

University of Nottingham

Supplemental Scenario Content for the UK National Ecosystem
Assessment Scenarios

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INTRODUCTION

This report presents the results of work done by Vision Foresight Strategy LLC (VFS) in the winter of 2012-2013 to develop content for the Follow-on Phase of the UK National Ecosystem Assessment (UK NEA). Specifically, this report presents supplemental material created in support of Work Package 6 of the follow-on phase, focused on the scenarios developed by the UK NEA: “To deepen the analysis of the six scenarios developed in the UK NEA to facilitate the inclusion of a wider range of ecosystem services and explore how these influence well-being values”.

The task presented to VFS was to provide some assistance in making the six NEA scenarios both more rigorous and more colorful, and VFS was specifically requested to employ the “Verge” general practice framework to facilitate achieving these objectives. VFS therefore developed original content to accompany each of the scenarios, using Verge as an organizing framework for the new material. The work of developing this new content took place within the “unexplored spaces” of the original scenarios, which themselves were fairly broad and not very deep beyond the realm of impacts on ecosystem services.

In an effort to develop new content that participants in the UK NEA follow phase would find valuable, VFS developed two sets of supplemental content. The first round of content combined the Verge framework with a version of layered analysis to generate historical timelines and societal changes for each of the six scenarios. This round of content was heavily modified based on client feedback to create the second round of content, describing societal changes in the time periods of 2030 and 2060. The second round of content was used in the follow-on phase “Workshop on Scenarios and Response Options”, which took place on January 31, 2013.

The UK National Ecosystem Assessment

The UK NEA is an analysis of the UK’s natural environment carried out from 2009 – 2011 as part of the Living With Environmental Change Initiative, supported by the UK Department of Food, Environment & Rural Affairs and the Devolved Administrations and other partners. It followed on the UN Millennium Ecosystem Assessment, itself produced in 2005. The UK NEA is “a wide-ranging, multi-stakeholder, crossdisciplinary process, designed to provide a comprehensive picture of past, present and possible future trends in ecosystem services and their values,” and one of the methods used to explore the future implications of trends was scenario analysis.¹

According to the UK NEA report of 2011, scenarios were an essential part of the assessment:

“In the context of the UK NEA, the aim has been to use them to explore how UK ecosystems and their services might change in the future, and to identify what the possible effects might be in terms of human well-being and who might be affected most.”²

¹ UK NEA Technical Report, page 2

² UK NEA Technical Report, page 23

The UK NEA process developed six scenarios through its work with a multitude of stakeholders and experts:

Scenario	Description
<i>Green and Pleasant Land</i>	A preservationist attitude arises because the UK can afford to look after its own backyard without diminishing the ever-increasing standards of living.
<i>Nature@Work</i>	The belief that the promotion of ecosystem services through the creation of multifunctional landscapes is essential for maintaining the quality of life in the UK is widely accepted.
<i>World Markets</i>	High economic growth with a greater focus on removing barriers to trade is the fundamental characteristic of this scenario.
<i>National Security</i>	Under this scenario climate change results in increases in global energy prices forcing many countries to attempt greater self-sufficiency (and efficiency) in many of their core industries.
<i>Local Stewardship</i>	This is a future where society is more concerned with the immediate surroundings and strives to maintain a sustainable focus on life within that area.
<i>Go with the Flow</i>	This scenario is essentially a projection based on current trends and results in a future UK that is roughly based on today's ideals and targets.

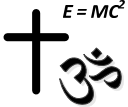
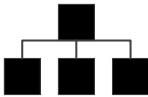




VFS used the narrative descriptions of these six scenarios, found in Chapter 25 of the UK NEA report, as the basis for its work in generating original, supplemental content.

“Verge” General Practice Framework

Known in the UK as the “ethnographic futures framework”, the Verge general practice framework was created by Dr. Richard Lum and Michele Bowman in 2004. It is a framework that is increasingly used in foresight work around the world *to identify changes in society and to explore how those changes are reshaping the ways in which people experience and live their lives*. Originally intended as an alternative taxonomy for environmental scanning, Verge has evolved through use into a general practice framework employed by foresight professionals at virtually every stage of futures research. Since its creation the Verge framework has been used with a variety of organizations, such as Nissan Motor Company, PepsiCo, Ford Motor Company, MTV, Eurostar, and the Singapore Civil Service College.

The Verge framework consists of six domains, shown on the following page. Each domain focuses on an aspect life. While facilitators and researchers generally try to treat these domains as discreet categories, in practice there is a degree of interpretation of the exact boundaries of each domain. This flexibility is in part what allows Verge to adapt to fit each situation and is very much a part of its power to elicit deeper insights from participants and researchers.

As an example of this flexibility, VFS used these domains in their original definition for the first round of content development (see table on the following page). The Verge domains were specifically designed to ask questions about people, and generally focused on people-to-people relationship. For the second round, VFS used modified definitions of the domains in response to client feedback. Thus, in the second round the domains were shifted to attempt to focus more on human relations with ecosystems and ecosystem services.

Domains	Generic Definition	Supplemental Content Definition
 <p><i>Define</i></p>	<p>Define speaks to the concepts, ideas, and paradigms we use to define ourselves and the world around us.</p>	<p>How people define “nature” and “natural”</p>
 <p><i>Relate</i></p>	<p>Relate deals with the social structures and relationships which define people and organizations.</p>	<p>How people relate to the environment and the natural world</p>
 <p><i>Connect</i></p>	<p>The Connect domain encompasses the technologies and practices used to connect people, places, and things.</p>	<p>How people are connected to the environment and ecosystem services</p>
 <p><i>Create</i></p>	<p>Create is concerned with the technology and processes through which we produce goods and services.</p>	<p>The processes and technologies through which people produce goods and services</p>
 <p><i>Consume</i></p>	<p>Consume is about the ways in which we acquire and use the goods and services we create.</p>	<p>The ways in which we acquire and use ecosystem services</p>
 <p><i>Destroy</i></p>	<p>The domain of Destroy is about the ways in which we destroy value and the reasons for doing so.</p>	<p>The ways in which people destroy natural value and the reasons for doing so</p>

SUPPLEMENTAL SCENARIO CONTENT

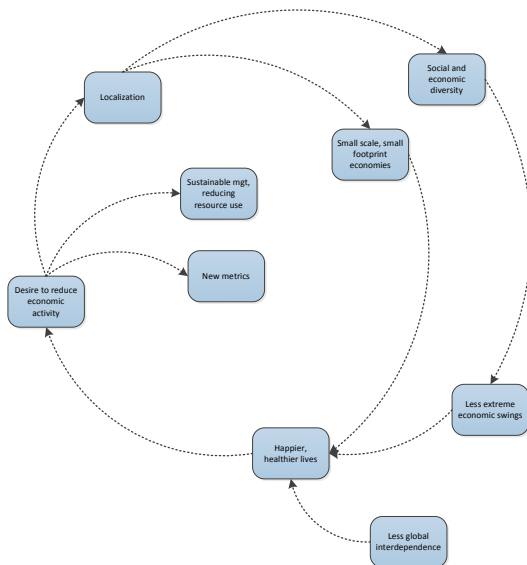
VFS developed original content to supplement the original UK NEA scenarios with the intent of making the scenarios more rigorous and engaging. In trying to develop this content, VFS went through two rounds of drafts, soliciting and incorporating feedback to produce content that would be valuable to future workshop participants. In the first round VFS used the original definitions of the domains in the Verge framework in a fairly straight forward application of interaction analysis (see below), and employed an original heuristic developed specifically to aid interaction analysis (see Appendix B).

While the content developed in the first round was provocative, it was seen as straying too far from the concerns of UK NEA follow-on phase participants, namely addressing ecosystem services in a more direct manner. The supplemental content in this first round was in fact created with an eye towards exploring how the changes in the original scenarios would “ripple” across the broader society. In this way it very much moved away from a direct discussion of people’s interactions with ecosystems and ecosystem services.

VFS therefore substantially modified the content to reflect these concerns and produced the second round of content, which simplified certain elements and focused more directly on human interaction with the natural environment. The second round content employed the modified Verge definitions (see page 3) and shifted to describe developments in just two time frames: 2030 and 2060.

Basic Scenario Dynamics

As part of its efforts to understand the original UK NEA scenarios VFS developed diagrams illustrating what appeared to be the important dynamics at work in the original scenarios. These diagrams reflected what the scenario narratives in Chapter 25 of the UK NEA report presented as important drivers and structural relationships within the scenarios. All six of these diagrams are presented in Appendix A, while one is included below as a sample.



Basic scenario diagram for *Local Stewardship*

In developing the diagrams VFS was attempting to apply something of a systems view to the material presented in Chapter 25 to understand the structural dynamics driving each scenario. It is not uncommon for trained futurists to employ various systems approaches during scenario projects, sometimes building scenarios on the scaffolding of systems archetypes. While the diagrams do not represent true systems maps, they were valuable reference points during the creation of the first round content.

These diagrams were included in the first round content but dropped during the modifications to create the second, and final, content.

First Drafts

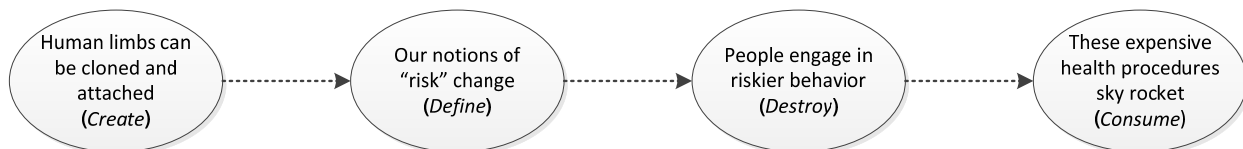
In the first round of content creation, VFS generated a new timeline of changes to go along with each of the six original UK NEA scenarios. These new timelines were intended to explore logical sequences of events that could occur within the boundaries of the original scenario, essentially exploring new details and interactions not covered by the narratives presented in Chapter 25 of the UK NEA report. The intent was to add more social, economic, and political texture to the scenarios and not to alter the fundamental trajectories of the original scenarios. In this sense the broad outlines and the endstates of the scenarios were taken as given, and the content creation focused on the “blank” spaces in between.

The basic question behind the creation of the supplemental content was, “what potentially challenging, and possibly unanticipated, changes might ripple through society as a result of the trajectories of the original scenarios?” Because of this we wanted to explore chains of events passing beyond the policy realms most directly related to “ecosystem services”. Ultimately this proved to be less useful for follow-on phase participants, and the second round material took a different direction.

The supplemental content for each scenario consisted of a timeline of events and descriptions of changes occurring within each of the six Verge domains (see sample on page 7). To create the content VFS used the original Verge domain definitions (see page 3) and employed a combination of interaction analysis and layered analysis.

Interaction Analysis

Verge interaction analysis involves forecasting the impact of changes occurring in one Verge domain cascading across other domains. This method produces causally linked chains of impacts across the six Verge domains. In essence, one takes a change occurring in one domain, say Define, and forecasts how that change would drive changes in another domain, say Create. The resulting content typically resembles timelines of changes across society.



This exercise can be framed in any number of ways, and for this project VFS employed an original heuristic used specifically to aid developing these causal chains, which can be found in Appendix B. As the diagram in Appendix B shows, this particular heuristic incorporates a version of layered analysis, another conceptual framework commonly employed by trained futurists.

Layered Analysis

Layered analysis covers a number of approaches for conceptualizing society or reality in multiple layers, not unlike the layers of an onion. In most approaches, the top most layers represent the most transient phenomena or the uncritical assumptions or actors, while the bottom most layers typically represent deeper structures such as mythology and metaphor. The most well-known method in futures studies is likely to be causal layered analysis, created by Sohail Inayatullah, but other examples of similar thinking can be found, for instance in some of the conceptual framing created by Fernand Braudel.

<i>Surface Layer</i>	Things happening close to the pace of daily life; they change often and quickly but tend to have limited impact.
<i>Systems Layer</i>	The structures, institutions, and rules that make up society; they change less often than the Surface, but have more impact.
<i>Worldview Layer</i>	The philosophies, metaphors, and values that underlie society's core assumptions; they change slowly but generally with great impact.

For the first round VFS employed a version of layered analysis with three layers: Surface, Systems, and Worldview. These relate to the daily rhythms and quick fads at the surface of life, the larger institutions and structures that organize society, and the deeper philosophies and worldview that structure perception.

Generally speaking, we expect change to happen fairly often and quickly at the Surface, somewhat slower and less often at the Systems layer, and slowly and infrequently at the Worldview layer. Barring genuine wildcards or true black swan events, we would not expect multiple or recurrent changes in the lower layers within the time span of a single generation. The very existence of that rule, however, should keep us sensitive to logical reasons why such unusual and deeply rooted change *could* happen.

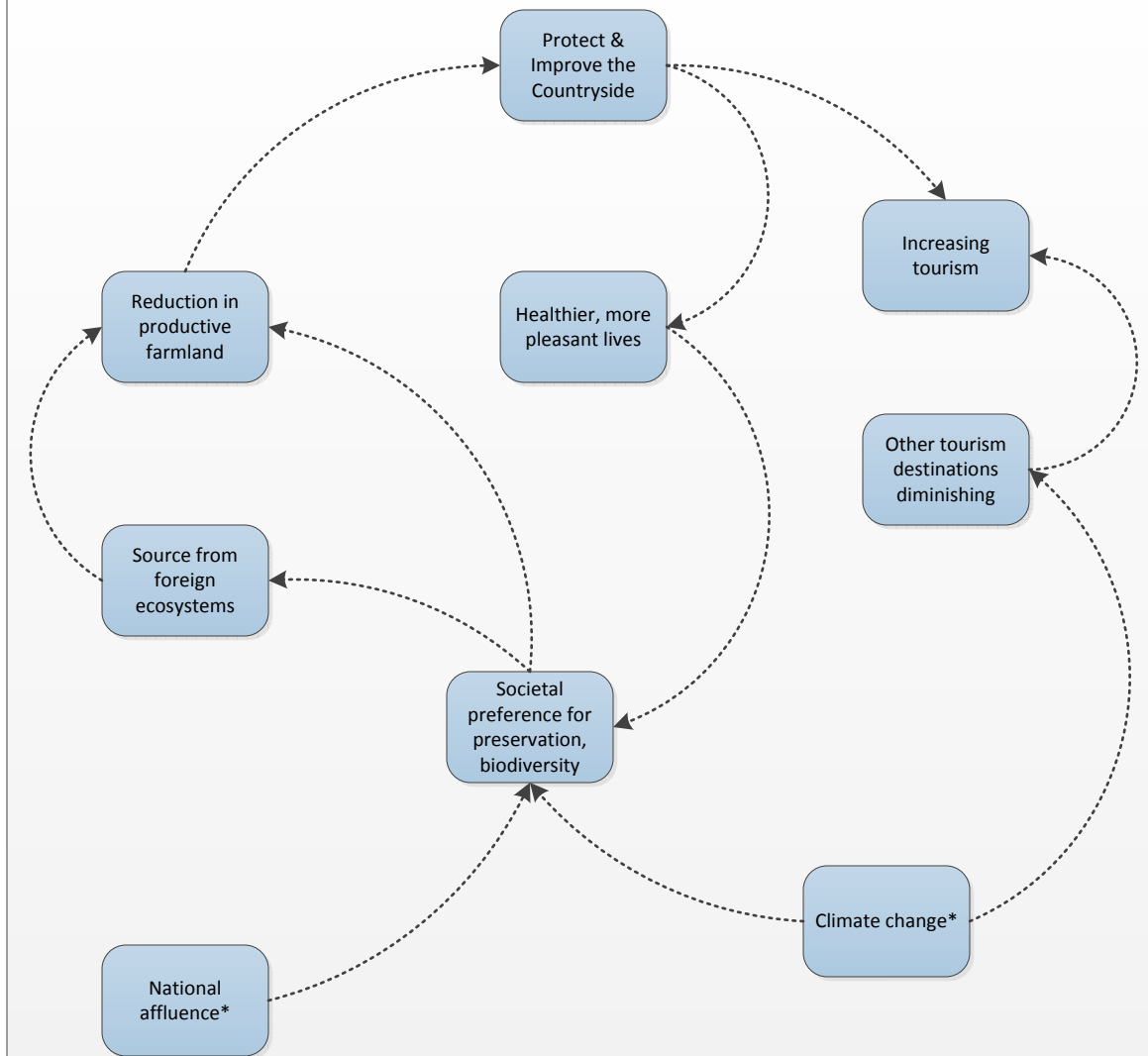
Other References

In order to generate the supplemental content VFS drew inspiration from a wide variety of intellectual sources, ranging from theories of change and stability to theories of human motivation to emerging issues and new technology. These items were used to introduce new events and developments and to forecast human behavior and societal patterns of change. A sampling of these items is presented in the table below.

