

**Curtin University Sustainability Policy (CUSP) Institute**

**The Words We Use and the Actions We Choose: The Power of Keywords,  
Naming and Framing in the Transition towards Sustainability.**

**The Story of Waste**

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**This thesis is presented for the Degree of**

**Doctor of Philosophy**

**of**

**Curtin University**

**May 2017**

## Declaration

To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledgment has been made.

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university

A rectangular box containing a handwritten signature in black ink. The signature is stylized and appears to be 'Angie Silva'.

Angie Silva

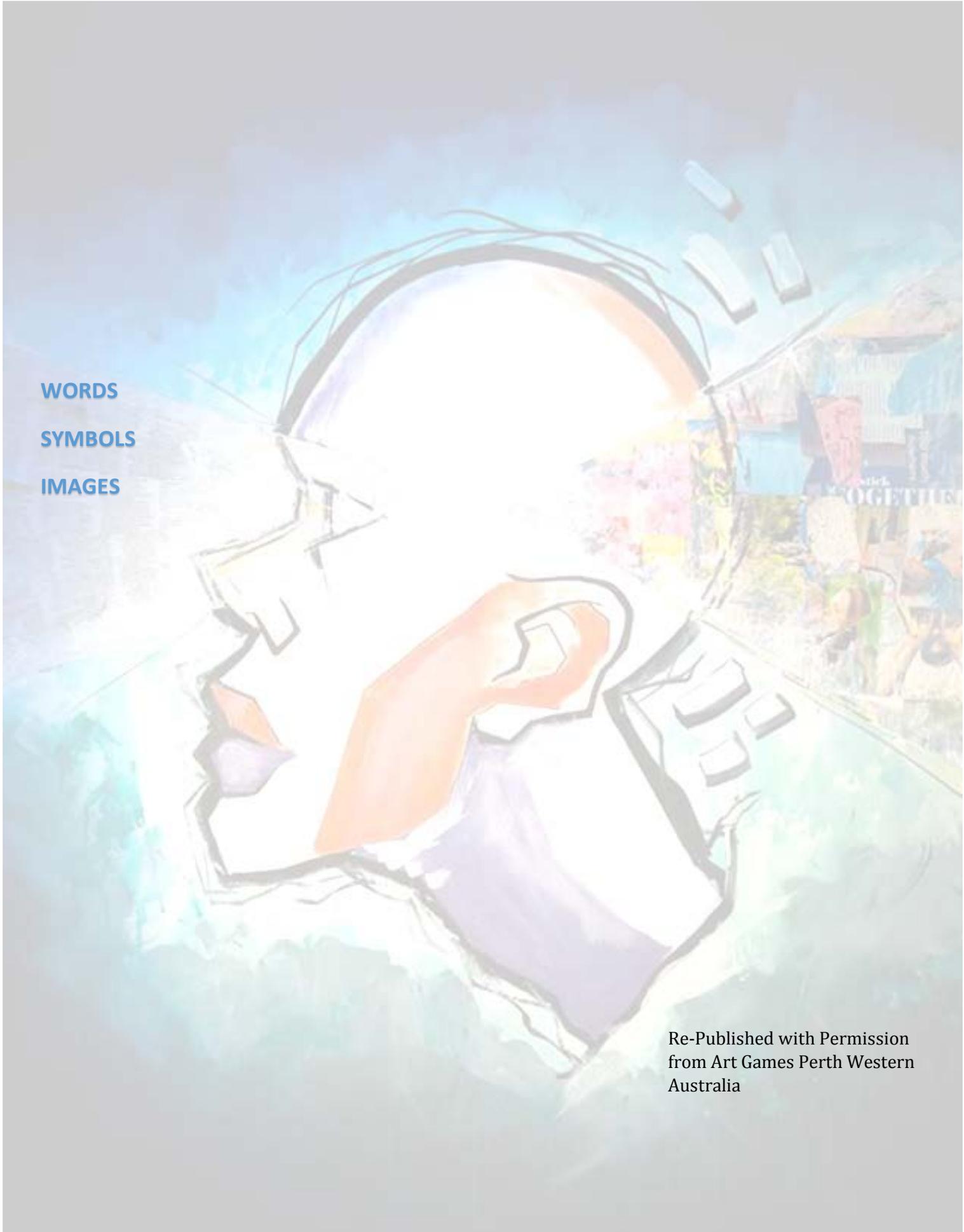
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## Abstract

Development is the dominant story of modern Western society. However the shortcomings of conventional development, such as environmental and social injustice, have created an opportunity for a new narrative: the transition to a sustainable future. Naming sustainability transitions purposefully and effectively has been an overlooked yet crucial variable in an age of media sound bites, hashtags, search engines and rapid communication technologies. The present research contributes to the new narrative by investigating what role *keywords, naming and framing* play in a major sustainability transition: waste. This question is answered in detail in two published and two submitted research papers. The exegesis provides a general introduction and guide to these papers. The significant findings and contributions are summarised below.

**Theory:** I identify and explore keywords, names and naming as a discursive unit, advancing the theoretical frameworks of discourse analysis that have tended to focus only on framing and narrative. I develop a new concept: *collective codified signifiers*, defined as *a signifier representing specific and fully codified knowledge, such as a set of practices and/or outcomes, disseminated and shared by different actors so as to create an identifiable network and discursive space*. My work demonstrates how knowledge can be disseminated and leveraged through effective naming strategies. Building upon a multi-level governance approach to sustainability, I show that naming and framing influences elected governance structures. My findings demonstrate the power of keywords, names and frames in signifying emerging sustainability knowledge, building discursive global networks and driving actionable change.

**Policy:** The waste sector is vitally important in terms of desired sustainability outcomes and is shifting away from a story about waste towards materials and resources. I provide valuable insights into best practices and future policy directions for practitioners and academics working in the waste and materials arena. A variety of naming and framing tactics are explored and their outcomes are presented. A range of possible metrics and tools that can be used to analyse progress of diversion, productivity, cyclical use, material inputs, material cycles and sustainable design are identified. The findings also provide insights into applicable governance structures and geographical scales to manage waste to materials policy transition.

**Methodology:** Visual approaches to discourse analysis offer a highly relevant methodology for academic and practitioners interested in the future of sustainability communication. Information Communication Technology platforms enhance visual modes of communication and knowledge dissemination. Visual approaches can take advantage of new technologies or can rely on low-tech

methods. Using a multi-methods research design, I include visual research as a cutting-edge approach in investigating keywords, names and frames.

## Acknowledgements

Pursing a PhD has been an honour, a privilege, a journey of support and self-discovery. Many of my family members did not have access to even a basic education. My grandfather Benigno only knows how to write his name and my grandmother Anna was also barely literate. My father Joao only completed year four and my mum Fatima year ten. To be the first person in my family lineage to hold a PhD is a testament to the accessibility of education in Australia. It is my hope that the Australian community uphold and protect accessibility to education for all people, as worthy and admirable social value.

I would next like to acknowledge the change makers, great thinkers and earth protectors of our times, who despite often facing conflict, ridicule and personal sacrifice, continue to strive for a better world. Thank you for the inspiration, courage and contribution.

To my dad Joao, thank you for encouraging me to be a curious, independent, globe trotter. Your life story so far, with all its battles and adventures allowed me to appreciate the great mystical unfolding of the human journey. Thank you for instilling in me a sense of work ethic and self-belief.

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## **List of publications as part of this thesis**

**Silva, A.**, Stocker, L., Mercieca, P., & Rosano, M. (2016). The role of policy labels, keywords and framing in transitioning waste policy. *Journal of Cleaner Production*, 115, 224-237.

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**Silva, A.**, and Stocker, L., Collaborating for sustainability: the role of transition networks and names in creating powerful global niches. (Under Review) *Technological Forecasting and Societal Change*

**Silva, A.**, and Stocker, L., What is a Transition? Exploring visual and textual definitions among sustainability transition networks (Under Review) *Global Environmental Change*

## Statement of Contribution and Co-authorship declaration

I hereby declare that this thesis contains no material which has been accepted for the award of any other degree or diploma at any university or equivalent institution and that, to the best of my knowledge and belief, this thesis contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

This thesis includes *two* original papers published in peer reviewed journals and two unpublished publications currently under review. The core theme of the thesis is sustainability transitions and communication tactics. The ideas, development and writing up of all the papers in the thesis were the principal responsibility of myself, the student, working within the Curtin University Sustainability Policy Institute under the supervision of Associate Professor Laura Stocker

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In the case of chapters 1-6 of the exegesis my contribution to the work involved the following: 100% of the write up

<b>Paper</b>	<b>Publication Title</b>	<b>Status</b> <i>(published, in press, accepted or returned for revision)</i>	<b>Nature and % of student contribution</b>	<b>Co-author name(s)</b> <b>Nature and % of Co-author's contribution</b>	<b>Institutional affiliation</b>
1	<i>The role of policy labels, keywords and framing in transitioning waste policy</i>	<b>Published</b> <i>Cleaner Production</i>	<i>Angie Silva: 80% Conceptual development data collection, write up</i>	<b>Laura Stocker:</b> 7.5% <i>Conceptual guidance Paper structure, editing, written content</i> <b>Michele Rosano:</b> 7.5% <i>Conceptual guidance Paper structure, editing, written content</i> <b>Paul Mercieca:</b> 5% <i>Conceptual guidance, lit review content</i>	
2	<i>From waste to sustainable materials management: three case studies of the transition journey</i>	<b>Published</b> <i>Waste Management</i>	<i>Angie Silva 75% Conceptual development data collection, write up</i>	<b>Leen Gorissen:</b> 10% <i>Written contribution to SMM case study</i> <b>Michele Rosano:</b> 10% <i>Conceptual guidance Paper structure, editing, written content</i> <b>Laura Stocker:</b> 5% <i>Paper structure, proofing and editing</i>	
3	<i>Collaborating for sustainability: the role of transition networks and names in</i>	<b>Under Reviewed</b> <i>Technological Forecasting</i>	<i>Angie Silva: 85% Conceptual development</i>	<b>Laura Stocker:</b> 15% <i>Conceptual guidance Paper structure, editing, written content</i>	

	<i>creating powerful global niches</i>	and Societal Change	<i>data collection, write up</i>		
4	<i>What is a Transition? Exploring visual and textual definitions among sustainability transition networks</i>	<b>Under Review</b> Global Environmental Change	Angie Silva: 90%	<b>Laura Stocker: 10%</b> <i>Guidance and data collection, editing, written content</i>	

I have / have not renumbered sections of submitted or published papers in order to generate a consistent presentation within the thesis.

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**Date: 17/02/2017**

The undersigned hereby certify that the above declaration correctly reflects the nature and extent of the student's and co-authors' contributions to this work. In instances where I am not the responsible author I have consulted with the responsible author to agree on the respective contributions of the authors.

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## Other research outputs during PhD candidature

### International Conference Article

**Silva, A.**, and Stocker, L., 2016. IST (International Sustainability Transitions) Wuppertal Germany. "Collaborating for sustainability: the role of transition networks and names in creating powerful global niches"

**Silva, A.**, and Mercieca, P., 2014. GRF-SPaC (Global Research Forum Sustainable Production and Consumption) Shanghai China. "Framing waste policy transitions"

**Silva, A.**, Mercieca, P., and Stocker, L., 2014. IST (International Sustainability Transitions) Utrecht Netherlands. "Labelling sustainable transitions, relational constructions of space and the multi-level perspective"

### Domestic Presentations

**Silva, A.**, 2015. One Planet Anti-Conference, Fremantle WA (Waste expert panel)

**Silva, A.**, 2015 Margaret River Sustainability Seminar, "From Waste to Sustainable Materials Management. Margaret River WA

**Silva, A.**, 2014 One Planet Community Series Fremantle WA: "Communicating a shift towards Sustainable Materials".

### Selected Media

**Silva, A.**, and Raphaely, T., 2015 The Conversation: Why do we tax goods and services at the same rate, when goods are so much less sustainable? <http://theconversation.com/why-do-we-tax-goods-and-services-at-the-same-rate-when-goods-are-so-much-less-sustainable-50008>

Radio Interview: Curtin Radio 100.1 FM. 18<sup>th</sup> February 2016 Jenny Seaton. Topic: The use of words in marketing to sell ideologies around environmental movements.

Radio Interview: Panorama SYDNEY 90.7 FM. 16<sup>th</sup> April 2015 with Rebecca. Topic GST, consumption and waste.

Radio Interview: ABC Regional 684am. 6<sup>th</sup> of April 2015 with Niomi O' Hara. Topic: Waste to Sustainable Materials Management

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2015 Excellence in Teaching and Learning

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Reviewer, Journal of Environmental Planning and Management

Reviewer, Journal of Industrial Ecology

STRN Sustainable Transitions Research Network

ASTRA Australia Sustainability Research Alliance

Ecolingustics Research

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# 1. General Introduction

*“Stories are the secret reservoir of values: change the stories individuals or nations live by and you change the individuals and nations themselves” – Ben Okri*

*“If knowledge is power, then changing the terrain of discourse is the first but very important step”. - Sun Tzu’s Art of War“*

What stories have we been living by? If we look around us today what stories have created the world we now see? And perhaps more importantly what stories will we tell to guide our future?

The relationship between the stories we tell about our society and the reality we create is a profound topic: one in which a diverse array of scholars, authors and philosophers, have explored. Wolfgang Sachs (1992) *'The Development Dictionary, A Guide to Knowledge as Power'*, was one such exploration that propelled the story of Western development in to the spotlight.

*"Development occupies the centre of an incredibly powerful semantic constellation. There is nothing in modern mentality comparable to it as a force guiding thought and behaviour. At the same time, very few words are as feeble, as fragile and as incapable of giving substance and meaning to thought and behaviour as this one" (pp 3).*

Stories of *'prosperity'*, *'security'* and *'secular meanings'* of life as matter and mechanism (Korten, (2007), stories of *'individualism'*, *'progress'* and endless *'economic growth'* (Meadows et al., 2004; Bowers, 2010; D'Alisa et al., 2014), and stories of *'human centrality'* and the domination of other species (Kingsnorth and Hine, 2009) have been rehearsed and refined through all channels of communication and have reached a point of conceptual legitimacy: they are not perceived as stories but rather as a taken-for-granted truth. Feminist scholar Mary Poovey, refers to *'cultural naturalisation'* as the process by which socio-cultural milieu becomes invisible to the members of that community. She describes the process by which economic matters are *'naturalised'* to fall *'below the horizon of cultural visibility'* such that individual economic transactions are not scrutinized but taken on faith. (Poovey, 2008 cited in Burke, 2012). Danger lies in social reluctance to objectively analyse these stories and to assume that they are not mutable but permanently fixed. As renowned linguists Noam Chomsky puts it: *'the general population doesn't know what's happening, and it doesn't even know that it doesn't know'* (Chomsky, 2011).

The consequences of these stories to ecological health are widespread and have left no corner of the world untouched. The undoubtable effects of human activity on our planet in the forms of climate change, extinction of species, degradation of water and air, have demonstrably accelerated during times of unbridled economic growth.

Arran Stibbe (2015) states;

*"The increasingly rapid destruction of the ecological systems that support life is calling into question some of the fundamental stories that we live by: stories of*

*unlimited economic growth, of consumerism, progress, individualism, success, and the human domination of nature” (Preface).*

This crisis has also presented an opportunity to establish and nurture alternative emerging stories that support and enhance life and our planet. ‘Sustainability’ has appeared as a dominant narrative representative of a movement that endeavours to create positive synergies among environmental, social, cultural and economic values for a better future. Research networks, scholars and grassroots groups have converged on the keyword ‘*transition*’ to represent ‘*transitioning towards sustainability*’: a storyline for our pathway forward.

Transitioning to this new and improved sustainable world requires a reconceptualisation and reconstruction of many of our deeply entrenched social and technical systems. The importance of discourse in designing and shaping our collective values has been extensively analysed (Fairclough et al., 2011; Fairclough and Wodak, 2005; Hajer, 1995; Howarth et al., 2000; Van Dijk, 1997). Discourse is now considered a form of social practice, where discursive events deeply influence and guide the enveloping social structures (Burr, 2015; Lakoff, 2010). This relationship between discourse and its ability to indicate purpose and action is a central point in my research discussion.

In an age of media sound bites, hashtags, search engines and rapid communication technologies, knowledge is encoded within and disseminated by smaller discursive units such as keywords and names (Silva, et. al., 2016). It is therefore crucial that the transition towards sustainability narrative develops and nurtures a new array of words to signify new meanings and practices, disseminating this new knowledge effectively. This new vocabulary is already in effect, adjusting and enhancing old terms, such as, *green economy, natural capitalism, organic, renewable energy, and economies of community*, or birthing new terms such as, *degrowth, locavore, ecocracy, and climatarian*. Although the connection between discourse and ecology has found a home in environmental communication and ecolinguistics studies, the keywords and names used in transitions towards sustainability is an underdeveloped yet highly valuable field of inquiry. It is within this context that I see the value in presenting naming as a distinct discursive unit worth analysing within sustainability communication.

Waste is a prime example of a sector in transition. Until the mid-1980’s waste and discarded materials were mostly buried, shipped out to sea or turned into ash, requiring further raw materials to be extracted and enabling wasteful consumerism to continue unchecked. The discourse shaping earlier waste ideologies and framing consequent solutions lacked an environmental orientation. Rather, they were often linked to human health concerns such as disease risks, stench and unsightliness that resulted from inappropriate waste disposal practices

(Rootes, 2009). Prominent keywords within the waste discourse included: *cleanliness, disposal, dumping, garbage, throw away, rubbish, litter* and *landfill*, words that focus thinking far from the concepts of reusable materials and valuable resources. Keeping places ‘clean’ was the main doctrine of societal perceptions and government interventions in managing waste (Paredis, 2011).

The rapid and decentralised manufacture of complex consumer products, such as electronics, is having immense environmental impact (Buijs & Sievers 2011). Sustainable innovation in waste and materials management is now recognised as an urgent task in addressing the mounting ecological damage caused by high levels of consumerism and the depletion of resources to manufacture short life-cycle products (Andrews-Speed et al. 2012). Coinciding with the sustainability agenda on material and natural resource scarcity, the mid 2000’s witnessed a surge in political debate and initiatives that moved away from the ‘disposable’ culture towards Sustainable Production and Consumption (SPC) and the Circular Economy (EEA, 2014; UNEP, 2010; PBL, 2011).

This transition narrative reconceptualises waste as materials or resources and embeds this change into the sustainability agenda. In my thesis, I use this prevalent and interesting example to explore how further refinements to the narrative may lead to actionable and measurable sustainability changes. I was particularly curious to analyse the keywords and names used in this emerging materials story and the roles they played.

### 1.1 Aim

In order to contribute to the transition to sustainability narrative, the papers I wrote sought to understand how as practitioners and researchers we can communicate this story more effectively. The following work is an assemblage of published and submitted research papers exploring the role *keywords, naming* and framing play in transitioning a major sustainability challenge; waste.

### 1.2 Research Questions

In order to contribute to this overall inquiry, six questions were established that underpinned four research papers.

I start by asking:

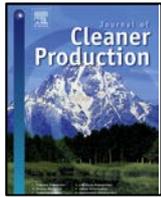


1. What is a sustainability transition?

[What is a Transition? Exploring visual and textual definitions among sustainability transition networks Under Review Global Environmental Change]

2. What is the story of waste transition?

Paying particular attention on the choice of keywords used to name waste policy transitions, I explore:



3. How do different waste policy naming and framing tactics influence the initiatives, measurement tools and outcomes pursued?

[The role of policy labels, keywords and framing in transitioning waste policy- published in Journal of Cleaner Production on the 29th of December 2015]



4. To what extent has the transitioning story of waste shifted waste management towards more sustainable and environmentally acceptable models?

[From waste to sustainable materials management: Three case studies of the transition journey - published in Journal of Waste Management on the 11th of December 2016]

Presenting the anti-incineration and zero waste movement as examples of discursive networks, I investigate;



5. What role do shared transition names play in connecting globally dispersed actors and expanding the uptake of certain transition directions?

[Collaborating for sustainability: the role of transition networks and names in creating powerful global niches - Under Review in Journal of Technological Forecasting and Social

Change]

Finally, in appreciating visual communication platforms in which the new vocabulary of sustainability transitions will likely be disseminated and shared. I assess:



6. In what way are visual research methodologies applicable in analysing how new names and their meanings are understood?

[What is a Transition? Exploring visual and textual definitions among sustainability transition networks -Under Review Global Environmental Change]

### 1.3 Significance of Contributions

**Theory:** I identify and explore keywords, names and naming as a discursive unit, advancing the theoretical frameworks of discourse analysis that have tended to focus only on framing and narrative. I develop a new concept: *collective codified signifiers*, defined as *a signifier representing specific and fully codified knowledge, such as a set of practices and/or outcomes, disseminated and shared by different actors so as to create an identifiable network and discursive space*. My work demonstrates how knowledge can be disseminated and leveraged through effective naming strategies. Building upon a multi-level governance approach to sustainability, I show that naming and framing influences elected governance structures. My findings demonstrate the power of

keywords, names and frames in signifying emerging sustainability knowledge, building discursive global networks and driving actionable change.

