both sides of the board and reflect on their role and course of actions as well as similarities and differences between the two scenario explorations. This debriefing phase is one of the most important parts of the SES as this is when the learnings and reflections can emerge, be expressed and harvested by the group. It can be structured and extended according to the need of the organisers.

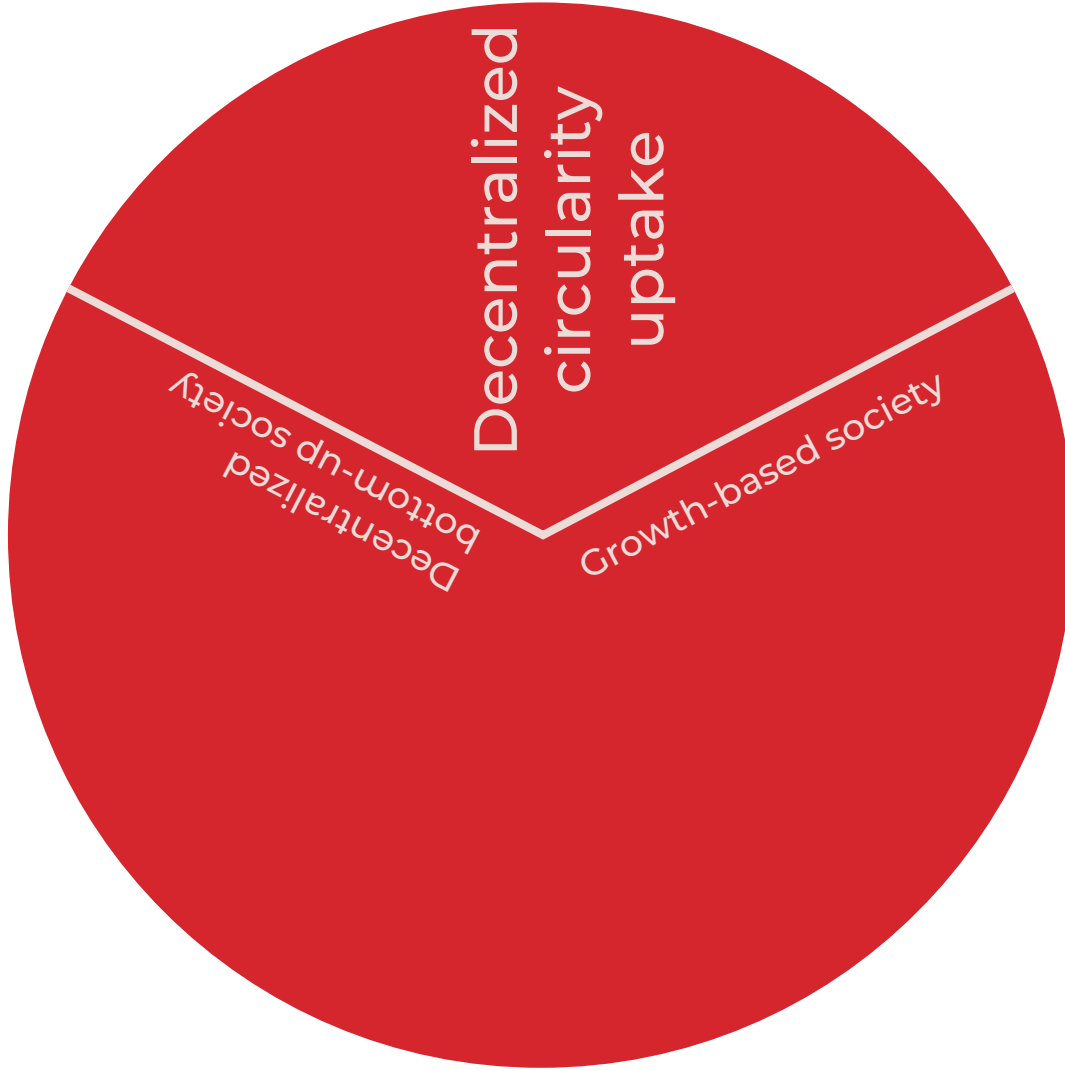


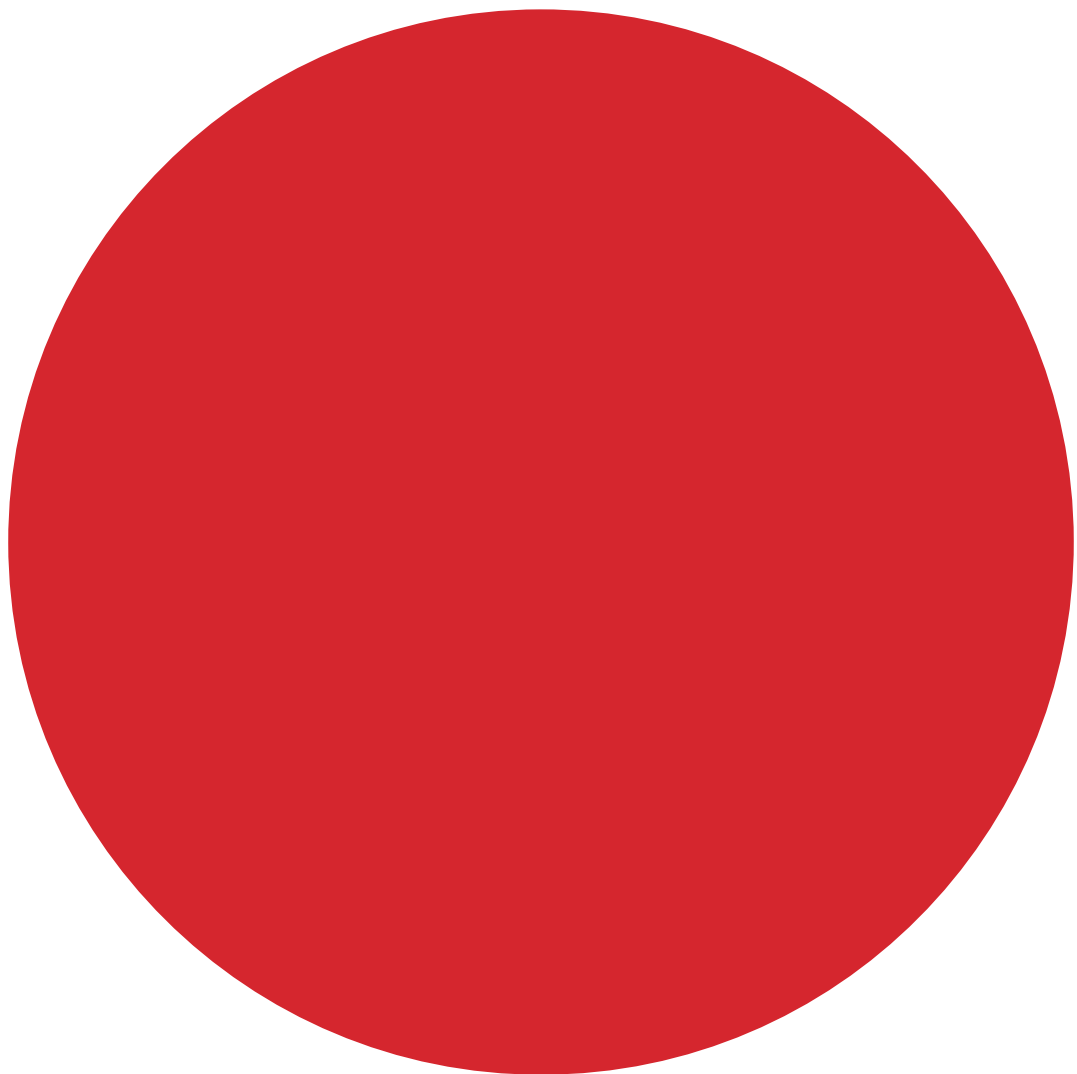
PLEASE NOTE: The following pages include all necessary elements to play the SES (excluding the dice and resource tokens). However, the most suitable format for printing can be found and freely accessed at the following link:
<https://drive.google.com/drive/folders/1L0XjXF5LjhEskvGnRTatNHUdlUynXygB>