Models, Concepts, and Historical Precedents	Trends, Emerging Issues, and Miscellany
<ul style="list-style-type: none"> • "S-curve" of issues development • Trends prompting counter trends • Layered analysis: different rates of change for phenomena at different layers of society • Systems archetypes • Historical patterns/structure of social movements (Charles Tilly) • Maslow's hierarchy of needs • Disruptive innovation (Clayton Christensen) • Social capital (Yochai Benkler) • Conflict theories: conflict within society between groups drives change • Government economic planning and citizen mobilization (WWII) • "Elite capture" of institutions • Jungian archetypes • The Hero's Journey (Joseph Campbell) 	<ul style="list-style-type: none"> • B-corps • Augmented reality (AR) • Big data/analytics • Bioproduction • Civic media/gov 2.0 • Cradle to cradle (C2C) • Design thinking • Digital fabrication • DIY movement • Google Hangouts • Hacktivism/cyber terror • Illegal cross-border waste dumping • Machine learning and algorithms • Maker/hacker spaces • Mesh networking • Open gov/open data/transparency • Open innovation • "Rise of the Rest" • Sharing economy/services • Social financing (crowdfunding, etc...) • Upcycling

Green and Pleasant Land: from Manifest Guilt to "Global Backyards"

Basic Dynamics Observed in the Original Scenario



* Key assumptions

Overview

The additional scenario elements of "from Manifest Guilt to 'Global Backyards'" present a narrative about how the contradictions inherent in the scenario, namely the model of using wealth to externalize economic costs in order to foster a "green" domestic development creates a cognitive dissonance that develops into a manifest guilt about living healthy, ecologically conscious lives while the natural environments of other peoples are being rapidly degraded. The awareness of this dissonance spreads and eventually drives people to expand their notions about their environmental "backyard" to include the ecosystems "upstream" in their economic lives. This in turn leads to a citizen lead, crowdsourced, and self-organizing set of efforts to improve the ecosystems, and by necessity the economic practices, of many places abroad.

Define

The new "preservationist" worldview that has become pervasive eventually alters language and archetypes, leading to the emergence of new heroes and narratives.

Most popular movie, *The Arborist*, a sci-fi flick about a man braving all to travel back in time to retrieve the species needed to repopulate the world's dying forests.

At the same time, this new worldview sets up a cognitive dissonance between living healthy, ecological beautiful lives and shifting the ecological costs of a 21st century lifestyle to other lands. This is best captured when elementary students from across the country crowdsource a book, *Indra's Tree*, illustrating their collective concern for the homes of children in India.

Relate

A growing number of local organizations emerge to self-manage "their own backyards", volunteering to help with maintenance and monitoring of ecosystems.

The TEDxLondon talk "My Country, My Source", hits a chord with the UK's latent cognitive dissonance. About one woman's discovery that her life was as dependent as much on ___ as on the beautiful streams in her backyard, it kicks off a flurry of debate about place and community.

London design studios begin producing maps depicting the new "geographies" of UK communities, visually linking affluent Londoners with both their pristine backyards as well as their "source" communities abroad.

Connect

A rising interest in local monitoring and maintenance of the environment; made easy through mobile apps, cheap remote monitoring vehicles, and distributed computing through ubiquitous mobile devices.

A citizen-led push to participate more in global development emerges, wanting to lend help to "source" communities. Ecosystem monitoring services developed in the UK are scaled up and redeployed to work with members of source communities to impact environmental and corporate monitoring, and collecting supply chain data.

Create

The "Global Backyards" movement emerges, coalescing around the desire to improve the "upstream" economic practices and ecological impacts. It is a largely self-organized movement, built on open source platforms and globally crowdsourced data on how things are extracted and produced, and how they could be changed.

Connected to the "GB" movement, there is increased interest and investment in radical industrial design and innovation, an attempt to redesign basic industrial processes and lower ecological impacts. Intended initially to be exported abroad, the new knowledge has obvious domestic application.

Consume

As the GB movement expands globally, it supports the emergence of global networks of "cradle to cradle" (C2C) design approaches and processes. Together these various networks begin to identify and promote GB-certified goods and services, accompanied by a growing wealth of sourcing data.

Mobile apps and social networks work to steer an increasing number of people to UK retailers and producers with GB certification. Legislation follows on with new phase-in tariffs for non-GB goods.

Costs for consumer goods rises in the short term, and in order to reduce the impact on lower incomes, time-limited subsidies are enacted.

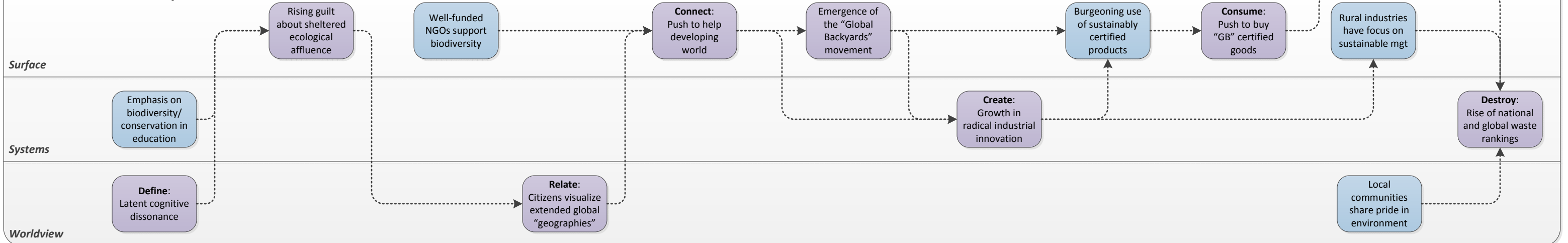
Destroy

As the GB movement and radical industrial innovation matures, a respected think tank publishes a milestone report, "From Carbon Footprints to Leaving No Trace: transitions to a high efficiency, low waste society." This cements the new C2C approach as a public policy cornerstone

Both social networks and government agencies launch local waste reduction and monitoring programs, leading to national (and transmitted through global networks, regional) community and industry waste rankings.

Slowly but surely, ecosystem value destruction is attacked from both ends of industrial process, attempting to close the loop, for the UK and the world.

Evolution of the new layer of the scenario



Final Drafts

In response to the feedback provided in response to the first round material, VFS made substantial modifications and generated what became the final draft content used in the January, 31 2013 Workshop on Scenarios and Response Options. The main thrust of the feedback was that the first round content strayed too far from the immediate concerns (and hence, relevance) of the individuals who would be participating in the January 31 workshop. What would be more relevant for the participants would be supplemental content that spoke more directly and more narrowly about human interaction with ecosystems and ecosystem services.

For the second round, VFS edited its first draft material to alter some of the “plot lines” that it initially created, removing as well as adding content. The basic scenario dynamics diagrams were removed, along with the historical timelines, and the narratives around each of the six Verge domains were reformatted to focus on changes in two specific time periods: 2030 and 2060. It was felt that dividing the new narratives into those two time frames would be easier for participants to process while still providing some sense of a timeline of changes.

The final drafts, shown on the following pages, present the set of drivers for each of the original UK NEA scenarios, the set of models, concepts, and emerging issues referenced in creating the supplemental content, and the new narratives arrayed by Verge domain and in the time frames of 2030 and 2060.

It should be noted that VFS produced second drafts for only five of the original six UK NEA scenarios, with the *Go with the Flow* scenario being the scenario without final draft content. While the *Go with the Flow* scenario is explained as being a continuation scenario rather than a “do nothing” scenario, in many respects it assumes little environmental change (“environment” is used here in the sense of the broader context of the scenario, and not in reference to ecosystems or natural habitats) and an extrapolation of current attitudes and policies. Combined with the generally low-level of technological change found across the entire set of UK NEA scenarios, this presented an even greater difficulty for exploring additional dynamics of change within the extant scenario, as the scenario in many respects assumes that most things across society do not experience significant change. Given this context, there was limited value that VFS could provide in exploring additional changes in society. Additionally, much greater value from applying a framework such as Verge for the purposes of exploring implications would be had from subject matter experts.

Nature@Work (supplemental content)

Indirect Drivers of Change (original scenario content)	
Demographic	Population grows steadily through ageing and immigration.
Socio-political	A globally-minded government. Decision-making is strongly influenced by EU and other countries ideas. Global issues are dealt with in a global manner. Public services are a priority.
Economic	Moderate economic growth with global free trade. Growth continues seemingly without any downturn.
Science and technological	Strong technological industry guided by improving sustainable resource use.
Cultural and religious	A strong utilitarian view dominates but also a greater understanding that nature supplies finite goods and services.

Additional Drivers and Models of Change (new content)

- Continued advancement in software algorithms and machine learning
- Automation-driven structural shifts in the economy lead to far greater productivity and far less human employment
- Remote, mobile, and micro sensor technology is powerful, cheap, and ubiquitous
- People adapt the most powerful technologies available to support/manifest their worldview and values
- “Success to the Successful” (system archetype)

Fundamental Assumption within the Original Scenario Material:

If a pragmatic and balanced approach to actively managing ecosystem services is taken, then a genuine “green economy” will emerge.

Verge Domains	2030	2060
Define How people define “nature” and “natural”	<ul style="list-style-type: none"> • People see the environment as a partner; but it is not about stewardship of the land so much as it is about <i>management</i> of this relationship • Society has a renewed faith in rational thought and planning 	<ul style="list-style-type: none"> • People do not perceive a strong distinction between the human world and the natural world; strong information and analytical technologies support the perception that the world is defined by clear and continuous flows between human and natural systems (it is all one big system)
Relate How people relate to the environment and the natural world	<ul style="list-style-type: none"> • People see their partnership with the environment as one of give-and-take, where both sides have to be able to keep functioning • Measurement and accounting is part of every discussion and activity related to the environment 	<ul style="list-style-type: none"> • Socialized from birth to perceive modern human/environment interaction to be composed of multiple flows and complex and delayed feedback loops (outside of the optimum time frames for influencing human behavior), individuals rely on machines and not their eyes for anticipating the effects of their actions on the world around them
Connect How people are connected to the environment and ecosystem services	<ul style="list-style-type: none"> • Remote sensors, mobile devices and apps, powerful software modeling and data analytics, and ubiquitous wireless internet access enable pervasive real-time measurement of the world • Third party applications continuously advise individuals of the environmental impact of their behavior/choices in real time 	<ul style="list-style-type: none"> • Due to a high level of structural unemployment (automation has simultaneously increased productivity and increased human unemployment), people spend a lot more time in leisure and consequently, out of doors
Create The processes and technologies through which people produce goods and services	<ul style="list-style-type: none"> • Companies use government measurement data and sophisticated modeling to predict future product and service impacts • Companies and individuals involved in producing goods rely on real-time data about local sourcing options and local supply and demand projections 	<ul style="list-style-type: none"> • “Companies” that produce or manufacture goods are largely “staffed” by machines (software and software + physical platforms), which remain in constant communication and coordination with the country-wide network of software that monitors and models ecosystem impacts across the UK
Consume The ways in which we acquire and use ecosystem services	<ul style="list-style-type: none"> • Consumers are continuously advised by software applications on the availability and location of goods and services • Government ecosystem analysts continually refine their estimates and issue new ecosystem service guidelines and usage quotas, altering the calculations and recommendations made by software applications 	<ul style="list-style-type: none"> • Most consumption decisions for individuals are managed by algorithm-based smart systems that continuously communicate with the smart systems of producers of all sizes for just-in-time and no-more-than-you-need purchasing and possession
Destroy The ways in which people destroy natural value and the reasons for doing so	<ul style="list-style-type: none"> • Amidst the increasingly apparent success of the government’s ecosystem management initiatives, there is a brief though intense debate in which a vocal few asserted that humans were in real danger of destroying that which is unpredictable, serendipitous, and miraculous in Nature 	<ul style="list-style-type: none"> • Due to the scale and pervasiveness of the monitoring, measurement, and modeling of human choices and impacts being conducted by machines, and because machines execute many of their own conclusions, people are almost entirely reliant on these same systems to understand future impacts on the environment

Terms

- Systems archetypes: “Common system structures that produce characteristic patterns of behavior.”†
- “Success to the Successful”: the systems archetype in which one person or group is initially given more resources than another person or group, which increases their chances of succeeding, and whose subsequent success justifies more resources going to them than to the other person or group, who now have a harder time succeeding, which makes it harder to justify resources...

†Meadows, Donella. *Thinking in Systems: A Primer*.

World Markets (supplemental content)

Indirect Drivers of Change (original scenario content)	
Demographic	Population grows steadily through ageing and immigration.
Socio-political	Strong, centralised national government. Devolved power has been taken away. Markets have very little regulation; there are few environmental policies. The welfare state is reduced considerably.
Economic	Strong initial economic growth but characterised by occasional global market crises and periods of stagnation.
Science and technological	The private sector undercuts technology advancement and it flourishes but benefits a smaller proportion of society.
Cultural and religious	Utilitarian without greater understanding of nature's benefit to mankind. A return to the traditional Christian stewardship values.

Additional Drivers and Models of Change (new content)
<ul style="list-style-type: none"> • Internet-based social media technology develops into a fundamental and ubiquitous information and communication infrastructure • Augmented reality develops into a mainstream technology • Synthetic biology becomes standard • More intense global economic cyclicalities and increased volatility • Historical example: the ways populations have responded to crises by seeking forms of "escape" • "Tragedy of the Commons" systems archetype • Age cohort analysis

Fundamental Assumption within the Original Scenario Material:

If policies constraining economic markets are removed, then the global free-market dynamos will inevitably drive the irreversible consumption of natural resources and un-built environments.

Verge Domains	2030	2060
Define How people define "nature" and "natural"	<ul style="list-style-type: none"> • Nature is firmly seen as merely a resource and commodity • The world "out there", meaning wilderness and the un-built world, is increasingly seen as disconnected from the "real" life going in cities, in business life, and in global exchange • Pining for the pristine pastoral past is seen as silly and foolish 	<ul style="list-style-type: none"> • "Nature" is the (nostalgia-inducing) blueprint for synthetic resources; it represents the past and is wistfully remembered by aged Millennials* • Common usage of the term "natural" now includes "what man can fashion" rather than simply "that which exists without human influence."
Relate How people relate to the environment and the natural world	<ul style="list-style-type: none"> • People are increasingly removed from interaction with anything other than the built, urban environment, which is increasingly outfitted with pervasive information, entertainment and distraction • Augmented reality (AR) applications come into their own. Extremely popular are "Nostalgia" apps that represent the world as it used to be 	<ul style="list-style-type: none"> • Simulated and synthetic experiences of "ancestral" environments are the norm for new generations, for whom the built environment is merely a canvas on which to grow or project whatever environs are needed • Society develops an unconscious "siege mentality" towards climate change: simply build more walls, more barriers, and more pumps
Connect How people are connected to the environment and ecosystem services	<ul style="list-style-type: none"> • Arising out of government "bread and circuses" programs to quell public unrest, experimental "synthetic preserves", large and elaborate "natural" spaces in climate controlled indoor spaces are built: recreating everything from parks with clean air and streams that are safe to drink to exotic (and increasingly rare) ecosystems 	<ul style="list-style-type: none"> • The extensive network of synthetic preserves evolve into a fusion of state and privately-funded national parks/museums/biolabs • For the increasing percentage of the population that is urban, accessing "ancestral" or unspoiled resources involves considerable travel and expense
Create The processes and technologies through which people produce goods and services	<ul style="list-style-type: none"> • Domestic and global market incentives drive a "race to the bottom" with regard to access to resources. Control over resources is a tightly choreographed dance between large companies and government agents • Globally, synthetic biology and other bioindustries go mainstream as governments race against tightening natural resource supplies 	<ul style="list-style-type: none"> • Biology is the scaffolding on which people build the resources they require, and biology is harnessed as the production line that mindlessly churns out the feedstocks and chemicals that society requires • Novel synthetic plant forms and ecosystems designed for urban environments and climate change are tested in synthetic preserves
Consume The ways in which we acquire and use ecosystem services	<ul style="list-style-type: none"> • People "retreat", focused on feeling good and seeking to satisfy immediate impulses: immersive entertainment and virtual worlds • Control and access to many natural spaces and resources are privatized and require access fees, and most state-run areas likewise charge the public for access 	<ul style="list-style-type: none"> • The Mountain now comes to Mohammed: people no longer think about travelling out into the natural environment for services; increasingly such services as needed are created or synthesized where most convenient • Virtually all traditional and synthetic habitats and resources are privately owned or privatized public assets
Destroy The ways in which people destroy natural value and the reasons for doing so	<ul style="list-style-type: none"> • What remains of the state's regulatory apparatus, as well as the diminishing environmental advocacy sector, report escalating resource wars between corporations, and growing gray and black markets for resources of all types 	<ul style="list-style-type: none"> • Consuming or converting natural resources and habitats, traditionally the epitome of destructive behavior, is no longer perceived as "wrong" • Attempts to halt or interfere with the advance of synthetic biology and biotechnology, largely seen as key components of human ecological and economic adaptation, are seen as irresponsible and selfish

Terms

- Systems archetypes: "Common system structures that produce characteristic patterns of behavior."†
- "Tragedy of the Commons": the systems archetype in which individual actions to maximize individual interests overwhelm the system, creating diminishing returns for all
- Age cohort analysis: a method of anticipating future social changes based on the fact that different cohorts, who are born and mature in the same place and time, often share beliefs about the world that are very different from preceding cohorts

*In 47 years time Generation X will largely have passed on, while Millennials will be in their 60s and 70s, with "Generation Z" (first being born in 2005) in their 40s and 50s, and two as-yet unnamed generations forming the bulk of young workers and filling schools and colleges.