**Policy:** The waste sector is vitally important in terms of desired sustainability outcomes and is shifting away from a story about waste towards materials and resources. I provide valuable insights into best practices and future policy directions for practitioners and academics working in the waste and materials arena. A variety of naming and framing tactics are explored and their outcomes are presented. A range of possible metrics and tools that can be used to analyse progress of diversion, productivity, cyclical use, material inputs, material cycles and sustainable design are identified. The findings also provide insights into applicable governance structures and geographical scales to manage waste to materials policy transition.

**Methodology:** Visual approaches to discourse analysis offer a highly relevant methodology for academic and practitioners interested in the future of sustainability communication. Information Communication Technology platforms enhance visual modes of communication and knowledge dissemination. Visual approaches can take advantage of new technologies or can rely on low-tech methods. Using a multi-methods research design, I include visual research as a cutting-edge approach in investigating keywords, names and frames.

## 2. The Great Transition towards...?

*"The Great Transition story brings the message that we can create a better world if we shift our values and transform our institutions. Critical to this transition is growing public awareness of the dangers ahead and the need to revise our ways of living – and living together – on this planet. In this, our time of choice, we need a vast movement of global citizens to carry forward a Great Transition."*

*--Paul Raskin. The Great Transition Initiative*

*"If we succeed, future generations may look back on this as a time of profound transition and speak of it as the time of the Great Turning. If we fail, our time may instead be known simply as the tragic time of the Great Unraveling."*

*--David Korten. (The great turning. From empire to earth community. 2007, pp 21)*

*The* vision of our collective future is clouded by uncertainty and complexity. Despite all the evidence indicating our current civilization is eroding the natural systems of our planet, significant actionable change is an ongoing, frustrating challenge to achieve. Scientific evidence of this unbalance has been insufficient to convince policy makers and the wider public of the urgent required change (Hulme, 2009). Additionally, the power of big business, whose profit models rely on the status quo, has enabled them to launch severe and usually successful campaigns against challenges to business as usual (Dunlap and McCright, 2011).

However the rapid rise of technology and the complex global value-chains that dominate our goods and services mean we have never been so connected and informed as now. Thus the failings of business as usual to serve social equality and environmental health are being revealed publically in an unprecedented way. Financial crises shine light on the instability of our economic systems, the destabilisation of regions on migration movements and security matters, the impacts of environmental and climate catastrophes on food supply and coastal communities. These challenges are reaching a tipping point of global proportions, setting the scene for a great transition (Raskin et al., 2002; Korten, 2007).

Transition has emerged as a popular keyword in describing the need to shift from the current state of affairs to a re-envisioned and renewed society in harmony with itself and its natural surroundings (Markard et al., 2012). The broad definition of the term transition is “a change from one form or type to another or the process by which this happens” (Cambridge Dictionary, 2016). This was most often applied within the sciences as a method to describe the ‘phase transition’ of substances going from solid to liquid gas (Loorbach, 2010). The concept was then developed as a method to analyse biological and ecological systems’ evolution, addressing patterns of interaction and complex adaptive change (Gell-Man 1994; Holland 1995). This transition model is traditionally applied to describe non-linear shifts between qualitatively different states also known as punctuated equilibrium and has also been applied to psychology, technology studies, economics and sociology (Rotmans et al., 2001; Kemp et al., 2007; Loorbach, 2010).

Markard et al., 2012 states;

*“A transition involves far-reaching changes along different dimensions: technological, material, organizational, institutional, political, economic, and socio-cultural. Transitions involve a broad range of actors and typically unfold over considerable time-spans” (pp 956).*

While the term ‘transition’ has been repeatedly used, a collectively understood definition of what a transition is or should look like remains unclear. Exploring transition discourse and framing,

Audet (2012; 2014) described two main discursive frames shaping transitions theory and practice. The first frame encapsulates a technocratic school of state-driven interventionism and industry incentivisation. The second points to radical and transformational shifts driven by bottom up civil change agents. This top-down versus bottom-up approach to transition is an interesting dichotomy, important in understanding how transitions are being played out.

Raskin et al., (2002) book *'Great Transition; The promise and lure of the times ahead'*, opens by stating;

*"The global transition has begun—a planetary society will take shape over the coming decades. But its outcome is in question. Current trends set the direction of departure for the journey, not its destination" (Preface).*

Although many future scenarios can be realised, *'sustainability'* is the most common alternative pathway set out in political, business, scientific and public forums (Kuhlman, and Farrington, 2010; Raskin et al., 2010). In our paper *'What is a Transition? Exploring the draw and write technique for sustainability communication'* we explore the origins of transitions towards sustainability.

See



What is a Transition? Exploring visual and textual definitions among sustainability transition networks Under Review Global Environmental Change

## 2.1 Transitions towards Sustainability

Sustainability has been shaped at an international level by a number of agencies, most influential of which has been the United Nations (Kidd, 1992; Assembly, 2015). Since 1968 the United Nations has had programs and conferences designed to encourage the nations of the world to integrate their environment and development policies, and to better control environmental degradation. Early among these conferences was the 1972 UN Conference on the Human Environment at Stockholm, which sought to define the environmental problem and to galvanise world leaders and NGOs into action (Sustainable Development Knowledge Platform, 2017).

In the 1980s the United Nations established the World Commission on Environment and Development (WCED), which produced the well-known report "Our Common Future" in 1987 (WCED, 1987). This book was a blueprint for change and laid the policy groundwork for the next five years. Following directly on from the WCED's work, the 1992 United Nations Conference on Environment and Development (UNCED) was held in Rio, Brazil. This was the largest ever meeting of Heads of State of the world, underscoring the significance of the environmental crisis. Through a process of preparatory meetings, agreements were negotiated among representatives

from various nations and stakeholder groups (Kidd, 1992). One of the main outcomes from UNCED was a document called Agenda 21, a sustainable development policy statement which all nations in the world were asked to sign (Sitarz, 1993). The Paris Agreement in 2016 and the release of the updated Sustainable Development Goals (SDGs), in *'Transforming our world: the 2030 agenda for sustainable development'* were the latest international activities to take form (Nam, 2015; Rogelj et al., 2016).

Although this process has been ongoing internationally and nationally, success has been very mixed. The term *'sustainable development'* has been criticised as an attempted to prolong the development story. Sachs (1992) states;

*"The way was thus cleared for the marriage between 'environment' and 'development': the newcomer could be welcomed to the old-established family. 'No development without sustainability; no sustainability without development' is the formula which establishes the newly formed bond. 'Development' emerges rejuvenated from this liaison, the ailing concept gaining another lease of life" (pp 28).*

Nevertheless, interpretations of the term are widely variable and the respective discourses have long been contested (Jacobs, 1999). The renowned definition as quoted in the Brundtland Report (WCED, 1987) is: "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs". Davidson (2010), suggests that the term *'sustainable development'* is an empty signifier, often representing the integration across social, environmental and economic constructs; however the outcomes, frameworks and objectives of a *'sustainable development'* program may vary significantly or not amount to any practical achievements. Milne, et al., (2009), critique the term as being more consistent with dominant economic ends than environmental protection, reinforcing rather than challenging the status quo. Jacobs (1999) argues that *'sustainable development'* as a highly contested concept is still in the process of establishing more concrete meaning. Subsequently, the term *'sustainability'* on its own is thought by many to be more transformative and inclusive than *'sustainable development'* and thus preferable (Robinson, 2004). Unlocking sustainability from the assumption that economic expansion is the only way forward allows novel future scenarios to be imagined.

Sustainability is a concept that resists a single form of prescriptive solution and must be viewed as an adaptive, progressive and continuous societal movement pressuring our economic and political models to adapt towards more sustainable processes, practices and outcomes, a challenge that is both multifaceted and multi-dimensional (Paredis, 2013). Contemporary

emphases on uncertainty and complexity are central to sustainability and climate science (Dovers, and Handmer, 1992). For this reason transitioning towards sustainability has been described as 'radical', 'deep' or 'transformational' change to complex social ecological systems (Loorbach, 2007). It is this systems perspective that has underlined a large portion of transition discourse, especially amongst many of the large organisational bodies such as the United Nations Environmental Programme (2011), Organisation for Economic Co-operation and Development (2010) and the International Energy Agency (2010) (Audet, 2012).

Transition towards sustainability is a relatively recent field of research and practice based on the normative assumptions that current paradigms and societal systems are unsustainable. Transitions therefore need to be investigated and understood in order to contribute to facilitating and navigating a shift towards sustainability (Geels, 2002; Loorbach, 2010). Rather than positing change as an unplanned, sporadic and non-prescriptive occurrence, theorists and scientists have developed deeper insights into why and how transitions from one paradigm to another manifest. Sustainability transition studies consist of historical investigations of past transitions establishing the multilevel perspective (MLP) (Geels, 2002; Geels and Kemp, 2007), theoretical deliberations exploring concepts such as, Technological Innovative Systems (TIS) (Jacobsson and Johnson, 2000; Hekkert et al., 2007), and Strategic Niche Management (SNM) (Smith et al., 2005; Smith and Stirling, 2008), as well as empirical studies of governance frameworks and processes navigating societies towards sustainability (Rotmans et al., 2001; Loorbach 2010; Berkhout et al., 2004; Kemp and Loorbach, 2006; Rotmans and Kemp, 2008).

Sustainability transitions research has since become a large global network (Sustainability Transition Research Network or STRN) and is considered a major authority in the sustainability field; thousands of articles, seminars and actions have been shaped by the networks transitions frameworks (Markard et al., 2012). According to key authors Rotmans et al., (2001), Geels and Kemp, (2007) and Loorbach (2007) sustainability transition research tries to unravel the complex interaction patterns between individuals, organizations, networks, and regimes within a societal context. Under a co-evolutionary perspective, with technology and society mutually shaping each other, instead of one more or less determining the other, multiple dynamic interactions over time can lead to speedy and deliberate change. The term '*socio-technical systems*' is used in order to relay not only the need to create and adopt technical innovations but also the required evolution of societal values as well. This enables the formulation of a way of governance based on complexity (Loorbach 2010).

Beyond conceptual contributions, many change agents are achieving sustainability through what has been called 'transitions in action' (Smith, 2011). This area of transitions is primarily focused on accomplishing actionable sustainable changes across multiple sectors including energy,

mobility, food production and water management. Narrowing the transition to a particular sector or community, change agents can pursue focused, readily manageable agenda. Originating in Totnes UK in 2005, the Transition Towns (TT) movement is considered an example of ‘transitions in action’ and has now developed some 6597 individual projects from across every corner of the globe (TransitionNetwork.org) as a response to growing community concerns over climate change and peak oil consumption (Hopkins, 2008). These case examples are helping to inform theory and provide insights into how transitions can be governed in the ‘real world’.

The management of sustainability transitions requires new governance frameworks which require a reorientation away from competitive ideologies towards collaborative principles, whereby industry, community, government, and knowledge institutions work together for the ‘common good’. The ongoing works of Loorbach, (2007; 2010) establish *Transition Management* as a systems-based governance approach in which conventional governance structures are seen as a limiting variable in the change process: existing silos tend to reinforce business as usual. The significance of *Transition Management* is that it highlights the importance of innovative governance structures that bring together front runners and change makers across traditional siloed boundaries (Spath and Rohracher, 2012). Strong reliance falls on the actions of the front runners who, through an alignment process, help build power, agency, legitimacy and wider system acceptance in challenging the incumbent regime.

What both the sustainability transition research and transitions in action demonstrate is the crucial role social ideologies and values play in creating our current realities and future directions, and the need to disseminate and share them with a widening audience. For example Raskin et al. (2010) present four different future scenarios one of which is a great transition to a sustainable civilisation. For this scenario to play out deeply entrenched values must eventuate;

*“The new paradigm is rooted in a triad of ascendant values: human solidarity, ecological resilience, and quality of life. Less consumerist lifestyles moderate the growth thrust of Conventional Worlds scenarios, as notions of the good life turn toward qualitative dimensions of well-being: creativity, leisure, relationships, and community engagement” (pp 2360).*

## 2.2 Discourse and Sustainability Transitions

The importance of discourse in designing and shaping our collective values has been extensively analysed. Historical works, such as Foucault (1972) and Percheux (1975) helped established the relatedness of discourse as an enacted instrument of ideology. This perspective created critical approaches to discourse analysis, which founded the works of more recent discourse scholars (Fairclough et al., 2011; Fairclough and Wodak, 2005; Hajer, 1995; Howarth et al., 2000; Van Dijk,

1997). Although discourse analysts apply slightly different approaches using this critical lens, the accepted viewpoint across the field is first, that, language does not exist as an innate cognitive or neutrally representative construct. Rather it is indicative of sociocultural, ideological and power paradigms. Second, written, spoken and multimodal discourse is perceived as a form of social practice that assumes a dialectical relationship between discursive events and the enveloping social structures. This implies that language is a mode of action that is embedded within a historical and social context (Fairclough, 2002).

As Lakoff (2008) stated in his work *'The Political Mind; why you can't understand 21st century politics with an 18th century brain'*;

*"Language does not merely express identity: it can change identity. Narratives and melodramas are not mere words and images: they can enter our brains and provide models that we not merely live by, but that define who we are ... Language has a political force ... What makes language powerful is its capacity to activate, communicate, regulate, and even change all aspects of our understanding!" (pp. 231).*

This link of association between discourse and its ability to indicate purpose and action is a central point in our discussion. It is this critical lens of discourse analysis that has been adopted throughout this research.

Encapsulated under the wide reaching 'discourse umbrella', many levels and scales of discourse analysis exists. One of the most comprehensively explored, across the social sciences, is the analysis of frames and framing. Prominent discourse theorists Goffman, (1974); initiated a discussion on framing, postulating "that the context and organisation of messages affect audiences' subsequent thoughts and actions about those messages" (Rodriguez et al., 2011, pp 49). Framing often attempts to organise experiences by linking them to wider structural and ideological processes. Snow and Benford (1988); Fairclough and Woodak, (2005); and Dewulf et al., (2009) have extensively developed the concept of frames and framing which can be further understood as a social process of meaning making, whereby perceptions of reality are organised through that which is highlighted in promoting a particular issue. The framing process involves determining what themes resonate and where the issue is best situated within a larger narrative. It often reflects prevalent framing group values (Yanow 2000; Johnson, Dowd and Ridgeway, 2006). For example, environmental policy may be framed by economic rationalism, using terms such as 'resource efficiency' and 'resource security'; a more social framing of environmental policy may use terms such as 'conservation for future generations'.

Substantial increases in visual modes of communication matched with high global usage of Information Communication Technology (ICT), has subsequently expanded predominantly textual forms of framing analysis to include visual framing (Coleman, 2010). Visual materials are able to capture the essence of an issue or ideological perspective in graphical form. The popular proverb “a picture tells a thousand words” has been scientifically demonstrated in several studies which show that visual communication often carries “excess meaning” and takes precedence over textual forms of communication (Gamson and Stuart, 1992; Hertog and McLeod 2001). It has been suggested that visual communication require less cognitive effort to unload, therefore peripheral rather than central processing takes place, leading the audience to make quick assumptions of a visual as fact (Rodriguez et al., 2011). Conceptual and methodological uncertainties do exists, which pose challenges in identifying scientifically rigorous approaches to visual framing analysis. However the field is predicted to increasingly become a crucial sub-section of framing analysis in future (Grabe and Bucy, 2009).

As the sustainability challenge becomes increasingly pertinent to a vast range of fields and sectors, an emerging number of discourse theorists are also applying their frameworks and concepts to environmental discourse analysis and to the sustainability transition agenda (see Jerneck and Olsson, 2011; Jensen, 2012; Spath and Rohracher, 2010; Lawhon and Murphy, 2012). This trend includes the establishment of an extended linguistic group ‘Ecolinguistics’ which embodies the specific study of language and ecology, focusing not only on how humans speak about the environment but how this impacts our interactions with it (Stibbe, 2015).

In our research papers - *‘The role of policy labels, keywords and framing in transitioning waste policy’*, and *‘Collaborating for sustainability: the role of transition networks and names in creating powerful global niches’* we further investigate how discourse influences sustainability transitions.

See  The role of policy labels, keywords and framing in transitioning waste policy – published in Journal of Cleaner Production on the 29th of December 2015



Collaborating for sustainability: the role of transition networks and names in creating powerful global niches - Under Review in Journal of Technological Forecasting and Social

As stated in section 2.1, sustainability transitions are based on the dissatisfaction with the current system and an opportunity for socio-technical systems change. Transitioners as change makers, often oppose dominant discourses and thus perform on public stages and compete discursively for influence (Benford and Snow 2000; Boschma 2005). Most significantly they need to influence the cognitive realm in which issues are contested by employing effective discourse tactics

(Johnson et al., 2006; Jerneck and Olsson, 2011). Stewart et al., (2012) refer to the adoption of languaging strategies and tactics, which include the use of identification, framing, narrativisation and sloganising to transform perceptions, legitimise and sustain movements and prescribe courses of action, especially via the use of emerging communication technologies. Multiple media platforms for example, have been found to be significantly influential in constructing visual frames of climate change (Hansen and Machin 2013).

In this way transitioning towards sustainability requires the articulation of expectations and visions, the shared learning of relevant processes and the consequent enabling of innovation (Geels, 2011). Sustainability transition can gain momentum if expectations become more precise and more broadly accepted. If an innovation gains the right attention from the right actors; stable configuration may materialise and the system may shift towards greater sustainability.

The significance of discourse and sustainability transitions in action has previously been noted in transition literature. Smith et al. (2005) recognises that transition articulation accounts for social and political traction as well as developing capacity to coordinate transition actors and mobilise resources. Geels and Verhees (2011) evaluate framing and the collisions between social movements and environmental innovations. Jerneck and Olsson (2011) discuss the representation of the dominant regime through framing activities performed in accordance with multiple interests of regime actors. These works have built a foundation that incorporates discourse analysis within the sustainability transition research program.

Beyond the use of discourse to frame action and future direction, sustainability transitions can also utilise discourse in order to establish networks. The notion that networks can be discursively described has been explored under a variety of terms including: epistemic communities (Haas, 1992) discourse coalitions (Hajer, 1995), communicative action groups (Habermas, 1996), symbolic isomorphism (Glynn and Abzug, 2002), discursive coalitions (Dryzek, 2005), advocacy coalition (Sabatier, 2006), narrative networks (Ingram et al., 2014), and discursive fields (Pesch, 2015). Here I refer to 'discursive networks' to capture this concept in relation to sustainability transitions. These concepts imply that a group of actors are connected in time and space through an identifiable shared set of discursive cues, establishing spaces of shared meaning and identity. Discursive cues may be general discourse alignments such as shared storylines, or more specific and intentional discourse alignments such as shared names, labels, logos, visuals or frameworks (Leitch, et al., 2014). Discursive action is therefore not only about sense-making or influencing attitudes and opinions but also about building powerful global networks that stabilise and institutionalise discursive practice (Tarrow, 1998 Burr, 2003).

See



Collaborating for sustainability: the role of transition networks and names in creating powerful global niches - Under Review in Journal of Technological Forecasting and Social

In regards to exploring discourse from the perspective of transition networks, Lawhon and Murphy (2011) express the specific potential of linguistic power and its relational socio-spatial manifestations. Pesch (2015) explores discursive spaces as a tool in building niche networks and upscaling niche outcomes. Spath and Rohrer (2012) introduce the building of authoritative storylines within the non-fossil sustainable energy systems through discourse coalitions.

Although analysing discourse in relation to the environment and sustainability is not a new area of inquiry a crucial component is missing: the concepts of keywords and naming.

### 2.2.1 The Naming Game

A name can be understood as the specific choice of keywords intentionally selected for publication across multiple channels. Essentially it is the 'marketed title' of whatever is being presented, whether it be a new policy instrument, theory, company, social movement, innovative technology, idea, NGO or governance body. Content necessitates a name in order to be sought after, disseminated and consumed or applied (Alkon et al., 2012; Longhurst, 2015). Through social processes of sense making a name can be loaded with meaning, used to categorise and signify specific content. In this way naming can act as an umbrella signifier of a collection of associated content that would otherwise be disconnected. For example each of the names 'Cradle to Cradle', 'Circular Economy', 'Industrial Symbiosis', 'Clean Energy' and 'Organic' evokes a different and specific set of ideologies, frameworks, information, governance structures, actors, networks and outcomes.

Ironically, naming has not been explicitly "named" or explored even within the discourse fields (Vanguri, 2016). Similar to *frames* and *framing* I see *names* and *naming* as a socially constructive choice, aligning a sub-set of content to specific narratives which can be politically loaded and thus strategically relevant to sustainability transitions. However conceptual development is neglected when narrowing analysis to a specific keyword or name's social meaning. Although the study of singular words within linguistics is advanced, this type of scholarship is purely interested in how sentences and words relate to each other from a semantic perspective and is less applicable to social sciences or sustainability transitions (Vanguri, 2016).