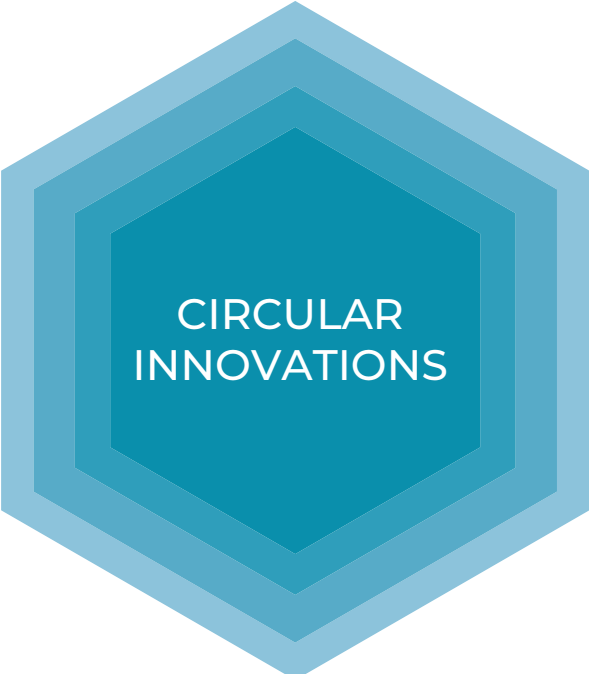








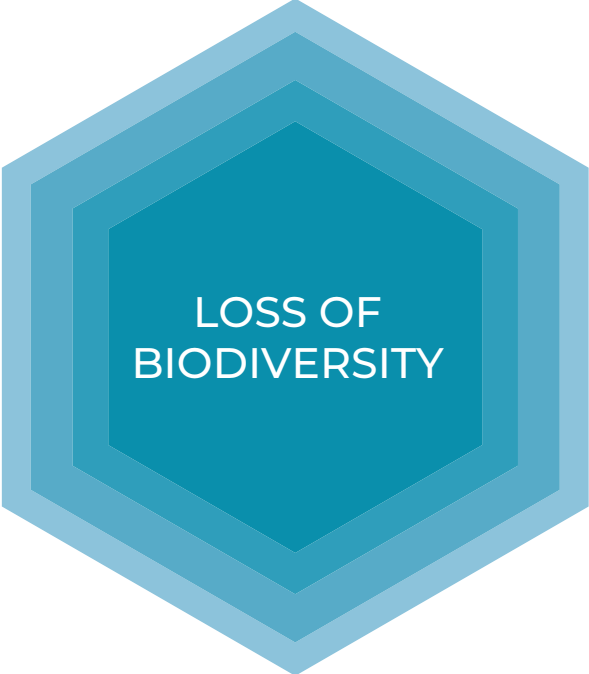
GROWING
CONSUMPTION



CIRCULAR
INNOVATIONS



COMPETITION
FOR LAND



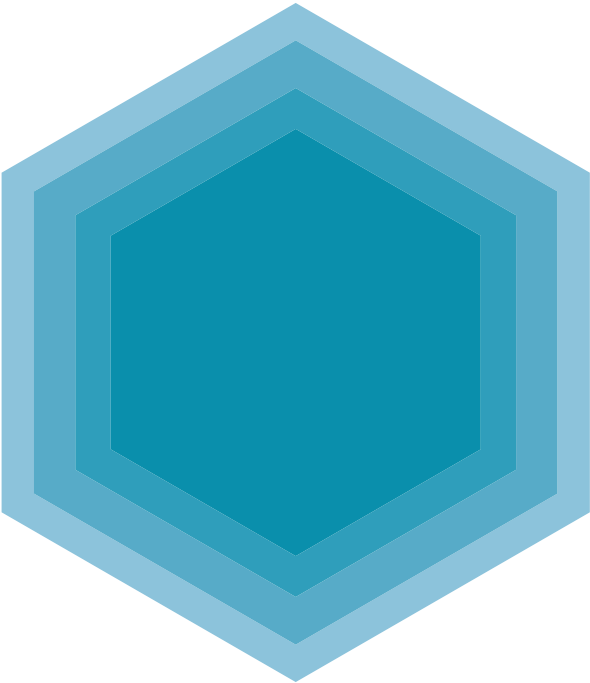
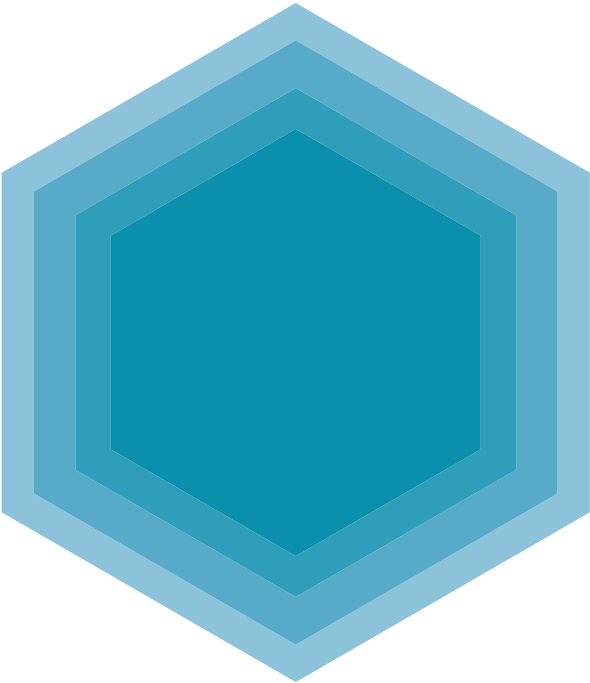
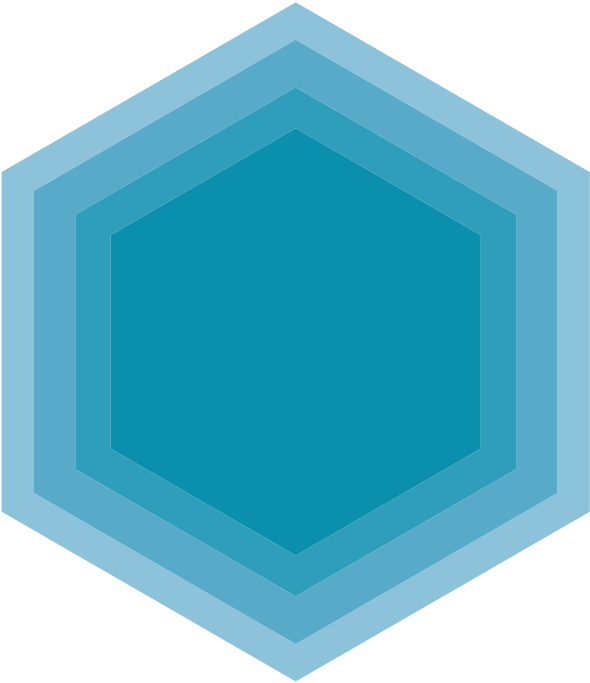
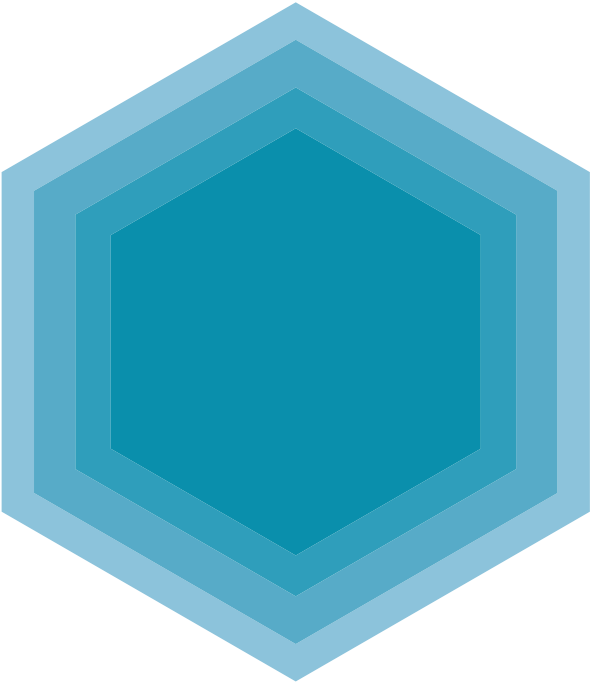
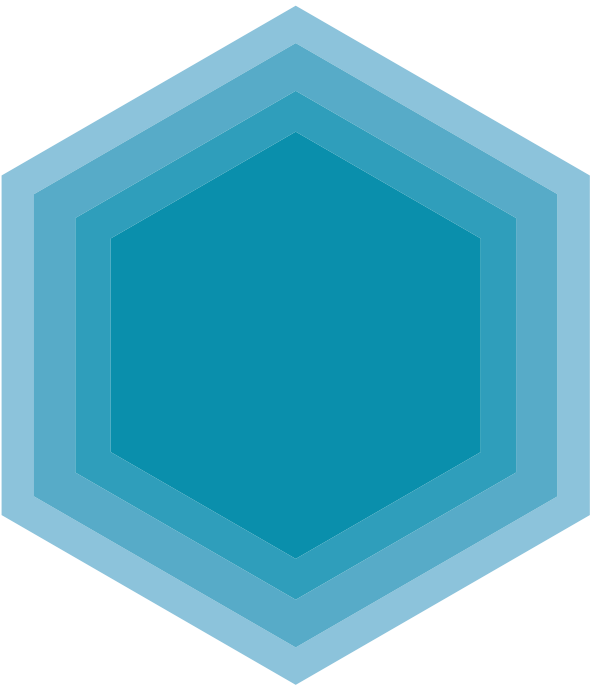
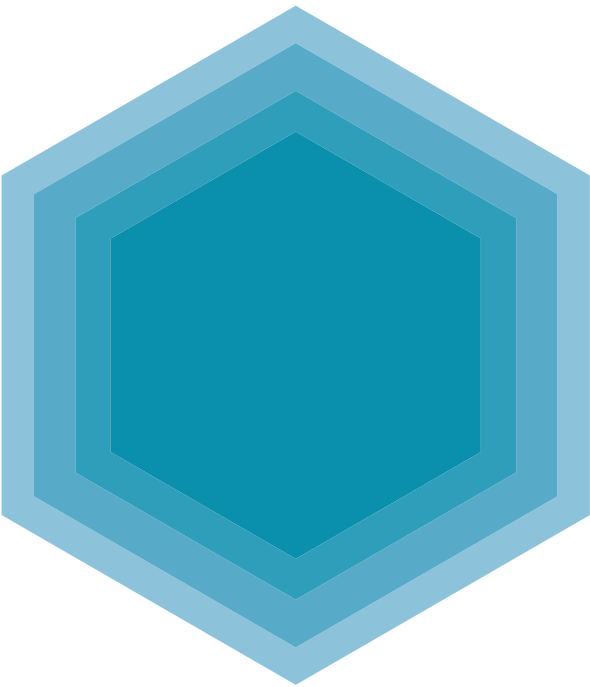
LOSS OF
BIODIVERSITY

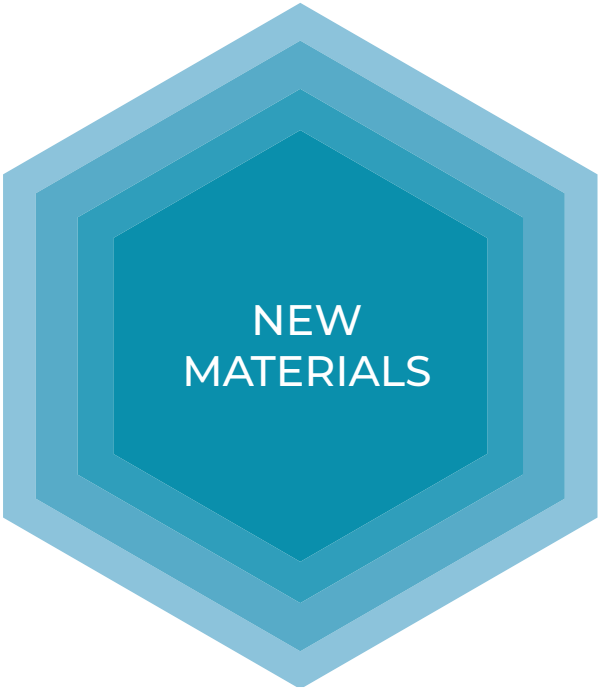


NEW
TECHNOLOGIES



NEW
INVESTMENT
LANDSCAPE





NEW
MATERIALS



VOLATILE MARKETS



NICHE
MARKETS
DOMINATE



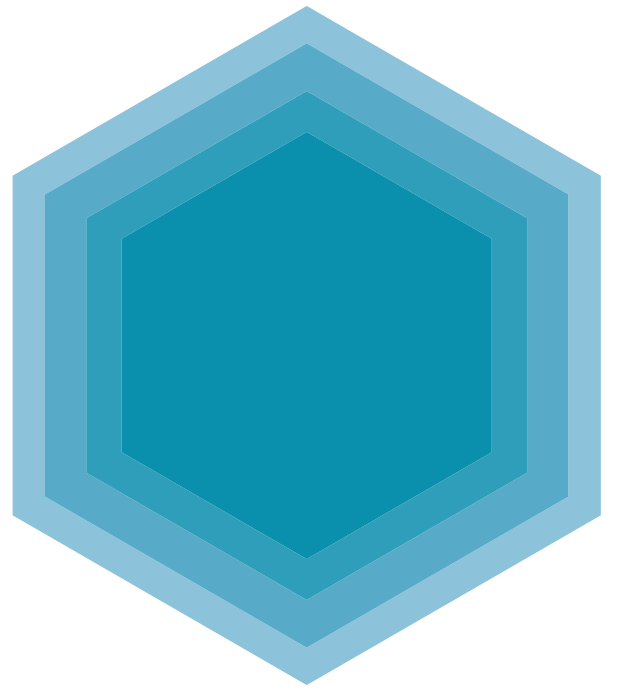
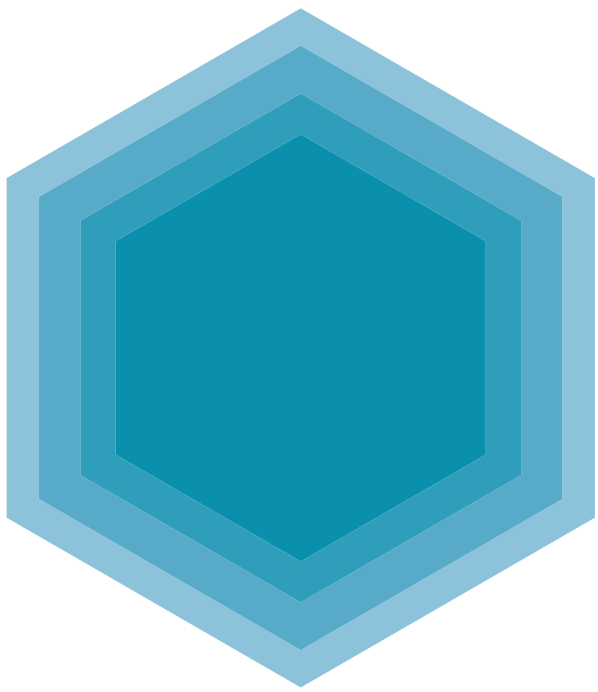
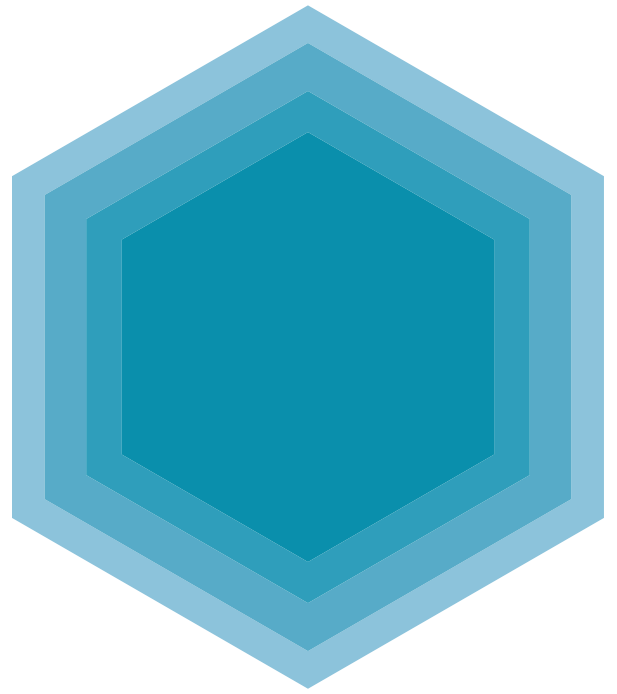
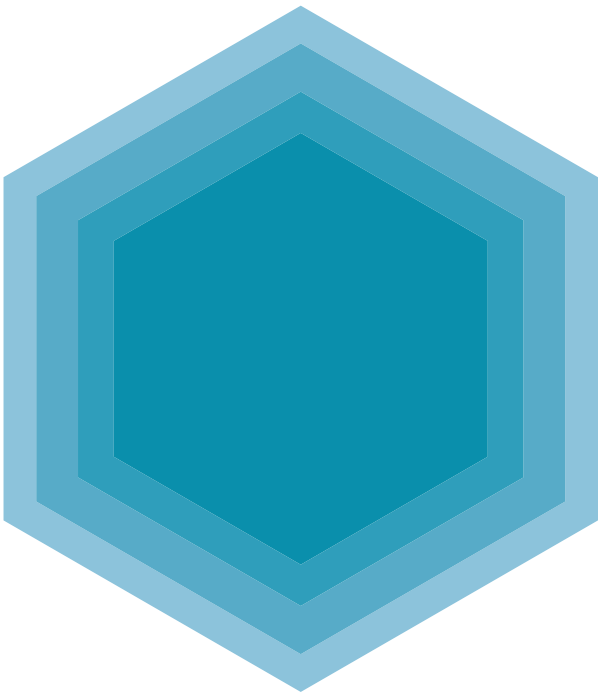
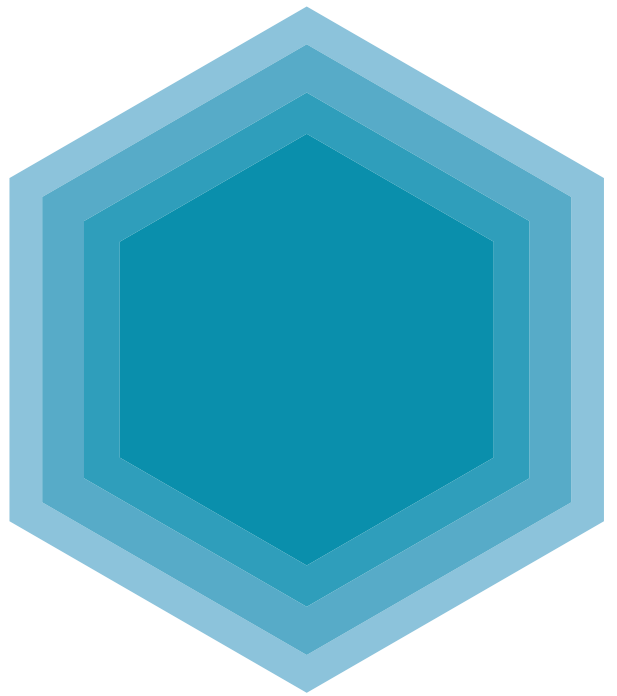
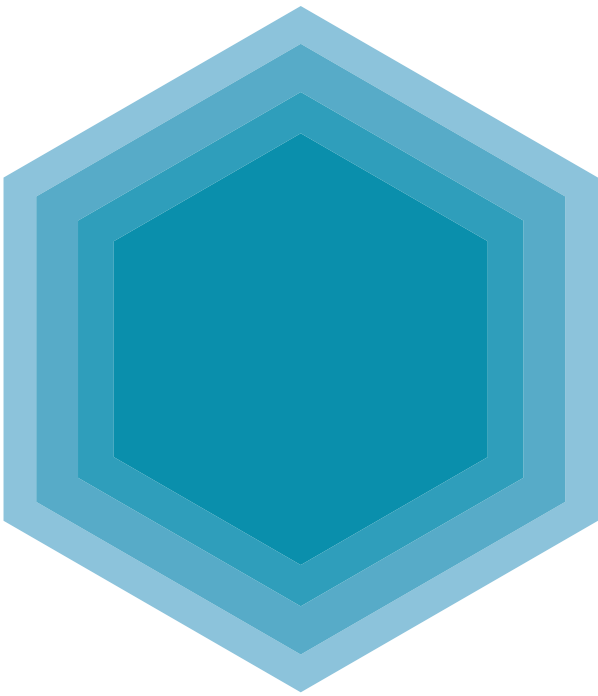
CONVERGING
TECHNOLOGY