†Meadows, Donella. *Thinking in Systems: A Primer*.

National Security (supplemental content)

Indirect Drivers of Change (original scenario content)	
Demographic	Population grows steadily through ageing and immigration.
Socio-political	The government interferes with the free market to protect UK interests and institutes trade barriers and other protectionist measures.
Economic	Strong initial economic growth but characterised by occasional global market crises and periods of stagnation.
Science and technological	Strong technological industry guided by improving sustainable resource use.
Cultural and religious	Society values landscapes and much of the beauty nature provides – particularly those which embody national identity. In ‘uglier’ areas though nature is given less respect.

Fundamental Assumption within the Original Scenario Material:

The government can (successfully) take an active role in countering global scarcities through promoting domestic resource management and thereby largely maintain a contemporary post-industrial society.

Verge Domains	2030	2060
Define How people define “nature” and “natural”	<ul style="list-style-type: none"> Through government support, generations of citizens are socialized to develop and manage local natural resources with an eye to larger state economic goals (revised and published annually) The ideal citizen is depicted in decades of government programs as one who is tireless, economically self-sufficient, and relentlessly innovative 	<ul style="list-style-type: none"> Land (resources) is seen as the foundation for a country’s prosperity and its survival; it is something to be protected, like the Golden Goose The savvy, innovative young farmer becomes the popular archetype, the person who is relentless in preserving and expanding the bounty of the land
Relate How people relate to the environment and the natural world	<ul style="list-style-type: none"> UK Industrial Innovation Program: legislation that creates government sponsored regional innovation centers, sector-specific innovation centers, and innovation competitions in natural resource use/expansion Government invests heavily in technology and tech platforms for tightly monitoring domestic resources (sensors) 	<ul style="list-style-type: none"> Regions within the UK are highly competitive with regard to their scores on the government’s digital dashboard; communities within regions are fairly competitive with each other A point of pride and a staple of talk shows is how the UK compares with other countries in making productive its domestic resources
Connect How people are connected to the environment and ecosystem services	<ul style="list-style-type: none"> Communities, regions, and industries are able to daily see their relative success at efficiently managing resources via the government’s web-based digital dashboard, sourced with data from the national resource sensors 	<ul style="list-style-type: none"> With the growth of the domestic economy of DIY manufactures, many are routinely involved in accessing, but more importantly, trying to be innovative and efficient in their use of local and regional resources Thanks to extensive resource monitoring, virtually all domestic feedstocks can be digitally traced up their supply chains
Create The processes and technologies through which people produce goods and services	<ul style="list-style-type: none"> The government creates a national network of community centers for collecting and reusing materials (free to the public) Local DIY and “maker” groups set up workshops near these centers, establishing the groundwork for a national network of makerspaces 	<ul style="list-style-type: none"> After years of government subsidized science, research, and education, the UK finds itself on the cusp of a revolution in materials Founded on a national network of recycling and “maker” spaces, there emerges an incredibly diverse and endlessly innovative domestic economy of DIY manufactures.
Consume The ways in which we acquire and use ecosystem services	<ul style="list-style-type: none"> Community bazaars, often arising alongside the national recycling centers and maker spaces, feature local crafts, both humble and high tech, spun from upcycled goods, 3D printers, and a plethora of other digital fabrication processes 	<ul style="list-style-type: none"> Thanks to the DIY economy and infrastructure, the average family is much more actively involved in making things for themselves or obtaining those things from others locally
Destroy The ways in which people destroy natural value and the reasons for doing so	<ul style="list-style-type: none"> Children are taught to practice cradle to cradle (C2C) thinking and are taught to reuse everything they own. Cuba, an island nation once shunned by the “West”, becomes a commonly taught case study to students of all ages, demonstrating the creativity and innovative capacity of people under even the harshest economic isolation. 	<ul style="list-style-type: none"> Waste of any form is basically seen as a sign of ineptitude or laziness

Additional Drivers and Models of Change (new content)

- Digital fabrication technologies continue to evolve and have the most impact at the low end of the manufacturing scale
- Historical example: WWII government-driven economic planning and accompanying marketing/propaganda
- Historical example: socialist governments of the 1970s

Terms

- **Maker:** an individual that typically follows a Do It Yourself (DIY) ethos and enjoys creating things through a combination of skills, from coding to electronics to robotics to digital fabrication
- **Makerspace:** a community-operated physical space or lab in which individuals interested in computers and coding, digital art, digital fabrication (including 3D printers and other equipment common to machine shops) and similar activities can gather to share knowledge and collaborate. Also known as a “hackerspace”.

Local Stewardship (supplemental content)

Indirect Drivers of Change (original scenario content)	
Demographic	Population grows but slowly; immigration is very tightly controlled and only rich & skilled workers may enter the UK. Small families are encouraged. There is an expanding elderly cohort.
Socio-political	Local government gains considerable powers from Westminster and almost creates a mini-United States of GB & NI. A higher percentage of tax raised locally is spend locally.
Economic	Fairly static but reasonably healthy – most needs are catered for although excess supplies of goods are hard to come by.
Science and technological	[Appendix 25.2 identifies no entry for this component for this scenario]
Cultural and religious	A strong utilitarian view dominates but also a greater understanding that nature supplies finite goods and services.

Fundamental Assumption within the Original Scenario Material:

Society can choose to consume less and downshift its economic activity, and this will result in a more peaceful and happier world.

Verge Domains	2030	2060
Define How people define “nature” and “natural”	<ul style="list-style-type: none"> People are beginning to see the world as a place of specific responsibilities: it is incumbent upon each individual to take care of their <i>local</i> environs and resources “Democracy” becomes an increasingly favored concept, and participatory processes become common in many aspects of daily life 	<ul style="list-style-type: none"> Individuals are very much of a family and a particular place; primary identities spring from these associations The human impulse to invent, innovate, and consume must be continually dampened or channeled into socially-acceptable directions
Relate How people relate to the environment and the natural world	<ul style="list-style-type: none"> As rural communities fill out with urban émigrés, economic roles and other activities shift towards things directly reliant on local habitats and ecosystems 	<ul style="list-style-type: none"> The natural world around individuals is seen as, well, the <i>natural</i> place in which humans would be found People implicitly assume that any issue (housing, food, sports, etc...) must address or be placed within the context of a living and productive environment
Connect How people are connected to the environment and ecosystem services	<ul style="list-style-type: none"> A return to a “hand-shake-based” economic life, with relationships and recommendations more important to how things gets done People are transitioning to a more rural lifestyle in which they do more of their daily activities out in the world around them 	<ul style="list-style-type: none"> As localization continues, as local social networks become more important, and as long-distance travel continues to diminish, the UK sees the return of traveling merchants. These trusted individuals help serve an emerging network of makerspaces, and also act as delivery systems for online commerce between parties in different regions
Create The processes and technologies through which people produce goods and services	<ul style="list-style-type: none"> People learn to blend local feedstocks, local values, and new tools to produce goods. Community makerspaces, with fewer 3D printers but more lathes and routers, spring up across the country to support individuals and small businesses. 	<ul style="list-style-type: none"> Economics is generally hyper local and tangible, and much more about biophysical flows than GDP, knowledge work, or “externalities”. For most communities, local environments provide most of the energy and physical flows that sustain daily life
Consume The ways in which we acquire and use ecosystem services	<ul style="list-style-type: none"> The downscaling of daily life drives a dematerialization of consumer life, which drives a demand for things of unique beauty and durability. Quality, handcrafted or otherwise, becomes a key criteria for purchasing the fewer goods that people do buy 	<ul style="list-style-type: none"> The youngest generations are maturing with an innate capacity to see how to get the most use for the longest lifespan out of the material things of daily life; consumption is less about acquisition than it is about use (over the long term)
Destroy The ways in which people destroy natural value and the reasons for doing so	<ul style="list-style-type: none"> While consumer refuse is diminishing, what waste does remain is often subjected to local “waste taxes” which rise over time The drive to recycle and upcycle waste finds a natural outlet in the local makerspaces that spring up across the country 	<ul style="list-style-type: none"> Ideas or developments that are perceived to promote “growth”, consumption, or expansion are seen as inherently destructive of the appropriately balanced order

Additional Drivers and Models of Change (new content)

- There are no good models or patterns for forecasting the social implications of the intentional and controlled unwinding (not wholesale destruction or replacement) of something large and structurally complex like an economic system or a political economy
- The closest references points someone might use include rejection of technology/social change (the Amish in the United States), top-down conversion to command economies (USSR, China), or forced economic isolation (Cuba)

Terms

- Makerspace: a community-operated physical space or lab in which individuals interested in computers and coding, digital art, digital fabrication (including 3D printers and other equipment common to machine shops) and similar activities can gather to share knowledge and collaborate. Also known as a “hackerspace”.

Green and Pleasant Land (supplemental content)

Indirect Drivers of Change (original scenario content)	
Demographic	Population grows steadily through ageing and immigration. The average family size is larger than today.
Socio-political	A globally-minded government. Decision-making is strongly influenced by EU and other countries ideas. Global issues are dealt with in a global manner. Public services are a priority.
Economic	Modest growth but sustained and steady without any major perturbations.
Science and technological	Science and technology advancement slows in some areas (e.g. biotechnology) but in others increases (social network enhancements; green tech.).
Cultural and religious	A strong sense of stewardship and responsibility towards nature. The intrinsic value of biodiversity is heavily supported. The Judeo-Christian old-world view is disappearing.

Fundamental Assumption within the Original Scenario Material:

Conserving domestic ecosystems by externalizing the costs of a high consumption society (enabled by a strong domestic economy) is a sustainable economic proposition.

Verge Domains	2030	2060
Define How people define “nature” and “natural”	<ul style="list-style-type: none"> The new “preservationist” worldview alters language and archetypes, leading to the emergence of new heroes and narratives This new worldview sets up a tension from living healthy, ecologically beautiful lives via shifting the ecological costs to other lands 	<ul style="list-style-type: none"> How people in the UK define nature is not much changed, but certainly the scope of the natural world they consider important is enlarged: citizens now firmly envisioning themselves as part of a globalized whole, intertwined with other peoples and other lands, and intensely interdependent
Relate How people relate to the environment and the natural world	<ul style="list-style-type: none"> A growing number of local organizations emerge to self-manage “their own backyards”, volunteering to maintain and monitor ecosystems London design studios begin producing maps depicting the new “geographies” of UK communities, visually linking affluent Londoners with their “source” communities abroad. 	<ul style="list-style-type: none"> Outdoor living, which includes both recreation as well as maintenance/conservation work, is seen as a critical component of healthy living A generation raised on mental maps that connect their lives with ecosystems abroad drives a push in the UK and the EU for deeper changes in industrial and commercial practice
Connect How people are connected to the environment and ecosystem services	<ul style="list-style-type: none"> With a beautiful backyard, most people in Britain spend a greater portion of their time out of doors Local monitoring and maintenance of the environment conducted through mobile apps, cheap remote monitoring vehicles, and distributed computing through ubiquitous mobile devices 	<ul style="list-style-type: none"> Ecosystem monitoring services developed in the UK are scaled up and redeployed to work on global supply chains People now are routinely presented with comprehensive information about the origins and processing of the goods and services they purchase
Create The processes and technologies through which people produce goods and services	<ul style="list-style-type: none"> A “Global Backyards” movement emerges around the desire to improve “upstream” economic practices and ecological impacts. It is a largely self-organized movement, built on open source platforms and globally crowdsourced data on how things are extracted and produced around the world 	<ul style="list-style-type: none"> As concerns about global resource scarcities ripple across markets, many countries begin a frantic and belated push for industrial innovation Innovations developed abroad quickly feed back to influence how companies in the UK design, source, manufacture, and reclaim their products
Consume The ways in which we acquire and use ecosystem services	<ul style="list-style-type: none"> As the Global Backyards movement expands globally, it supports the emergence of global networks of “cradle to cradle” (C2C) design approaches and processes. Together these various networks begin to identify and promote Global Backyards-certified goods and services 	<ul style="list-style-type: none"> Rising global resource scarcity leads to increasing price spikes and market shocks which raise prices Rising domestic (policy) tensions as the market push to increase use of domestic ecosystem services competes with the established value of preserving cultural services and biodiversity
Destroy The ways in which people destroy natural value and the reasons for doing so	<ul style="list-style-type: none"> Despite the slowly rising popularity of social movements like the Global Backyards, the British economy is still largely maintained at the cost of devaluing other people’s habitats and ecosystems (via global trade and market mechanisms) 	<ul style="list-style-type: none"> There is a sense among people in the UK that domestically they are no longer guilty of destroying natural value

Additional Drivers and Models of Change (new content)

- Continued development of mobile technology enables cheap monitoring and ubiquitous computing
- Rising cost of oil
- Rising resource scarcity
- “Shifting the Burden” systems archetype

Terms

- Cradle to Cradle: an industrial design ethic that approaches product design and manufacture with the goal of eliminating “waste” by intending to reclaim all biological and technical materials contained within the product.

“To eliminate the concept of waste means to design things – products, packaging, and systems – from the very beginning on the understanding that waste does not exist.”¹

¹McDonough, William and Michael Braungart. *Cradle to Cradle: Remaking the Way We Make Things.*

CONCLUSIONS AND RECOMMENDATIONS

The following are concluding thoughts on the UK NEA scenarios and recommendations for further follow-on phase work.

Challenges

The greatest single challenge in producing new and useful content for the follow-on phase came from needing to work within the confines of the original scenarios and not violate any of their premises or outcomes. Much of the value that typically emerges from good futures work comes out of the exploration and examination of developments and outcomes that are previously unanticipated. These insights often arise in the process of following to their conclusion the logical but complex interactions of many variables. Given that the task was to add content *within* the outlines of existing scenarios, we were unable to allow our explorations to take us to their logical conclusions, and instead had to redirect these causal chains to align with the internal logics already presented.

An additional challenge for us lay in the fact that the original UK NEA scenarios addressed the whole of the UK. In developing supplemental content, it was challenging at times to know in which direction we should head and at what level of analysis to operate. Was it most useful to speak in broad generalities, to focus on particular sectors of society, or to attempt to zoom to the level of individual lives. If there is more supplemental scenario content created in the future, we would advise scoping the content more narrowly.

Reflections on the Original UK NEA Scenarios

The explanation of how the UK NEA scenarios were developed makes it clear that the intent was to consider how UK ecosystems and their services might change in the future, and also how different policies might affect or drive these changes. Our primary observation, having now used the original scenario narratives provided in Chapter 25 to explore more detailed social changes, is that in general they present both an unexpectedly low degree of social change across their 50 year timelines and that technology, as a core driver of social change, is surprisingly muted across the scenarios.