Some studies have attempted to understand how keywords and names enact social meaning however a clear title representing this growing area of inquiry is not yet provided. My investigation across social science literature returned numerous titles and descriptions, such as a *keyword*, *buzzword*, *term*, *label*, *lexicon*, *signifier*, *slogan* or *name*. Although we could reason each

of these terms have differing interpretations it can also be argued that these terms are currently used interchangeably as there is little theoretical consistency or guidance. While it is not my intention to construct a new theoretical discourse framework incorporating keywords and names, I do wish to acknowledge the limitations in building upon an emerging and thus insubstantial field. However believe it is a crucial area relevant to social change, therefore studies that build upon the impact of keywords and names are timely and significant.

Pioneering the analysis of keywords in his 1976 book “Keywords, a vocabulary of culture and society,” Raymond Williams demonstrates the significance of keywords and the vocabulary of meaning, in shaping and navigating cultural and societal processes (Williams, 1985). Some researchers have followed suit, for example Leitch et al., (2014) who investigate *keywords* in the titles of government agencies, demonstrating that a change of keywords also indicates a change in the government agency’s directions. Ghaziani and Ventresca (2005) explore the link between *keywords* and cultural change in the business sector, showing how keywords have changed from the years 1975 to 2000. Interestingly, as most academic journals require keywords in order to categorise each paper, the use of a search engine to find work on *keywords* itself is a rather frustrating task. Hence other academics have refrained from using keywords to describe their work opting for other terms instead. Cornwall and Brock (2005), for example explore 'Participation', 'Empowerment' and 'Poverty Reduction' as *buzzwords* in development policy. McDonald et al., (2013) discuss the *labels* used in counted terrorist documents, and Carlile (2004) use *lexicons* in demonstrating how knowledge is transferred, translated and transformed.

Exploring the significance of *names* and *naming* Glynn and Abzug (2002) discuss the symbolic similarities in organisational names. Wilcox (2011) also investigates the symbolic comparisons common amongst those using the ‘Creative Campus Initiative’ name. The recent book ‘*Rhetorics of Names and Naming*’ by Vanguri (2016) is perhaps the most comprehensive work bringing different areas of *names* and *naming* together. In it, Vanguri states:

*“Names differ from common nouns in that they identify rather than describe; they denote rather than connote. That is, rather than calling to mind an agreed upon, pre-established, meaning, they work to exert new meaning through the “speech act of identifying reference”. In this way, names are powerful, but we often forget that power because the act of naming occurs frequently and is embedded in our everyday lives” (2016, pp 1).*

Capturing the experience, lessons and results from transition practitioners, in order to share valuable knowledge with external actors, change agents must package and disseminate that information strategically. Transitions towards sustainability must take into account the most

significant channel for disseminating transition knowledge, the Internet. Increasingly the majority of information sought is via Internet search engine platforms which require a keyword search (Van Laer, and Van Aelst 2010). The results that are displayed are a direct consequence of the keywords we select and type into the query log (Shiri, 2012). Pesch, (2015) refers to this as mediated transfer of discursive fields. The vast amount of data available online emphasises the need for sustainability transition names to be readily searchable and identifiable in order to compete for attention with other movements. Every online marketing company knows this well.

Studying the global expansion of Bus Rapid Transport or BRT, Sengers and Raven (2015) identified key documents that represented BRT knowledge in order to map BRT on a global scale. The method in which these key documents were identified was through the search term “bus rapid transit” typed into the Science Direct database. Although they identified knowledge being exchanged through multiple channels, the authors did not investigate the significance of the BRT name itself. What influence did sharing the BRT name have on the identification and spreading of BRT programs? Although I do not endeavour to investigate the above question specifically I have realised that a crucial gap exists in both the discourse and sustainability transition literature which presents a missed opportunity to investigate and identify the role that *keywords, naming and framing* plays in transitioning our society towards a sustainable future.

In order to constrain my research sufficiently for a PhD, I chose to focus on the waste sector which is undergoing a much needed transition vital to wider sustainability objectives. Since the release of Rio 20+ 10-Year Framework of Programs on Sustainable Consumption and Production (10YFP on SCP), more diverse sustainable innovation in waste and materials policy has been emerging. The current transitional state of waste management across the world requires the development of further government policy, planning and behaviour change. It is in this transition towards sustainable consumption and production that it is valuable to review the role *keywords, naming and framing* play within the context of waste to assist in the development of more sustainable and environmentally acceptable economic and social behaviour models.

See



From waste to sustainable materials management: Three case studies of the transition journey – published in Journal of Waste Management on the 11th of December 2016

### 2.3 Sustainability and the Story of Waste

Waste is a guaranteed component of any urbanised landscape and the management of waste has existed for centuries. Propelled by an economic philosophy of exponential growth through consumerism, the availability, complexity and rapid manufacturing of consumer products is

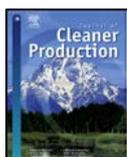
creating highly unsustainable levels of ‘waste’ material outputs. These point to the urgent need to remodel the way waste is managed (Rootes, 2009; UNEP, 2011).

Waste management has for the most part provided end of pipe solutions dictated by a kind of ‘out of sight, out of mind’ or ‘swept under the rug’ mentality. During the sustainability movements of the early 1980’s, environmental concerns start to penetrate the waste discourse. Increasing local landfill site costings as well as public contestation focused attention on alternative end of pipe solutions: *recycling* became the new keyword that is linked to reducing environmental impacts associated with landfill. The name was quickly disseminated and adopted across many geographical borders and waste management policy documents, leading to numerous recycling programmes (Karani, and Jewasikiewitz, 2007). Although the recycling concept remained central to numerous waste policies’ environmental goals (and can still be seen as one of the major waste management solutions implemented today), a necessary extension of the recycling name was that of the 3 R’s: reduce, reuse, and recycle.

It is now argued that waste management should not focus on diversion of waste from landfill and increased recycling rates, but rather through front-end solutions that prevent over-consumption and waste generation (Andrews-Speed et al., 2012; Buijs and Sievers 2011; EEA, 2014; UNEP, 2010). The reason for this shift has been linked to volatile material prices and increased global demand for resources (Happaerts, 2014), a greater awareness and acknowledgement of the scarcity of some raw materials, a growing concern for national resource and materials security, and the emerging unwillingness and inability of countries such as China to deal with the West’s discarded materials (hence China’s Green Fencing movement) (Tibbetts, 2015).

The emergence of a range of new evaluation tools, with names such as *life-cycle assessment*, *cradle to cradle production*, *materials flow analysis*, *resource efficiency indicators*, *full cost accounting* in addition to wider systems thinking, such as the *Circular Economy* principles, *industrial ecology* and *material chain management*, have all combined as a driving force towards a new waste discourse paradigm which is also recognised through the realignment of the policy discourse moving away from waste management towards resource and materials cycles.

See



The role of policy labels, keywords and framing in transitioning waste policy – published in Journal of Cleaner Production on the 29th of December 2015

## 2.4 Key Findings and Identified Gaps in the Reviewed Literature

- Cultural narratives play a crucial role informing the social ideologies and values creating our current realities and future directions.

- Transition to sustainability is an emerging story for a better future. This evolving narrative is establishing new knowledge that must be effectively communicated.
- Media sound bites, hashtags, search engines and rapid communication technologies are dictated by smaller discursive units such as keywords and names. These portals are dominant channels in which knowledge dissemination occurs.
- The transition to sustainability narrative develops and nurtures a new array of words to signify new meanings and practices; disseminating this new knowledge effectively is a crucial task for academics and practitioners in the field.
- Conceptual development which narrows discourse analysis to specific keywords and names has been a neglected and underdeveloped area. Numerous titles and descriptions have been used, such as a keyword, buzzword, term, label, lexicon, signifier, slogan or name. This has led to a lack of conformity. Discontinuity in the area suggests that a clearer framework is required.
- An excellent example of a transition to sustainability story is occurring with waste. This offers an opportunity to understand how keywords, naming and framing, may lead to measurable sustainability changes and outcomes.

### 3. Methodology

*“Research is: A problem to be investigated – A process of inquiry – Explanations that enable individuals to understand the nature of a problem” (Stringer, 1996 pp. 5)*

Social science requires methodological approaches that account for the complexities of social life, which is subject to continual reproduction and transformation. As stated by Yanow (2007);

*“Complex problems require analytic tools that do not oversimplify social realities in order to force-fit them into restricted, and restrictive, models” (pp. 118).*

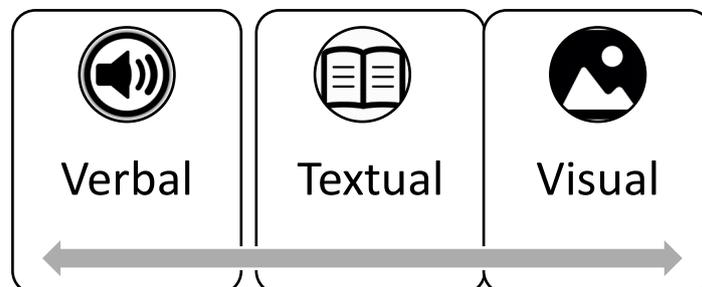
Interpretive and critical approaches to social inquiry often enable responses to questions that are not answerable with positivistic approaches which assume that the world exists independently of interpretation and meaning making (Yanow and Schwartz-Shea, 2015). Interpretive and critical approaches assume that knowledge can be subjective or relational and open to multiple interpretations. A thorough interpretive approach necessitates reflexivity, acknowledging the role of the researcher and the research design.

My research questions on sustainability transitions within the waste sector require an interpretive approach incorporating a multi-method research design.

### 3.1 A Multi-Method Research Design

Multi-method (or mixed methods) research refers to the use of methodological combinations relying on more than one analytical tool in order to triangulate results. A multi-method research design can include either quantitative and qualitative approaches or several distinctive research tools (Miles and Huberman, 1994). The benefits of cross-validating results, according to more than one perspective, increases the validity of the findings while reducing the interpretive bias of the researcher (Brewer and Hunter 1989).

In order to explore how keywords, naming and framing influence the transition of a highly multifaceted sustainability challenge; waste, I combined three levels of evidence from verbal, textual and visual data collection and analysis.





### 3.1.1 Verbal Data Collection and Data Analysis

Verbal data were collected via semi-structured interviews and analysed over two stages of research. The first stage took place in early 2013 and was treated as a preliminary exploration involving actors embedded in the waste sector of a developed city in Australia, Perth. A purposive sample of 15 potential subjects was identified by mapping the waste service value-chain in Perth. An email was then sent informing the subjects of the research proposal, followed by a call. Nine subjects were interviewed, representing a cross-section of occupational roles within the waste sector. The interviews ranged in duration between 30 and 60 minutes and were carried out face-to-face usually in the subject's office or work area. Conducting the interviews face-to-face, I could observe body language and expression which were noted as field observations. These notes were used to highlight exaggerated expression or any indications of uncertainty in the participant's response within the audio transcriptions. A recording device (iPod) was used with permission from the interviewee. The interview schedule was adapted according to the occupational role

#### **Box 3.1.1 Example of Semi-structured Interview Schedule**

##### *Interview Questions*

1. Describe your current role and how it relates to the waste sector?

##### **Initiation**

2. Please describe why improving waste management emerged (this could also be the green bin) at (insert institution name)?
3. (I.e. who was responsible for the initial discussions and decision making? How did people respond? Stakeholders...)
4. In the beginning were there any factors that made improving waste management a difficult thing to implement? (What were they and how were they resolved?)
5. In the beginning what were the factors that enabled the third bin to be approved? (People in charge, available resources, culture, leadership)
6. How were decisions made in regards to improving waste management? (I.e. higher up management, participatory process with other stakeholders)

##### **Implementation**

7. Describe how the third bin system was implemented? How were the bin design selected, location etc.?
8. Were there any issues in implementation? Continuous Management
9. Who is responsible for the management of improving waste management?
10. Is it successful at (insert institution name)? Why? Why not?
11. If the implementing of a third bin system at (insert institution name) could be done again, what could be done to improve the process?

held by the subject and the relevancy of the questions. However the underlining intention for all preliminary interviews was to explore the enablers and barriers of transitioning waste process and services towards sustainability outcomes.

The interviews were transcribed within a few days and sent back to the interviewee for approval and any required clarifications. Each audio transcription was manually analysed and coded for emerging themes. The themes were named according to my best judgment and the keywords that arose during the interviews. The works of Metze et al., (2017) discuss the importance for transition researchers to pinpoint common barriers to systems change, further highlighting how barriers to change manifest in discursive practices. The themes uncovered from the interview transcriptions were then identified and categorised as either a barrier or an enabler.

**Table 1. Themes to emerge from the first stage of interviews**

Barriers to transitioning the waste sector	Enablers of transitioning the waste sector
<ul style="list-style-type: none"> <li>• Resources money / man power</li> <li>• Distrust</li> <li>• Lack of authority to influence change</li> <li>• Information asymmetry</li> <li>• System lock-in</li> <li>• External capabilities to manage change (system and market)</li> <li>• Multiple diverse perspectives on best course of action</li> <li>• Disconnection between actors and deference of responsibility</li> <li>• Low prioritisation</li> <li>• Instability and inconsistency in the waste sector</li> <li>• Organisational image</li> <li>• Organisational culture</li> </ul>	<ul style="list-style-type: none"> <li>• External pressure (community and regulators)</li> <li>• Funding opportunities</li> <li>• Networks / relationships</li> <li>• Openness to change</li> <li>• Champions and front runners</li> <li>• Organisational image</li> <li>• System changes, restructuring / refurbishment</li> <li>• Previous successes</li> <li>• System capabilities</li> </ul>

The second stage of interviews was conducted towards the middle of 2016. The interviews were designed to confirm and corroborate, or otherwise, some of the new themes and topics that arose within the other forms of data collected and analysed (textual, visual). These interviews were applied to a very narrow selective sample of subjects who held relevant positions in the waste sector. Four interviews in total were conducted following a similar format to the first stage of interviews.



### 3.1.2 Textual Data Collection and Data Analysis

As the verbal evidence was geographically confined to Perth, Western Australia, secondary textual data were collected and analysed to widen the research to a global scale. In order to build a case that presented and described the current state of transitioning waste at an international level, key documents produced in the last decade, such as OECD, EPA, UN, Government and industry reports reviewing recent waste policies, as well as the waste policies themselves, were compiled. The selected documents were produced within the timeframe of 2004-2014, as this is when significant waste policy changes emerged. The documents were selected on the grounds of their authoritative standing and level of influence. They include policy instruments, political documents and significant research and industry reports discussing the waste transition.

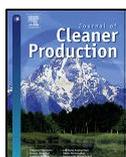
Detailed manual analysis identified two key discourse orientations: ‘waste prevention and reduction’ and ‘materials cycles’. These documents were then grouped and allocated to one of two corpuses<sup>1</sup> to be built for analysis. Each corpus was uploaded into an online corpus analysis tool (ANTConc), and manually evaluated and coded to determine the key findings. The evaluation was focused on determining the dominant goals, key success indicators and measurement tools, as well as the governance structures in place to manage the waste transition in question emerging out of the principal documents.

**Table 2: Overview of the key documents used and a comparative summary of the key findings.**

Keywords	Documents included in the corpus	Key Frames	Key Performance Indicators	Governance Structure
<b>Zero Waste</b>	On the road to zero waste. Successes and lessons from around the world (GAIA, 2012)	Limited land-fill capacity or land-fill closure	Diversions rate from landfill	Centralised  Small number of official players
	San Francisco Zero Waste Policy (SF Environment, 2014)	The 3 R's: waste reduction, reuse and recycle		Initiated at the city, organisational or state level
	No Waste by 2010: Action Plan 2004-2007 (Australian Capital Territory, 2004)	Becoming a waste free society		
	Toward Zero Waste – Waste Management Plan 2006 (Christchurch City Council, 2006)	Becoming a green city exemplar	Reducing the impact of waste on the environment	

<sup>1</sup> A Corpus is the term given to a collection of text on a particular topic, most often presented in electronic form. It is a term most commonly used in linguistics studies and research

	City of Toronto's Waste Diversion Initiatives: Zero Waste to Landfill by 2012 (City of Toronto, 2005)	Recovering resources from waste streams		
<b>Sustainable Materials Management</b>	Sustainable Materials Management: the Road Ahead (EPA, 2009)	Current unsustainable production and consumption	Resource productivity	More decentralised
	Roadmap towards a Resource Efficient Europe (EU commission 2011)	Volatile resource availability and price due to protectionism and increases in demand	Reduction in raw material inputs	Large number of official players
	Sustainable Materials Management; Green Growth Policy Brief (OECD, 2012a)	National resource management and security	Cyclical use rates	Initiated at a regional, state, national or international level
	Sustainable Materials Management; Making better use of resources (OECD, 2012b)	Minimising national reliance on resource imports	Final disposal amounts	
	Fundamental Plan for Establishing a Sound Material-Cycle (Ministry of the Environment Japan, 2008)	Reducing environmental impacts		
	Plan C (Flanders 2012),	Preserving natural capital		



From:

The role of policy labels, keywords and framing in transitioning waste policy – published in Journal of Cleaner Production on the 29th of December 2015

Delving further into the textual data I revealed several programs that represented 'best practice' in the waste transition to sustainability. Three case studies were selected; San Francisco's Zero Waste Program, Flanders's Sustainable Materials Management Initiative and Japan's Sound Material-Cycle Society Plan. These case studies were identified as opportunities to investigate the variety of leading approaches, governance structures, and enhanced waste policy outcomes, emerging globally and the similarities and differences in the keywords, naming and framing of their waste discourse.

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### **Box 3.1.2 Overview of the Three Waste Case Studies**

#### *1) San Francisco (Zero Waste Program): 100% diversion from landfill*

This case was selected because it is one of the more publicised and recognised recent zero waste initiatives and is often used as a zero waste exemplar. Since 2002 this city has had considerable success in driving a zero waste program having achieved their goal of 75% diversion of waste from landfill and incineration in 2010, with current estimates stating an 80% diversion rate. It is also recognised as the national leader in waste management within the US. A brief overview of San Francisco's actions are examined through publicly available government and policy documents produced and published by the San Francisco Environment department as well as building upon the work of Krausz, 2012 and other secondary academic and industry reports.

#### *2) Flanders (Sustainable Material Management): Selective collection and recycling*

A prominent example of the transition from conventional waste management to an integrated materials policy is the Flanders's Sustainable Material Management (SMM) program. The case was selected on the premise that the initiative was one of the first regional attempts at such a policy. This case has been selected since the change trajectory has been the focus of in depth study and multiple publications (Paredis, 2013) which enabled deep insights into how the initiative took shape and the relevant outcomes that ensued. In this case study the emergence of the concept of materials in the waste discourse within Flanders is analysed and some of the activities, outcomes and future directions are outlined.

#### *3) Japan (Sound Material-Cycle Society): Improving resource productivity whilst simultaneously reducing waste output*

Japan's recycling initiatives date back to the late 1970's. However the urbanisation of Japan's major cities in the mid 1980's combined growing economic affluence, high density population and mass-consumption, creating difficulties to resolve and manage waste and recycling within Japan's municipalities. Responding to these changes, Japan experienced a policy shift in waste and recycling management towards a national framework founding a 'Sound Material-Cycle Society'. Three fundamental plans were produced and published by the Ministry of Environment Japan (2001; 2008; 2013). These available documents, as well as other significant academic and industry reports assessing the Japan Sound Material-Cycle Society plan, guide the findings outlined in this article.

### Box 3.1.3 Overview of Two Transitions Case Studies

#### 1) *The 'Sustainability Transition Research Network*

Sustainability transitions research emerged in the last few decades as a governance framework developed by the Dutch Research Institution for Transition (DRIFT) and commissioned by the Dutch government. Originally designed to work alongside policy making in order to enhance the boundaries of outdated short term policy objectives, sustainability transitions research has since become a large global network (STRN) and is considered a major authority in the sustainability field; thousands of articles, seminars and actions have been shaped by the networks transitions frameworks (Markard et al., 2012).

#### 2) *Transition Town*

Transition Towns (TT) originated in Totnes UK in 2005. At the time, co-founders Rob Hopkins and Naresh Giangrande were encouraged to establish a local movement in response to growing community concerns over climate change and peak oil consumption (Hopkins, 2008). The Transition Towns model is very much a community-driven approach, whereby residents are encouraged to drive sustainable change and take ownership of their localities. According to recent estimates, the Transition Towns network now consists of some 6597 individual projects from every corner of the globe (TransitionNetwork.org). TT has created a diverse array of initiatives and actions from local food production and distribution, group build housing developments, household energy sharing and communal mobility programs.

#### *Case Selection Justification*

The 'Sustainability Transition Research Network (STRN) and the Transition Town' (TT) movements emerged from very different origins and for different purposes; however both have witnessed significant growth in membership over the last decade (Markard et al., 2012; Audet, 2014). Both STRN and TT have been vital in propelling sustainability transition knowledge into the limelight, shaping how transitions are interpreted and implemented. These two networks are an interesting demonstration of how locally launched ideas and actions can reach and engage global audiences, creating a transnational network. This is why both of these networks were strategically selected to further understand what a transition is.