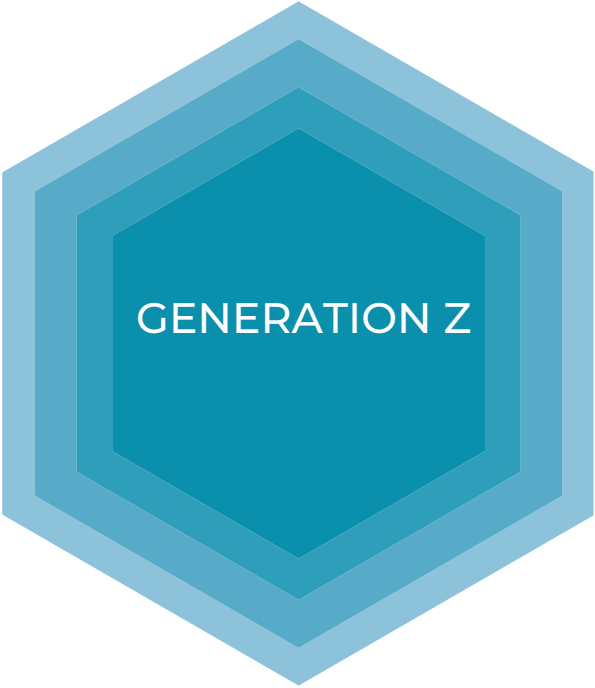


INCREASED
POLLUTION



SLOW
ECONOMIC
GROWTH





GENERATION Z



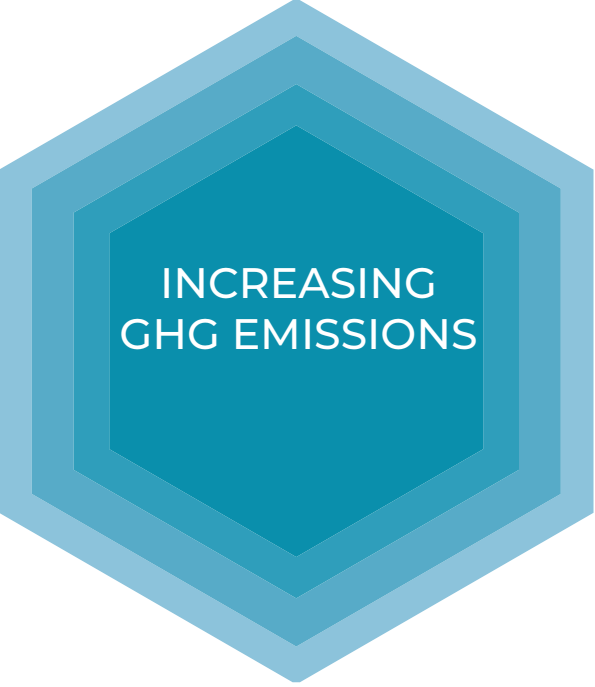
NEW
INTERNATIONAL
TRADE RULES



NEW
GOVERNANCE
SYSTEMS



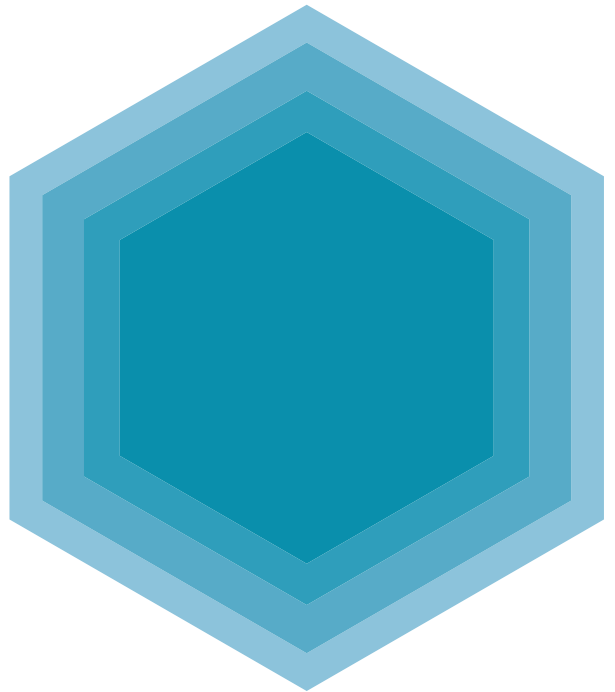
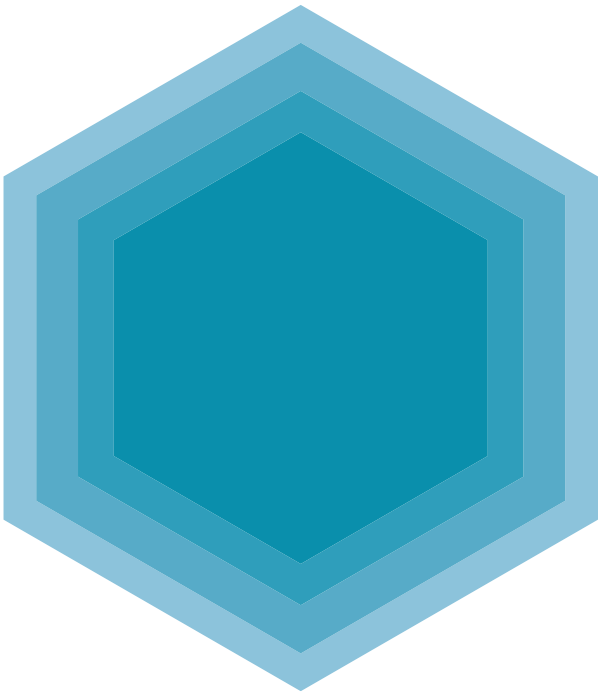
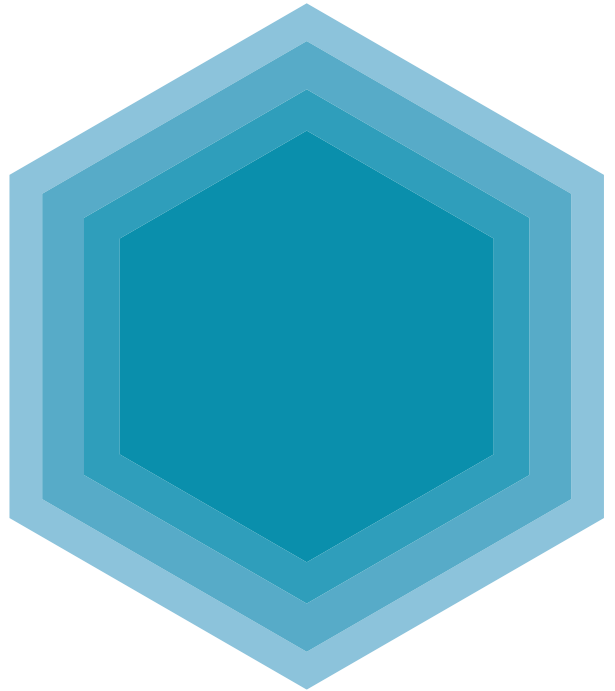
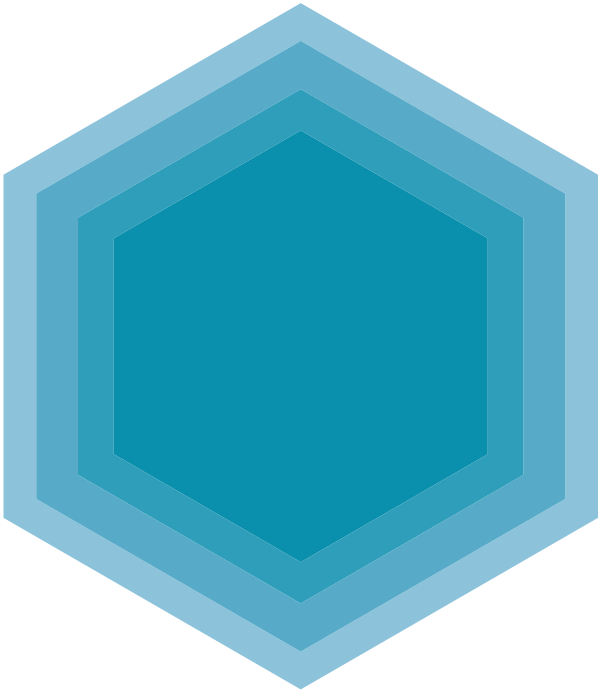
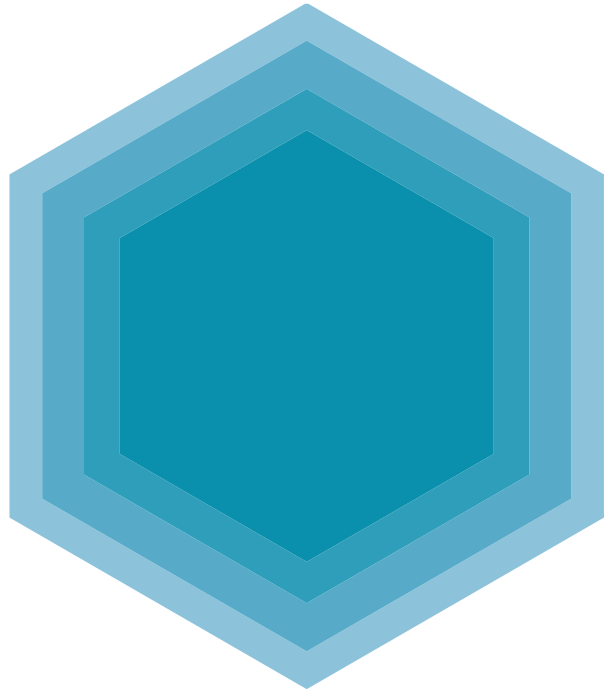
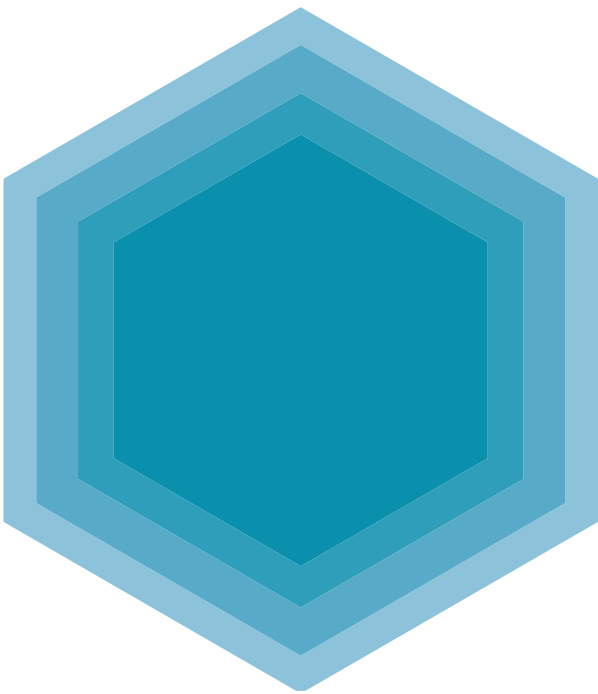
COMMUNITY
INNOVATION