While both social change and technology appear as phenomena and drivers throughout the scenarios, we would expect a far greater amount of change in the world at large and within the UK over a period of 50 years. The last 200 years of history reveal an unprecedented degree of social change, much of it related to technological change. This time period has seen five separate industrial revolutions, and these industrial and economic transformations alone have had a dramatic and *global* impact on ecosystems and their services. To assume that there would, for instance, be no more such revolutions over the next 50 years is a questionable assumption, especially when applied to each of six (6) scenarios of alternative futures. Given any assumptions of a sustained or accelerated rate of technological change (an assumption that is occasionally questioned in professional futures circles but generally accepted), there should be *more* differences between the UK of today and that of the year 2060.

When reading the set of six original scenarios, one can easily get the impression that while attitudes towards conspicuous consumption, for instance, have changed in some of the scenarios the underlying political economies are largely the same. Things like biotechnology or renewable energy are sometimes mentioned, but the core assumptions and structures of human economics, the things that so clearly impact our perception and use of the natural world, are discussed less (in the available narratives) than probably should be the case. It is not enough to posit varying changes in the amounts of global trade or resource extraction if we are simply assuming the same economic, social, and political systems. Our

greater insights will emerge when we consider how those systems themselves could fundamentally change over the next 50 years.

For future UK NEA scenario work, we might advise developing scenarios that have a stronger focus on first exploring broad societal changes, and then using those scenarios to explore in much more detail how shifts in worldview, demographics, economics, and politics would create new patterns of impact on how people view and use ecosystems and their services. This may have in fact occurred in some form in the original UK NEA process, but the narratives provided in Chapter 25 of the Technical Report somewhat suggest otherwise, as they weave together some discussion of broad strategic changes with more detailed descriptions of resulting changes in ecosystems and their services. For future work we would advocate a much stronger and more explicit separation between the two conversations of scenarios and implications.

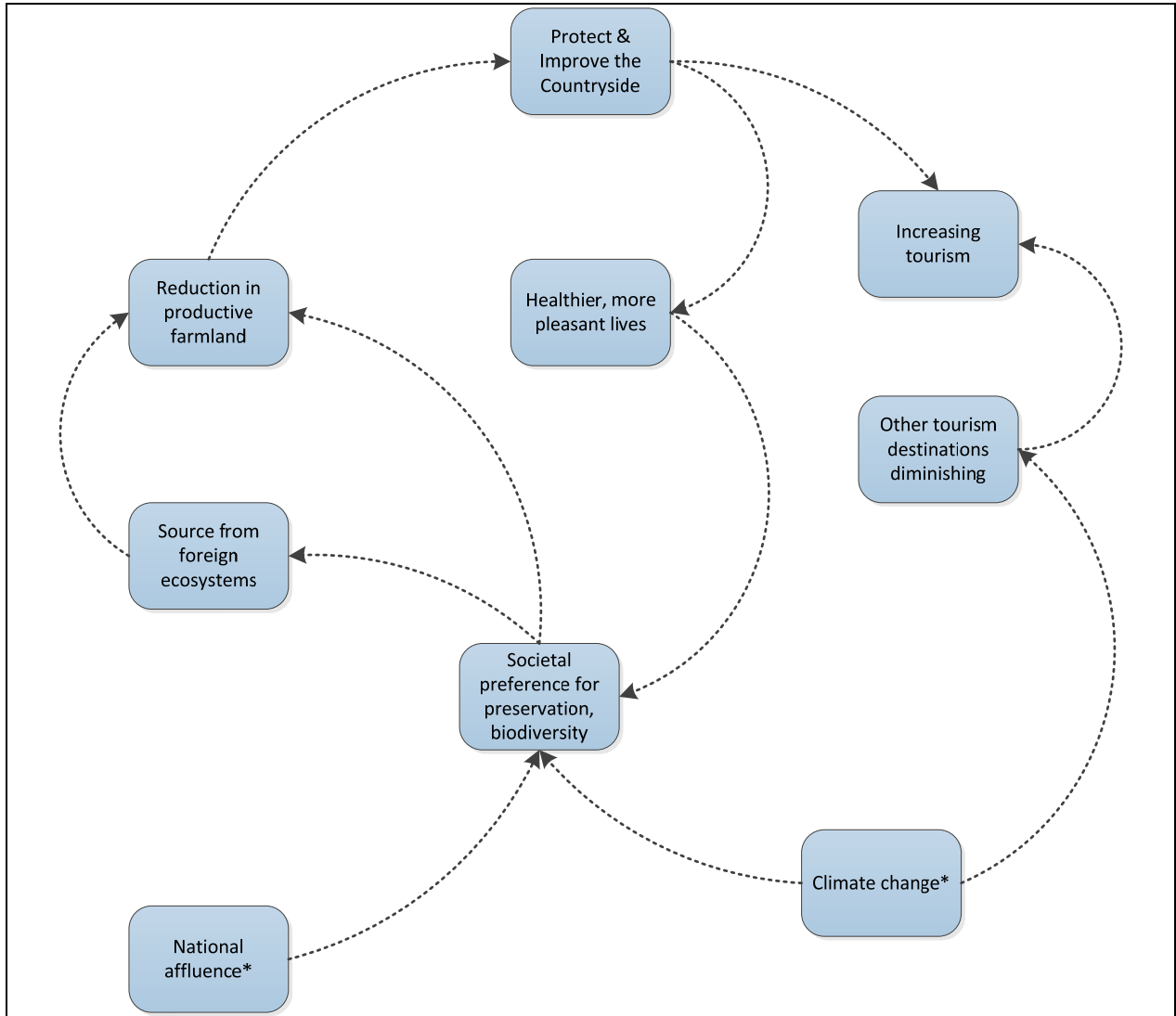
Additional Comments Regarding January 2013 Workshop

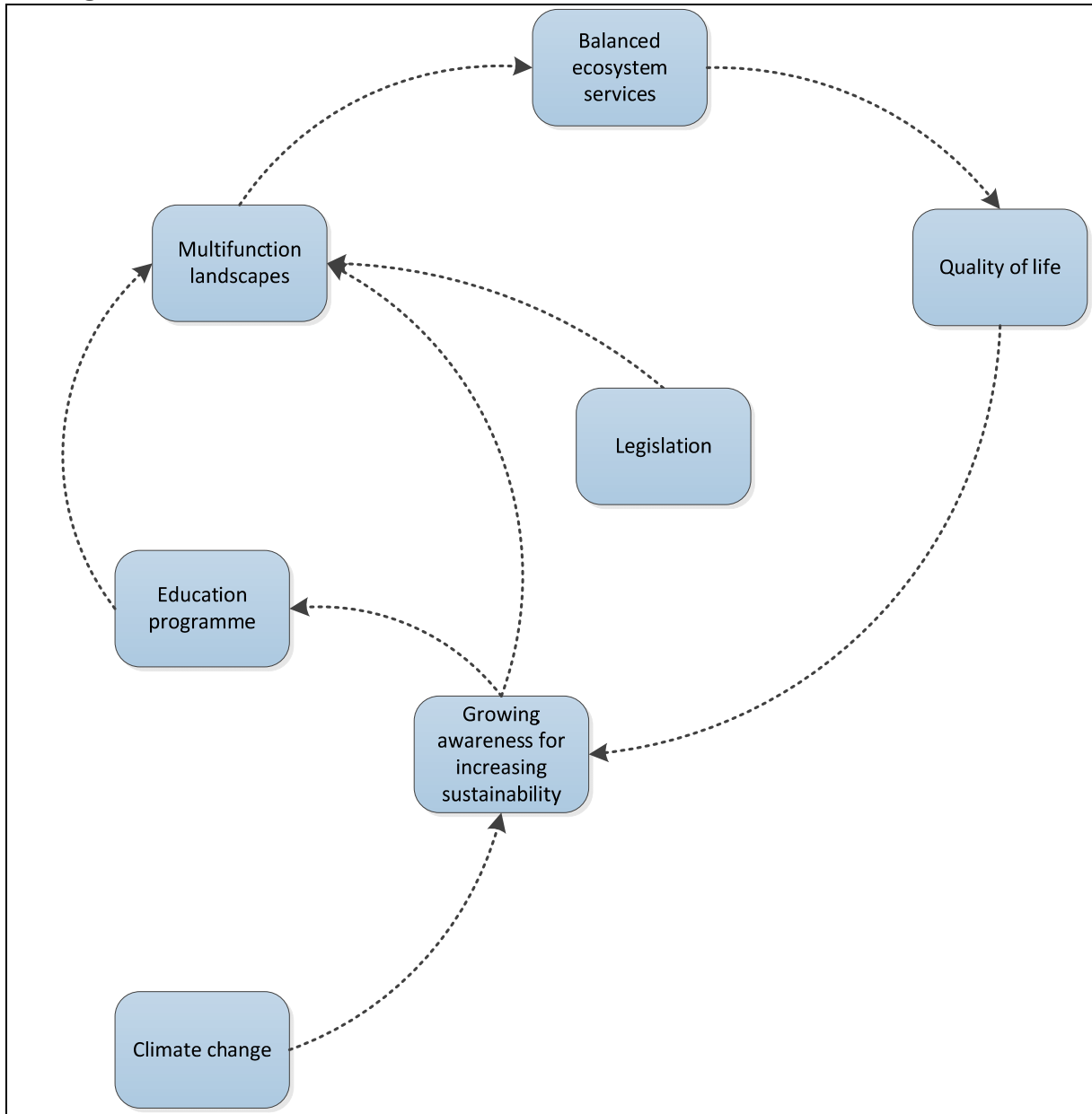
While VFS was not able to be present at the January 2013 workshop, we did receive feedback about the session and participant commentary on the supplemental scenario content. While the participant reactions to the Verge framework in this particular workshop seemed mixed, we believe that future follow-on phase exercises could continue to benefit from the framework. The best use of the Verge framework is likely to be found in using it to organize work group brainstorming or analysis that is using the Verge domains to structure the analysis of implications. Additionally, if future workshop participants were themselves to employ the Verge framework as part of an interaction analysis, they might find the framework can produce much greater insights.