See From waste to sustainable materials management: Three case studies of the transition journey – published in Journal of Waste Management on the 11th of December 2016



What is a Transition? Exploring visual and textual definitions among sustainability transition networks Under Review Global Environmental Change



### 3.1.3 Visual Data Collection and Data Analysis

Visual research methods are an evolving form of social enquiry, whereby images are alternative or supplementary to textual or numerical data sets. Previously employed in studies involving child participants, the applicability of visual research methods is now being widened to social sciences, information studies and anthropology (Hartel, 2014). Advocates of visual methods proclaim visually represented data are crucial in a world dominated by media platforms that preference non-textual communication (Gauntlett, 2007; Jewitt, 2009). Visual techniques also ignite different cognitive processes and outcomes, thus are offered as an enhancing asset to traditional research approaches (Brezemer and Kress, 2008). Others promote visual methods as a more sensitive and ethical form of enquiry compared to what some may consider, intrusive processes such as interviews (Guillemin, 2004).

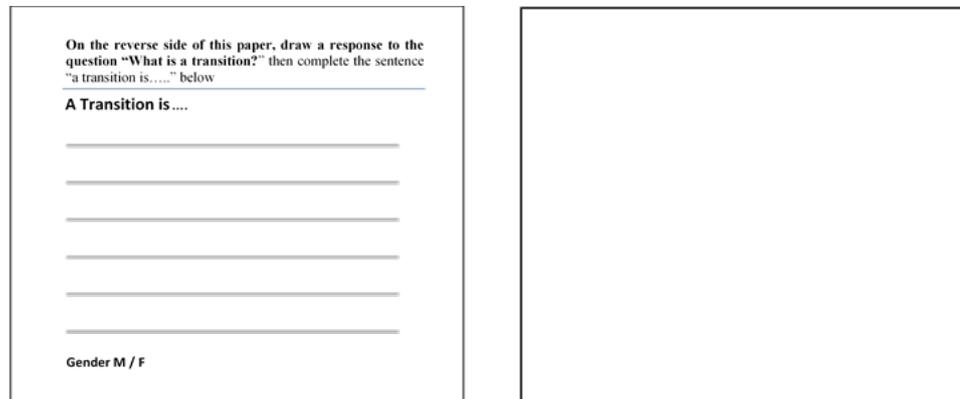
The draw-write technique is an arts-informed methodology generating visual and textual data. The key research instrument used is a t-Square to mean a “transitions square”, adapted from Hartel and Thomsons (2011), iSquare (“information square”). This is a palm sized card that can be adapted to answer a vast range of ontological questions (What is...?). Previous studies have explored visual descriptions of information (Hartel and Thomson, 2011), women’s health (Guillemin, 2004), teacher identity (Weber and Mitchell, 1995) and celebrities (Gauntlett, 2007).

In seeking to answer the question ‘what is a transition?’ We turned to the transition communities themselves. Two sample groups were identified; 1) participants attending the International Sustainability Transition Conference 2016, Wuppertal, Germany and 2) attendants at the Transition Towns conference 2015 in Devon, UK, as well as other Transition Town members in Margaret River Western Australia.

Both sample groups were provided with a t-Square (a palmed size card) each and informed of the draw-write technique. The t-Square read “On the reverse side of this paper, draw a response to the question “What is a transition?” then complete the sentence “a transition is.....” below. At the bottom of the t-Square participants were asked to specify their gender and area of expertise or interest. This demographical information could then be used in order to analyse more deeply our results. They were then provided with a single coloured pen and read an instructional script. Each sample group was also told that the activity had a five minute time restriction. This was to ensure that the drawing exercise was not over conceptualised and was rather ‘off the top of the head’.

In total 77 t-Squares were collected of which 68 were legitimate and forwarded for used. All participants were adults but varied in age and gender. While the International Sustainability Transition conference attendees were largely academics, those attending the Transition Towns

conference were from a more general cross section of society. The data gathering took place during the conference breaks and was therefore a relaxed setting but controlled in the sense of managing the sample.



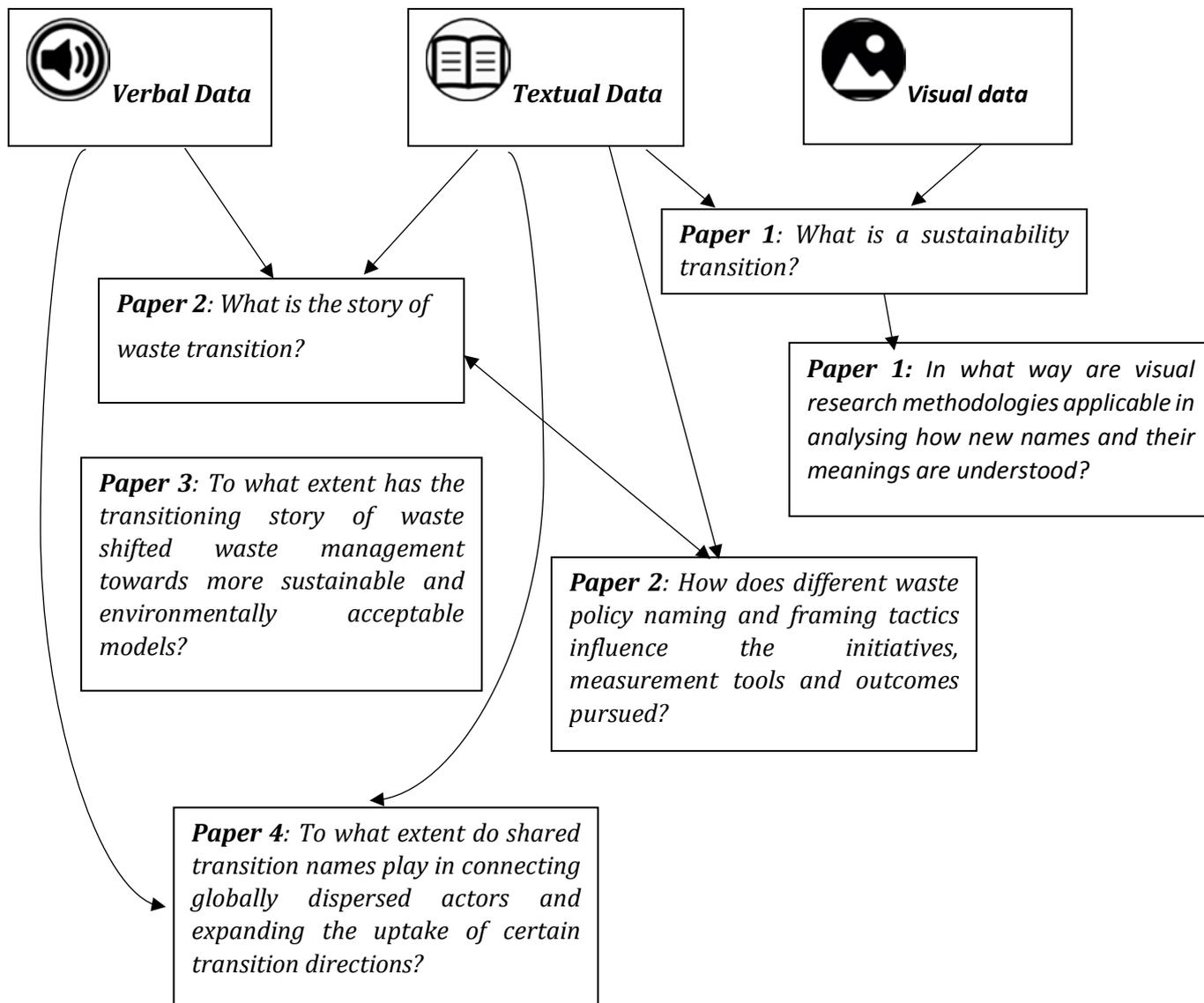
**Figure 1. The 't-Square': Visual data collection tool**

### 3.2 Triangulating Results and Researcher Reflections

By gathering verbal, textual and visual data offered an opportunity to engage in data triangulation as well as explore concepts that are not easily described only with words (Weber and Mitchell, 1995). Engaging in a multi methods research design, I was able to approach my research questions from different angles using data from multiple sources. This ensured that a singular view was not relied upon too heavily and a broader and multiplex picture of the topic achieved.

As mentioned at the start of section 3 social inquiry encourages the researcher to acknowledge their role in the research process and thus reflect on how they may have influenced the results. Since the beginning of the my research journey I maintained a reflexive journal that doubled as a sounding board for my ideas and also documented how I was influencing the research's direction and findings. By keeping a reflective journal, I was able to track the unfolding methodological processes and new information I came across. It demonstrated the adaptive nature of my research journey: the direction of each stage depended on the outcomes of the previous stage. The multi methods approach provided the flexibility I needed in tackling a dynamic and unpredictable research problem which a more predefined methodology would have restricted.

**Diagram 1. Multi Methods Research Design**



## 4. Paper Summaries



**Paper 1:** [What is a Transition? Exploring visual and textual definitions among sustainability transition networks: Under reviewer in Global Environmental Change]

**Background:** This paper explored two questions: 1) “what is a sustainability transition?” 2) In what way are visual research methodologies applicable in analysing how new names and their meanings are understood? Seeking both textual and visual definitions from two communities predominant in the transition to sustainability narrative; Transitions Towns and the Sustainability Transition Research Network. As both communities promote the term ‘transition’ to name their sustainability activities I was curious whether the term carried consensual meaning or if it was a contested concept.

Through social processes of sense making a name can be loaded with meaning, used to categorise and signify specific content or it can be applied more loosely. Understanding and managing how the name transition is being interpreted and applied plays an important role in continuously evolving appropriate frameworks towards sustainability practices and outcomes. In order to delve deeper into representations of transition knowledge I considered multiple modes of communicating transitions which include many visual illustrations to accompany textual information such as photos, models, graphs and charts. For this reason a methodological design that encompassed textual and visual definitions of a transition was undertaken.

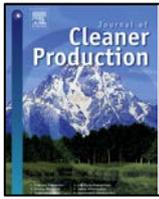
Two main questions underlined this paper:

- 1) *What is a sustainability transition?*
- 2) *In what way are visual research methodologies applicable in analysing how new names and their meanings are understood?*

**Methodological Approach:** The draw-write technique is a form of visual research which involves the collection of visual and textual data produced by a selected group of participants. Two sample groups were identified: 1) Transition Towns members 2) Sustainability Transition Research Network members. Both sample group’s participants were provided with a t-Square (a palmed size card) and informed of the draw-write technique. In total 87 participants took part in the draw-write activities. Each t-Square was marked with a code that clearly identified the origin of the image. The content and form of the t-Squares were then assessed as graphical representations and categorised according to 10 classifications as developed by Engelhardt’s

(2002). The textual content was also evaluated for keywords and similarities or differences across the written definitions.

**Findings and Contributions:** The findings demonstrated that a transition was defined differently amongst participants; divergences were especially apparent between the two sample groups. The Transition Town members defined a transition according to desired outcomes and had a much higher reference to community, people and sustainability. The Sustainability Transition Research Network defined a transition conceptually as a procedural change with little reference to specific outcomes. **Conceptual Contributions:** The findings established that transition knowledge is still in a state of contestation with the two communities approaching transitions knowledge from contrasting ends of the spectrum. However there is opportunity to conceptually merge the diverging definitions to encompass both *processes* and *outcomes* in order to enhance transition knowledge. **Methodological Contributions:** A new name is often accompanied by a collection of supportive visual information. Defining a transition visually allowed me to demonstrate a relationship between what participants drew and the visual information published across Transition Towns and Sustainability Transition Research Network materials. Therefore collecting and presenting both textual and visual evidence was shown to be a viable methodological approach for researchers to explore how new names emerging within the sustainability narrative are defined. **Practical Contribution:** The visual data enable transition managers and scholars working in Transition Towns or Sustainability Transition Research Network to gain insights in to how transition knowledge is being disseminated, understood and applied amongst their community members. This is a powerful tool to ensure that the intended messages are shared and that future visual materials can strategically represent transitions towards sustainability.



**Paper 2:** [The role of policy labels, keywords and framing in transitioning waste policy– published in Journal of Cleaner Production on the 29th of December 2015]

**Background:** Discourse is powerful not only in its capacity to communicate but also in activating concepts and understanding around environmental issues (Hajer, 1995). The discourse surrounding waste is transitioning to encompass a greater sustainability and environmental narrative and a greater stewardship and sense of responsibility. This transition story is revealing itself in a new wave of ambitious policies addressing the increasing pollution and the wastage of resources caused by high consumptive levels of short life-cycle products. However it is not clear what dominant narratives are behind this transition or how these emerging story lines are shaping policy directions and outcomes.

Two main questions underlined this paper:

- 1) *What is the transition story of waste?*
- 2) *How do different waste policy naming and framing tactics influence the initiatives, measurement tools and outcomes pursued?*

This paper explores this changing story and discovers two major story lines: 1) waste prevention and reduction, and 2) materials cycles. Each of these narratives is also establishing new keywords and names which are been used to name waste policies. ‘Zero Waste’ is presented as a major policy label representative of the waste prevention and reduction narrative whereas ‘Sustainable Materials Management’ is examined as the prominent name for material cycles. I wanted to determine whether these two narratives also evolved into different policy directions and practical outcomes or whether the differences were contained to the surface level only.

**Methodological Approach:** I undertook an analysis of key international, regional and corporate documents produced in the last decade, such as OECD, EPA, UN, Government and industry reports reviewing recent waste policies, as well as the waste policies themselves, established two key discourse orientations: ‘waste prevention and reduction’ and ‘materials cycles’. The selected documents are produced within the timeframe of 2004-2014, as this is when significant waste policy changes emerged. These documents were combined, enabling two corpuses to be built for analysis. Each corpus was then uploaded into an online corpus analysis tool (ANTConc), as well as manually evaluated and coded to determine the key findings.

By focusing on two respective waste policy names: 'Zero Waste' and 'Sustainable Materials Management', I comparatively analysed these two concepts based on an understanding of keywords and frames as reflective of ideologies and policy objectives. Each concept (zero waste and sustainable materials management) was analysed by identifying the dominant, goals, key success indicators and measurement tools emerging out of the principal documents promoting each concept, as well as the governance structures in place to manage the waste transition in question.

**Findings and Contributions:** An analyses of the waste discourse supports the notion of an overall discourse adaptation within the waste arena; where the concept of waste and how it is managed are seen to be on an evolutionary track, moving away from the end-of-pipe linear based models of the past towards a future understanding of resource recovery, reusable materials and life cycle thinking. It is in this transition towards a Circular Economy model of closed loop waste management that this paper has considered the role of discourse in both supporting and or detracting from the development of waste policy. **Conceptual Contributions:** The results demonstrate that the difference in policy framing (preventing and reducing or materials cycles) and policy names (zero waste or sustainable materials management) steered the policy initiatives, measurement tools and outcomes in different directions. The results showed how the waste problem is named and framed, created policy solutions that either aimed to prevent or reduce the problem or policy solutions that completely reframed and reconceptualised it. The evidence that policy naming and framing can significantly influence policy directions, outcomes and the actors involved is a key discovery for future research applying discourse analysis to policy making. **Practical Contributions:** This paper suggests that policy practitioners and academics should refrain from using the single term 'waste' within policy development, with an aim to strategically take this important discussion away from 'wasteful' end-of pipe solutions. Alternative terms, such as "materials", "resources" or "tangible output" help widen the applicability and inclusivity of important actors and industry players currently outside the waste paradigm. This encourages a much needed reformation and transition of current waste governance structures and the reconceptualisation of waste policy as the management of underutilised or unutilised materials.



**Paper 3:** [From waste to sustainable materials management: Three case studies of the transition journey – published in Journal of Waste Management on the 11th of December 2016]

**Background:** The world of waste management is moving away from conventional landfill and recycling towards resource and materials cycles. This transition story is shifting the perception of waste towards valuable materials, which is revealing itself across the world in the form of new waste management policy solutions (paper 2). In this paper we investigate specific emerging waste policy interventions on this transition journey and determine how these programs are influencing sustainability outcomes.

One main question underpinned this paper:

- 1) *To what extent has the transitioning story of waste shifted waste management policy towards more sustainable and environmentally acceptable models?*

I was particularly interested to understand the motivations behind evolving waste policy to materials policy and how the story was being told by different agents in the waste and materials sector. I also wanted to understand how the policy changes were being implemented, by whom and at what geographical scale. The opportunities and challenges across different policy programs were also investigated.

**Methodological Approach:** In order to answer the above question, three case studies on the transitioning journey from waste to sustainable materials management were identified; San Francisco's *Zero Waste Program*, Flanders's *Sustainable Materials Management Initiative* and Japan's *Sound Material-Cycle Society Plan*. These three cases were presented as opportunities to investigate the variety of leading approaches, governance structures, and enhanced waste policy outcomes emerging globally. The case studies are first discussed individually and then comparatively. However rather than present the cases in competition to each other, we identify what each case can learn from the other.

**Findings and Contributions:** The examined case studies bring to light policy directions, governance frameworks and regional conditions, propelling waste management towards resource and materials systems thinking encompassed in the sustainability agenda. The findings demonstrate that enhancing material policy has considerable potential in assisting with the

redefinition of the word 'waste' and the movement away from end-pipe land-fill solutions towards greater sustainability outcomes. However these international programs illustrate that even as global leaders in evolving waste management policy and practice, these programs are still in transition toward the integrated waste management models required for sustainable materials management in circular economy thinking. ***Practical Contributions:*** The paper provides practitioners and researchers working in the field of waste and materials management with a vast range of metrics and tools used to analyse progress of diversion, productivity, cyclical use, material inputs, material cycles and sustainable design. This article also highlights the variety of keywords, naming and framing initiatives used to articulate context, purpose, vision, expectations and action in global waste systems as they move towards a waste transition. The findings provide insights into applicable governance structures and geographical scales to manage waste to materials policy transition.



**Paper 4:** [Collaborating for sustainability: the role of transition networks and names in creating powerful global niches - Under Review in Journal of Technological Forecasting and Social

**Background:** In order to capture the experience, lessons and results from transition practitioners and share valuable knowledge with external actors necessitates packaging and disseminating that information strategically. The choice of keywords used to name a transition, such as the words selected for the titles of government and corporate documentation, research papers, or policy instruments published across media channels, online platforms and any other media that built a narrative around the transition in question, is a crucial mechanism by which to identify and steer sustainability transitions (Paper 2 and 3). Transition managers must consider what marketers have known for decades: the value of branding. In this paper we present a novel perspective describing how a transition process can build an identifiable and legitimate transition brand which aligns niche actors globally; we conceptualise this as a *collective codified signifier*.

One main question underlined this paper:

- 1) *What role do shared transition names play in connecting globally dispersed actors and expanding the uptake of certain transition directions?*

The current emphasis on competitive advantage means corporation and brand naming are almost always copyrighted; thus a name, logo and title cannot be readily or legally adopted by others. However within other domains, such as social movements, collaboration is desirable, thus the dissemination and adoption of a social movement's name can be used to build momentum and reach out to various actors, including them under the same name banner. The replication of a successful framework or methodology represented by a name collectively used across multiple projects avoids reinventing the wheel and increases the visibility and legitimacy of those projects: they are no longer viewed in isolation but rather associated with a wider transition network. Building on papers 1, 2 and 3, I wanted to investigate how a name could be used to not only create actionable policy directions and outcomes but also to build networks and collaboration. Continuing with the theme of waste transitions, I delved into the names 'zero waste' and 'anti-incineration' as examples of names being shared by actors interested in transitioning waste towards sustainability. I explored what significance sharing the same name has for transition scholars and practitioners in order to connect globally disperse actors and expand the uptake of certain transition direction.

**Findings and Contributions:** The findings demonstrated that both ‘zero waste’ and ‘anti-incineration’ are being used to name waste transitions. These names have been shared beyond localised or isolated sites, expanding to a global scale. Shared names identify otherwise disconnected movements or innovations signalling to those within the transition and the outside world of possible alignments across globally dispersed actors. The existence of discursive connection acts as a spatial platform where knowledge, resources success stories, technological achievements, processes and experience, can be exchanged and shared. **Conceptual Contributions:** In this paper, we contribute to the ongoing debate surrounding the local-global nature of collaboration towards sustainability, providing support for relational and discursive networks. To describe this concept we developed the new term ‘collective codified signifier’ to mean a signifier that embodies specific and fully codified knowledge being shared under the same signifier (name). An auxiliary discourse framework is developed, which illustrates how shared names contributes to transition theory’s collaborative principles. **Practical Contributions:** Search engines and information communication technologies played as significant role in disseminating important transition outcomes and lessons, which can then be incorporated in real life transition processes. The paper calls for future transition practitioners and theorists to place greater importance on naming their transitions by exploring the applicability of collective codified signifiers in identifying opportunities to venture passed territorially bounded and confined networks which may inhibit a transition’s progress.