INCREASING
GHG EMISSIONS



SHIFTING
CONSUMER
BEHAVIOUR





ENVIRONMENTAL
DAMAGE



ELEVATED
FOOD PRICES



SOCIAL
INNOVATION



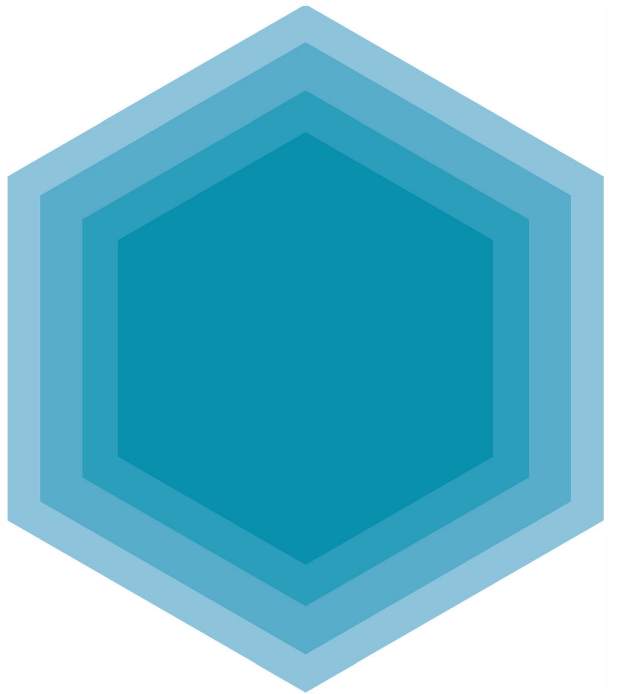
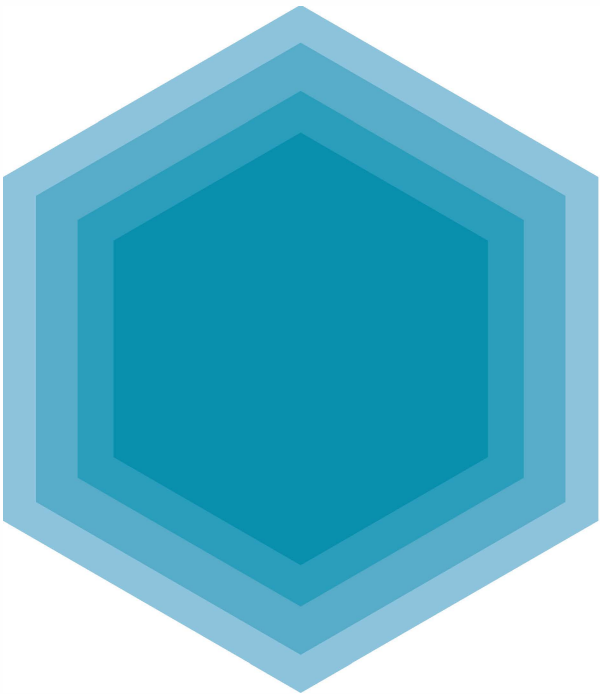
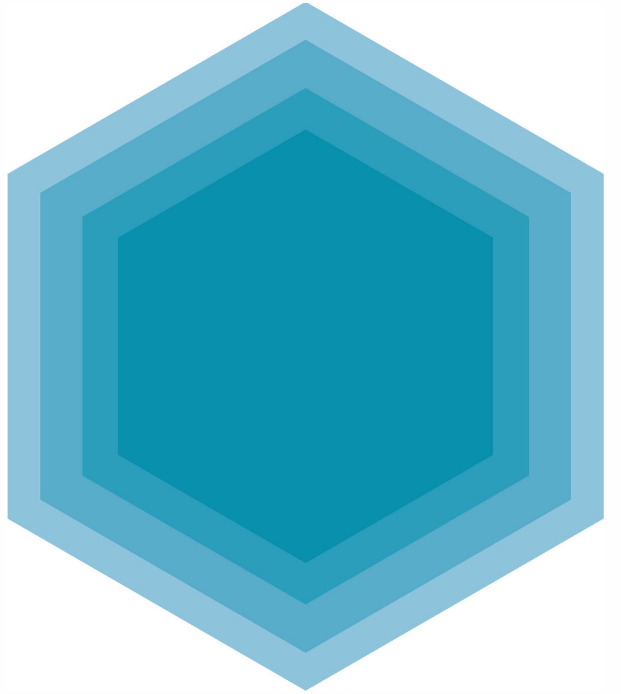
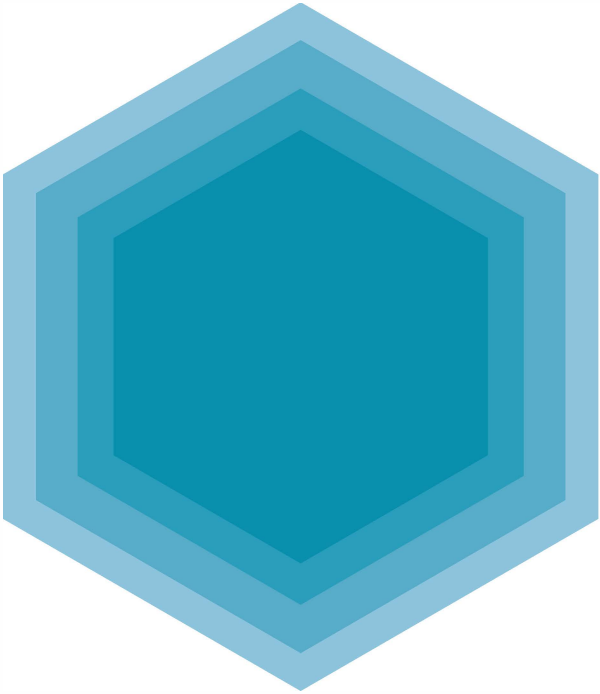
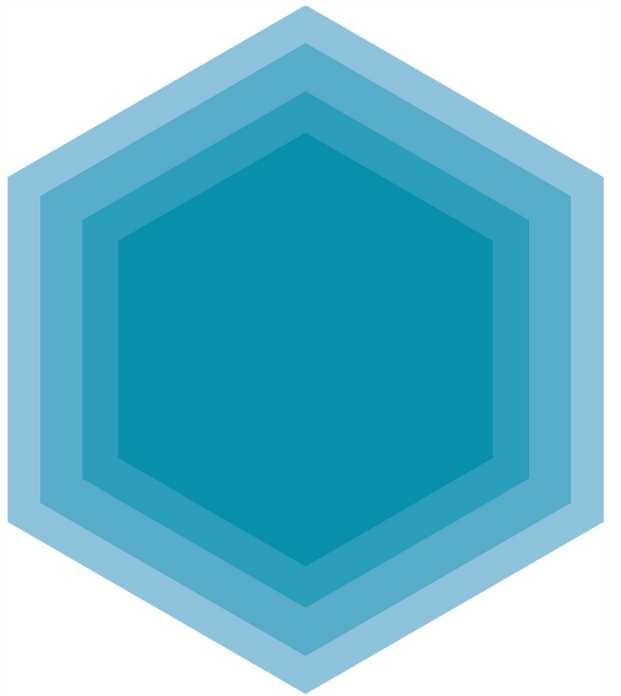
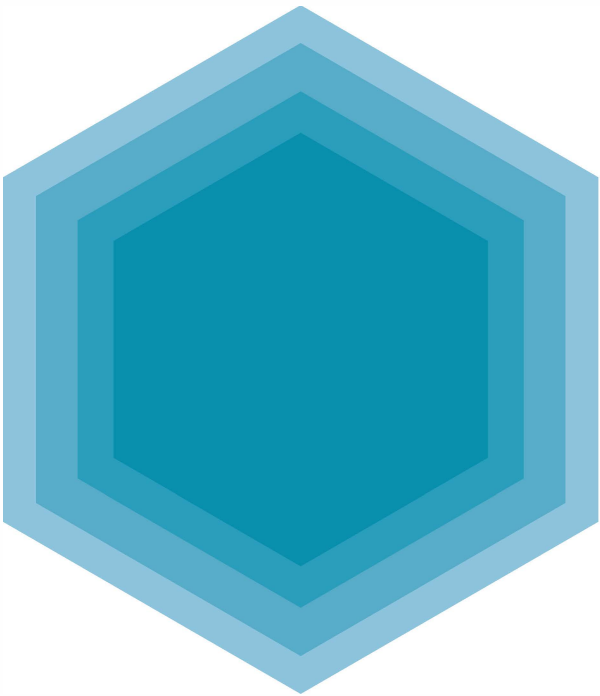
AGING
POPULATION



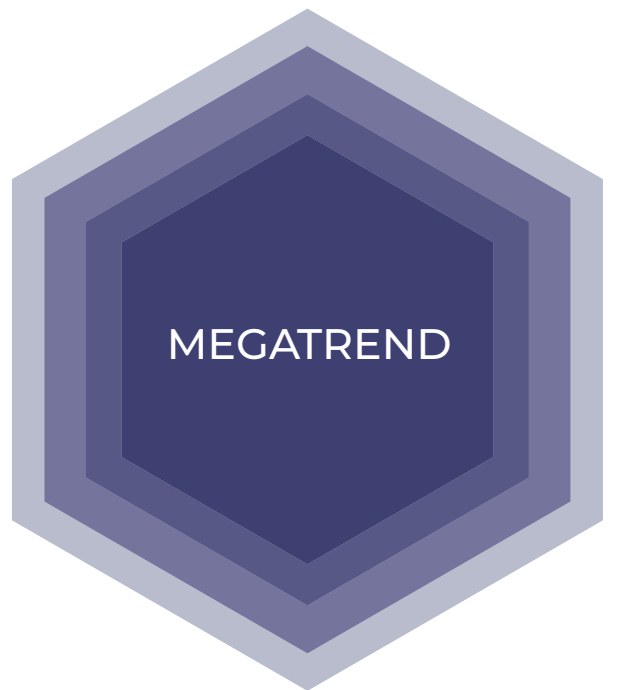
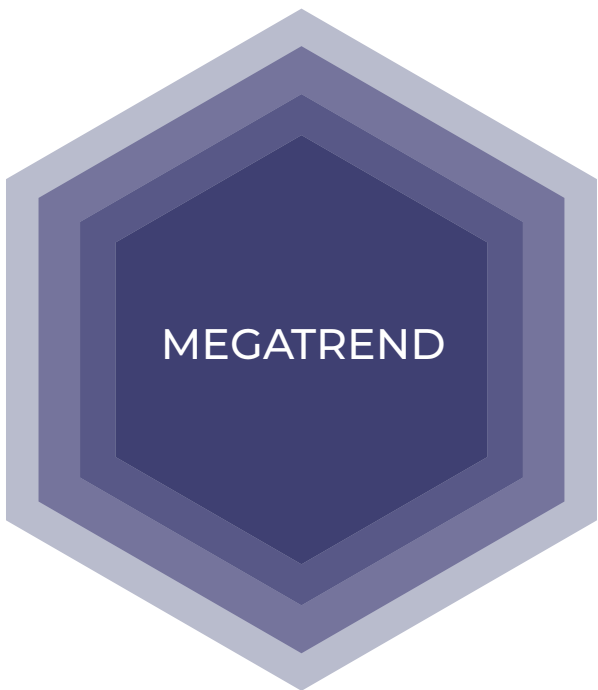
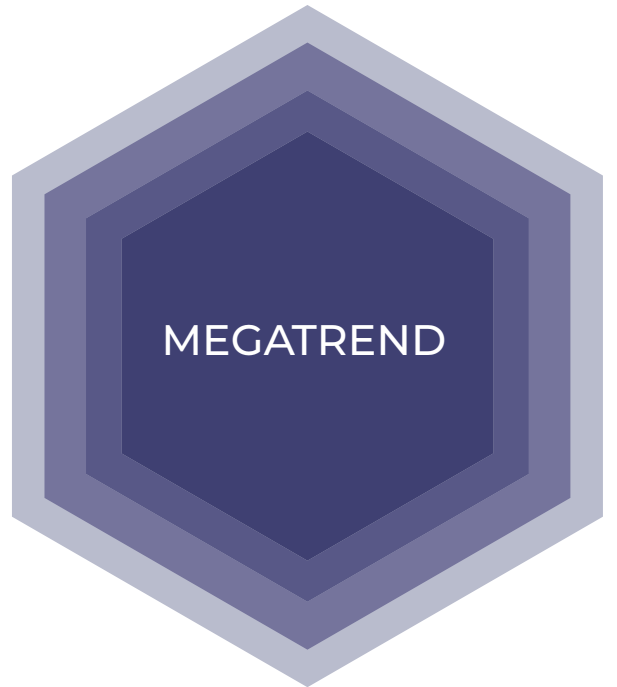
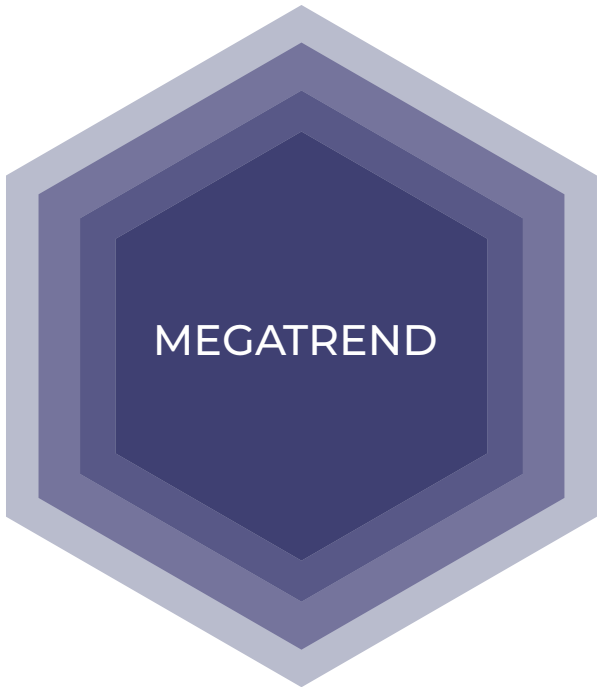
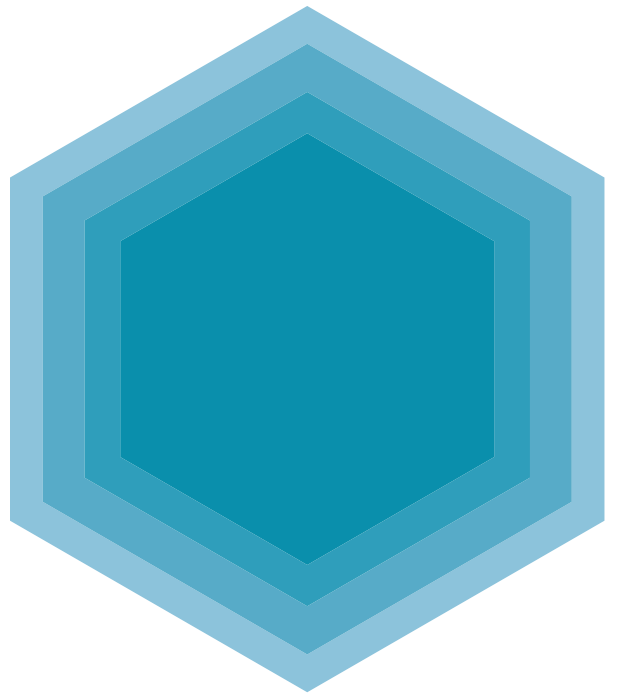
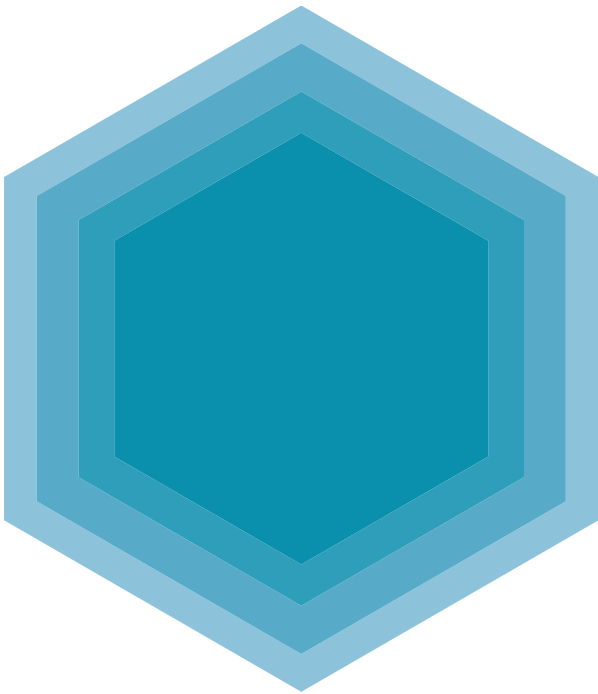
WIDENING
INEQUALITY