APPENDICES

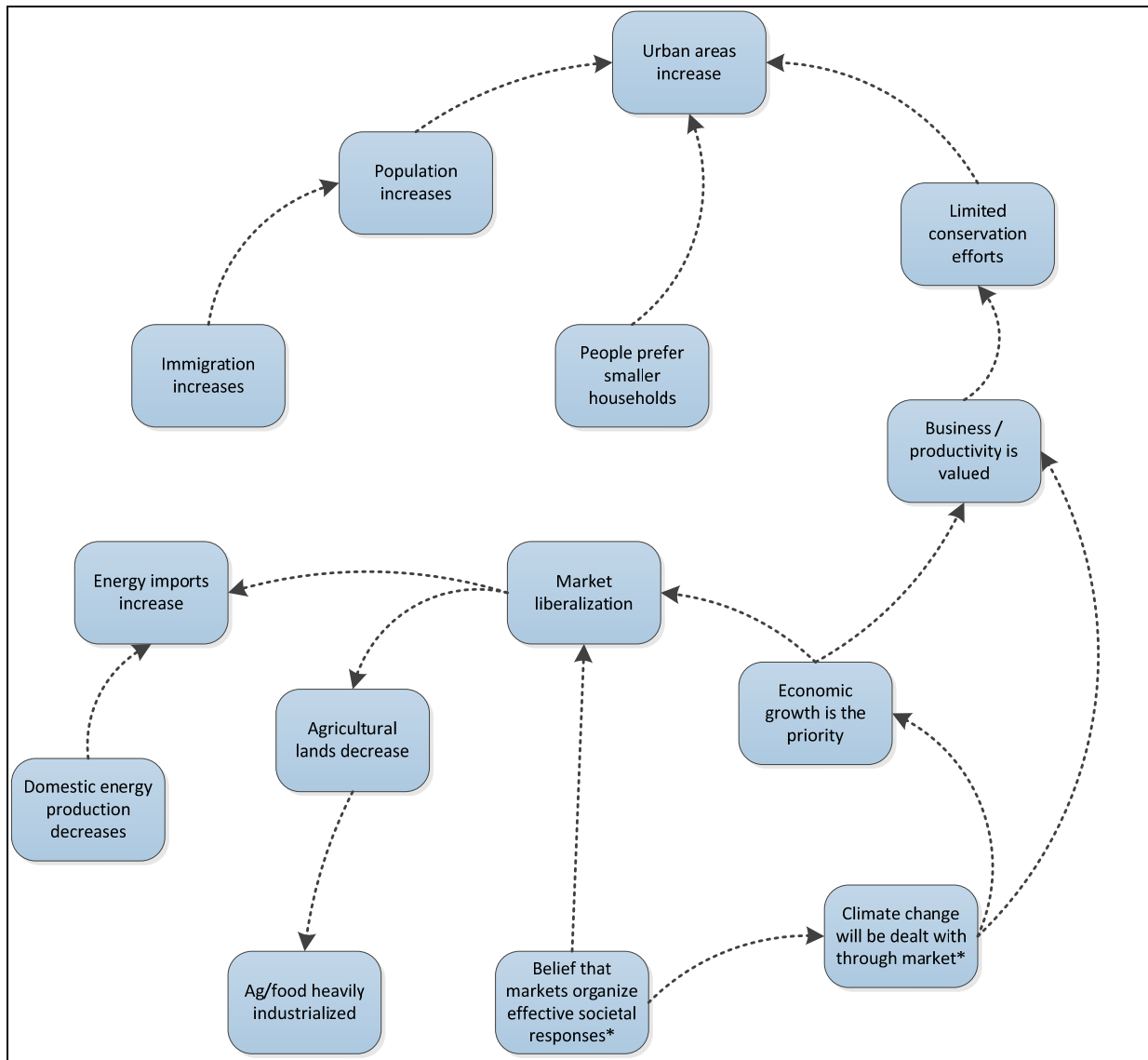
Appendix A: Basic Scenario Dynamics

Green and Pleasant Land

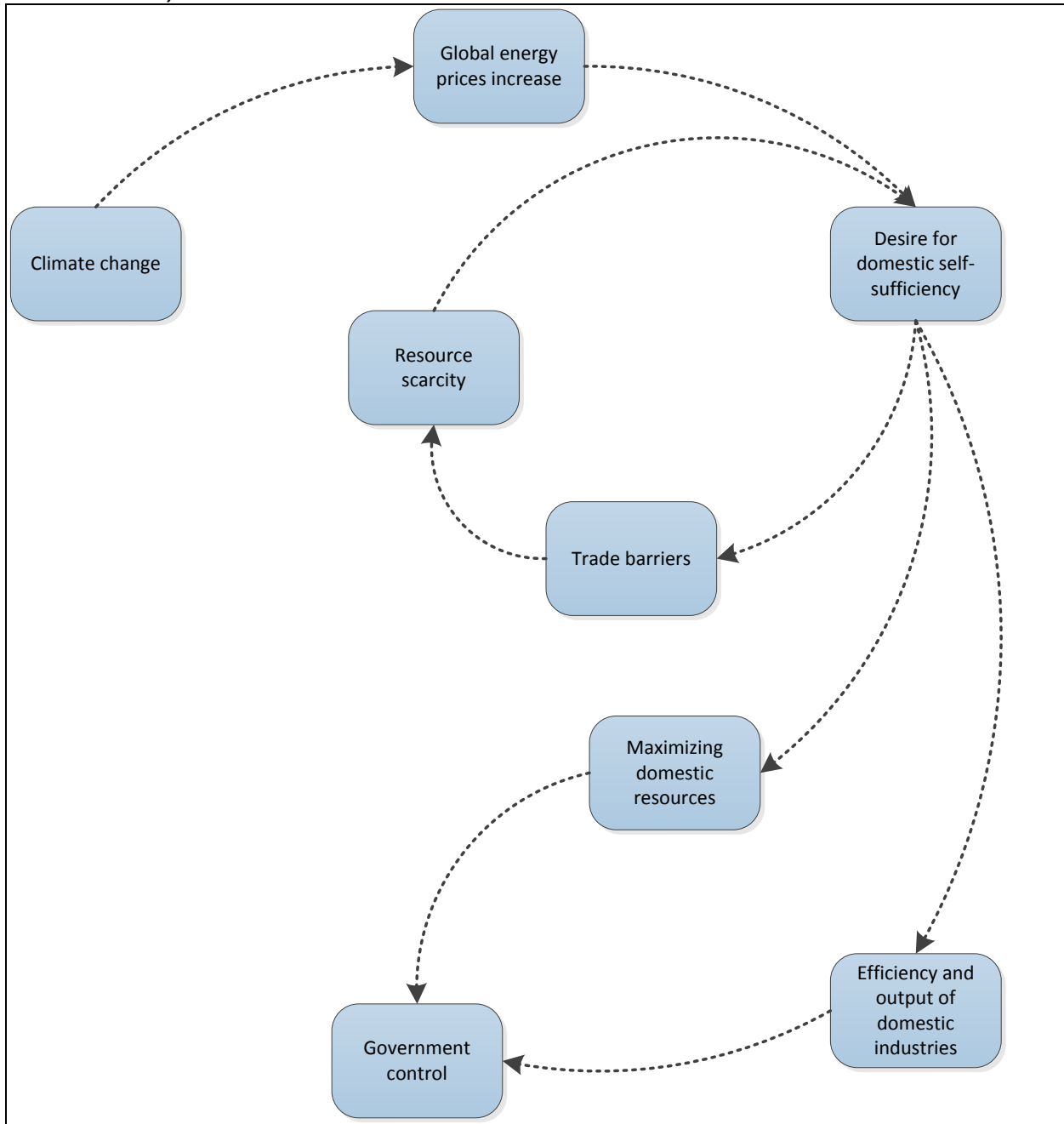




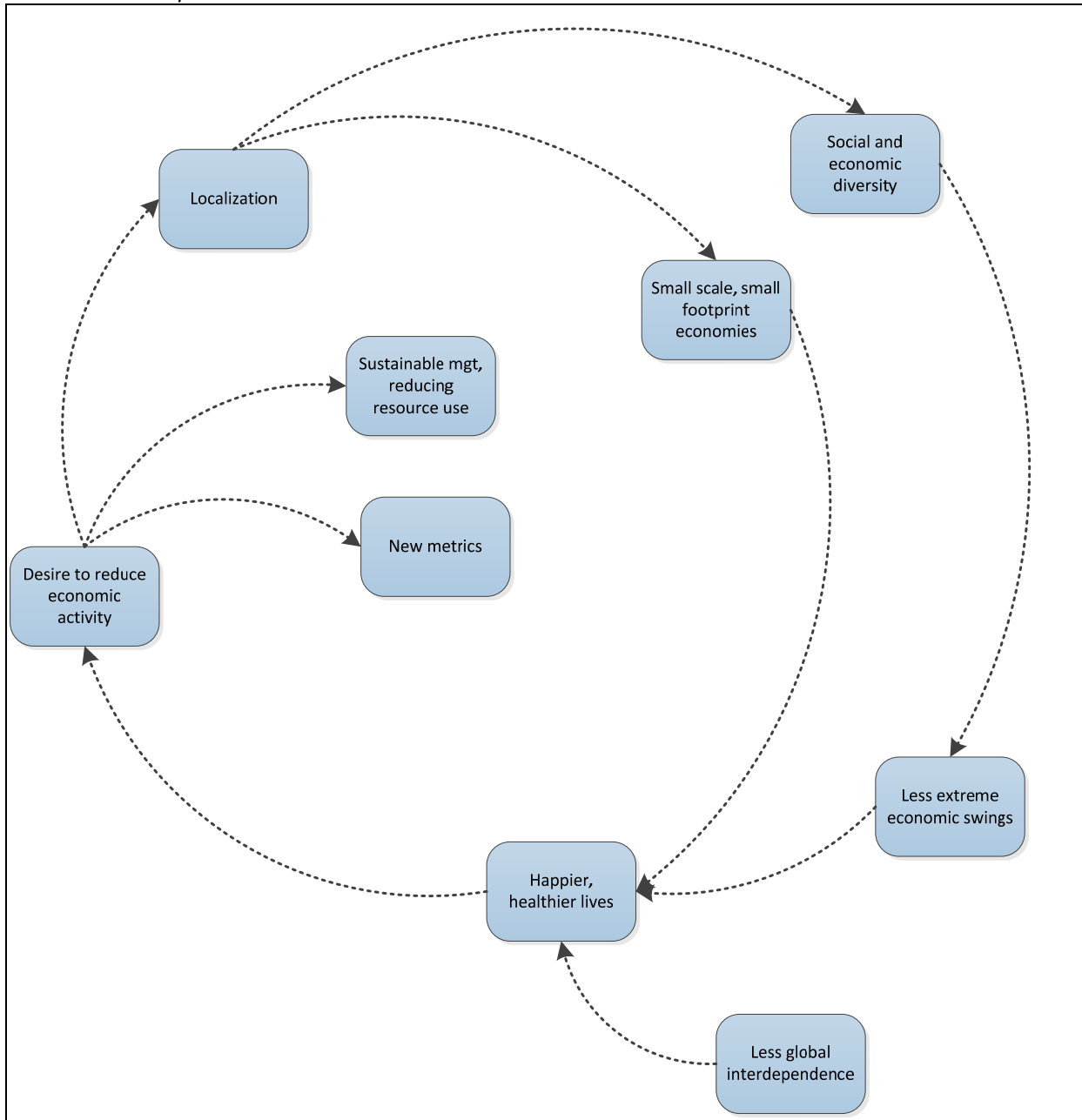
World Markets



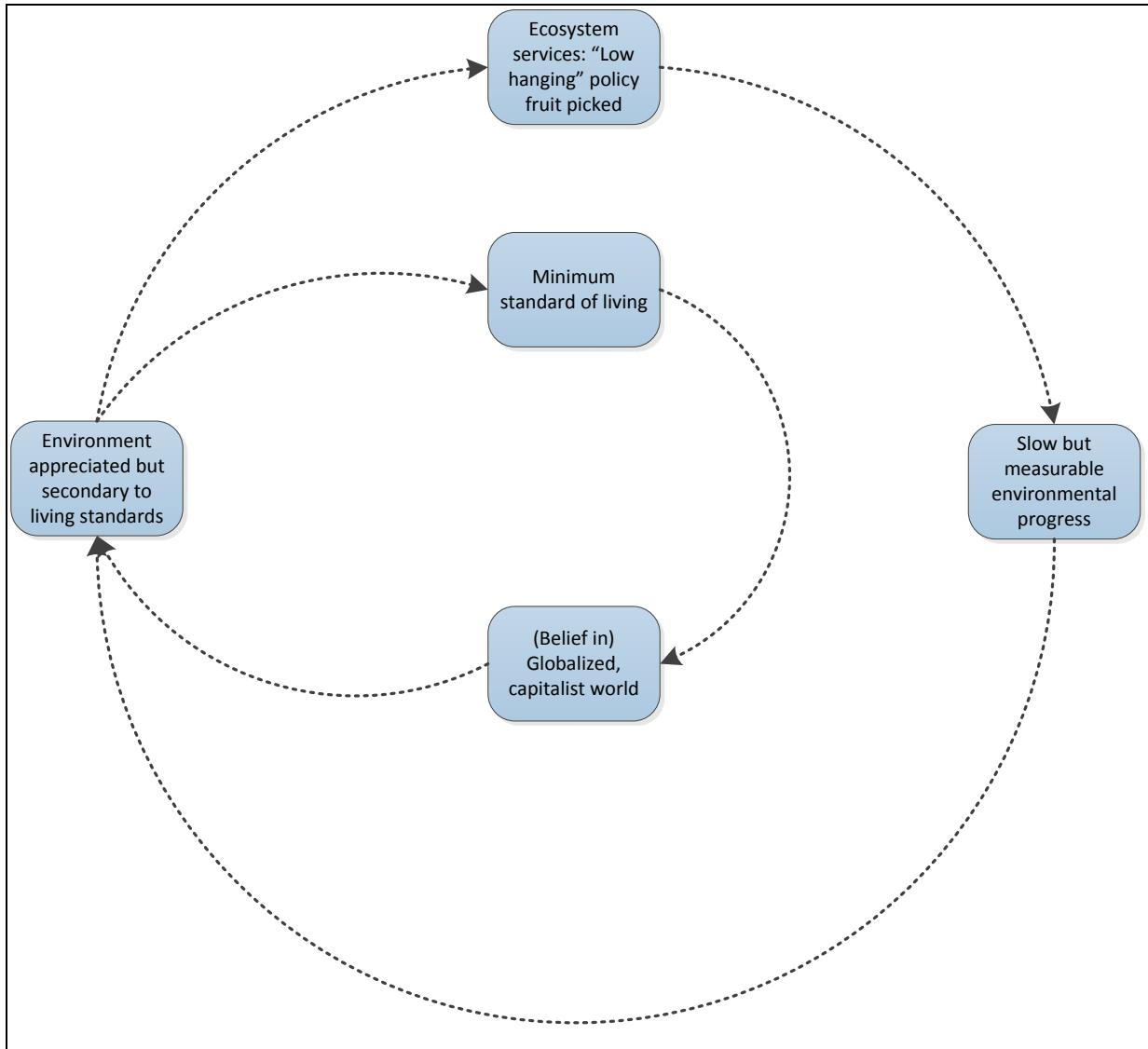
National Security



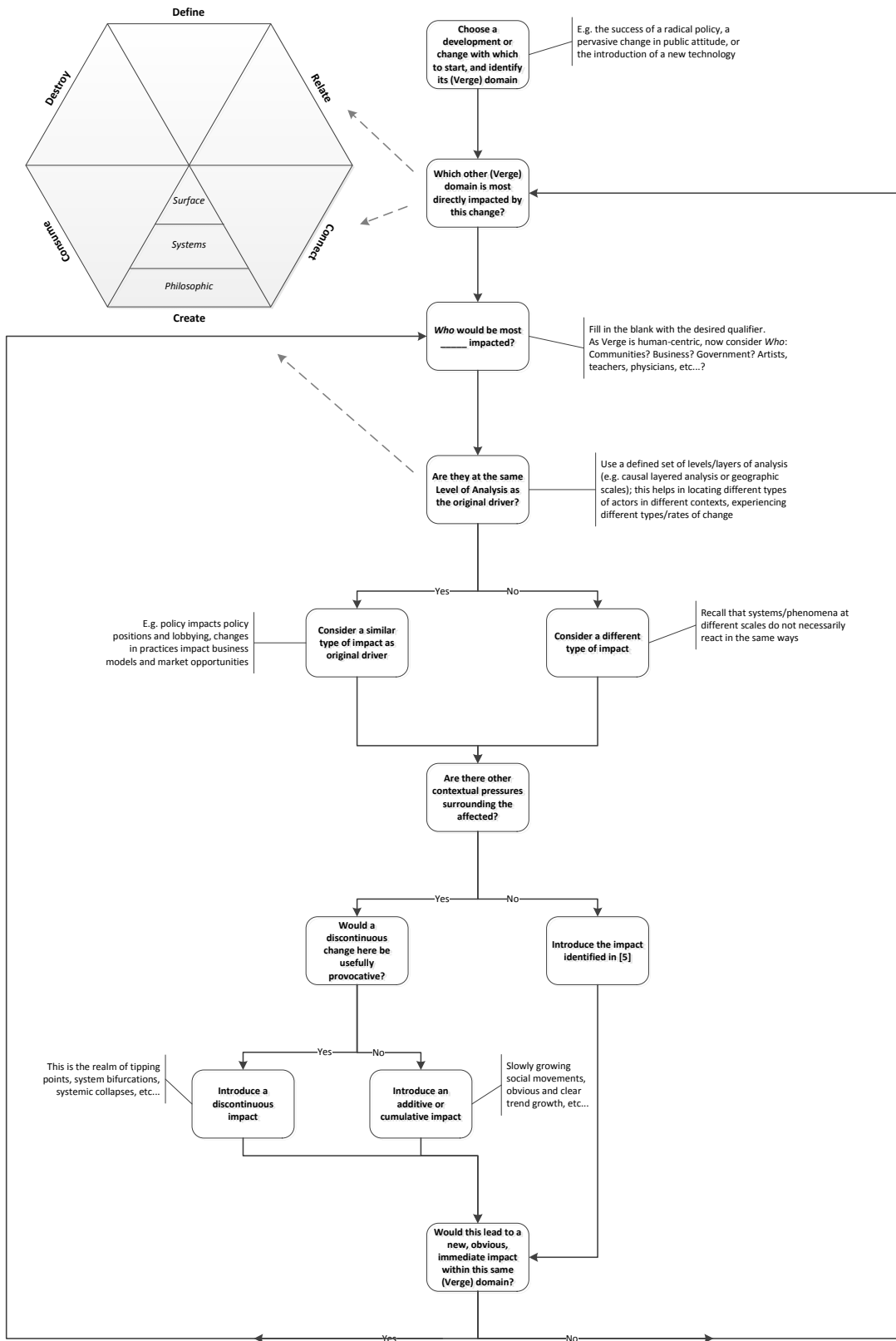
Local Stewardship



Go with the Flow



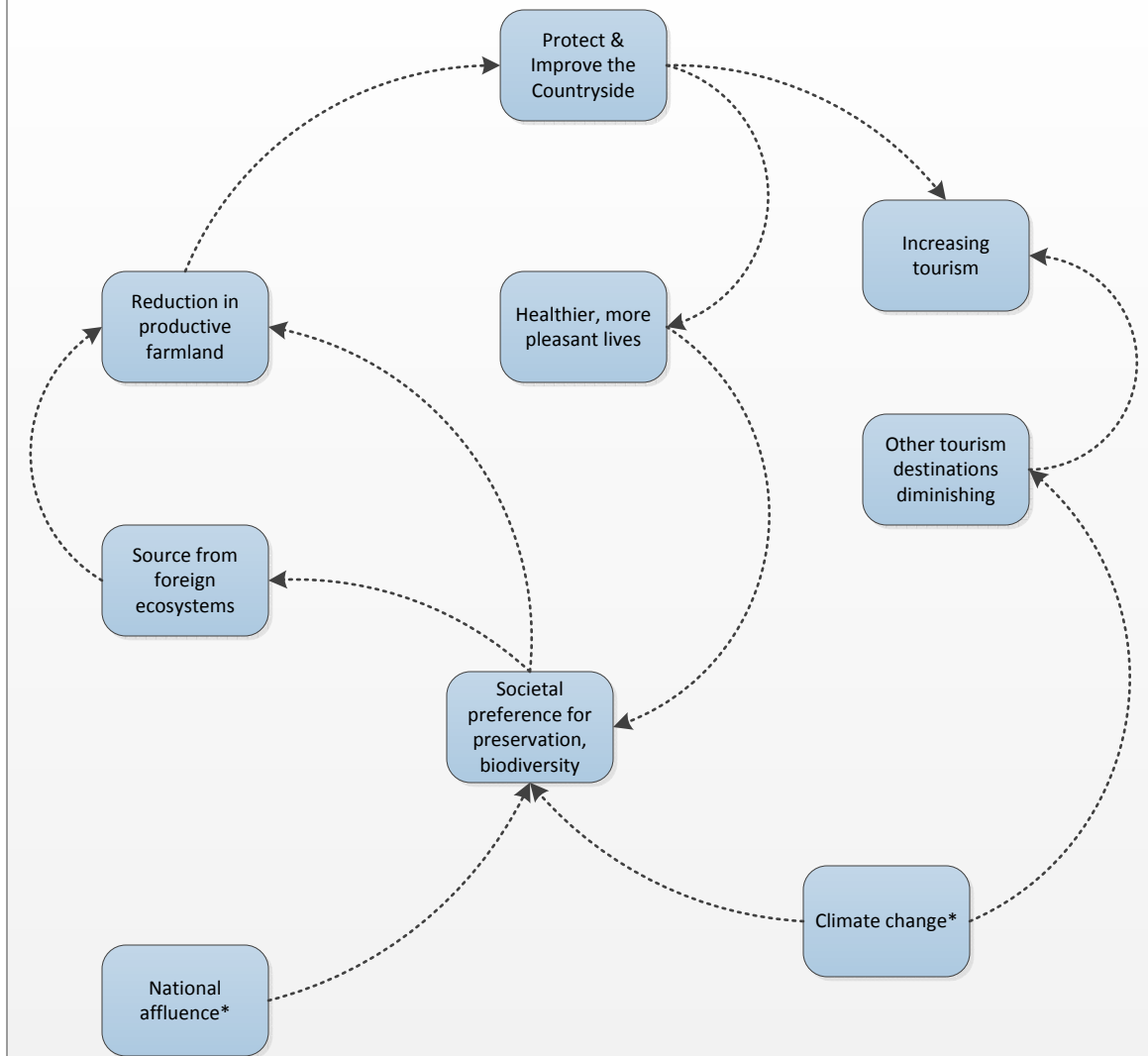
Appendix B: Interaction Analysis Heuristic



Appendix C: First Drafts

Green and Pleasant Land: from Manifest Guilt to "Global Backyards"

Basic Dynamics Observed in the Original Scenario



* Key assumptions

Overview

The additional scenario elements of "from Manifest Guilt to 'Global Backyards'" present a narrative about how the contradictions inherent in the scenario, namely the model of using wealth to externalize economic costs in order to foster a "green" domestic development creates a cognitive dissonance that develops into a manifest guilt about living healthy, ecologically conscious lives while the natural environments of other peoples are being rapidly degraded. The awareness of this dissonance spreads and eventually drives people to expand their notions about their environmental "backyard" to include the ecosystems "upstream" in their economic lives. This in turn leads to a citizen lead, crowdsourced, and self-organizing set of efforts to improve the ecosystems, and by necessity the economic practices, of many places abroad.