## 5. Louder than Words: Discussion

*“Words have power to destroy or heal. When words are both true and kind, they can change our world.” – The Buddha*

*“Throughout human history, our greatest leaders and thinkers have used the power of words to transform our emotions, to enlist us in their causes, and to shape the course of destiny. Words cannot only create emotions, they create actions. And from our actions flow the results of our lives.” – Tony Robbins*

*In* the first section of this exegesis the economic development story was presented as the dominant story of our contemporary Western Society. However the consequences of this story's shortcomings in reality have created an opportunity for a new story that offers a vision for a sustainable future. The transition to sustainability is a promising narrative which is gaining traction as an antidote to growing ecological and social injustices. In order to contribute to the sustainability story I sought to establish how as practitioners and researchers we can communicate this story more effectively. The role keywords, naming and framing play in propelling intended messages forward and contributing to actionable change was identified as a significant yet an undeveloped area.

Waste was recognised as a major ecological and social challenge which is transitioning towards greater sustainability outcomes. By narrowing my study to investigate the transitioning story of waste and how this is revealing itself in practice became the focus of my works. I was particularly interested in exploring the keywords, names and naming tactics used by relevant actors in the waste arena and how discursive choices transpired into actions and networks. Six research questions underpinned my four papers:

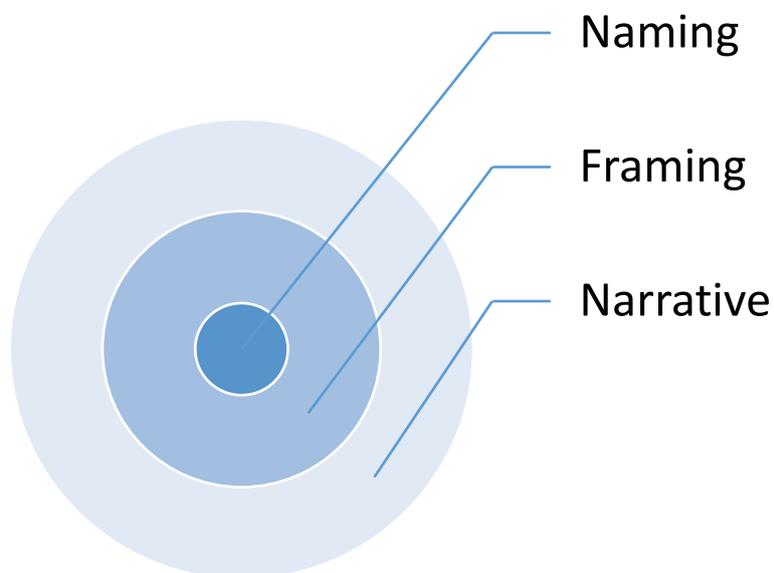
1. *What is a sustainability transition?*
2. *What is the story of waste transition?*
3. *How does different waste policy naming and framing tactics influence the initiatives, measurement tools and outcomes pursued?*
4. *To what extent has the transitioning story of waste shifted waste management towards more sustainable and environmentally acceptable models?*
5. *To what extent do shared transition names play in connecting globally dispersed actors and expanding the uptake of certain transition directions?*
6. *In what way are visual research methodologies applicable in analysing how new names and their meanings are understood?*

The above questions guided my research and I sought to answer them in an interpretative rather than positivistic fashion. Each question has been addressed and discussed extensively in the corresponding publications.

In this section I will instead highlight the significant overall findings emerging from my papers, presenting how keywords, naming and framing are significant instruments in transitioning our societies towards sustainability. In order to fulfil my overall intention to contribute new knowledge, leading to more effective transition storytelling, this section evolves beyond the set out research questions and also explores unexpected findings.

## 5.1 The Power of Keywords, Naming and Framing to Shape Action

The findings from my research demonstrated that keywords, names and frames are particularly pertinent in driving sustainability transitions. In order for a sustainable solution to be proposed an unsustainable problem must be apparent, which is identified and explained through discourse. As new concepts, ideas and technologies enter the social arena and form the sustainability narrative, selected keywords are highlighted to name them. Not only are these keywords crucial as a vehicle for articulation but they also have power to navigate actionable direction (**Paper 2 and 3**). The named content is then incorporated within a relevant frame, which identifies and connects applicable subject areas being addressed. The naming and framing choices are then embedded in and shape the wider sustainability narrative (see Figure 2).



**Figure 2. Naming, framing and narrative as embedded stages of sustainability discourse**

Strategically framing a sustainability issue is a well-documented approach within political communication, as political strategists acknowledge that certain frames resonate with particular audiences (**Paper 2**). Although framing is crucial in effectively communicating sustainability transitions, the power of naming is where my findings offer greatest contribution. Naming sustainability transitions purposefully has been an overlooked yet crucial variable in an age of media sound bites, hashtags, search engines and rapid communication technologies. It is within this context that I see the value in presenting naming as a distinct discursive unit worth analysing within sustainability communication.

### 5.1.1 Naming the Problem is the Start of the Solution

The choice of keywords used to name a sustainability transition, such as the words selected for the titles of government and corporate documentation, research papers, or policy instruments published across media channels, online platforms and any other media that build a narrative around the transition in question, is a crucial mechanism by which to identify and steer sustainable change (**Paper 2 and 3**). The findings showed a tendency existed whereby sustainability solutions are named and framed using the language of the identified problem. For example the 'low-carbon', 'degrowth' and 'zero waste' narratives all repeat the identified problem in the named solution. In these cases ideas tend to be directed at resolving and reducing the problem rather than enhancing the solutions. The consequence of this is it limited the capacity for innovative and creative solutions to be put forth. Two significant reasons are provided; firstly it cognitively positions the change makers to think of solutions within the frameworks of the problem. Secondly the solution space is more likely to attract the inputs of those actors working with the problem, limiting the inclusion of a diverse range of actors and expertise.

Interestingly, I found that names utilising the same keywords in naming both the problem and solution showed much higher rates of uptake than those solutions named using alternative keywords. The evidence suggests that knowledge and learnings attached to sustainability transitions, is both published and sought after over Information and Communications Technology (ICT) platforms. The impact of ICT in emphasising certain terms over other is also a significant and valuable finding across all papers (**Papers 1-4**). **Paper 4** proposed that actors using a query log in search engines are more likely to use the keywords of the problem in seeking information about possible solutions. For example zero waste and anti-incineration incorporate the keywords waste and incineration, the identified problem. Hypothetically an actor working in waste policy required to search for advances in waste management, would likely opt to search for this information under the keyword 'waste' rather than 'materials'. Therefore the information displayed may be skewed, highlighting certain names while missing others.

Section 5.1.2 below explores these findings further by analysing the comparative results and outcomes aligned to the keywords *waste* and *materials* used in naming and framing relevant to waste transitions.

### 5.1.2 Waste or Materials Policy?

In **Papers 2 and 3** the transitioning story of waste was explored. The background informing both papers suggested that the production of waste and the mechanisms to manage it are currently unsustainable. Waste for the most part has been perceived as a valueless product and managed as a societal expense; hence its management often falls under the auspices of government bodies. Therefore solutions have been put forward predominantly through the frameworks of policy

making. The discursive strategies chosen by government actors and policy makers retain a certain amount of authoritative standing in shaping the issue and the solutions at hand. Therefore both papers concentrated on the transitioning story of waste delivered from governmental and policy platforms.

**Paper 2** gave prominence to internationally recognised progressive waste policies, assessing how these policies were named. This was worth exploring in the transitioning waste sector as the title of policy programs and legislation are highly visible and should be representative of policy content. The analysis uncovered some interesting results; the keywords used to name the policy instruments somewhat determined how the policy was translated into action. Government bodies that identified the problem as waste and named and framed the solution within the confinements of waste, pushed forward actions and outcomes restricted to the capabilities of current waste management practices.

'Zero Waste' for example, is presented as an ambitious policy approach; however the use of the term waste seemed to gain the most traction with the traditional waste management actors, who dominated in their adoption and promotion of the name. Policy implementation has therefore been driven in a direction confined to these actors' experience. However the policy instruments that identified the issue of waste as a misdirected and mismanaged materials flow challenge instead named their policies using the keyword material/s. By re-naming the problem away from waste the policies not only reconceptualised the possible solutions, enabling alternative approaches, they also opened up the policy space to actors outside of the traditional waste management siloes, establishing new governance structures.

**Paper 3** extended these results beyond policy names, contextualising naming and framing strategies within specific geographical settings; San Francisco's *Zero Waste Program*, Flanders's *Sustainable Materials Management Initiative* and Japan's *Sound Material-Cycle Society Plan*. These case studies symbolise emerging enhanced waste management policies in practice, each case thus provided contextual background where cultural, economic and environmental drivers could be explored. The three cases demonstrated the different scales in which waste/materials could be managed (locally, regionally or nationally) as well as three unique discourse orientations. **Paper 3** identified that cultural, economic and environment variables were key in motivating a shift in the waste policy narrative and the ensuing directions and outcome. For example, Japan as a highly populous island with a cultural stance towards innovation saw technology playing a large role in how materials could be managed. Flanders, Belgium on the other hand, framed their materials program as a solution to overcome a high dependency on materials imports, which was seen as a volatile market from a European regional perspective.

Again the results showed that reorientating the waste story towards a materials challenge pertained to significant differences in policy directions and the actors included in the policy's governance structure (see Table 3). This shift from waste to material outcomes was represented by naming and framing the policy in a manner that removes the keyword waste and replaces it with materials.

**Table 3. Naming, framing and governing waste transitions**

Name	Frame	Governance approach
<i>Zero Waste</i>	<ul style="list-style-type: none"> <li>○ Diversion from landfill,</li> <li>○ prevention and reduction of waste to landfill,</li> <li>○ increasing recycling rates,</li> <li>○ increasing cost of landfill</li> <li>○ green city,</li> <li>○ community and behaviour change</li> </ul>	Actors confined to conventional waste actors (waste/recycling services, local council, waste board, waste service users)
<i>Sustainable Materials Management/ Sound Material-Cycle Society Plan</i>	<ul style="list-style-type: none"> <li>○ Current unsustainable production and consumption,</li> <li>○ Volatile resource availability and price due to protectionism and increases in demand,</li> <li>○ National/ regional resource management and security,</li> <li>○ Minimising national reliance on resource imports,</li> <li>○ Reducing environmental impacts</li> </ul>	Complex array of actors involved, Multiple industry representatives (chemistry, manufacturing, producers, academic and research institutions)

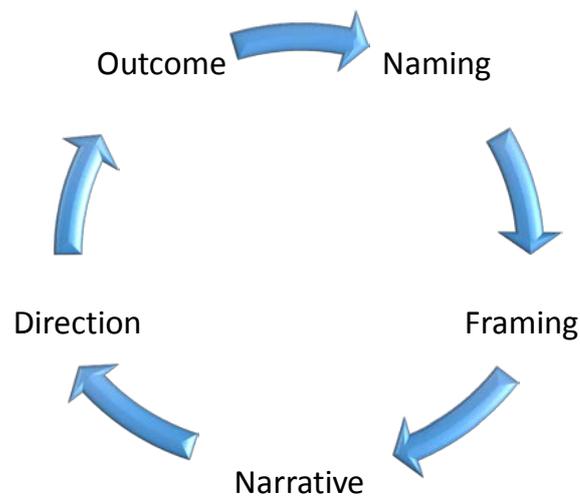
I must note that despite materials policy progressing waste management to greater sustainability outcomes, Zero Waste interestingly was found to be a much more popular name. **Papers 2 and 3**

demonstrated that Zero Waste had been disseminated at a much higher rate across waste policy platforms internationally, than names incorporating materials. Again this emphasises the higher visibility of problem based naming strategies discussed in section 5.1.1. However actor agency and power in propelling certain names in to the limelight was also a significant finding. This will be further explored in section 5.2.

The evidence from **Papers 2 and 3** demonstrates how the transitioning story of waste is becoming more tightly interwoven in the sustainability agenda. This waste to materials transition is not only happening on a discursive level but is already being recognised for substantial environmental and social beneficial outcomes. **Papers 2 and 3** conclude that policy makers in the waste sector seeking to shift policy beyond waste management can utilise naming and framing tactics building a case that waste is a valuable material which requires a renewed sustainability management approach.

It is important to acknowledge that these results are susceptible to a bit of a ‘chicken and the egg’ scenario whereby it is unclear whether the intended policy direction and outcome is determined first and reflected by the naming choice or if the naming choice then influences the policy direction and outcome. I should note that in the case of Zero Waste the research did confirm the intentions were not to restrict the program to the confinements of traditional waste management capabilities. The origin of the Zero Waste name came about to represent an opposition to wastefulness. This wider application didn’t take hold in the policy space and instead Zero Waste became a popular name for advanced waste management programs. That is not to say that intended policy directions do not greatly influence naming and framing choices, rather that discourse is a socially constructed force that cannot be tightly controlled (**Papers 1 and 4**). Once something is named and released into the public sphere it is susceptible to adaptability, disputed connotation and cyclical processes of meaning making (see Figure 3.)

**Figure 3. Discursive cyclical processes of meaning making**



The overall findings of my research indicated that naming, framing and narrative are not only embedded within each other, as illustrated in Figure 2, but are also in a state of relatedness, whereby discursive choices made at each phase not only shape and influence each other but also impact on the choice of directions and outcomes. Figure 3 illustrates this cycle, where naming and framing shape wider sustainability narratives and therefore directions and outcomes. However the direction and outcomes also dictates what name is chosen and how it is interpreted and framed. Hence the process of meaning making is in a continuous cycle of interpretation and application. It is this cyclical process of meaning making which directly positions naming and framing as powerful indicators of actionable and measurable outcomes of sustainable change.

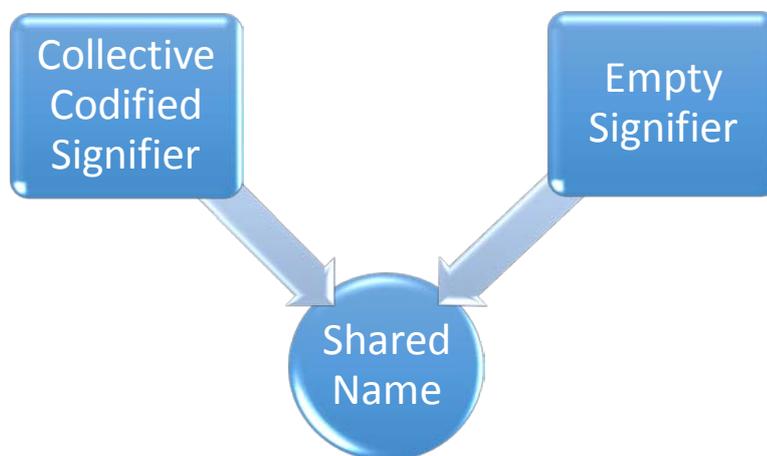
This new knowledge may offer an important conceptual contribution to interpretive approaches. However more empirical work testing this framework is needed to substantiate and expand on my research findings.

### 5.2 Transferring Sustainability Knowledge: Naming as a signifier

Unlike the competitive and protectionist tendencies surrounding corporate knowledge, the collaborative nature underpinning sustainability enables knowledge to be transparent and open to external actors. Effectively transferring sustainability knowledge is crucial, ensuring experience, lessons, best practice and results are shared and supported. In order to share valuable knowledge with external actors, change agents must package and disseminate that knowledge strategically. Naming transitions tactfully and purposefully is a simple yet powerful method to transfer sustainability knowledge. When a name used to describe a sustainability transition is shared across multiple projects, the repetition of this name establishes an identifiable transition “brand”, often signifying a set of ideas and frameworks. The power of naming to signify knowledge is central to my results.

**Paper 4** showed some shared transition names signify specific and collectively defined actions and outcomes while other names acted as empty signifiers, used only as loose representations (see Figure 4). If a shared name is not only used for discursive purposes, but rather as representative of specific content then this is what I called a '*collective codified signifier*'; that is, a signifier representing specific and fully codified knowledge, such as a set of practices and/or outcomes, disseminated and shared by different actors who collectively define it.

For example **Paper 4** shows that naming a program using the keywords 'sustainable development' is perceived as an empty signifier (REF) whereby its exact meaning can be hard to pin down even though many people think they know what the name signifies. The outcomes, frameworks and objectives of a 'sustainable development' program may vary significantly or even not amount to any practical outcomes. On the other hand the name Zero Waste is an example of a '*collective codified signifier*' as it signifies a diversion from landfill framework, Waste transition programs from all over the world are sharing their diversion from landfill success stories under the Zero Waste banner, increasing not only Zero Waste's visibility and legitimacy, but also diversion from landfill as a waste transition pathway. Sharing the Zero Waste name is therefore enacting a '*collective codified signifier*' because what is signified is clearly understood by most of the major parties interpreting its meaning.



**Figure 4. A shared transition name as a collective codified signifier or an empty signifier**

The power of a '*collective codified signifier*' is evident because when a shared name becomes collectively codified and is mainstreamed so too does the concepts it signifies, increasing the likelihood of the solutions to be undertaken and eventually institutionalised (**Papers 1 and 4**).

**Paper 1** explored what the name Transition signified to those academics and practitioners who use the term to name their communities; 'Transitions Towns' and 'Sustainability Transition Research Network'. These two communities were selected to participate in this study, which aimed to define a transition both textually and visually. **Paper 1** found the name Transition was

being used by the Transition Towns community to signify specific desired *outcomes*, which focused on connecting community and nature. Although the textual and visual definitions slightly differed among the Transition Town members, significant thematic similarity was found to establish a collective interpretation. The Sustainability Transition Research Network instead viewed the name Transition as signifying a *process* of systematic change without deciphering the outcomes this change would lead to. Again the thematic patterns in the findings demonstrated a shared definition amongst these members. However the distinction across both communities ascertained that consensus had not yet been reached by the major communities using the Transition name and therefore it was not yet a '*collectively codified signifier*'.

#### 5.2.1 Agency and Power in Signifying Sustainability Knowledge

The battle to dictate the meaning of what a name signifies is one that played out in both **Papers 1 and 4's** results. The process of cyclical meaning making was found to be significantly influenced by the agency and power of the actors who incite and promote the name. Zero Waste was able to be dominated by the actors in the waste sector, particularly government agents, who collectively defined Zero Waste to mean Solid Municipal Waste's (SMW) diversion from landfill, despite the scholars pursuing a wider "wastefulness" agenda (**Paper 4**). Interestingly the name Zero Waste originated from the chemicals research sector, which promoted the business exchange of chemical wastes, unrelated to SMW. The successful promotion of the San Francisco Zero Waste program as an exemplar of best practice propelled the diversion from landfill framework in to the limelight. The authoritative positioning and ability to implement Zero Waste in to action substantiated these government actors' dominance in determining Zero Waste's interpretation and continuing application.

The name Anti-incineration was developed by grassroots actors, signifying knowledge frameworks used to disrupt the installation of incineration infrastructure. These grassroots actors faced conflict with pro-incineration actors (mostly from industry), who launched a discursive counter-strike avoiding the term incinerator altogether and opting instead for alternative names such as; gasification, pyrolysis, waste to energy, energy recovery and even renewable energy (**Paper 4**). Although this counterstrike was somewhat effective, power and agency over the incineration narrative was maintained by the anti-incineration agents by forming a global anti-incineration network. This demonstrated that actors lacking the granted agency and power individually were able to establish it through building a network (see section 5.2.2 below). This supports the notion that change makers at the community level can play an important role in enacting powerful signifiers which shape sustainability knowledge.

**Paper 1** demonstrated how the Sustainability Transition Research Network attempted to subsume Transitions Towns into their own frameworks, which may be accurate conceptually but

this could also represent a power-play in the politics of knowledge. Agency and power is again a prominent indicator here, with the Sustainability Transition Research Network comprising of mostly researchers, policy makers and industry front runners. On the other hand Transition Towns is driven mostly by a network of community agents who may appear to lack “official expertise” in transition knowledge, yet are able to establish legitimacy and visibility through network status.

The notion that a name can be collectively defined to signify specific sustainability knowledge must also account for the susceptibility for these names to face counter and alternative meanings, especially when some of the knowledge being signified is perceived as a threat to the security of powerful regimes. These are interesting findings, presenting an opportunity for future critical discourse analysis to observe the role power and agency play in defining sustainability names.

In order to create names that are collectively codified rather than empty, is a complex process of shared meaning making. However this is an important step in strengthening emerging names and the content they signify to legitimise sustainability transitions as real life applicable solutions and not just rhetorical raft. Social exposure to transition solutions and outcomes progresses conceptual ideas into reality, leading to practical change. **Papers 1 and 4** demonstrates to future transition scholars and practitioners, that building an identifiable and legitimate transition name increases the likelihood that the transition, its success stories and outcomes will be up scaled and implemented beyond a once off localised case. In order to achieve this, requires a certain amount of power and agency, which can be established through building a signified network.