NEW
LEADERSHIP









DEGROWTH



LOW
ECONOMIC
GROWTH



ARTIFICIAL
INTELLIGENCE



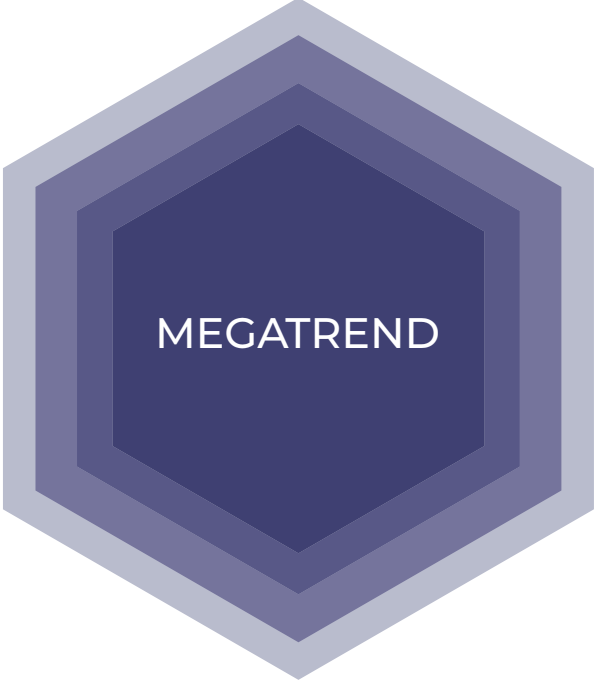
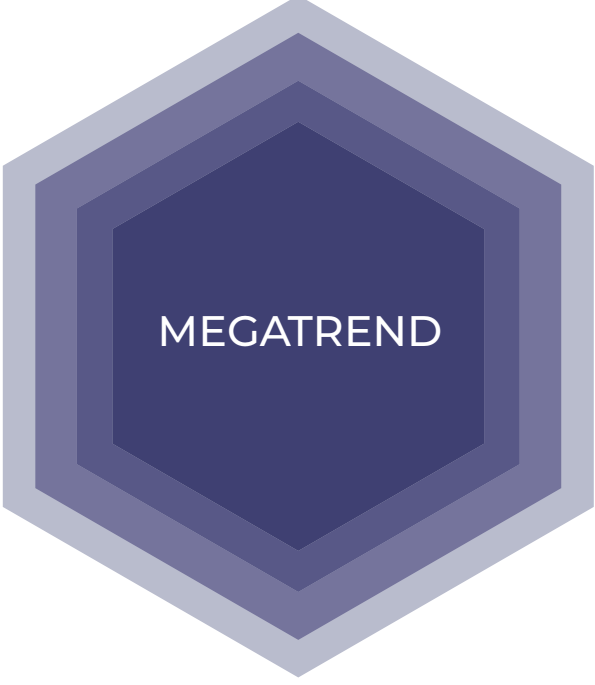
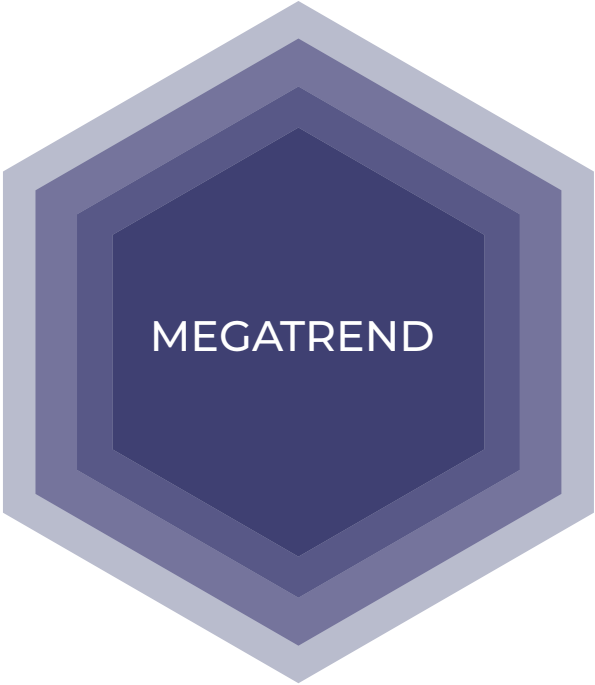
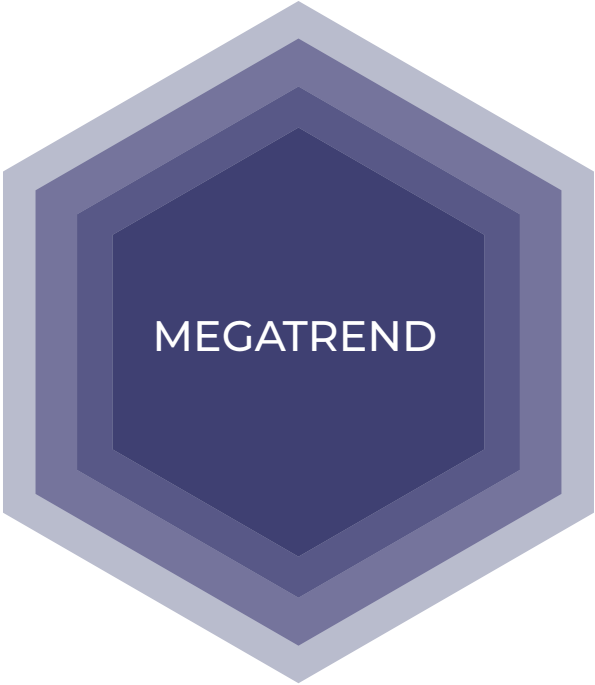
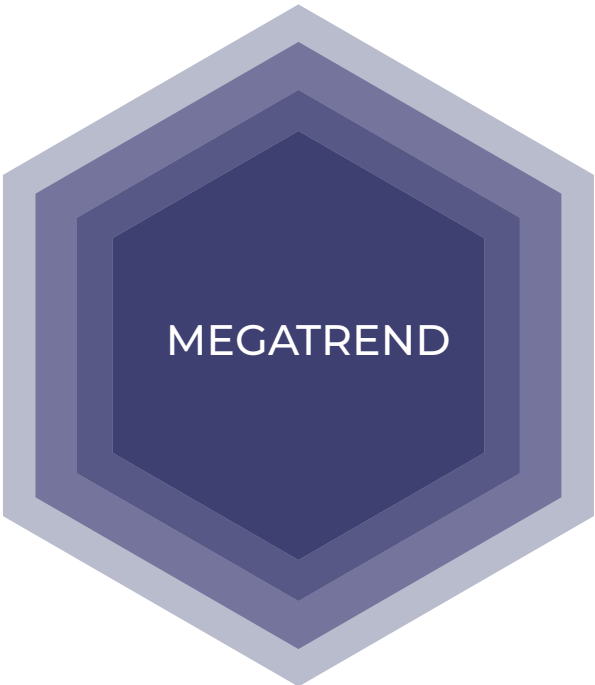
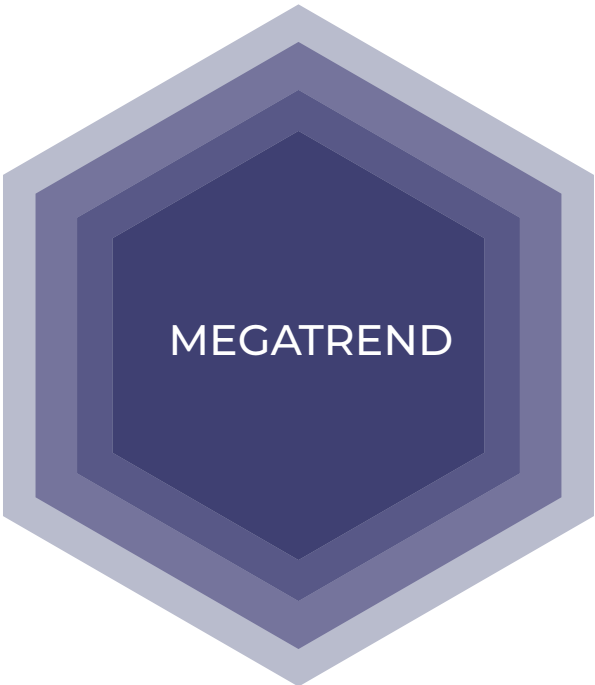
TECHNOLOGICAL
INNOVATION



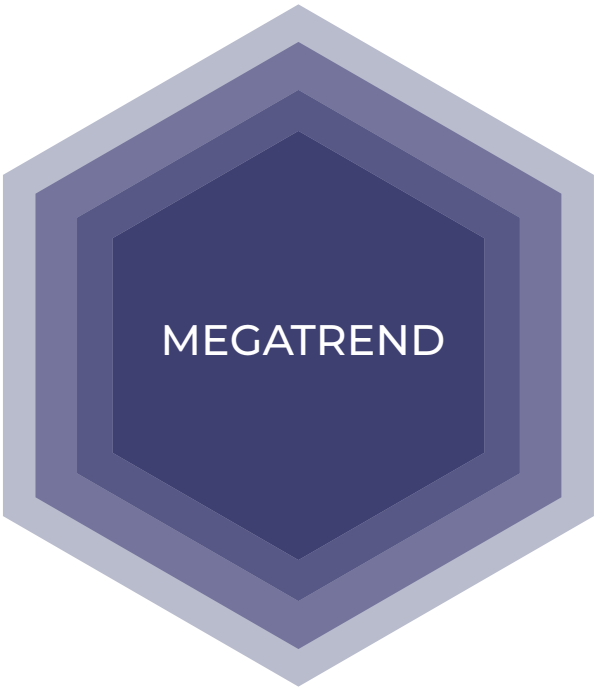
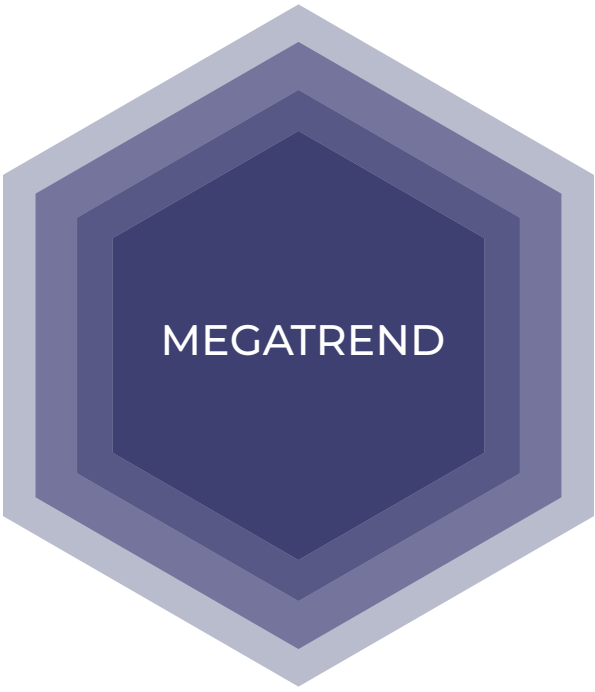
DECLINING
BIRTH RATES



AGING
POPULATION







10 YEARS AHEAD

1. Limited water availability becomes a significant challenge leading to widespread environmental activism.
2. Advancements in technologies like Artificial Intelligence, Machine Learning, and 3D Printing reshape production and work methods towards more efficient processes.
3. Workers and unions protest against the perceived 'dehumanisation' of work, sparking debates over pay and ethics.

10 YEARS AHEAD

4. Governments introduce regulations requiring firms to offer product repairs and take responsibility for waste.
5. States introduce eco-taxes on carbon and subsidies towards recycled materials.
6. States adopt a stance that economic growth is the key solution to the climate crisis.

20 YEARS AHEAD

1. Right-to-repair policies incentivize centralization of repair in the hands of manufacturers, putting local independent repair shops out of market.
2. The consumerist and materialistic lifestyle prevalent in the Global North extends to the Global South. Earth Overshoot Day advances to January 30th.
3. AI technology giants emerge, acquiring key technologies, developing efficient global supply chains and fully automated workforce.

20 YEARS AHEAD

4. Recycled materials become the norm and for the first time the amount of primary materials extracted from mines decrease.
5. Large corporations employ data-driven insights to manipulate consumer behaviours and choices in a system of "Surveillance Capitalism".
6. Large corporations seize the opportunity to acquire struggling SMEs unable to automate their supply chains and compete.