Define

The new "preservationist" worldview that has become pervasive eventually alters language and archetypes, leading to the emergence of new heroes and narratives.

Most popular movie, *The Arborist*, a sci-fi flick about a man braving all to travel back in time to retrieve the species needed to repopulate the world's dying forests.

At the same time, this new worldview sets up a cognitive dissonance between living healthy, ecological beautiful lives and shifting the ecological costs of a 21st century lifestyle to other lands. This is best captured when elementary students from across the country crowdsource a book, *Indra's Tree*, illustrating their collective concern for the homes of children in India.

Relate

A growing number of local organizations emerge to self-manage "their own backyards", volunteering to help with maintenance and monitoring of ecosystems.

The TEDxLondon talk "My Country, My Source", hits a chord with the UK's latent cognitive dissonance. About one woman's discovery that her life was as dependent as much on ___ as on the beautiful streams in her backyard, it kicks off a flurry of debate about place and community.

London design studios begin producing maps depicting the new "geographies" of UK communities, visually linking affluent Londoners with both their pristine backyards as well as their "source" communities abroad.

Connect

A rising interest in local monitoring and maintenance of the environment; made easy through mobile apps, cheap remote monitoring vehicles, and distributed computing through ubiquitous mobile devices.

A citizen-led push to participate more in global development emerges, wanting to lend help to "source" communities. Ecosystem monitoring services developed in the UK are scaled up and redeployed to work with members of source communities to impact environmental and corporate monitoring, and collecting supply chain data.

Create

The "Global Backyards" movement emerges, coalescing around the desire to improve the "upstream" economic practices and ecological impacts. It is a largely self-organized movement, built on open source platforms and globally crowdsourced data on how things are extracted and produced, and how they could be changed.

Connected to the "GB" movement, there is increased interest and investment in radical industrial design and innovation, an attempt to redesign basic industrial processes and lower ecological impacts. Intended initially to be exported abroad, the new knowledge has obvious domestic application.

Consume

As the GB movement expands globally, it supports the emergence of global networks of "cradle to cradle" (C2C) design approaches and processes. Together these various networks begin to identify and promote GB-certified goods and services, accompanied by a growing wealth of sourcing data.

Mobile apps and social networks work to steer an increasing number of people to UK retailers and producers with GB certification. Legislation follows on with new phase-in tariffs for non-GB goods.

Costs for consumer goods rises in the short term, and in order to reduce the impact on lower incomes, time-limited subsidies are enacted.

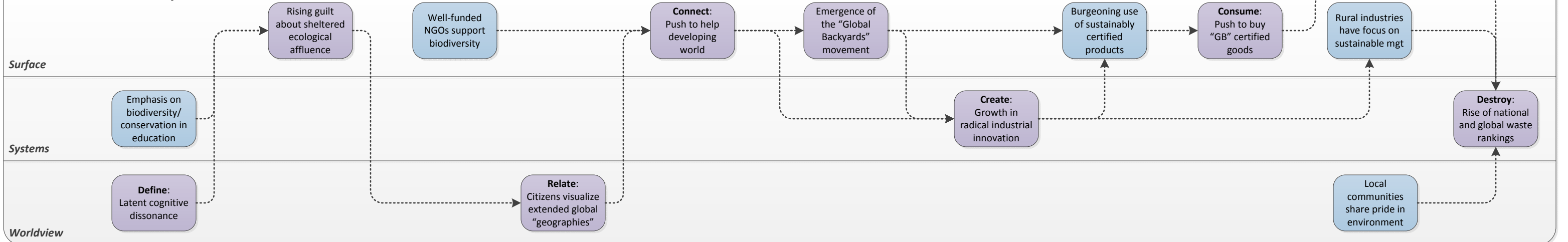
Destroy

As the GB movement and radical industrial innovation matures, a respected think tank publishes a milestone report, "From Carbon Footprints to Leaving No Trace: transitions to a high efficiency, low waste society." This cements the new C2C approach as a public policy cornerstone

Both social networks and government agencies launch local waste reduction and monitoring programs, leading to national (and transmitted through global networks, regional) community and industry waste rankings.

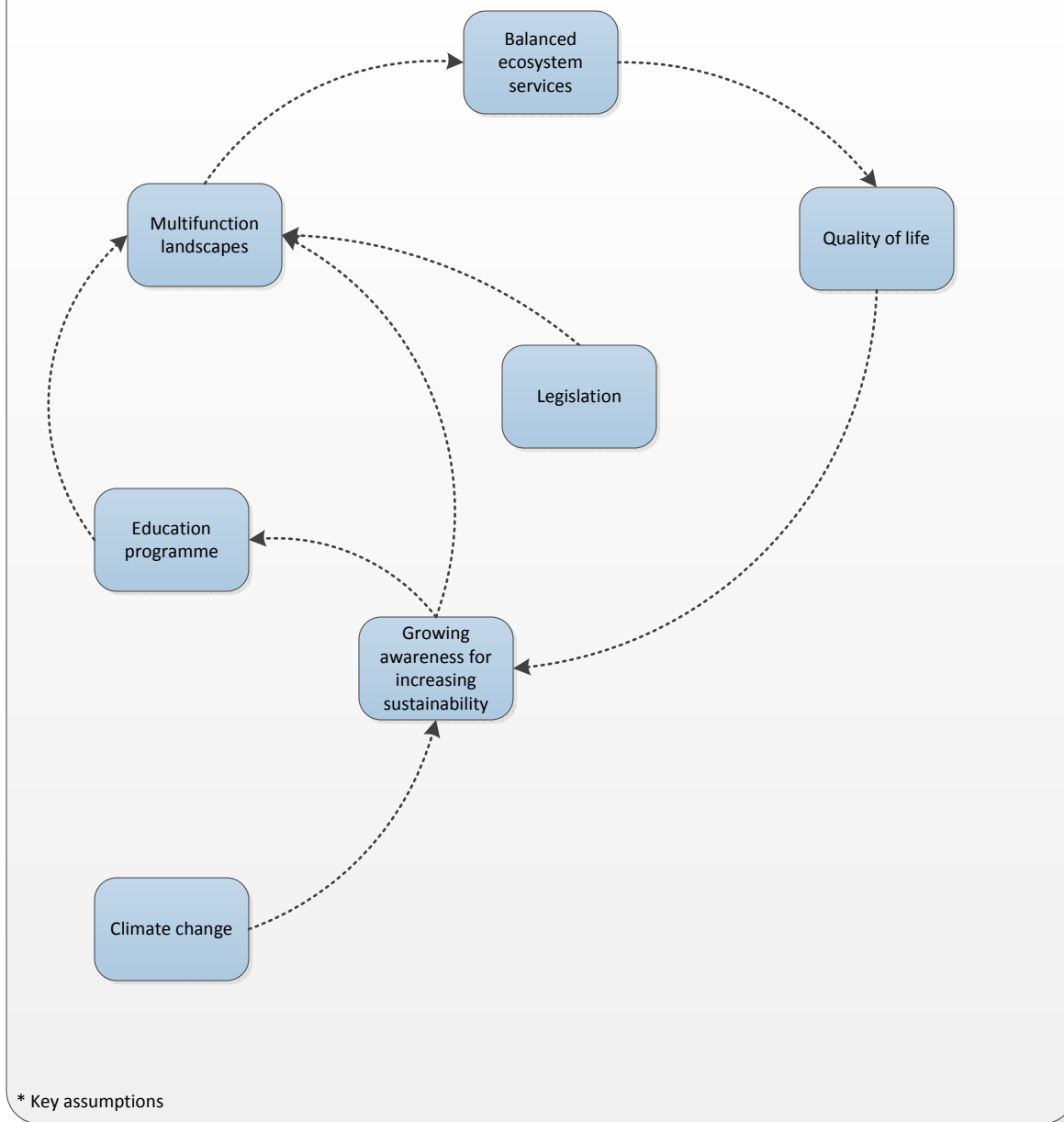
Slowly but surely, ecosystem value destruction is attacked from both ends of industrial process, attempting to close the loop, for the UK and the world.

Evolution of the new layer of the scenario



Nature@Work: What Gets Measured Gets Done

Basic Dynamics Observed in the Original Scenario



Overview

The new layer added by *What Gets Measured Gets Done* explores how the success of the UK's ecosystem services management programs affects the general attitude towards challenges in daily life. The belief that a calm, collective approach to problems, coupled with good science and advanced technology, will yield positive results leads to the proliferation of data-driven measurement and accounting systems that form that basis of a new governance infrastructure.

Define

The "pragmatic approach to balancing multiple aims" behind the successful ecosystem management effort diffuses as a general outlook across the UK. Everything comes to be seen through the lens of "balanced and measured", focused on compromise and meeting the interests of multiple stakeholders and goals. (WV)

People want and expect that most if not all societal issues will admit to objective assessment and pragmatic accounting, resulting in greater fairness and access for all. Concomitant with this is a renewed faith that science and technology do indeed have answers to society's problems.

The renewed bias towards science and objective measurement, as exemplified by the structure and processes of the government's ecosystem initiatives causes a value shift toward openness and transparency and an expectation that citizens should see *how* services are delivered, not just what.

Create

Companies and agencies use the government's measurement, accounting, and planning infrastructure to drive product, service, and policy decisions. From nonprofits to corporations, organizations use the interconnected MAP systems to place a pragmatic, numbers-driven assessment of potential impacts across environment, customer, and community at the center of operational decisions.

Scientific and technical expertise, modeling and analytic skills, and multidisciplinary teams become sought after profiles in virtually all sectors as companies large and small attempt to retrofit their operations around MAP systems.

In the midst of these management shifts, the most popular book for the C-suite for a decade was *The NESAS-Driven Business*, followed closely by *The NESAS-Driven Life*, both of which developed followings rivaling those of Tom Peters or Stephen Covey. (SUR)

Relate

In addition to the general belief in a balanced and measured approach to problems, the resounding success of the ecosystem programs also instills in the public a greater faith in the state and its ability to provide security and stability for the country. (WV)

Arising from this there is a push for more government measurement, accounting, and planning (MAP) systems like the national ecosystem services accounting system (NESAS), in areas like economic development, social services, and education. (SUR)

This in turn naturally leads to the call for additional regional planning teams for these various subject areas. While other societies are busy reducing government budgets and privatizing services, the UK experiences what to outsiders appears to be increased bureaucratization and increasing civil service. (SYS)

Consume

Consumers get used to "open data" in business, making purchasing decisions on the basis of scientifically modeled impacts.

Developers build online public policy simulators on top of the MAPs infrastructure, allowing citizens to forecast impacts of different choices made in different areas of life across the environment, the economy, and community.

While the increasing participation of the public in exploring systemic tradeoffs generally results in broad agreement and buy-in to the judgments of the expert planning teams, as citizens become more familiar with the practice, they create tensions with government agents by pushing to provide less "feedback" to planning teams and instead have more direct and affirmative role in policy.

Connect

As the government expands its use of measurement, accounting, and planning (MAP) systems like NESAS, such systems become *de rigueur* across government, business, and nonprofit sectors. Across the globe, several governments seek to adapt the government's crown jewel (NESAS) for their own use. (SUR)

With the rise of multiple MAP systems, independent software developers begin creating apps that tap these systems, making data available and creating novel applications for public use. (SUR)

Under increasing pressure by such civic media applications, the various government agencies and planning teams responsible for the many MAP systems begin to knit together their systems, enabling higher-order assessments across domains. These connected MAP systems form a key layer of governance infrastructure (SYS)

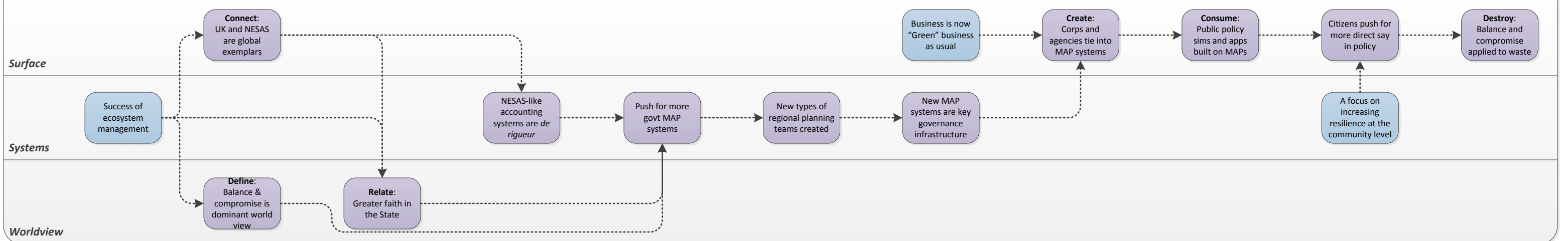
Destroy

Like so much else in this scenario, the issues of inefficiencies and waste, as well as refuse, are submitted to govt-supported scientific analysis, measurement, and programmatic balancing.

Through the MAPs infrastructure and the public applications built on top of it, the many topical regional planning teams and the public make funding and policy choices between options such as government funding for technical innovations (increasing efficiencies), incentives for waste reduction, and traditional waste disposal options.

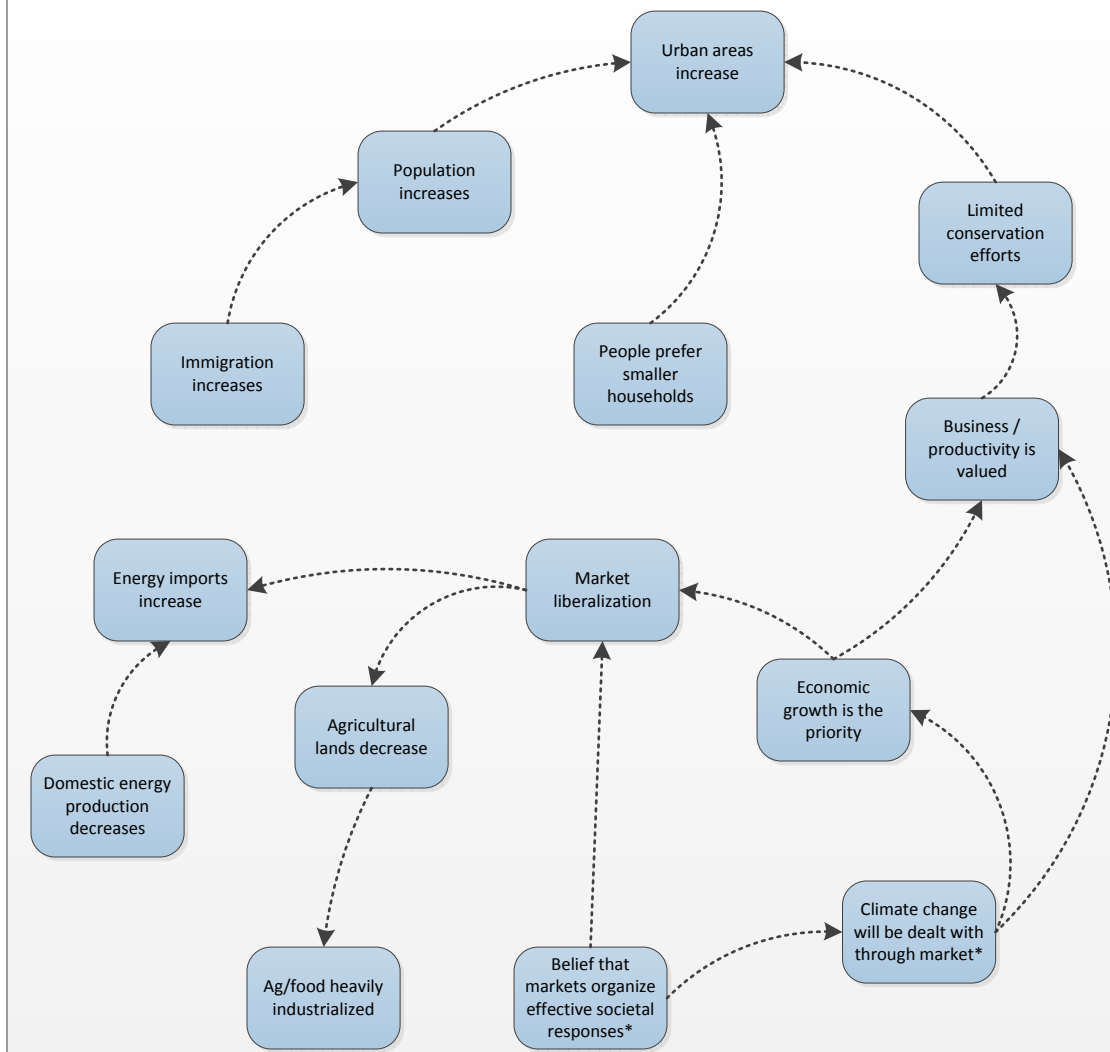
Society does not become a zero-waste eco-paradise, and neither does it merely continue traditional industrial age practices with regard to the creation and discarding (and discounting) of waste and refuse. In general there is less waste all around, but in certain sectors and certain regions, dumps and incinerators continue to be filled, or waste shipped abroad.