#### 5.2.2 Building Legitimacy, Visibility and Transferability: Naming as a Network

Transitioning towards sustainability often requires large investments with only long term returns that are not always monetary. Profiteering is therefore not at the centre of major sustainability shifts. This allows for a collaborative network model where knowledge sharing and transparency is not only occurring but encouraged (**Paper 4**). **Papers 1 and 4** explored the notions of naming as a network and the strategic implications of this in the transition towards sustainability. Change agents often perform on public stages and compete discursively for influence, when a particular name is shared by a number of agents this creates an opportunity to gain attention. This is particularly necessary for those smaller less visible change agents.

In section 5.2, I explained how a shared transition name can be loaded with specific codified knowledge which can then be transferred and applied. This involves packaging and disseminating transition knowledge strategically, which is where naming tactics are crucial. Although the benefits of strategic transition naming and adoption of shared signifiers may seem obvious, many transition studies have failed to successfully promote their transition frameworks beyond a

narrow audience. This has led some transitions to be observed in isolation lacking visibility and credibility. One of the questions underpinning **Paper 4** sought to explore the extent shared transition names played in connecting globally dispersed actors and expanding the uptake of certain transition directions. Shared names identify otherwise disconnected innovation pockets signalling to those within the transition and the outside world of possible alignments across the globe.

As a transition name expands and is adopted by others a discursive connection is created which then acts as a network platform where knowledge, resources success stories, technological achievements, processes and experience, are exchanged and shared (**Papers 1 and 4**). For example **Paper 4** demonstrates the keywords 'anti-incineration' have been used to name a movement, acting as a connective discursive force, which clearly identifies those against incineration who may be geographically separated but connected in a common pursuit. The Anti-Incineration network not only promotes the cause but it also significantly supports its network members by sharing knowledge and resources. **Paper 1** analysed the Transition Towns movement which connects hundreds of geographically dispersed grassroots community projects, under the Transitions Towns network. By naming your town's sustainability initiative as a Transition Town signifies network status and grants automatic visibility and legitimacy.

The visual data collected in **Paper 1** was particularly valuable in demonstrating how two communities using the same keyword (*transition*) to name their network, determined that the name signified different content. The evidence showed Transition Towns and Sustainability Transition Research Network members defined transition both visually and textually in a similar way amongst their peers but differently to those members belonging to the other community. This again highlights the concept of shared names as potentially collectively codified but in a process of conflicting meaning making. This contributes to other studies, linking discursive network status to communities of practice; that is a community who narrates, interprets and practices collectively.

**Papers 1 and 4** showed that garnering support and legitimacy by aligning to allies both at home and abroad can occur through a shared name strategy. Ideas can become game changers if they are enabled to flourish and take form therefore a highly visible naming strategy is a crucial component in the transition process as it enables particular sustainability transitions to explode on an international stage. Sharing names is not only valuable to market transitions effectively but it also enables discursive networks to be established generating greater power and agency amongst transition actors.

The discussion highlights below pinpoint significant findings valuable insights relevant to sustainable transition actors and communications practitioners.

### 5.3 Discussion Highlights

- ✓ Sustainability transitions are often driven by problem solving objectives. Thus narratives evolving alongside these transitions often name and frame proposed solutions using the keywords of the problem. This may attract actors who have vested interest in the problem. In some cases giving “new life” to the regime’s un-sustainable activities, by enabling them to re-position and align themselves to trending sustainability keywords.
- ✓ The impact of keyword web-based searches provides increased visibility to solutions named and framed by the familiarised language of the identified problem, as this familiar language is most likely used to search for information. This was demonstrated by the high uptake of Zero Waste internationally, rather than Sustainable Materials Management orientated solutions.
- ✓ Re-naming the problem away from waste, opting for alternative keywords such as materials, enabled re-conceptualised innovative approaches and solutions to emerge. Not only does this increase capacity to attract actors outside of the traditional waste management siloes, it also increased the likelihood of greater sustainability measurable outcomes.
- ✓ The process of discursive cyclical meaning making demonstrates how naming and framing shape wider sustainability narratives and therefore directions and outcomes. However the direction and outcomes also dictates how a name is interpreted and framed. Hence the process of meaning making is in a continuous cycle of interpretation and application.
- ✓ The broader implications point towards a need to develop sustainability communication strategies which encourage innovative and diverse actor inclusion. While acknowledging the role familiar keywords and the dominance of search engines play in disseminating sustainability knowledge.
- ✓ Naming can also be enacted as a signifier, representing specific codified knowledge which can be disseminated and applied on an international scale. When a name is shared and interpreted similarly across multiple projects it can become collectively codified signifier.
- ✓ Collective codified signifiers are powerful in increasing the visibility and legitimacy of a sustainability transition’s frameworks and practices.
- ✓ Actor agency and power plays an influential role in the signification of new keywords and names. Those change agents lacking agency and power in isolation are able to ascertain their influence by establishing discursive networks, which share names and frames, shaping sustainability knowledge.

- ✓ The necessity for sustainability transition narratives to gain visibility, legitimacy and transferability is considerably aided through the strategic development and application of keywords, names and frames.

## 6. Conclusions and Perspectives for Future Research

The aim of my research was to contribute to the transition to sustainability narrative by investigating the role *keywords*, *naming* and *framing* play in transitioning a major sustainability challenge; waste. The findings showed that *keywords*, *naming* and *framing* played a significant role not only in transitioning waste outcomes but in narrating sustainability generally. Keywords and naming, which concepts have been neglected within the current literature, were a particular unique inclusion across my papers. I have now promoted keywords and naming as a valuable variable to supplement conventional frames and framing theory and analyses. This claim is illustrated by the current dominance of Information and Communication Technologies, which preferences smaller discursive units in disseminating knowledge.

Some future recommendations for researchers and practitioners include;

- My focus was on waste transitions; therefore, in order to upscale the findings and frameworks I developed, herein, keywords and names relevant to other sustainability transitions should be explored.
- Transitions that name solutions using keywords that reconceptualise the problem were found to be excellent drivers for change; however they lack exposure using search engines. Future research and transition activities should look at the influence search engines, keywords and naming is having on knowledge dissemination, especially around unfamiliar terms. In this way we can address how sustainability solutions can be strategically named without being confined to problem management.
- Search engine metrics such as Google trends create a massive repository of knowledge dissemination data. Methodologies that incorporate search engine data are emerging as a novel yet unexplored approach. Future studies linking large data sets of keyword searches to social practices and outcomes may be particularly valuable.
- Methodologically using a visual research approach to analyse definitions of names was shown to be highly valuable; future research that seeks to understand how sustainability concepts are defined and understood are encourage, assessing visual data.
- The newly founded concept of a 'collectively codified signifier', should be further explored in relation to literature on storylines and boundary concept objects, in order to clarify difference and similarities

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## Appendix: Published and Submitted Papers

# What is a Transition? Exploring visual and textual definitions among sustainability transition networks

## **ABSTRACT**

‘What is a transition?’ This question is both pertinent and central in understanding the motivation amongst scientists, policy makers, practitioners, business actors and community groups in transitioning society towards sustainability. The Sustainability Transition Research Network and Transition Towns have emerged as two highly visible global networks, shaping and legitimising how transitions are interpreted and implemented. Yet, previous studies have not comparatively explored how transition knowledge is understood and defined both visually and textually by members belonging to these two global networks. Employing an innovative visual data collection methodology (the draw and write technique), we compare and contrast both the textual and visual representations of a transition across the two networks. The results suggest that there are some differences in worldviews between the two networks; however potential synergies between the two networks could promote a more comprehensive understanding of transitions, which better accounts for all aspects of social and technological change towards sustainability.

## **KEYWORDS**

Transition; transnational networks; visual research; sustainability communication; draw-write

## **1. INTRODUCTION**

‘Transition’ is a popular keyword in describing the need to shift from the current state of affairs to a re-imagined, renewed society in harmony with itself and its natural surroundings (Markard et al., 2012): a sustainable society. From ‘transition to renewable energy’ to ‘transition towns’, the term transition is employed by diverse actors and organisations working towards a sustainable future and has been used across political, business, scientific and public forums (Audet, 2012). ‘What is a transition?’ This question is both pertinent and

central in understanding the actions of scientists, policy makers, practitioners, business actors and community groups in transitioning society towards sustainability. Exploring how transition is defined in this paper, we turn directly to the actors within two transition networks to gain important insights into the embedded meaning the term transition represents for those who use and apply it.

Knowledge in many ways has become the new resource driving progress and successful innovative practices (van Oort, and Lambooy, 2014). It is crucial to understand the organisation, dissemination and application of knowledge in order to enhance and nurture emerging innovations across social and technical platforms (Bartel, and Garud, 2009). When new knowledge emerges, it often goes through a complex process of meaning making, in which agents argue, contest and compete for the dominance of their interpretations (Boschma, 2005). Sustainability transitions, as sites to re-imagine and shape the future represent a form of emerging knowledge that play an important role in activating and promoting frameworks for enhancing our journey towards better practices and outcomes. For these reasons, our understanding and management of knowledge for sustainability transitions must continuously co-evolve alongside increasingly complex global value-chains, transnational networks, and digital communications channels.

Sustainability transition networks, as platforms to collaborate, build collective agendas, and share information, inform and shape the wider meaning applied to the transition concept. In this way transition networks can be conceptualised as innovative clusters interacting across translocal or transnational borders (Spath and Rohracher, 2012). Nicolosi and Feola (2016) describe how social movements are often diffused across countries through a transnational network hub, which facilitates connections, shares codified knowledge and provides political support. Geels and Deuten (2006) introduce the importance of intermediaries as mobile agents who are able to aggregate localised lessons and experiences in order to promote more generalised (non-context specific) frameworks. Developing a global network, transition intermediaries can drive the adoption and deployment of specific action frameworks across diverse local contexts. Knowledge shared by transnational networks is often open to interpretive flexibility, whereby many diverse meanings and practices are played out according to local contexts. By establishing a more coherent body of shared codified knowledge, transnational networks create collectively agreed upon meaning, rules and

actions (Hargreaves, et al., 2013; Silva et al., 2016). The replication of successful frameworks and practices across multiple projects avoids reinventing the wheel and increases the visibility and legitimacy of those projects: they are no longer viewed in isolation but rather as closely aligned to a wider network (Featherstone et al., 2007). This will hold true as long as the projects adhere to a basic set of principles and continue to be successful. In a network of agents, close alignment of common cognitive frameworks is a significant enabler for innovation diffusion (Longhurst, 2015), policy transfer (Dolowitz and Marsh, 2000) and technological evolution (Garud and Rappa, 1994).

Along with many other commentators, Stocker and Burke, (2017) note that the dominant, privileged knowledge system has been linear, reductionist and mechanistic and therefore not suitable for complex systems. They go on to make a case that a broader definition of knowledge in line with modern understandings of complexity, pluralistic value systems and epistemes should incorporate managerial, lay and Indigenous knowledge alongside conventional scientific knowledge (Stocker and Burke, 2017). Further they argue that increased deliberative engagement across the boundaries of the currently siloed sectors of governance, knowledge, management and community can result in improved legitimacy for all of these sectors (Stocker and Burke, 2017).

Also important are the means of knowledge exchange, through which diverse actors across multiple countries are exposed to and share particular frameworks and practices. Although face to face interactions are found to be crucial for learning and knowledge exchange, other means such as print media, official websites, online communications and published resources can inform a network's collective values and actions across multiple countries (Feola and Nunes, 2014). The images and signs used by transition scholars and practitioners are also shaped by the rules and norms of the social context in which they are created. Although textual communication has been the most common way of sharing knowledge in a formal setting and amongst actors involved in science, policy, corporation, and academia: multimodal communication involving images, audio and three dimensional objects has been a rapidly growing area of communication studies for several decades (Halliday and Matthiessen, 2004). Research methodologies should therefore now account for multi-modal communication and expand beyond purely written and spoken forms of data collection to provide alternative ways of approaching a research question (Hartel, 2014).

Multimodal communication studies take into account the profound influence online technologies are having on knowledge transfer, increasingly positioning images, videos and audio above purely textual forms of communication (Jewitt, 2009). In particularity visual materials are able to capture the essence of an issue or ideological perspective in graphical form and often can carry excess meaning, taking precedence over textual forms of communication (Gamson and Stuart, 1992; Hertog and McLeod 2001). Representations of transition knowledge draw on multiple modes of communicating meaning; the materials used to discuss sustainability transition have included many visual illustrations to accompany textual information such as photos, models, graphs and charts. Stocker et al. (2016) and Stocker et al. (2012) have explored participatory mapping explicitly as a highly visual alternative to text as a means for co-producing sustainability knowledge.

The Sustainability Transition Research Network (STRN) and the Transition Town (TT) movements emerged from very different origins and for different purposes; however both have witnessed significant growth in membership over the last decade (Markard et al., 2012; Audet, 2014). Both STRN and TT have been vital in propelling sustainability transition knowledge into the limelight, shaping how transitions are interpreted and implemented. These two networks are an interesting demonstration of how locally launched ideas and actions can reach and engage global audiences, creating a transnational network. Although the works of Seyfang and Smith (2007), Seyfang et al. (2010) and Seyfang and Haxeltine (2012) have addressed the relationship between STRN and TT, limited attention has been given to directly engaging members from both networks to determine the meaning of 'transition' collectively and/or comparatively across multiple countries (Audet, 2014). We propose that there are key differences which may be reflected in meaning-making between the two networks. First, STRN is more academic, scientific and theoretical in its practice while TT is community-led, grounded and more activist in its practice. These differences imply that there may be divergent worldviews, reflecting divergent ontologies and epistemologies in play (DeWitt, 2011). Second, there may be different foci of interest for the two networks.

In this paper we investigate and discover how transition is being interpreted and applied by asking 'what is a transition?' directly to the STRN and TT network members themselves. Using an innovative visual data collection methodology (the draw and write technique), we examine and comparatively analyse textual and visual representations of a transition,

produced by members of STRN and TT. An understanding of how the transition concept is interpreted and visually represented by STRN and TT further contributes to developing transition knowledge. The paper first outlines STRN and TT, drawing on the popular frameworks and materials published through their transnational information hubs (online sources). The draw and write technique and research design is then described. Finally we present the significant findings, highlighting valuable insights and future recommendations relevant to sustainability transition.

## **2. DEFINING TRANSITIONS**

The broad definition of the term transition is 'a change from one form or type to another or the process by which this happens' (Cambridge Dictionary, 2016). This is most often applied within the sciences to describe the 'phase transition' of substances going from solid to liquid gas (Loorbach, 2010). The concept was then developed as a method to analyse biological and ecological systems' evolution, and applied to patterns of interaction and complex adaptive change (Gell-Man 1995; Holland 1995). This transition concept has been typically applied to describe non-linear shifts between qualitatively different states also known as punctuated equilibria and has also been applied in psychology, technology studies, economics and sociology (Rotmans et al., 2001; Kemp et al., 2007; Loorbach, 2010).

Environmental and social stressors indicate our economic and political models must to adapt towards more sustainable processes, practices and outcomes, a challenge that is both multifaceted and multi-dimensional (Paredis, 2013). For this reason, transition towards sustainability has been described as a 'radical', 'deep' or 'transformational' change to complex societal systems (Loorbach, 2010). It is this systems perspective that has underpinned much transition discourse, especially in large organisations such as the United Nations Environmental Programme, Organisation for Economic Co-operation and Development, and the International Energy Agency (Audet, 2012). In this discourse, the issues are framed as systemic: they are not just a question of specific products or production processes, but rather require an approach on a systems level, often explicitly embracing complex systems thinking (Audet, 2014).

Although the term transition has been widely used, a collectively accepted meaning has not yet been determined, and indeed may not have to be: the conversation about meaning is most important. Exploring transition discourse, Audet (2012; 2014) described two main discursive frames shaping transitions theory and practice. The first frame stems from a technocratic branch of state-driven interventionism and industry incentivisation. The second alludes to radical and transformational shifts driven by community-based or civil change agents. The institutional versus community approaches to transition represent an interesting difference in worldviews, important in understanding how transitions are being played out.

Beyond purely conceptual contributions, many change agents are achieving sustainability through what has been called 'transitions in action' (Smith and Stirling, 2010). This area of transitions is primarily focused on accomplishing actionable sustainable changes across multiple sectors including energy, mobility, food production and water management. These case examples are helping to inform theory and provide insights in how transitions can be governed in the 'real world'.

### **2.1 Sustainability Transition Research Network (STRN)**

Sustainability transitions research emerged in the last few decades as a governance framework developed by the Dutch Research Institution for Transition (DRIFT) and commissioned by the Dutch government. Originally designed to work alongside policy making in order to enhance the boundaries of outdated short term policy objectives, sustainability transitions research has since become a large global network (STRN) and is considered a major authority in the sustainability field; thousands of articles, seminars and actions have been shaped by the networks transitions frameworks (Markard et al., 2012). The network has established its own academic publishing platform; the journal of *Environmental Innovation and Societal Transitions* (EIST) as well as a popular annual conference; *International Sustainability Transitions* (IST) which has run for close to a decade.

People within the field are concerned with 'socio-technical' systems change, where multiple factors such as society and technology mutually shape each other, instead of one determining the other. STRN studies consist of several theoretical and empirical strains, including: historical investigations of past transitions establishing multilevel perspective (MLP) (Geels, 2002; Geels and Kemp, 2007); explorations of concepts such as, Technological Innovative Systems (Jacobsson and Johnson, 2000; Hekkert et al., 2007), and Strategic Niche

Management (Smith et al., 2005; Smith and Stirling, 2010); and, the development of empirical evidence on governance frameworks and processes that drive societies towards sustainability (Transition Management) (Rotmans et al., 2001; Loorbach 2010; Kemp et al., 2007).

According to key authors Rotmans and Loorbach (2009), the transition concept tries to unravel the complex interaction patterns between individuals, organisations, networks, and regimes within a societal context. Markard et al., 2012 states:

*A transition involves far-reaching changes along different dimensions: technological, material, organizational, institutional, political, economic, and socio-cultural. Transitions involve a broad range of actors and typically unfold over considerable time-spans (pp 956).*

The founders of STRN emphasized the importance of interdisciplinary knowledge development (Rotmans et al., 2001). Hence transition theorists originate from diverse fields of research and industry sectors, such as government, technology, energy, administration, history, political science, innovation studies, computer modelling and environmental sciences (Markard et al., 2012). STRN's membership remains comprised mostly of academics with many years' experience in conceptual frameworks, largely within the social and technical sciences. However, as the field was developed for direct practical application, it typically incorporates empirical knowledge emerging from industry consultation, interaction and experimentation. STRN's work includes: evaluating the Dutch energy system transition policy (Kemp et. al, 2007); developing pathways for a low carbon electricity system in the UK (Foxon et al., 2010); reducing energy consumption in the Dutch glasshouse horticulture sector (Elzen, et al., 2011); establishing niche to regime interactions to deal with algae blooms in Brittany France (Diaz et al., 2013); and, developing solar energy in China (Liu and Shiroyama 2013).

The governance of transitions has been described as a deliberative process coordinating and bringing actors together in order to compete for influence in governance activities and promote sustainability (Rotmans and Loorbach 2009). Transition Management (TM) highlights the importance of innovative governance structures that bring together front runners and change makers across traditional siloed boundaries (Spath and Rohracher,

2012). STRN's focus on 'front runners' has raised concerns that the field has become an area for elite innovative business, academics and policy leaders, and lacks engagement with 'ordinary' people beyond 'figurants of supply and demand' (Paredis, 2013, pp 44). Shove and Walker (2007) discuss the risk of a narrative that places transition managers as frontrunners shifting 'socio-technical systems' on behalf of society, which raised some important insights on the political power structures within STRN itself.

Within the TM literature, there are differences in the way seminal authors such as Geels (2002), Rotmans et al. (2001), Smith et al. (2005) and others frame transitions, with a vast array of visual graphs and frameworks evident into the literature. However some graphical representations of sustainability transitions have emerged as more prevalent, determined by the high frequency of replication and citations across the network. Interestingly, graphical representations emerging from STRN generally depict procedural visuals, where authors attempt to visually encapsulate the 'process' of a sustainability transitions rather than the outcomes. This process towards sustainability transitions is framed and graphically depicted differently, as demonstrated in Table 1.