30 YEARS AHEAD

1. Corporations produce ever growing quantities of products that are made with recycled materials but have shorter life cycles.
2. The absence of throughput limits has catastrophic effects on material scarcity and environmental deterioration.
3. Citizens are incentivized to earn extra income through recycling, reusing, repairing, and repurposing, while reducing and refusing behaviours are not being taken into account

30 YEARS AHEAD

4. Governments globally converge on compensation mechanisms for externalities and the creation of a worldwide carbon market.
5. A purposeful policy of reverse migration is orchestrated, with citizens offered lump sum payments to relocate to other continents upon reaching a certain age.
6. Planned obsolescence of products is harnessed to intensify the frequency of circular loops, emphasising recycling and recovery.

CENTRALIZED
CIRCULARITY
UPTAKE

10 YEARS

CENTRALIZED
CIRCULARITY
UPTAKE

10 YEARS

CENTRALIZED
CIRCULARITY
UPTAKE

20 YEARS

CENTRALIZED
CIRCULARITY
UPTAKE

20 YEARS

CENTRALIZED
CIRCULARITY
UPTAKE

30 YEARS

CENTRALIZED
CIRCULARITY
UPTAKE

30 YEARS

10 YEARS AHEAD

1. Younger generations initiate more radical lifestyle shifts, employing very effective boycott campaigns of linear products.
2. The UN establishes a novel decision-making body: a panel of eminent scientists tasked with formulating comprehensive top-down policies to mitigate climate change effectively and fairly.
3. The first wave of taxes and prohibitions is imposed on international trade, in an uncoordinated manner, resulting in a surge of protectionist measures.

10 YEARS AHEAD

4. Businesses undertake profound transitions, including downsizing of factories and an overall reduction in operational capacity.
5. Traditional global supply chains face disruptions, prompting a shift towards local recycling as a coping strategy.
6. The workforce experiences substantial job cuts due to a combination of technological advancements and production limitations.

20 YEARS AHEAD

1. Nation states agree to delegate a portion of their decision-making authority to the UN as a response to climate emergency and social unrest.
2. Individuals shift towards consuming services rather than owning products, social shaming becomes common for those not adapting to the change.
3. An autonomous reparation committee is established and substantial reparation funds are offered to the Global South.

20 YEARS AHEAD

4. Governments incentivise state-owned enterprises to relocate production domestically, implementing self-sufficiency policies.
5. Large corporations curtail product obsolescence and expand their Product-as-a-Service (PaaS) models, which prove to be profitable.
6. The consumption in the Global North begins to contract as individuals prefer to consume services rather than owning products.

30 YEARS AHEAD

1. International agreements on throughput rights allocation are finally signed, imposing stringent limitations on production for each country
2. Carbon emissions are accounted for at the consumption points, advocating for reduced consumption through education and promoting radical Circular Economy practices.
3. Citizens experience an intricate web of control and enforcement mechanisms, ranging from public use of private data to social shaming in communities.

30 YEARS AHEAD

4. To enforce socially responsible conduct, rigorous restrictions and bans are directed at businesses and citizens who fail to uphold communal norms.
5. Legislation also addresses planned obsolescence, placing restrictions on minimum usage periods and lifetime designs to minimise waste.
6. In the wake of full automation across most industries, legislative measures are implemented to manage population growth by controlling birth rates.

PLANNED
CIRCULAR
LOOPS

10 YEARS

PLANNED
CIRCULAR
LOOPS

10 YEARS

PLANNED
CIRCULAR
LOOPS

20 YEARS

PLANNED
CIRCULAR
LOOPS

20 YEARS

PLANNED
CIRCULAR
LOOPS

30 YEARS

PLANNED
CIRCULAR
LOOPS

30 YEARS

10 YEARS AHEAD

1. Protests emerge against the increasing adoption of automation and the perceived 'dehumanization' of work.
2. While consumption continues to rise, wages remain stagnant, compelling small social businesses to step in and create affordable welfare solutions.
3. A 3% tax is introduced for five years, applicable to both organisations and individuals to fund the transition to alternative manufacturing.

10 YEARS AHEAD

4. Representatives of fossil fuel companies are excluded from the UN Climate Change Conference (COP), while the interests of small organisations are prioritised.
5. Opportunities for circularity remain underexploited due to the high costs associated with establishing extensive circular loops.
6. The EU introduces a package aimed at fostering more equitable markets and curbing the influence of major corporations.

20 YEARS AHEAD

1. Governments are grappling with the complex task of financing the transition to a more sustainable economy while balancing current costs and supporting businesses in their transformation.
2. Communities establish health and income schemes, education programs to mitigate unemployment and promote youth and women entrepreneurship.
3. Start-ups are now the primary object of private and public funding.

20 YEARS AHEAD

4. Ethical concerns regarding the accountability of AI and 3D printing innovators have intensified, including cases of faults, economic sabotage, and monitoring.
5. The state invests in systems that grant the traceability of supply chains, promoting market efficiency and green innovation.
6. The state introduces an inheritance tax to create a large CE fund with the objective of funding CE businesses.

30 YEARS AHEAD

1. The Circular Economy (CE) fund enhances transparent and regional supply chains and effective taxation of externalities.
2. Community crowdfunding supports social enterprises and local cooperatives.
3. Sustainable circular opportunities are underexploited - only individually profitable loops are materialised without legal restrictions or demand pressures

30 YEARS AHEAD

4. There is significant propaganda about community resettlements to cope with the surging population and consumption.
5. Severe climate change consequences force community relocations.
6. Businesses are advertising the benefits of raising a family on social media, contrasting the demographic recession.

DECENTRALIZED
CIRCULARITY
UPTAKE

10 YEARS

DECENTRALIZED
CIRCULARITY
UPTAKE

10 YEARS

DECENTRALIZED
CIRCULARITY
UPTAKE

20 YEARS

DECENTRALIZED
CIRCULARITY
UPTAKE

20 YEARS

DECENTRALIZED
CIRCULARITY
UPTAKE

30 YEARS

DECENTRALIZED
CIRCULARITY
UPTAKE

30 YEARS

10 YEARS AHEAD

1. Many lawsuits find oil companies responsible for lying about the dangers of fossil fuels for decades, and oblige them to pay damages.
2. Most countries abandon GDP as a measure of economic performance.
3. Governments incentivise the transition to a circular economy founded on sufficiency.

10 YEARS AHEAD

4. Communities lead negotiations for establishing environmentally driven consumption, fostering cooperation between citizens and businesses to reshape demand dynamics.
5. Workers face substantial job losses stemming from a combination of technological efficiencies, cost considerations, capacity constraints, and demand restrictions.
6. Repair shops, makers' clubs and DIY shops become hubs of activity and professional education.

20 YEARS AHEAD

1. Democratically elected scientists and youth representatives oversee global guidelines and national laws for the distribution of environmental rights and responsibilities.
2. Governments are requested to deal with a just distribution of rights within their context, however they leave a lot of autonomy to regions.
3. CE committees are established to coordinate equitably within and among regions, fostering bottom-up federal agreements that allocate fair shares of limited resources

20 YEARS AHEAD

4. Localised, participatory organisations emerge empowering communities to actively shape production and consumption and foster sufficiency and ecological and social respect.
5. Shared community kitchens are very common, fostering healthy food practices, reducing meat consumption, and providing spaces for social interaction.
6. A global wealth tax is introduced to curb the laundering of commonwealth and resources, supporting workers during transitions.

30 YEARS AHEAD

1. Communities redefine work and enterprise, with a strong focus on ecology and equity.
2. Traditional firms have completely exited the markets while consumerism decreases.
3. Governments and community organisations collaborate to reassess environmental targets and impose adaptable production constraints.

30 YEARS AHEAD

4. The concentration of CO₂ in the atmosphere dramatically declines, thanks in part to reforestation undertaken by communities on land reclaimed from private landowners.
5. Communities and countries share knowledge and replicate successful self-sufficiency measures and innovations, reviving traditional knowledge systems.
6. Low-emission, small-scale renewable energy plants are constructed, although internal energy production remains insufficient to meet energy demands.

BOTTOM UP
CIRCULAR
LOOPS

10 YEARS

BOTTOM UP
CIRCULAR
LOOPS

10 YEARS

BOTTOM UP
CIRCULAR
LOOPS

20 YEARS

BOTTOM UP
CIRCULAR
LOOPS

20 YEARS

BOTTOM UP
CIRCULAR
LOOPS

30 YEARS

BOTTOM UP
CIRCULAR
LOOPS

30 YEARS

ESTABLISHED
BUSINESS

IMPROVE
Make production
processes more
circular, efficient,
cleaner and less
resource intensive.

ESTABLISHED
BUSINESS

INVEST
Devote resources
to research and
development for
the long-term.

ESTABLISHED
BUSINESS

CHALLENGE
Lobby to accelerate
and amplify a policy
direction or
regulatory or
legislative shift.

ESTABLISHED
BUSINESS

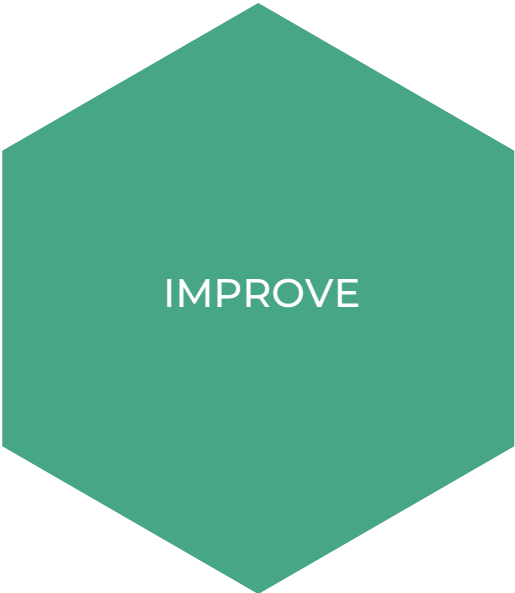
INNOVATE
Change your
business model or
introduce a radically
new way of doing
things.

ESTABLISHED
BUSINESS

STABILISE
Implement a multifaceted
strategy to enhance
resilience and long-term
sustainability.

ESTABLISHED
BUSINESS

PARTNER
Participate in a
multi-sector
communications
campaign that
challenges the prevailing
view of a situation.

A solid green hexagon.

IMPROVE

A solid green hexagon.

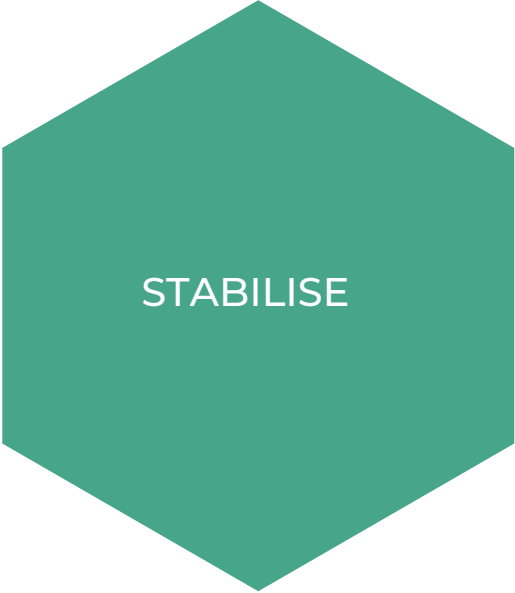
INVEST

A solid green hexagon.

CHALLENGE

A solid green hexagon.

INNOVATE

A solid green hexagon.

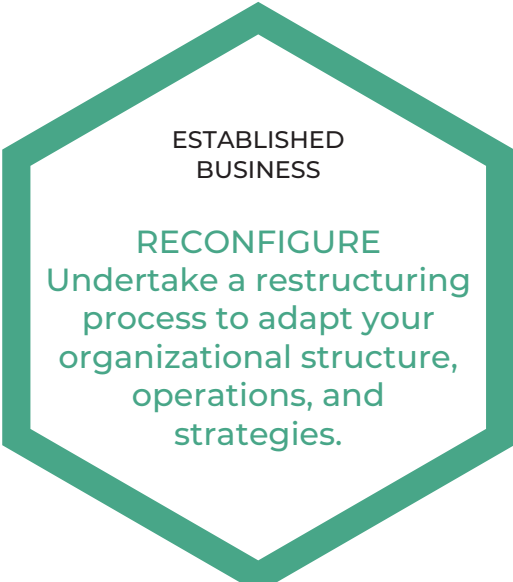
STABILISE

A solid green hexagon.

PARTNER



ESTABLISHED
BUSINESS



ESTABLISHED
BUSINESS

RECONFIGURE
Undertake a restructuring
process to adapt your
organizational structure,
operations, and
strategies.



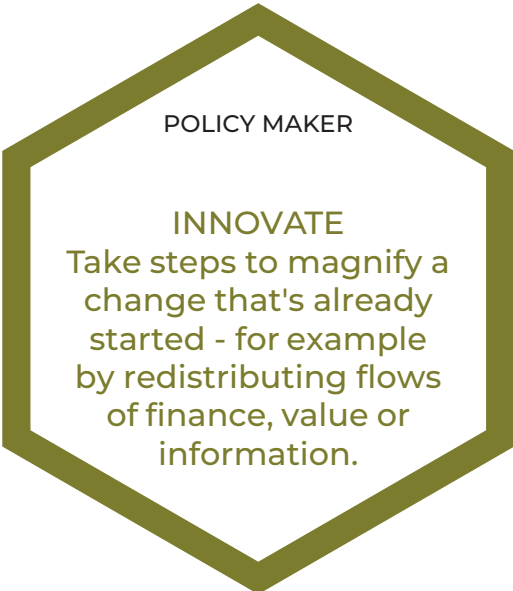
POLICY MAKER

LEGISLATE
Propose, draft, and
enact laws or
regulations within a
legislative framework
to address societal
issues.