Evolution of the new layer of the scenario



World Markets: *Splintering Views*

Basic Dynamics Observed in the Original Scenario



* Key assumptions

Overview

Splintering Views follows the long-term interaction of widening socio-economic differences with steadily changing technologies for communication and consumption. The alienating and isolating forces of the free market drive people not into individual silos, but rather more strongly into classic ties of affinity. Coupled with distinct patterns of urban development and the connectivity offered by social technologies, the identity of the nation-state is breached and steadily replaced by ethnic, cultural, and class divisions that are more effective at meeting needs than loyalty to the state.

Define

The interests of the individual, and to a lesser extent close knit affinity groups, come to be paramount for people, with citizens sharing very little sense of being part of any larger political community beyond one's geographic/socio-economic group.

As the wealth gap increases, as public services are increasingly privatized, and as politics becomes completely captured by elite interests, the classic image of Robin Hood surges in popularity. Indeed, across the many immigrant, ethnic, and less affluent communities blossoming across the country, *Outlaw* and *Trickster* archetypes become the most popular types of hero.

While real life Robin Hood campaigns fail (as the government steps up its surveillance of physical and online social networks), the actions of "economic vigilantes" (as they are painted in political soundbites) represent an emerging narrative: the state no longer fulfills its part in the social contract and people should place their faith and their loyalty elsewhere.

Create

With people being more interested in personal satisfaction and diversion (see Consume), and with global consumer technology continuing to innovate, there is a boom in augmented reality (AR) applications, layering information visually over the physical world. Extremely popular are "Nostalgia" applications that represent the world as it appeared in previous, greener, ages.

While more services and experiences are produced or mediated through AR and virtual worlds, which due to their low cost are popular with the less affluent, the more affluent seek refuge in increasingly large and elaborate "natural" spaces recreated in climate controlled indoor spaces. These new amusement parks recreate everything from simple parks with clean air and streams that are safe to drink to exotic foreign (and increasingly rare) ecosystems. These places are extremely expensive and while ostensibly available to all, they are effectively synthetic preserves for the rich. (SUR)

Relate

While the wealthy are able to seek psychological and social refuge in elaborate indoor "natural" spaces (see Create), the less affluent retreat to their urban neighborhoods of like-paid and like-speaking people. These neighborhoods become denser, more diverse from one another, and more culturally exclusive. (SYS)

The increasing social and geographic segregation, when coupled with the continued privatization of public services, leads to the emergence of more ethnic, religious, and community societies and networks created to respond to the needs of different underserved groups (of which a wider and wider swath of society is now a part). (SYS)

Ultimately, people come to associate primarily with local communities and virtual nations, stretching across state boundaries and supported through online tools (see Connect), sharing very little vertical connection to people and issues above or below on the national local economic ladder.

Consume

In the context of living in an increasingly unfriendly society, surrounded by a visibly degrading natural environment, people "retreat", focused on feeling good and seeking to satisfy immediate impulses. Because of this people look for creature comforts and insulating experiences, things that block out an exterior world that is no longer welcoming. (SUR)

As might be expected, there is a boom in things like entertainment, food, and home improvement. Particularly important are any and all products that provide immersive and compelling diversions, which helps to explain the explosive popularity of virtual worlds and "massively multiplayer online"-anything. (SUR)

Connect

The emerging ethnic, religious, and community societies take full advantage of social networking technology and social media, creating sites and mobile apps for everything from social lending to sharing services to service networking. (SYS)

In light of privatizing and shrinking public services, these apps develop into a significant social infrastructure, increasingly replacing state administrative systems for basic public services. Individuals rely on these social networks of services to access a widening range of benefits. And as many of these networks are formed around immigrant, ethnic, and religious communities, they are quickly tied with overseas family and friends, tapping larger networks of both needs and resources. (SYS)

This social and economic infrastructure, built to service members of these specific groups, reinforces the segregation and isolation of groups from one another. (SYS)

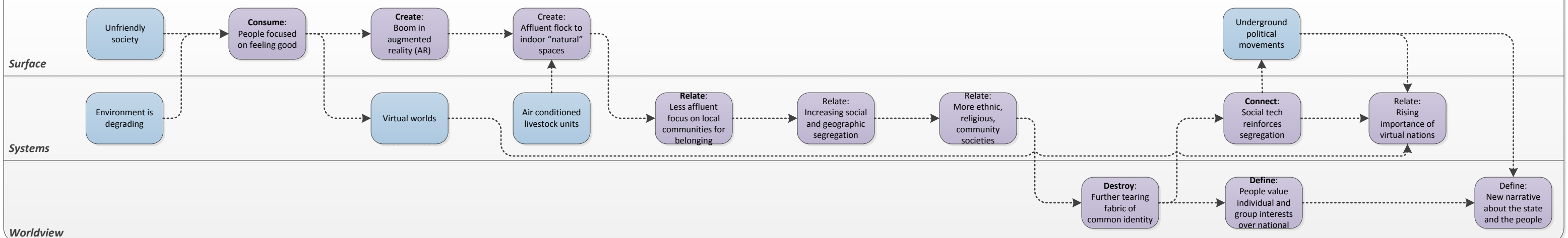
Destroy

The rising social and geographic isolation, the rise of strong ethnic and religious societies, and the creation of extensive and powerful social networking tools to support these communities all add to the forces already pulling at the fabric of a common UK identity. (WV)

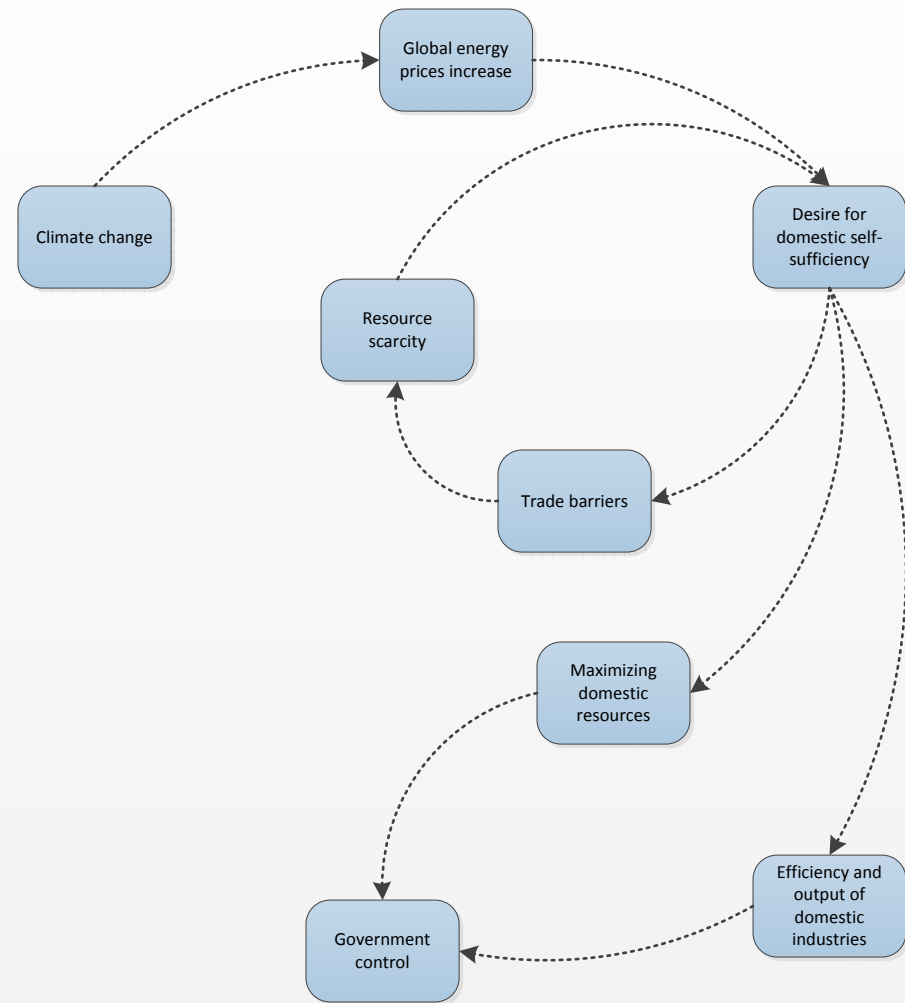
Increasingly there are calls within various communities to actively subvert or avoid contributing to the commonweal, with many pointing out that the wealthy and elite, who "plainly benefit" most from the current order, have little care for the less fortunate. (SUR)

A serious, although fairly comical, manifestation of the increasingly exclusive politics was the rather sophisticated trash removal services organized by entrepreneurs in one minority community for other minority communities. Through online ordering, carefully managed schedules, and vehicles with rotating disguises, they surreptitiously shipped trash across the UK for more than a year before getting caught.

Evolution of the new layer of the scenario



Basic Dynamics Observed in the Original Scenario



* Key assumptions

Overview

The supplemental content below describes an emerging societal narrative that control leads to self-sufficient production. It is layer of events about big government on a war-time footing and all of society in service to the state, though not quite as intense as the early 1940s. The underlying narrative managed by the government and absorbed by the citizenry is that the collective, innovative capacity of the citizenry, when properly channeled by the state, produces security and satisfaction for the country. The UK becomes very much a near-future oriented society: the far future is uncertain but the past was inefficient and undisciplined.

Define

In the interest of boosting domestic industry, the government creates incentives for innovation in domestic production. Programs are created to research new efficiencies, develop innovations in materials, and improve industrial processes.

Among the many initiatives is the UK Industrial Innovation Program, legislation that creates government sponsored regional innovation centers, sector-specific innovation centers, and innovation competitions. (SYS)

The narrative that dominates national debates and discourse is one of industry and service to the state. The ideal citizen is one who is selfless, tireless, and relentlessly innovative. Popular art, marketing imagery, and certainly government communications are filled with imagery of industrious and innovative men and women carrying society to better days. (WV)

Create

Through various acts of government schools are encouraged to change their emphases. Primary and secondary schools teach more science and technical skills while colleges shift more focus to subjects like environmental science, technology innovation, and business development. (SYS)

As part of its ongoing efforts to drive productivity and reduce waste, the government creates community centers and regional networks for collecting and reusing materials, free to the public. Before long local DIY, "maker", and hacker groups set up workshops within or near these centers, establishing the groundwork for a national network of makerspaces. (SYS)

After years of government subsidized science, research, and education, the UK finds itself on the cusp of a revolution in materials, with biotech and exotic advanced materials valuable for, among other applications, the low volume manufacture emerging from the national network of makerspaces.

Relate

At the urging of _____, Parliament passes the National Productivity Mobilization Act, establishing programs like the National Youth Work Force and the mandatory 2-year National Job Corps for high school graduates not bound for college and priority college subjects (SYS)

The government also establishes a number of scholarships to encourage individuals to earn college degrees in subjects deemed important to working in and improving national vital production areas. (SYS)

These programs not only radically boost admissions to key academic areas, it also sparks an outcry from advocates of lower income classes: charges that the government is drafting the poor into economic service. While the debate absorbs the media for a short time, most people acquiesce in the face of the dominant national narrative of industry and service to country.

Consume

Founded on a national network of recycling and "maker" spaces, fueled by years of government support for innovation, and animated by a national narrative that emphasizes that the country's security depends upon the productivity and relentless innovation of its citizens, there emerges an incredibly diverse and endlessly innovative domestic economy of DIY manufactures.

Community bazaars, often arising alongside the national recycling centers and maker spaces, feature local crafts, both humble and high tech, spun from upcycled goods, 3D printers, and a plethora of other digital fabrication processes.

Combined with the full spectrum of digital tools, citizens from across the country connect with other citizens and small businesses to purchase goods and to order custom-designed products easily crafted in single or low-volume runs.

Connect

To support the many government initiatives to boost productivity and innovation, the government contracts for the creation of ultra high speed broadband networks across the country. These build outs frequently include "access" strategies that focus on providing ample connectivity at schools, libraries, colleges, and other civic centers. (SYS)

A consortium of private companies, in partnership with the government, conducts a massive national campaign exhorting citizens to be industrious and innovative. With the slogan, "Innovative. Productive. Secure.", the multiyear, multimedia campaign is deftly interwoven into advertisements, public debates, and entertainment. (SUR)

Following on the initiative to deploy ultra high speed broadband, there are repeated but failed attempts to make mobile device access a right. What eventually gets passed instead is legislation supporting the creation of mesh networking technology.

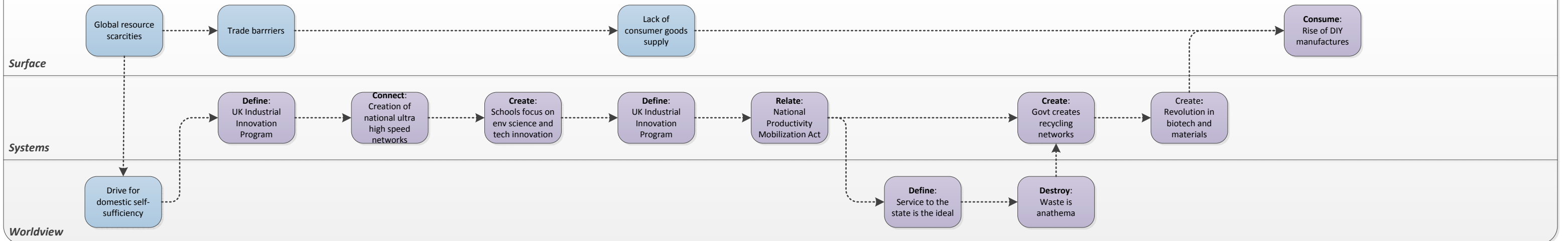
Destroy

In a society driven by a government intent on shaping the state into a productivity war machine, waste becomes anathema, but less because of the implications for the environment than simply because it represents inefficiency and a lack of innovative thinking. (WV)

In such an environment waste gets quickly squeezed out of the picture, as each instance is seen as an opportunity to innovate and is soon attacked by citizens in their collective attempt to increase productivity and ultimately national prosperity.