Table 1. Example of Sustainability Transition Research Network's Visual Frameworks

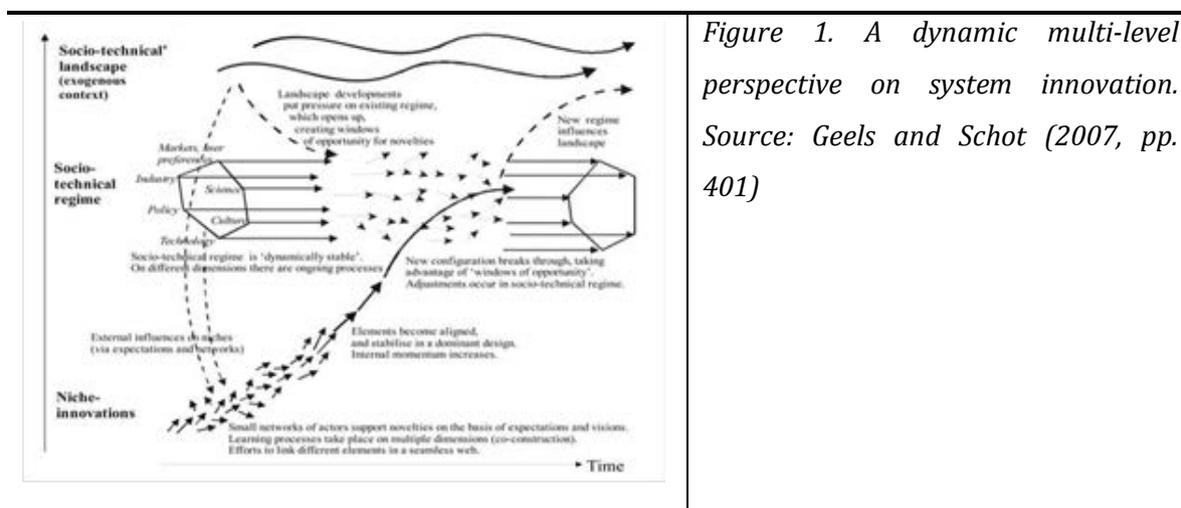


Figure 1. A dynamic multi-level perspective on system innovation. Source: Geels and Schot (2007, pp. 401)

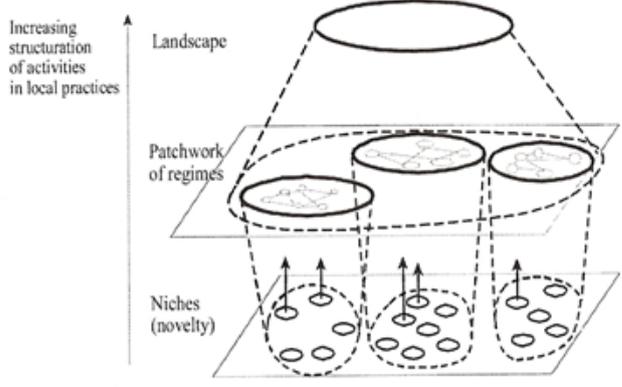


Figure 2. Multiple levels as a nested hierarchy.

Source: Geels, (2002, pp. 1261)

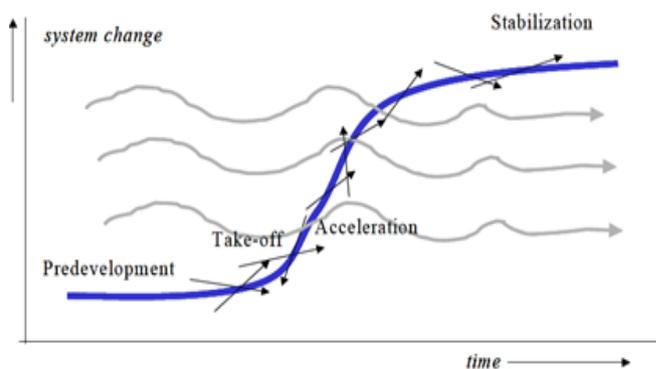


Figure 3. Transition phases

Source: Rotmans et al., (2001, pp. 17)

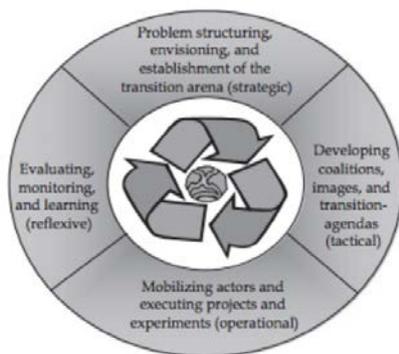
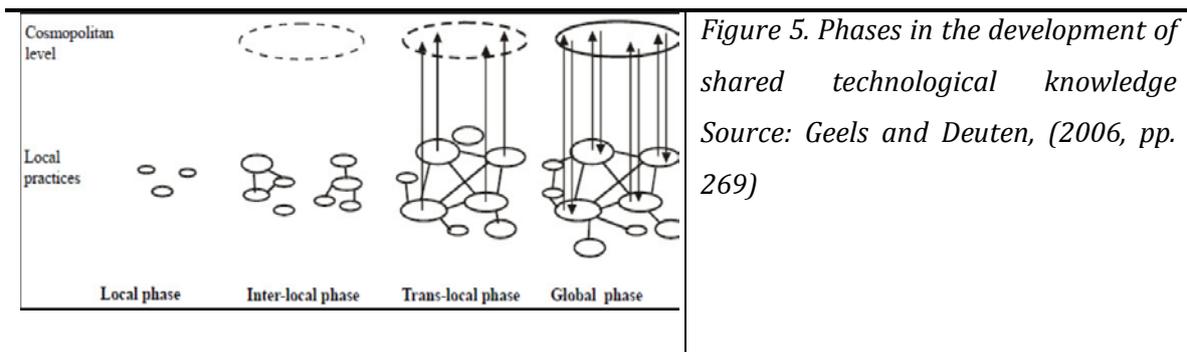


Figure 4. The Transition Management Cycle Source: Loorbach (2010, pp. 173)



The Multi-Level Perspective (MLP) (Geels, 2002) is perhaps the most commonly referred to graphical interpretation by presenting a tri-level concept; niche-regime-landscape (Figure 1). Niche-regime-landscape coincided with the terms micro-meso-macro alongside illustrations that could be interpreted as hierarchical depictions. Justification for this hierarchical structure was determined by the understanding that each level of the MLP framework was embedded in the levels above; so, for example, the niche level exists within both the regime and landscape, whereas the regime is embedded only within the landscape (Geels, 2011). Interestingly, very few of the graphical representations have escaped entirely from the Cartesian graph, two-dimensional matrix or hierarchical concepts that are central to conventional scientific discourse. Figure 4 is an exception, but even so it draws on the notion of a cycle which does not reflect the complexity of the systemic processes under discussion.

## 2.2 Transition Towns

Transition Towns (TT) originated in Totnes UK in 2005. At the time, co-founders Rob Hopkins and Naresh Giangrande were encouraged to establish a local movement in response to growing community concerns over climate change and peak oil consumption (Hopkins, 2008). The Transition Towns model is very much a community-driven approach, whereby residents are encouraged to drive sustainable change and take ownership of their localities.

Resilience and re-localisation is at the forefront of Transition Town's founding principles, as stated by Hopkins (2008):

*Rebuilding local agriculture and food production, localising energy production, rethinking healthcare, rediscovering local building materials in the context of zero energy building, rethinking how we manage waste,*

*all build resilience and offer the potential for an extraordinary renaissance – economic, cultural and spiritual (pp 15).*

Initially the narrative of resilience and re-localisation was underpinned by concerns about climate change and peak oil. However, the TT movement has evolved their framing to more closely align to the current political climate (Hopkins, 2011). The financial crisis led to a revised narrative that resonated better with community uncertainties and insecurities of their nearby future. “Asking individuals to consider a post-peak oil society is complex; asking them to engage with the notion of ‘living on half your current income’ is perhaps more immediate, thought provoking and likely to bring about engagement in the movement” (Smith, 2011, pp 101).

In 2007, Transition Network Ltd was officially launched with the aim being:

*To inspire, encourage, connect, support and train communities as they adopt and adapt the transition model on their journey to urgently rebuild resilience and drastically reduce CO2 emissions (Transition Network, 2013).*

Their website (TransitionNetwork.org) provides a platform in which local groups across the world can seek accreditation as ‘official’ Transition Towns. This site enables the general public and other Transition Towns to geographically locate the movement’s presences across the globe. The notion of a translocal network is one which connects local initiatives to a global hub, producing, circulating and implementing common action models. The network also acts as an international hub, disseminating information, offering support and building the movement’s visibility (Nicolosi and Feola, 2016). Although no specific frameworks are dictated, a set of guidelines was developed featuring the 12 Steps, and included in the Transition Handbook (Hopkins, 2008). These steps were not an imposed system but rather a set of ingredients to support and guide members along their transition journey. These ‘Ingredients of Transition’, as outlined in Hopkins (2011) ‘The Transition Companion’ include (1) starting out, (2) deepening, (3) connecting, (4) building, and (5) daring to dream (Hopkins, 2011). Recently ‘The Essential Guide to Doing Transition’ was created promoting seven essential ingredients:

<ul style="list-style-type: none"> <li>• <i>Healthy Groups</i></li> <li>• <i>Vision</i></li> <li>• <i>Community Involvement</i></li> <li>• <i>Networks and Partnerships</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>Practical Projects</i></li> <li>• <i>Part of a Movement</i></li> <li>• <i>Reflect and Celebrate</i></li> </ul>
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Hopkins and Thomas (2016)

These guiding principles are offered and inform a common thread of small-scale, place-based, multi-issued sustainability transitions (Forrest and Wiek, 2014). They have been found to be fundamental materials for Transition Towns members internationally (Nicolosi and Feola 2016). In essence the TT movement establishes the key ingredients to empower localities around the world to take action towards sustainability from within their own communities. In this way TT has been defined as ‘transitions in action’ or ‘doing transition’ (Smith, 2011).

According to recent estimates, the Transition Towns network now consists of some 6597 individual projects from every corner of the globe (TransitionNetwork.org). TT has created a diverse array of initiatives and actions from local food production and distribution, group build housing developments, household energy sharing and communal mobility programs.

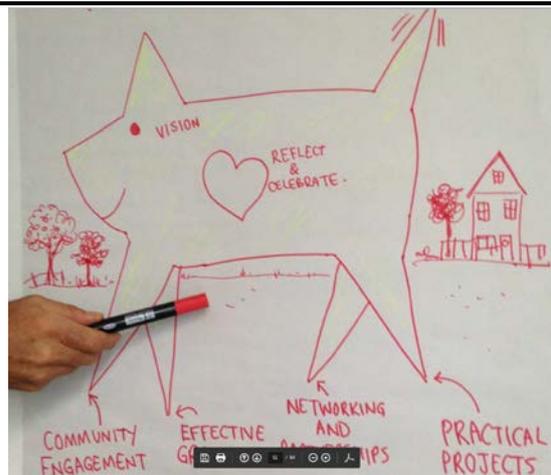
Exploring the role these community initiatives play to wider sustainable shifts, Seyfang and Haxeltine (2012) sought to understand ‘who’ made up the movement’s membership. An online survey was distributed to Transition Norwich members, the findings of which suggest that 58% of TT members surveyed were female, largely between the ages of 45-64. The results also showed that TT members were highly educated, with 83% holding a degree or postgraduate qualification and 50% of participants likely not to be in full time employment. Seyfang and Haxeltine (2012) describe the group as exerting “typical characteristics of ‘postmaterialists’ who eschew high-status jobs and consumption in favour of personal fulfilment and activism” (pp 388).

The visual representations provided online (TransitionNetwork.org) include coloured photographs, videos and cartoonist impressions. The latest publication ‘The Essential Guide to Doing Transition’, which is described as ‘essential reading for all people involved in Transition as it offers an overview of the Transition Model’ (Hopkins and Thomas, 2016). Table 2 provides an overview of some of the visuals and images in this document.

Table 2. Example of Transition Towns visual representations found in ‘The Essential Guide to Doing Transition’ (Hopkins and Thomas, 2016)



*Image 1. Front cover of 'The Essential Guide to Doing Transition',*



*Image 2. The Transition Healthcheck, Photo Rob Hopkins Pp 61*



*Image 3. Healthy Groups: Crystal Palace Transition Town members who formed Crystal Palace Food Market  
Photo: Jonathan Goldberg Pp 12*



*Image 4. 'Gallery' of crowd-sourced visions of the future: Transition Network conference 2010, Photo: Mike Grenville. Pp 19*



*Image 5. Transition Laguna Beach's vision of a low-carbon future Pp 18*



*Image 6. Transition Network Resources, Photo: Mike Grenville Pp 37*

Source: Hopkins and Thomas, 2016

Though commended for its efforts to support voluntary community members around the world to make changes, TT has been criticised for its lack of a coherent evaluative framework that can measure success, its primarily post-developed Anglo-Saxon membership and its difficulty in influencing wider socio-technical systems (Audet, 2014; Forrest and Wiek, 2014).

### **2.3 Comparing Sustainable Transitions Research Network and Transition Towns**

STRN and TT have emerged and developed autonomously so their sharing of the term 'transition' has led to some confusion and overlaps. Interestingly STRN's main webpage can be found at [www.transitionsnetwork.org](http://www.transitionsnetwork.org), TT's web address is almost exactly the same at [www.transitionnetwork.org](http://www.transitionnetwork.org). As a prominent channel to transfer transition knowledge sharing such similar URLs may interfere with the clarity and distinction of transition research and action. It is unclear whether any consultation occurred between STRN and TT's administrators in setting up their networks or whether sharing similar web addresses was intentional.

The shared name has also prompted some to conceptually integrate the two networks. This is especially true amongst those applying Geels' (2002) MLP framework or Jacobsson and Johnson's (2000) Strategic Niche Management. For example Forrest and Wiek (2014) view grassroots movements such as TT as conjoined to the multilevel perspective, niche-regime-

landscape. From this perspective TT are acting as niche experiments diffusing key learnings to other communities in the form of a social movement that will eventually change mainstream institutions (Geels and Deuten, 2006). de Vries et al. (2016), drawing on Ornetzeder and Rohracher (2013), provide an overview of the literature showing how niches are similar to community-based initiatives and should be enrolled in wider transition processes. These attempts to subsume TT under STRN frameworks may be accurate conceptually from a STRN point of view but this could also represent a power-play in the politics of knowledge whereby a community based approach is colonized by privileged academic or official knowledge.

Hargreaves et al. (2013) point out that unlike niches in STRN studies which aim to unsettle the regime, it is not always appropriate or possible for community-based initiatives to upscale and influence wider transition trajectories. Analysing Strategic Niche Management and Niche Policy Advocacy, Smith et al., (2016) discuss a third perspective: critical niches. This perspective proposes:

*The developments that really matter are those that challenge regimes and point to alternative, emancipatory possibilities regardless of elite policy agendas (pp 413).*

Smith et al. (2016) and Seyfang and Haxeltine (2012) found that community-based initiatives often lack the infrastructure and capabilities to become critical niches, therefore may play a limited role in socio-technical transition.

Seyfang and Haxeltine (2012) explore the relationship between academic sustainability transition literature and community led innovative movements, suggesting that STRN is mostly focused on technologically market based niches, neglecting social civil agents in social-technical systems change. It is suggested that TT practitioners may view the STRN's perspective as a form of ecological modernisation, in which too much emphasis is given to market instruments and technological innovation. TT instead opts to re-conceptualise and take ownership of lifestyles and community structures, regardless of larger external actors. Thus attempting to apply STRN's socio-technical perspective could be seen as conflicting with core principles of TT movement.

The debate of whether community led innovations such as TT are relevant to socio-technical transformations is ongoing and it is beyond the scope of this paper to fully explore this debate. However it is acknowledged that there are distinctions between STRN and TT perspectives on sustainability transition. Simply put, STRN proposes a systematic transition model with strong ties to technological innovations and multi-stakeholder solutions, whereas TT represents social innovations with a focus on community-led solutions (Audet, 2014; Seyfang and Haxeltine, 2012).

The aim of this paper is not to promote either STRN or TT as a preferred process for sustainability transitions, but rather to explore how STRN's and TT's knowledge is communicated and interpreted by participants of these networks. In honoring the complexity of sustainability transition knowledge the research design incorporates a methodology that collects visual and textual data. This presents an opportunity to explore the transition concept beyond descriptions using only words (Weber and Mitchell, 1995). Through the research findings we explore whether the knowledge frameworks promoted through STRN's and TT's respective transnational hubs are also used and shared by their wider network's membership. The results could enhance both STRN and TT in promoting future knowledge frameworks aligned to comprehensive communication strategies.

### **3. METHODOLOGY AND RESEARCH DESIGN**

Visual research methods are an evolving form of social enquiry, whereby images inform research questions as alternative or supplementary to textual or numerical data sets. Advocates of visual methods claim visual data are crucial in a world dominated by media platforms that preference non-textual communication (Gauntlett, 2007; Jewitt, 2009). Visual methods can also ignite different cognitive processes, thereby enhancing conventional research approaches (Bezemer and Kress, 2008). Another advantage of visual methods is that they can be used with individuals and communities who are not very literate, so are more democratic in terms of the politics of knowledge (Stocker et al., 2012). Others promote visual methods as a more sensitive and ethical form of enquiry compared to arguably more intrusive methods such as interviews (Guillemin, 2004).

However some critics question the validity of images as data due to the variability in the circumstances in which an image is produced as well as the interpretivist nature of visual

data analysis (Backett-Milburn and McKie, 1999). The distinction between an image and a diagram has also been highlighted by Kazmierczak (2001) who argues that an image results from 'art making' while a diagram is a form of 'information design'; therefore the two should be viewed as different visual formats. Umoquit et al. (2011) identified 80 studies using what they refer to as 'diagramming approaches' between 1986 and 2010, demonstrating that diagrams were particularly useful in studies where the researcher was required 'to capture cognitive structure, changes over time and/or differences between groups' (pp 5). Hartel (2014) also highlights that for adults, drawing often takes the form of diagramming or graphic ideation rather than art making more commonly expressed through a child's mode of communication. These statements have been accounted for in our research design.

Kress and van Leeuwen's (2001) highly cited book *Reading Images: The grammar of visual design* outlines the significance of semiotic communication, focusing on understanding the concepts and meanings a signifier (such as a word or image) may collectively represent. Schroeder (2006) also discusses the importance of critical semiotics, where signifiers exist in a mode of duality, creating meaning but also being shaped by the rules and norms in which meaning is created. Weber and Mitchell (1995) explore teacher identity, demonstrating the relationship between socially-constructed knowledge of teachers in mass media and participants' personal visual depictions of teachers.

Our own ontological understandings are oriented towards reflexivity, integration and relationality, whereby 'all things, including all practices, have a shared being and a mutual constitution. They start out and forever remain in relationship. Their very qualities, properties, and identities cannot stem completely from what is inherent or 'inside' them but must depend on how they are related to each other. The outside is as important as the inside" (Slife, 2004). This understanding is compatible with Schroeder (2006) and also with DeWitt's (2011) Integrative Worldview. In our research, we consider the possibility that the term transition creates meaning for both STR and TT networks but that this meaning is also shaped by the worldviews of the different networks and indeed by the specific context in which our case groups operate. We explore whether this meaning is made clear in the visual and textual data.

Exploring 'transition', we design our research according to the notion that diagrams produced by adults are a valuable data set to interpret, represent and compare results across selective sample groups and comprise an effective addition to scientific enquiry in general (Weber, 2008). Our research design also promotes the benefits of data triangulation, whereby we first display the visual frameworks of the two transition arenas (STRN and TT) and then look at the original personal diagrams and written conceptions of transition by individual members.

### **3.1 The Draw and Write Technique**

The draw and write technique is a form of visual research which involves the collection of visual and textual data produced by a selected group of participants. Collection of visual and textual data offers an opportunity to improve data validity and to explore concepts that are not easily described with words alone (Weber and Mitchell, 1995). Previously employed in studies involving child participants, the draw and write research method is now applied to social sciences, information studies and anthropology (Hartel, 2014). Beyond studies engaging children the draw and write technique including studies exploring women's health (Guillemin, 2004), and celebrities (Gauntlett, 2007). The technique has subsequently gained traction in studies using adult participants, predominantly in the health, education and social sciences (see Bennett, 2016; Guillemin, 2004; Hartel & Thomson, 2011).

Variations exist in terms of the instruments used for draw and write data collection across a diverse array of subject matter. Hartel and Thomson (2011) and Hartel (2014), who used the technique in a study investigating interpretations of information, establish what they refer to as an 'iSquare', i.e., an 'information square'. This palm sized card gathers visual and textual data by providing participants with a side to draw and a side to write. It can be adapted to address a vast range of ontological questions: those related to how participants apprehend the nature of reality.. The clear instructions and ease of use made the iSquare an effective data collection instrument for this study. Following the precedent created by the iSquare study, we coined the term 'transition squares' or 't-Squares', as we focused on transitions.

### **3.2 Data Collection**

Two sample groups were identified and purposively selected: 1) participants attending the International Sustainability Transition Conference 2016, Wuppertal, Germany and 2) attendants at the Transition Towns conference 2015 in Devon, UK, and other Transition

Town members in Western Australia. The International Sustainability Conference (IST) is the 'official' conference of STRN, (although other transition conference relevant to STRN take place). The conference was attended by hundreds of STRN members from all corners of the world, making it an appropriate sample of STRN members. In total, 37 t-Squares were collected from IST's 2016 sample group.