POLICY MAKER

REGULATE
Develop rules, laws,
and guidelines to
influence and
control the behavior
of individuals,
organizations, or
systems.



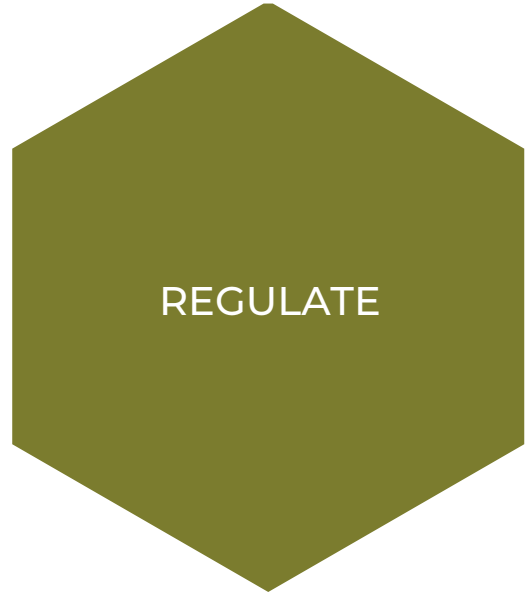
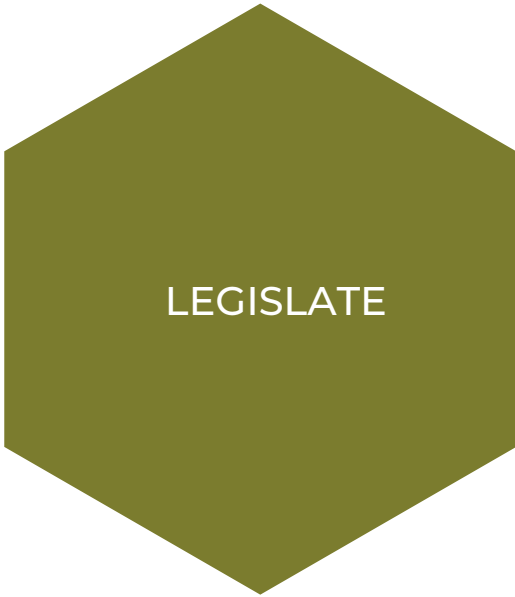
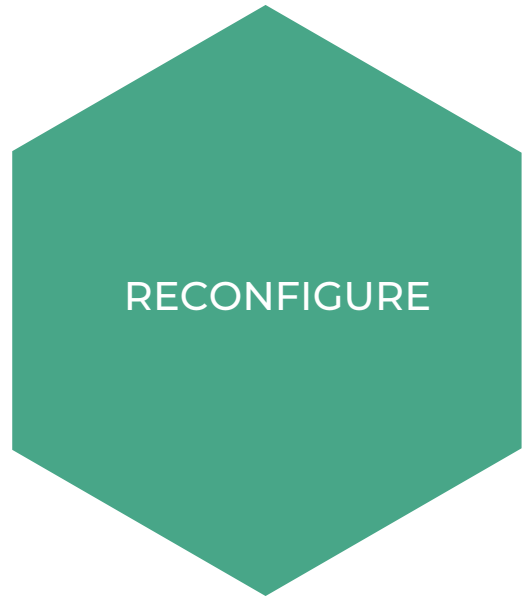
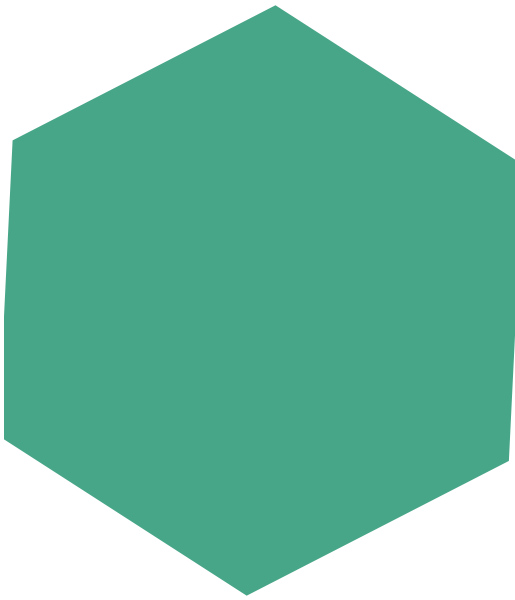
POLICY MAKER

INNOVATE
Take steps to magnify a
change that's already
started - for example
by redistributing flows
of finance, value or
information.



POLICY MAKER

LEAD
Replace an old goal with a
new one by introducing
new policies, visions,
constitutions or
manifestos.



POLICY MAKER

CHALLENGE

Make a decision that undermines the interests of established organisations in order to serve the wider public good.

POLICY MAKER

INVEST

Fund research that introduces a new school of thought, or that point out the draw-backs of an existing one.

POLICY MAKER

POLICY MAKER

STABILISE

Implement targeted economic, fiscal, and regulatory measures to mitigate disruptions and maintain stability.

CONSUMER

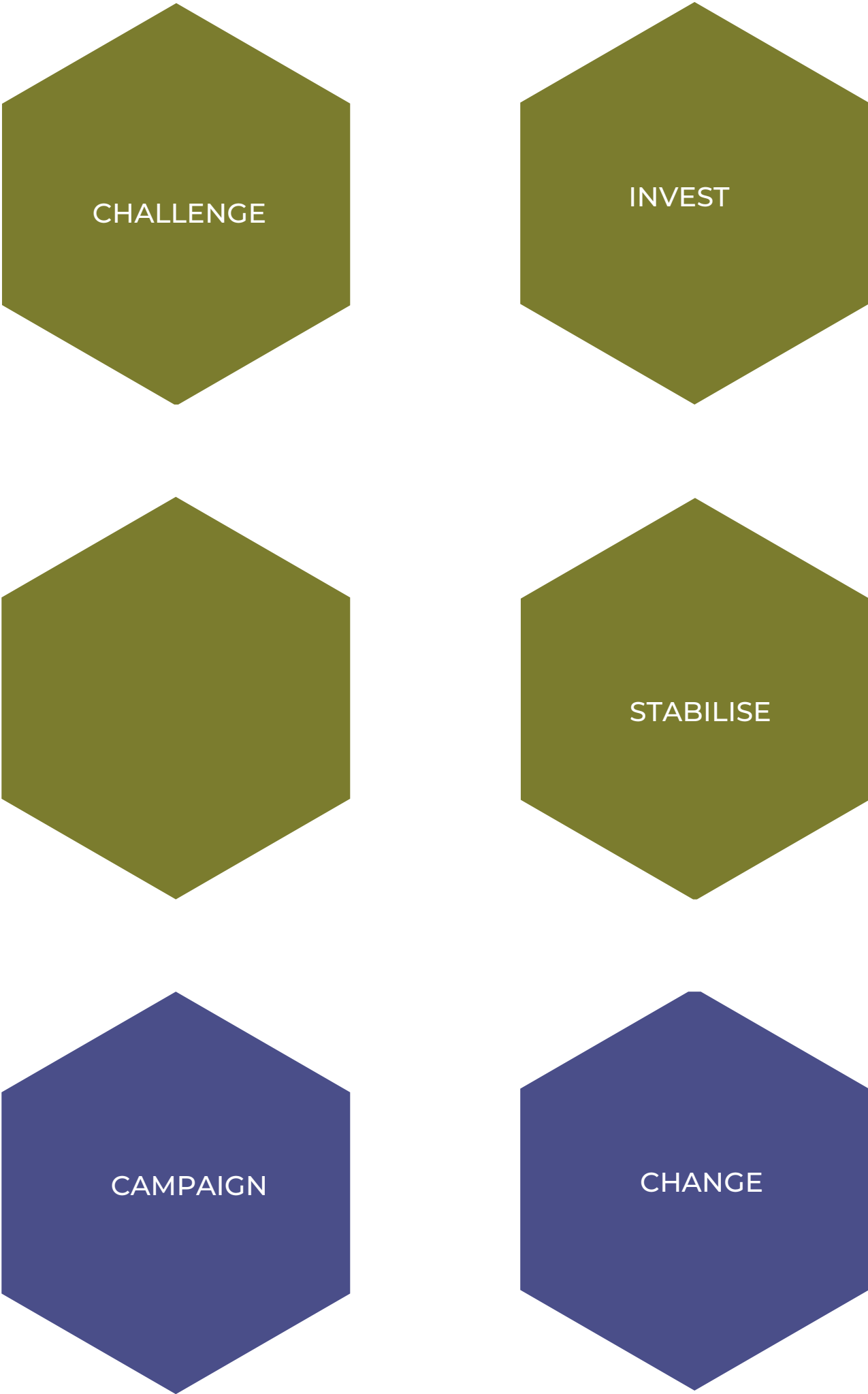
CAMPAIGN

Advocate for and support causes, products, or practices aligned with your values.

CONSUMER

CHANGE

Make conscious, informed choices, adopting sustainable behaviors.



CHALLENGE

INVEST

STABILISE

CAMPAIGN

CHANGE

CONSUMER

PARTICIPATE
Engage in activities
or collaborative
initiatives to
contribute input,
shape decisions,
and influence.

CONSUMER

CONSULT
Engage with experts,
raise awareness and
inform.

CONSUMER

MOBILISE
Organize or participate in
collective efforts to drive
broader awareness or
change.

CONSUMER

LEAD
Sett trends, influence
preferences, and drive
change through
conscious choices

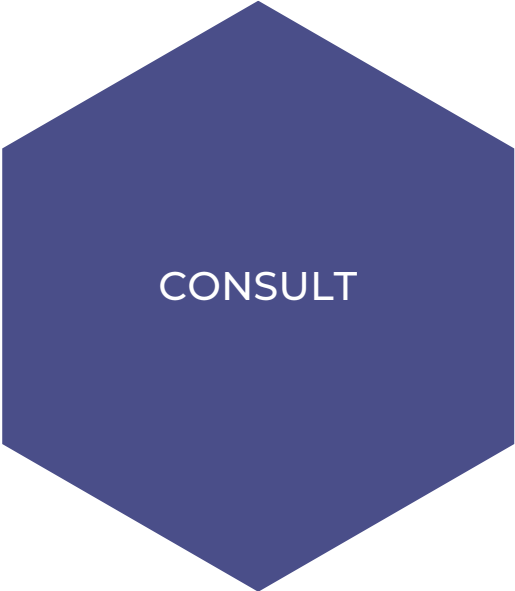
CONSUMER

CONSUMER

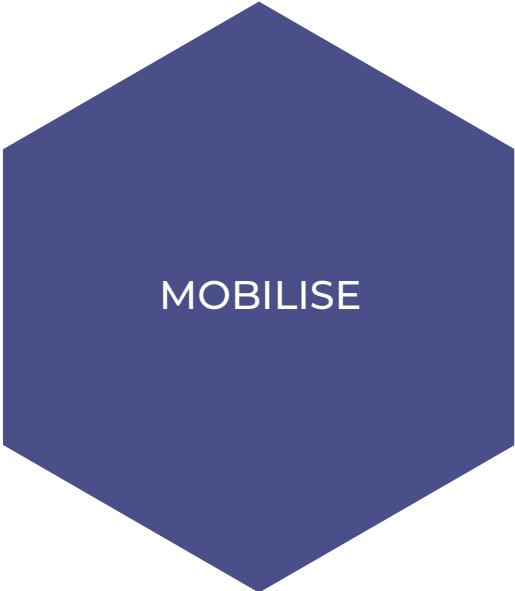
CHALLENGE
Question norms,
advocate for
transparency, and
support alternative
choices to promote
accountability.



PARTICIPATE



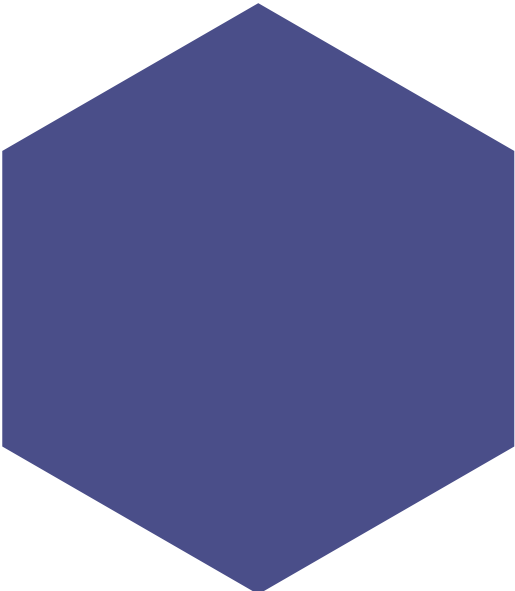
CONSULT



MOBILISE



LEAD



CHALLENGE

CIRCULAR SME

INVEST

Embrace a change of regulation that seeks to adjust market conditions.

CIRCULAR SME

INNOVATE

Move first to seize or create a market opportunity or develop the new forms of collaboration and exchange.

CIRCULAR SME

MOBILISE

Advance your cause by uniting with other actors that share your interests.

CIRCULAR SME

PROTOTYPE

Design and test innovative, sustainable product or service models.