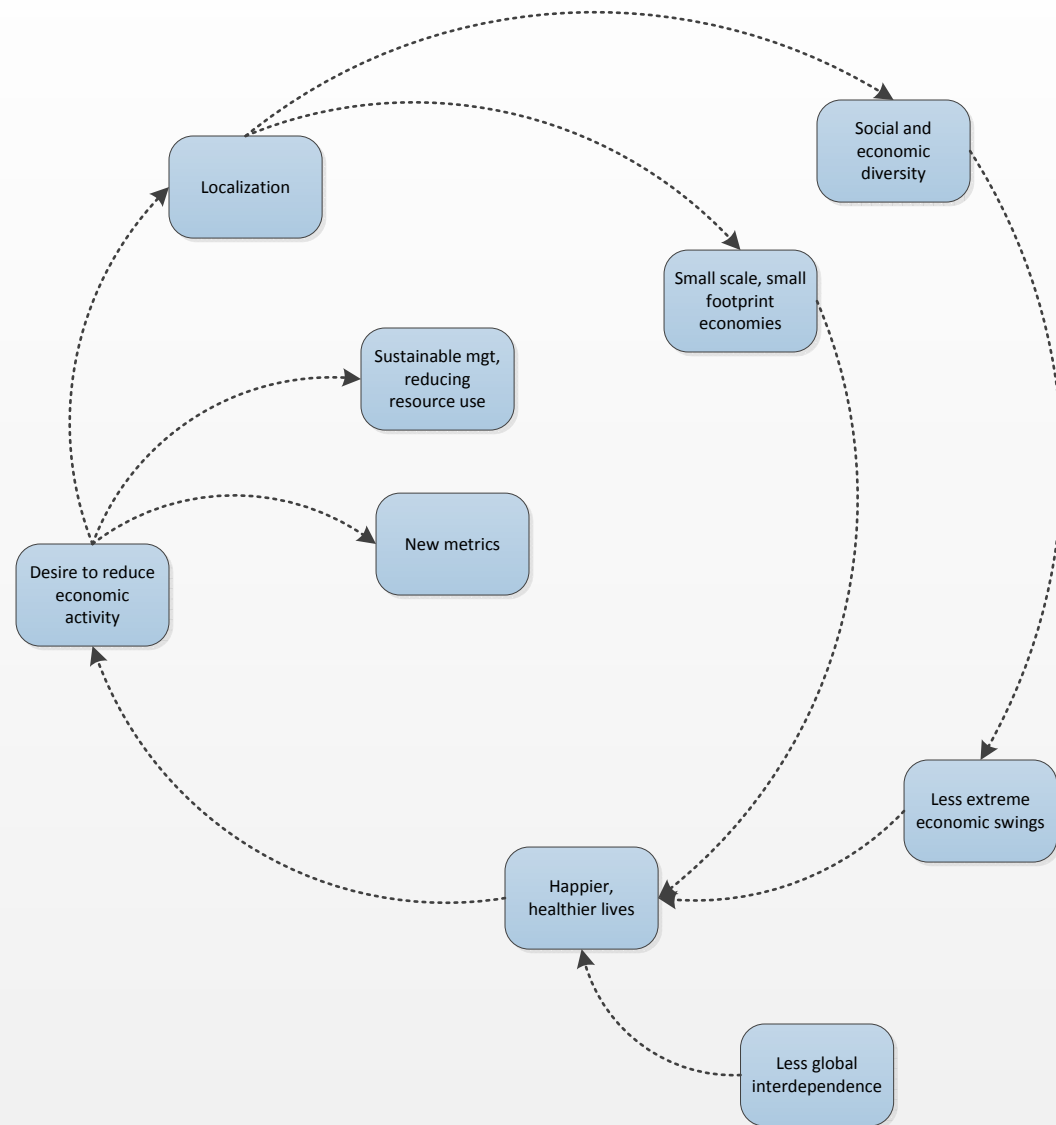
Children are taught from the earliest to practice cradle to cradle (C2C) thinking when creating and are taught to reuse everything they own. Cuba, an island nation once shunned by the "West", becomes a commonly taught case study to students of all ages, demonstrating the creativity and innovative capacity of people under even the harshest economic isolation.

Evolution of the new layer of the scenario



Local Stewardship: Downshifting and Devolution

Basic Dynamics Observed in the Original Scenario



* Key assumptions

Overview

The storyline of *Downshifting and Devolution* articulates how the general scenario arc for *Local Stewardship* is not an outright rejection of modernity, but rather a recentering of its tenets. Society is marked most dramatically by a shift down to the human-scale, where one-to-one interactions and social networks based in genuine daily familiarity structure life. It is a locally dense but globally sparse world in which the focus of most people's lives returns to their physical environs, and the pace and scale of life are recalibrated to something closer to that experienced by agrarian societies.

Define

Following the localization and downscaling trends in economic life, there is a general localization of education, with more of local schools' curriculum focused on locally relevant activities, knowledge, and economic opportunities. (SYS)

Co-evolving with economic downscaling, the rising importance of local community and social networks, and the increase in small and family-owned businesses, a 21st century version of apprenticeships emerges in most regions, connecting youth through their schools and families to economic roles in local communities. (SYS)

Following the long shift down towards smaller, human scale life, the language and imagery favored by people gradually changes. In addition to a slowly increasing regional diversity of expressions and references, in general there is a shift towards smaller units and communal imagery. "Democracy" becomes an increasingly favored concept, and participatory processes become common in many aspects of daily life.

Create

With the increase in importance of classic social capital in daily life, there is in many places a return to a more "hand-shake-based" economic life, with long term social relationships and recommendations more important to how business gets done.

The general shift to local and small scale life, and the accompanying rise in demand for fewer but higher quality goods (see Consume) impacts traditional UK-wide retail brands. The first response of many such companies is to acquire the "brands" emerging in local markets. When that fails, they often create faux brands resembling locally popular producers. (SUR)

Preferences for local, sustainably produced goods, greater self-sufficiency, localized education, and the reemergence of apprenticeships contribute to a surge of 21st century craft and creativity. People learn to blend local feedstocks, local values, and new tools to produce goods. Community maker spaces, with fewer 3D printers and more lathes and routers, spring up across the country to support individuals and small businesses.

Relate

The society-wide shift in outlook to smaller scales of living has the effect of making families, and in particular extended families, more important in every day life. With less geographic movement, local social networks become denser.

The rising importance of family, combined with denser local social networks and the more general localization trends increases the importance of classic social capital, vital for facilitating economic relations, in daily life. (SUR)

In general there are more small businesses and more businesses in the primary and secondary sectors (and less service sector), and more family businesses. (SUR)

Thanks to localization trends, the rising importance of quality, and local attempts at regulating "foreign" commerce, there is a hollowing out of the UK retail goods sector: only the small and the very large (globally owned) remain. Mid-size firms either break up into genuine regional units or go out of business

Consume

The downscaling of daily life drives a dematerialization of consumer life, which drives a demand for things of unique beauty and durability. Quality, handcrafted or otherwise, becomes a key criteria for purchasing the fewer goods that people do buy. (SUR)

In attempts to regulate inter-regional trade and thereby fight larger and "outsider" firms, communities and regions enact a variety of policies and campaigns, from endorsing "most favored brand" companies to organizing outright boycotts. (SUR)

Ultimately, local attitudes against larger corporations and the hollowing out of the national mid-size retailers has the effect of raising the value of both regional goods, which are prized for quality and indigeneity, as well as "foreign" goods, which are increasingly hard to find locally in stores and often represent guilty pleasures. (SUR)

Connect

With less immigration, less in-migration, and less travel in general the foreign (defined as anything from outside one's region) becomes all the more exotic, and thus valuable. People turn increasingly to services like virtual, real-time tours, where "tourists" hire individuals in other places to use webcams, microphones, and GPS to "carry" them through tours.

Indeed, because things shift so strongly back to a human scale, the pendulum of interaction swings back to F2F contact for everything from education to commerce. For those interactions that remain and must be had with distant contacts, real-time, multisensory connections are the norm. (SYS)

As localization continues, as local social networks become more important, and as distance travel continues to diminish, the UK sees the return of traveling merchants. These trusted individuals help serve an emerging network of maker spaces (see Create), and also act as delivery systems for online commerce between parties in different regions (SUR)

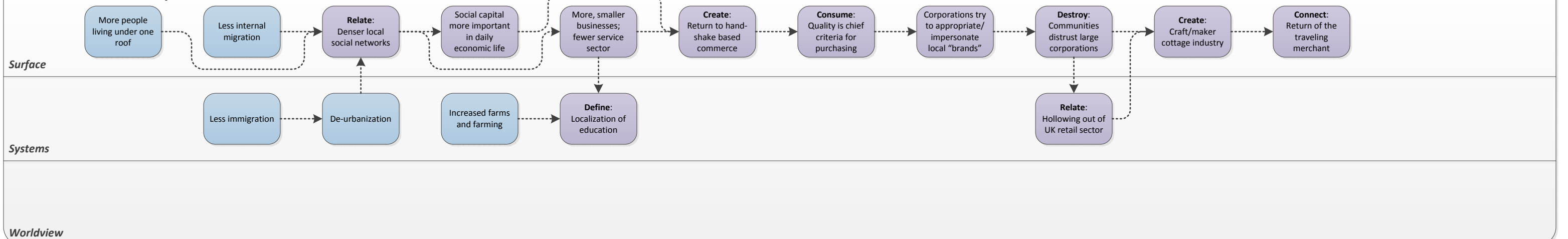
Destroy

As the shift to smaller firms and locally-produced goods drive national retail brands to acquire or impersonate local "brands", communities become increasingly distrustful of large companies, and of outsiders (anyone from outside the region) in general. (SUR)

The societal shift to a smaller scale of living, with its resulting drop off in personal consumption and retail, leads to a slowly diminishing stream of refuse. What waste does remain is often subjected to local "waste taxes" which rise over time and serve to drive more and more people to recycle and upcycle.

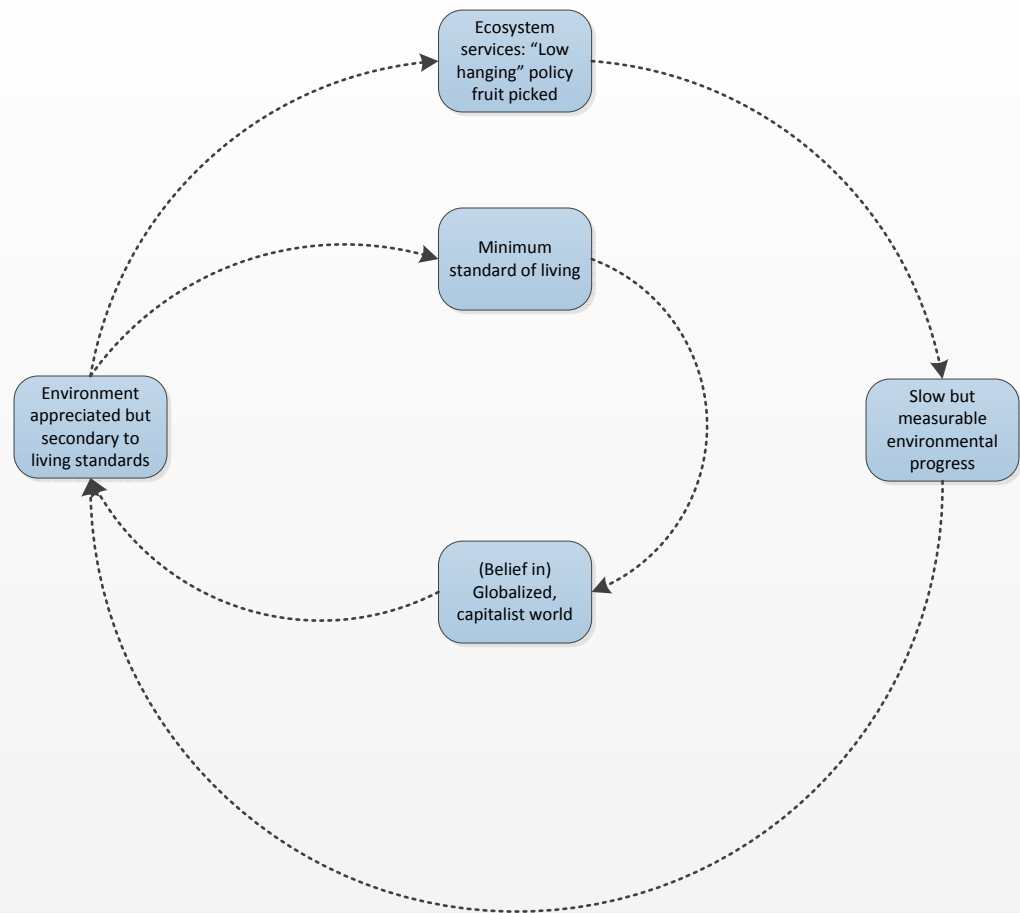
This drive to recycle and upcycle waste finds a natural outlet in the local maker spaces that spring up across the country. Already places for people to come together and create goods, these spaces eagerly absorb and repurpose the broken or cast-off goods and packaging that would otherwise have ended up in landfills.

Evolution of the new layer of the scenario



Go with the Flow: *Balancing the Scales*

Basic Dynamics Observed in the Original Scenario



* Key assumptions

Overview

The Balancing the Scales storyline derives its impetus from the need to maintain a minimum sense of progress in order to maintain the public's faith in the narrative of a global capitalist economy. The state and the powers that be remain focused on growth as the answer to meeting economic needs, in the process propelling technological development and interdependence. Activists and those primarily concerned with the environment are able to use this very technological interdependence to try to exercise some power of regional and global environmental policy.

Define

For a country prioritizing a minimum standard of living for its people in a globalized world, "growth" is a must if the current balance between citizen support for globalization and support for ecosystem maintenance is to be maintained. While maximizing ecosystem provisioning services does not always trump other environmental concerns, policy makers realize that the economic pie must continue to expand if they are to maintain the country's historic relationship with the drivers of globalization. (WV)

This deeply rooted acceptance of the imperative of growth creates a tension, however, with people's natural interest in and concern for the environment. Even as many people avail themselves of the opportunities for resource-intensive and larger "footprint" lifestyles, they continue to valorize and nominally support the efforts of environmentalists to preserve natural habitats and endangered species. (WV)

Create

Following from a general belief in the inherent necessity of "growth", organizations across business and government have a general bias towards production and increasing productivity, which is always assumed to be a goal. (SYS)

Within business, therefore, innovation is focused on increasing productivity and competing on the global stage. In academia and public research science is deployed to synthesize ever more novel materials and to develop radical improvements in productivity. (SYS)

In both corporate research labs and product development shops, researchers and designers turn increasingly to global open innovation networks to tap into global skillsets and stay ahead of the competitive curve. (SYS)

As a result, the market sees a broadening array of products made with new synthetic materials and products with labels such as "synthetic organic" and "organic-fortified". (SUR)

Relate

Many people across the UK experience the tension between a high consumption life style and genuine concern for the environment. While the wealthy use their purchasing power to assuage their guilt (see Consume), the less affluent turn to volunteerism in large numbers. Across the UK record numbers of people spend a significant amount of their free time working for all manner of environmental organizations. (SUR)

It is through these environmental associations that many residents connect with global online action networks. Enabled by social media tools and spurred to action by the failure of state leaders to make headway against climate change and environmental degradation, these networks create and share "grass roots policy" to fill the environmental leadership void

It is through these networks that many of the less affluent find common cause and solidarity with a global population of have-nots organizing for action against "indifferent" powers, hardening the societal cleavages between haves and have-nots.

Consume

UK citizens, while ranking among the savviest of global consumers and fully embracing an affluent, post-industrial life, respond to the inherent tension between economic growth and environmental preservation by looking for ways to assuage their anxiety. (SUR)

For the very affluent, this guilt finds an outlet through their wallets, with many of the wealthy and young upwardly mobile professionals participating in the social financing of a new generation of boutique biotech and research firms.

A mini industry of "crowdfunded" DIY biotech/nanotech labs emerges to tap into the collective guilt of these "weekend environmentalists" to finance research into exotic synthetic organisms and radical industrial processes aimed at things like reclaiming and recycling consumer waste. (SUR)

Connect

The continued build out of pervasive high tech transportation and energy infrastructure, ubiquitous computing through mobile devices, and the rapidly expanding mass of digitally connected and electronically-dependent humanity (the "Rise of the Rest") creates a dense and deeply interdependent global information infrastructure. (SYS)

When connected all of these computing systems, from smart grids to mobile devices, form an unprecedented on-demand source of distributed computing power. The global economy, and many nonstate actors such as global "grass roots policy" networks, take advantage of this massive infrastructure to coordinate activities, crunch data, and share innovations.

This global information infrastructure also provides an irresistible platform for global environmental activities to perfect the practices of "hacktivism", using cyber vulnerabilities to force global leaders to either change policies or account for their inaction.

Destroy

Waste processing has become a lucrative, privatized business, and considerable corporate resources are spent on solutions that promise the quickest and most profitable return, notably lowering shipping and storage costs for overseas disposal. (SYS)

One disruptive approach arises from Wal-Mart. With their resources, relationships with world leaders, and their command of global logistics, they create the "NewCycle" program. They charge an up-front recycling fee on every product sold, a portion of which consumers can redeem when they turn in packaging and related waste to Wal-Mart NewCycle Centers.

While the mass of people just try to get by in daily life, thanks to an increasingly organized and powerful network of global activists, there is a rising conflict between mainstream economic elites and counter-culture elites over economic and social justice. This conflict is increasingly played out (largely) nonviolently through networked social action and hacktivism (SUR)

Evolution of the new layer of the scenario