CIRCULAR SME

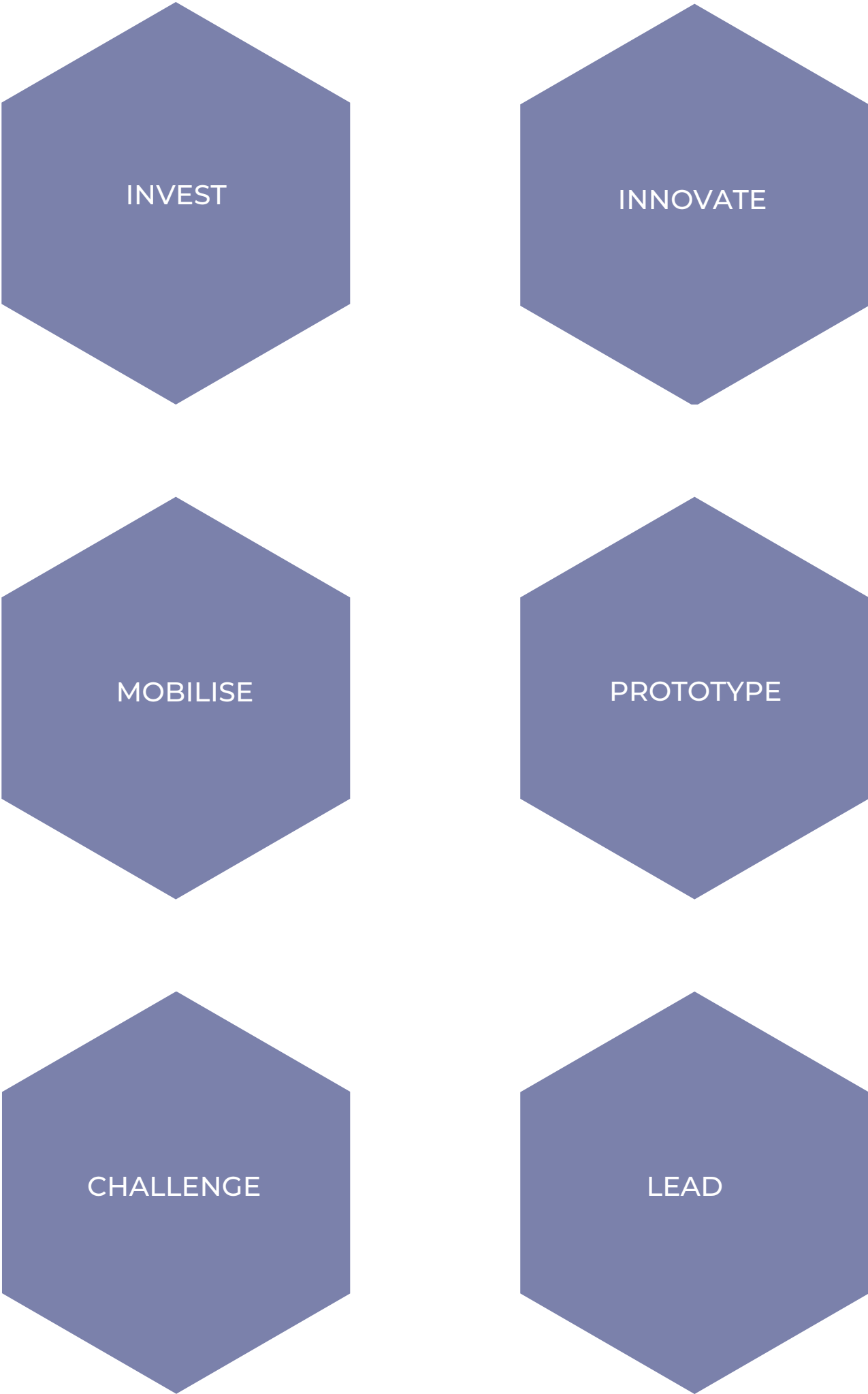
CHALLENGE

Make a radical discovery freely available for others to adopt and apply in any way they choose.

CIRCULAR SME

LEAD

Help to grow your market through communications that brings hidden needs and opportunities into the light.



INVEST

INNOVATE

MOBILISE

PROTOTYPE

CHALLENGE

LEAD

CIRCULAR NGO

CHALLENGE
Act to protect something from being eroded or to protect something new so it can establish.

CIRCULAR SME

CIRCULAR NGO

LEAD
Foster a critical mass of support and use it to create pressure for a fundamental change.

CIRCULAR NGO

MOBILISE
Lobby for measures to slow down the pace of a negative change to give time and space for corrective action.

CIRCULAR NGO

COMMUNICATE
Rally a movement to shift the deeper values that are driving behaviour in a situation.

CIRCULAR NGO

INVEST
Bring something niche to the mainstream.

A dark green hexagon with the word CHALLENGE in white capital letters in the center.

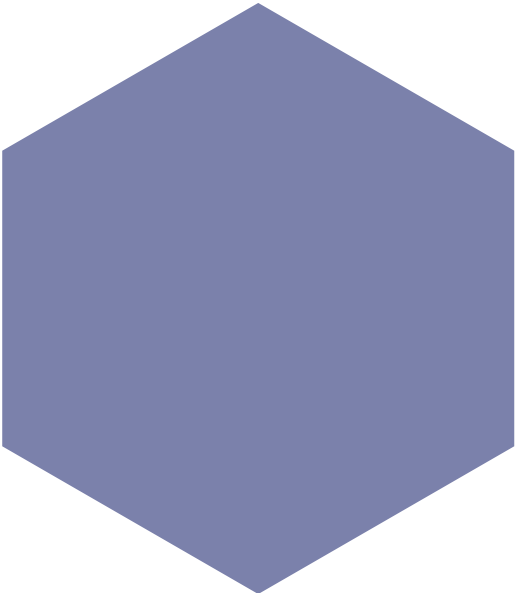
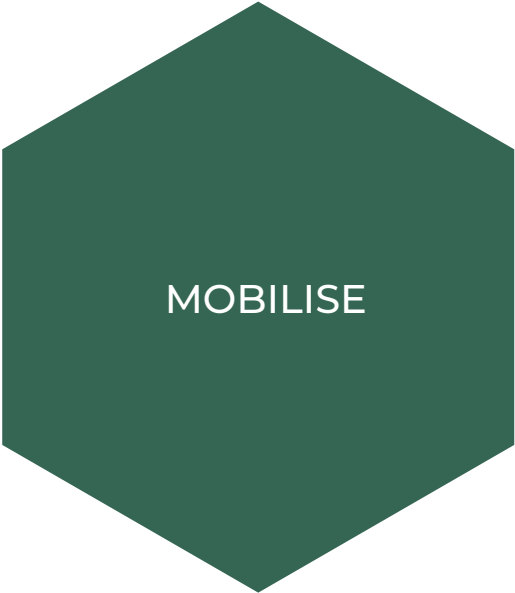
CHALLENGE

A dark green hexagon with the word LEAD in white capital letters in the center.

LEAD

A dark green hexagon with the word COMMUNICATE in white capital letters in the center.

COMMUNICATE

A purple hexagon with no text.A dark green hexagon with the word MOBILISE in white capital letters in the center.

MOBILISE

A dark green hexagon with the word INVEST in white capital letters in the center.

INVEST



CIRCULAR NGO

CONSULT

Engage stakeholders,
foster dialogues and
inform to shape
policies and practices.



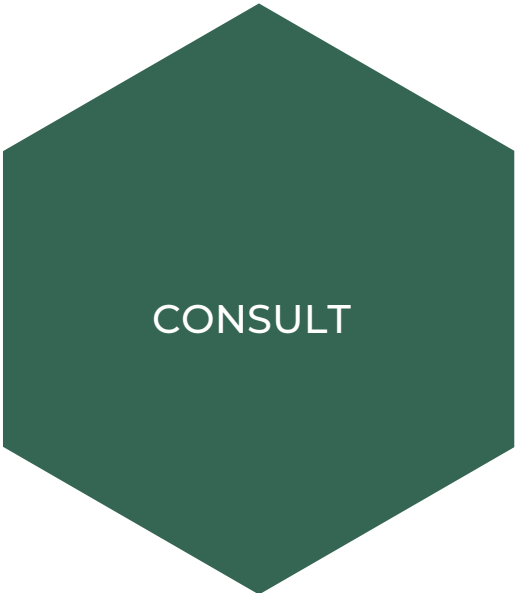
CIRCULAR NGO

INNOVATE

Pilot a form of civic
participation or value
exchange that radically
alters how people relate
to one another.



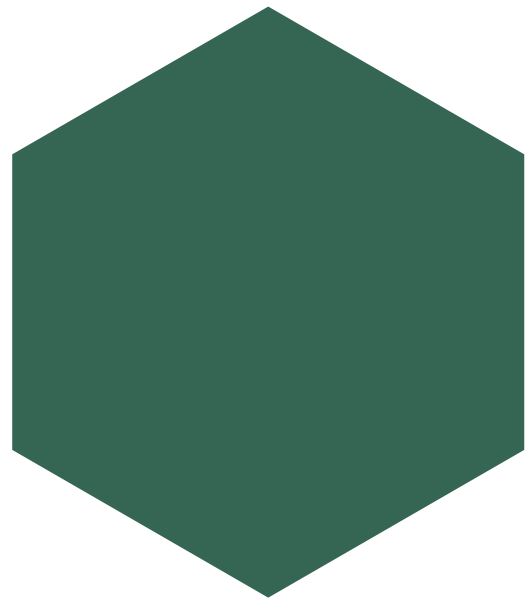
CIRCULAR NGO

A dark green hexagon with the word "CONSULT" centered inside in white capital letters.

CONSULT

A dark green hexagon with the word "INNOVATE" centered inside in white capital letters.

INNOVATE



Actor: Established business

SCENARIO:

Who you are may change as you play the game. Let's see.

At the start of the game, you are a formal organisation that's commercially-orientated. You sell a product or service for profit.

It's up to you to imagine who you are and what you do. The possibilities are endless.

You are large and successful, but that doesn't necessarily mean you are an old company. Your culture may be conservative or progressive. You may have a circular or a linear business model. You may be global or you may be established in specific regions. You could be in any sector or industry.

- What's the name of the organisation you represent?
- What do you do?
- What's your long-term vision?
- What are the values that guide you?

My record of play

GET READY TO START

As you play the game, your objective is to realise your vision as fully and successfully as possible. This means attracting additional resources and public support to amplify your impact. It also means making decisions that will enable you to survive and thrive.

There are no official winners or losers. We'll form our own judgement about this at the end of the game.

Round 1

What action are you taking?

Why?

In what way(s) have you had to change yourself in response to the shifting world around you? Perhaps you haven't needed to change at all?

Round 2

What action are you taking?

Why?

In what way(s) have you had to change yourself in response to the shifting world around you? Perhaps you haven't needed to change at all?

Round 3

What action are you taking?

Why?

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Actor: Policy maker

SCENARIO:

Who you are may change as you play the game. Let's see.

At the start of the game, you are an institutional body that's part of the machinery of governance. You have a democratic mandate and are accountable to the electorate.

It's up to you to imagine who you are and what you do. The possibilities are endless.

You could play a political or a bureaucratic role. You could be involved in creating policy, regulation and legislation or you could be involved in executing them. You could be focused on a particular facet of society, the environment or the economy or you could be crosscutting. You might have a global, supranational, national, regional, municipal or neighbourhood scope.

- What's the name of the organisation you represent?

- What do you do?

- What's your long-term vision?

- What are the values that guide you?

My record of play

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Actor: Circular NGO

SCENARIO:

Who you are may change as you play the game. Let's see.

At the start of the game, you are an organization dedicated to promoting and implementing circular economy principles within society.

It's up to you to imagine who you are and what you do. The possibilities are endless.

You could be small or large. You could be an established charity or emerging community group, or something else. You could have wide, popular support. You could be niche. You can focus on raising awareness about the importance of transitioning from a linear, "take-make-dispose" model to a circular approach. Your organization may engage in educational initiatives, collaborate with businesses and governments to develop and implement circular strategies, and advocate for policies that encourage sustainable practices. Or it can empower communities to adopt circular principles, encouraging responsible consumption and production patterns. It's up to you to choose.

- What's the name of the organisation you represent?

- What do you do?

- What's your long-term vision?

- What are the values that guide you?

My record of play

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Round 3

What action are you taking?

Why?

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Actor: Circular SME

SCENARIO:

Who you are may change as you play the game. Let's see.

At the start of the game, you are a formal organisation that's commercially-orientated. You sell a market proposition for profit.

It's up to you to imagine who you are and what you do. The possibilities are endless.

You are small and agile, and have an entrepreneurial mind-set. You might be an entrepreneur with a small team or an SME with a circular business model, creating value to broad range of stakeholders while minimizing ecological and social costs. You have a relatively short history. You may be global or you may be established in specific regions. You could be in any sector or industry.

- What's the name of the organisation you represent?
- What do you do?
- What's your long-term vision?
- What are the values that guide you?

My record of play

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Round 3

What action are you taking?

Why?

In what way(s) have you had to change yourself in response to the shifting world around you? Perhaps you haven't needed to change at all?

Actor: Consumer organisation

SCENARIO:

Who you are may change as you play the game. Let's see.

At the start of the game, you are an advocacy group that seeks to establish and attempt to enforce consumer rights, serve consumer interests and protect people from any harmful or unsafe products and abuse. You may be engaged in single-issued advocacy or be set as a general consumer watchdog.

It's up to you to imagine who you are and what you do. The possibilities are endless.

- What's the name of the organisation you represent?
- What do you do?
- What's your long-term vision?
- What are the values that guide you?

My record of play

GET READY TO START

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Round 3

What action are you taking?

Why?

In what way(s) have you had to change yourself in response to the shifting world around you? Perhaps you haven't needed to change at all?

My record of play

Actor: Public opinion

Scenario:

- Who are you?

Who you are may change as you play the game. Let's see. It's up to you to imagine who you are and what you do. The possibilities are endless.

At the start of the game, you are a powerful and active voice in the public realm. You take a 'truth' perspective, which means you contest the detail of others' assertions, weigh the facts as you see them and structure your opinions and arguments.

- If you have one, what's your long-term vision?
- What are the values that guide you?

You could be a high-profile and influential individual or you could be an organisation or an affiliation. You could be visible or hidden.

Whoever you are, your opinions are heard and they affect people's perceptions and the wider discourse in society.

Round 1

What is your opinion of the actions taken?

Round 2

What is your opinion of the actions taken?

Round 3

What is your opinion of the actions taken?

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