The Transition Towns conference held in Devon, UK in 2015 is likewise an 'official' TT event, and was the site of the preliminary data collection, with 20 t-Squares submitted. Unlike STRN's largely academic membership, TT consists mainly of civil agents who are not funded to participate in international conferences. For this reason the participants at the TT conference in Devon UK, although racially diverse, were predominately residents of the UK. In order to enable a more representative sample of TT's global network, follow up data collection activities took place at TT members' conferences in Western Australia in late 2016 and early 2017, with a further 26 t-Squares submitted. The t-Squares from both TT conferences in the UK and Australia demonstrated no marked differences and were thus amalgamated as a representative sample of the TT community. In total 87 participants took part in the draw and write activities; of these 83 t-Squares were legitimate for data analysis. The remaining four t-Squares were excluded as they were blank or spoiled.

The data collection took place during conference breaks in a relaxed but controlled setting. At the outset of data collection, each participant was provided with a description of the study, explaining it was a voluntary exercise, the researcher's identity, where the data would be stored and how it would be shared. To ensure anonymity, no identifying information or personal details were gathered. After participants agreed to take part in the draw and write activity they were provided with a single coloured pen and read an instructional script. Each sample group was also told that the activity had a five minute time restriction. This was to ensure that the drawing exercise was not over conceptualised but, rather, was 'off the top of the head'.

Members of sample groups who agreed to take part were all provided with a t-Square (a palm size 10cm by 10cm card) and informed of the draw and write technique. The t-Square read **'On the reverse side of this paper, draw a response to the question 'What is a transition?' then complete the sentence 'a transition is.....' below.** At the bottom of the t-Square, participants were asked to specify their gender, area of expertise or interest and

membership status. This demographic information could then be used in order to more deeply analyse our results. All participants were adults but varied in age, gender, cultural background, education level and income. While the International Sustainability Transition conference attendees were largely academics, those attending the Transition Towns conference were from a more general cross section of society.

On the reverse side of this paper, draw a response to the question "What is a transition?" then complete the sentence "a transition is....." below

**A Transition is....**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Gender M / F

Figure 6. Examples of the 't-Squares': Visual and textual data collection tool

### 3.3 Data Analysis

The primary focus of the analysis was to understand the visual and textual interpretations of the question 'what is a transition'? And further, to explore whether there was consensus or distinction within and/or between the STRN and TT groups. As mentioned in the introduction and the ensuing description of STRN and TT (section 2.1, 2.2, 2.3) these two groups and their membership form two different sample networks despite the commonality in using the name 'transition' as key signifier describing their work. Therefore research interest was located on any distinctions between the two networks.

Our analytical choices built upon the draw and write analysis taken in Hartel (2014): we referred to Rose's (2007) highly cited work on visual methodologies using compositional interpretation of visual data. This underpinned our analytical lens as interpretative. Engelhardt's (2002) authoritative work on the language of graphics also established 10 primary types of graphical representations, which was also applied in the classification of our t-Squares.

Our visual data analysis was based on three key variables:

1) The site in which the data collection took place: this was either a STRN or TT event, so each t-Square was marked with a code that clearly identified the origin of the image.

2) The form of each t-Square: the form was treated as a graphical representation, which is '*a visible artifact on a more or less flat surface that was created in order to express information*' (Engelhardt 2002, pp 2). Each t-Square was classified according to Engelhardt (2002), which presents 10 principal forms of graphical representations: *picture, link diagram, grouping diagram, written text, symbol, composite symbol, map, statistical chart, time chart, and table*.

3) The thematic coding of the content: an inductive coding approach was devised allowing for a compositional interpretation of themes and patterns across the data to emerge (Rose, 2007; Hartel, 2014). A title was chosen that best represented what the theme expressed. The themes include; *Transition Outcomes, Process of Transition, People and Community, Nature Depictions and Landscapes, Forward Direction*. The combination of form and content analysis provided a deeper assessment of what the visual data was showing us.

Textual data was analysed from two main sources. 1) The demographic information entered at the bottom of the t-Squares: these data did not appear to provide any patterns or correlations to the visual data. 2) The textual data written on the back of the t-Square: these data were explored for repeated terms and descriptions, which were manually coded and uploaded in an electronic format for further analysis. The textual data did reveal patterns which will be elaborated in section 4.2.

## 4 FINDINGS

### 4.1 Forms and Content of Graphical Representation of t-Squares

Based on the classification system by Engelhardt (2002), the t-Squares revealed a variety of forms of graphical representations, summarised in Table 1. However not all of the forms of graphical representation were found. Out of the 83 t-Squares collected, link diagrams (39) and pictures (22) formed the majority, while symbols (13), grouping diagrams (3) and written text (6) made up the remainder of the forms of graphical representations. Notably, link diagrams were a preferred form of representation amongst both the STRN and TT samples; however the thematic content was highly variable. For example the TT t-Squares classified as link diagrams (19) mainly featured the theme of Transition Outcomes (12)

(Figure 7) whereas the STRN link diagrams (20) largely showed the Process of Transition (15) (Figure 8).

Table 3. Summary of the major t-Square forms and content classification found in the data

<i>t-Square Classification</i>		<i>TT</i>	<i>STRN</i>	<i>Totals</i>
<i>Graphical Form</i>	<i>Link Diagram</i>	<b>19</b>	<b>20</b>	<b>39</b>
<i>Content Thematic Code</i>	<i>Transition Outcomes</i>	12	5	17
	<i>Process of Transition</i>	7	15	16
<i>Graphical Form</i>	<i>Picture Diagram</i>	<b>16</b>	<b>6</b>	<b>22</b>
<i>Content Thematic Code</i>	<i>People and Community</i>	11	3	14
	<i>Nature and Landscape Depictions</i>	5	3	8
<i>Graphical Form</i>	<i>Symbol</i>	<b>5</b>	<b>8</b>	<b>13</b>
<i>Content Thematic Code</i>	<i>Forward Direction</i>	5	8	13
<i>Graphical Form</i>	<i>Grouping Diagram</i>	<b>3</b>	<b>0</b>	<b>3</b>
<i>Graphical Form</i>	<i>Written text (word art)</i>	<b>3</b>	<b>3</b>	<b>6</b>
	<i>Totals</i>	<b>46</b>	<b>37</b>	<b>83</b>

The visual data across the other forms also showed the themes differed between the TT and STRN samples. Within the picture classification, the TT sample drew pictures depicting people and community (11) (Figure 9) whereas the STRN sample produced few pictures (6) and instead drew symbols, indicating a forward direction (8) representing a more conceptual understandings of transition (Figure 10).

In order to illustrate these findings, the following sections include selected drawings from both the TT and STRN samples representing each graphical category.

### *Link Diagrams*

Link diagrams were a common form used to illustrate a transition. A link diagram is classified as such when the presence of one or more nodes are joined by a connector which is usually a

line or an arrow (Engelhardt, 2002; Hartel, 2014). Figure 7. Showcases the TT sample's link diagrams under the theme: *Transition Outcomes*.

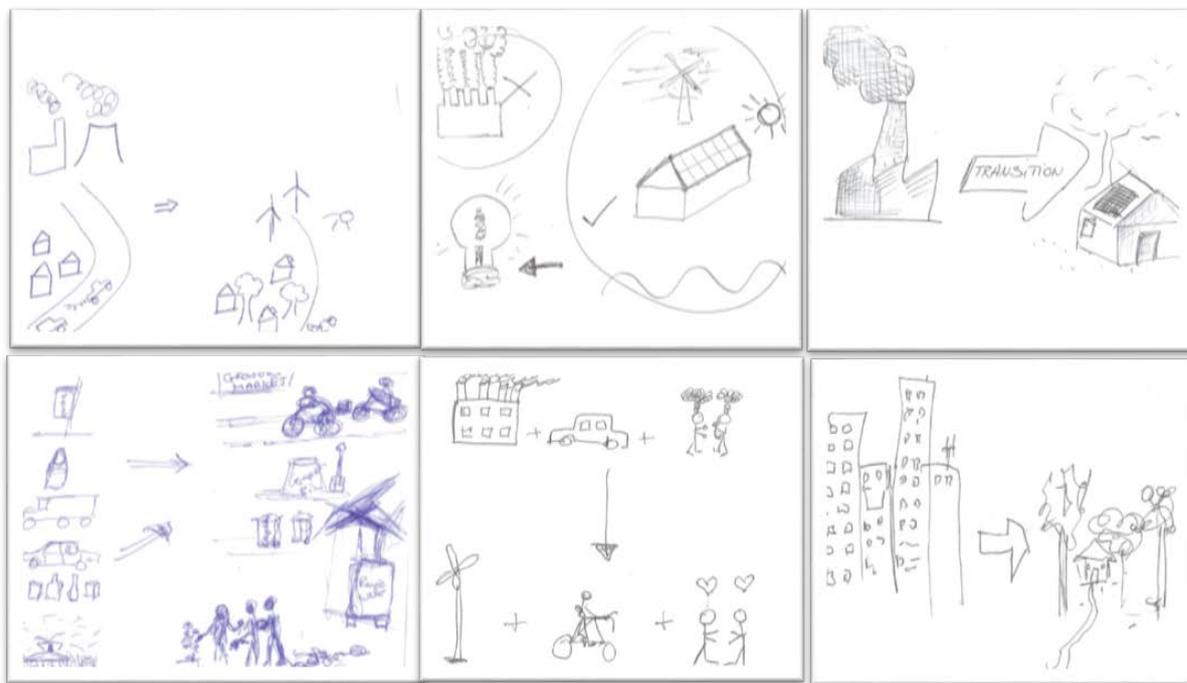


Figure 7. Examples of TT Link Diagram: Transition Outcomes

The theme was named *Transition Outcomes* because the diagrams often included several nodes (buildings, people, transport, nature) that represented specific outcomes of a transition for society. The TT diagrams tended to project a 'now scenario' and a 'desired future' scenario with the connector/s between the two. The now scenario consisted of buildings, cars and smoke stacks while the future scenario depicted a society with renewable energy sources, connected community, trees and rivers.

The majority of link diagrams produced by the STRN sample defined transition as a process of change, as shown in Figure 8. The theme was named: *Process of Transition*. In fact, 15 out of 20 STRN link diagrams showed the Process of Transition as conceptual, with shapes used as nodes and generally more connectors (lines and arrows). These depictions of a transition demonstrate a transition as a process of system change rather than as the practical outcomes of a transition seen in the TT link diagrams. Many of the illustrations could be identified as fitting conventional scientific definitions of a transition as the evolution of a system,

addressing patterns of interaction and complex adaptive change rather than a specific framework for sustainability.

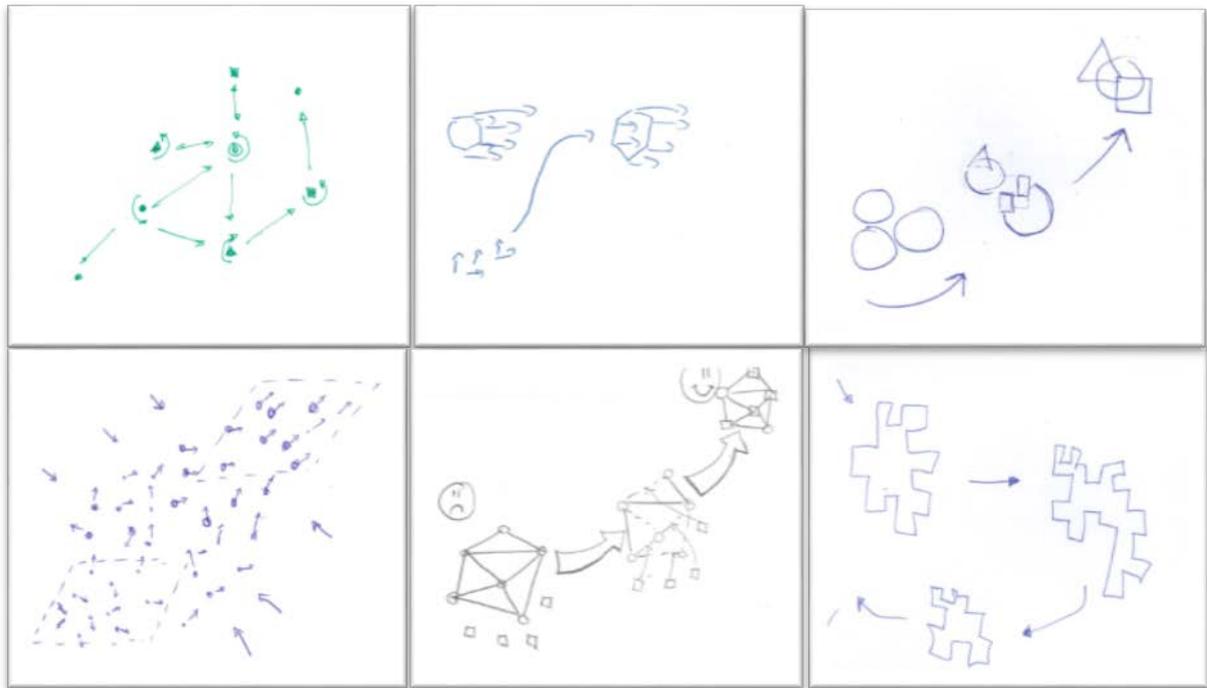


Figure 8. Examples of STRN Link Diagram: Process of Transition

The STRN sample tended to use arrows and evolving shapes in describing a transition as the process of change. This is consistent with illustrations of a transition published within STRN, frameworks such as MLP (Geels, 2002) which uses arrows and shapes in order to depict a transition. It is interesting that although STRN specifically references sustainability transitions, the visual data from this sample did not indicate a sustainability theme: transition was defined more generically rather than in terms of specific directions or outcomes.

#### *Picture Diagrams*

A picture diagram classification was accorded when a drawing was a figurative representation of an object or scene, as opposed to an abstract symbol. Given the purpose of the research, the pictures were not judged according to their aesthetic qualities but rather analysed by their proposed theme. Pictures were a popular form for visually representing a

transition: 22 participants opted for this style of representation. Out of the 16 pictures provided by the TT sample, 11 fell under the theme of 'people and community', as seen in Figure 9. Community was heavily represented with most of the pictures containing more than one person connected to others. These pictures indicated that this TT sample defined a transition in terms of the connectedness of people. This illustrated that TT participants perceived people and community as the basis of a process driving transitions towards sustainability, as well as a feature of sustainability; that is they see community empowerment as a means and an end in sustainability. This focus on people fits closely to the TT philosophy of empowered communities and re-localisation; however it de-emphasises wider influences and technical outcomes.

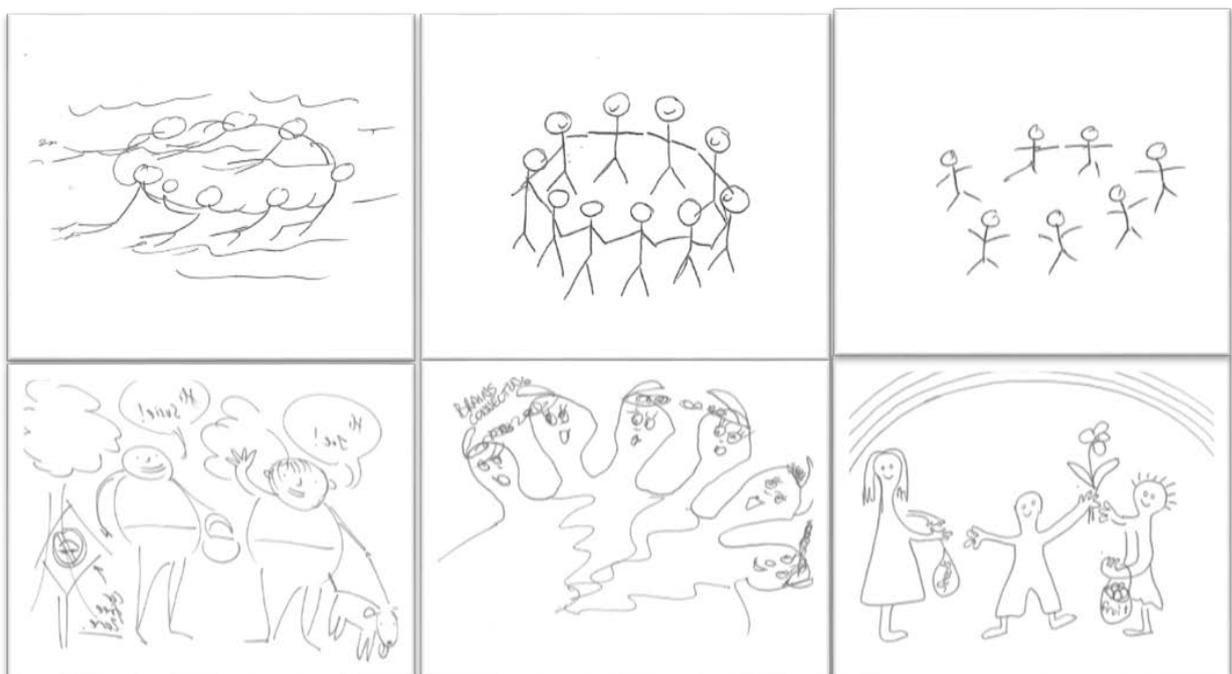


Figure 9. Examples of TT Picture Diagrams: People and Community

As discussed in section 2.2 TT is a grass-roots initiative that endeavors to build community resilience against future challenges, as well as driving sustainable change. The picture diagrams provided by TT correlated closely to this aim, demonstrating that transition knowledge is being influenced by the TT founder's interpretation.

### *Symbols*

A symbol refers to a mark or character used as a conventional representation that stands for a person, object, group, process, or idea (Business Dictionary, 2017). In contrast to TTs pictures of people and community, STRN's sample instead drew a transition as symbols all of which were represented by arrows as seen in Figure 10. Again the STRN sample visually defined a transition as a type of change process, using symbols and shapes to imply movement in a direction but not depicting details of the beginning and end points. Different symbols illustrated a slightly different interpretation, with some implying a breakthrough but all suggesting a forward direction.

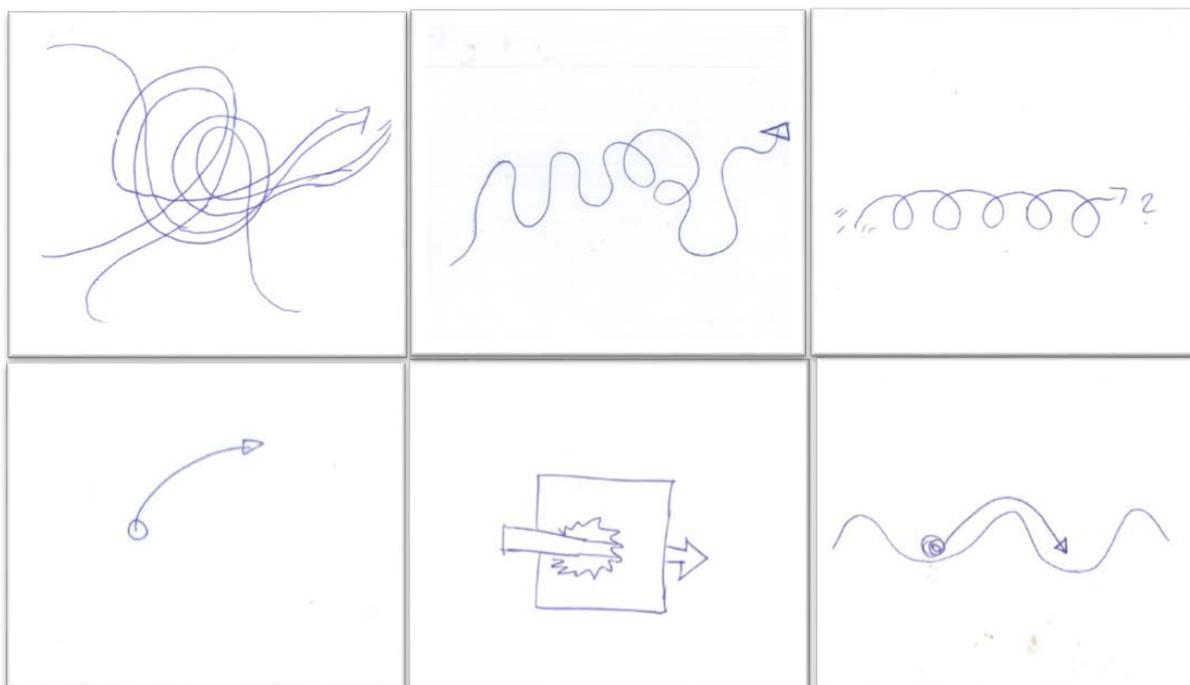


Figure 10. Examples of STRN Symbol Diagrams: Arrows

Again a clear distinction exists when comparing TT and STRN's picture and symbol diagrams: 'people and community' was a central theme for TT, whereas 'forward direction', indicated by the symbol of an arrow, was the dominant theme for STRN.

#### *Other Categories*

*Grouping diagrams* express multiple sets of elements that do not form a link diagram (Engelhardt, 2002). This graphical categorisation was used by three TT participants. This category depicted a transition as a collection of variables not necessarily linked together, as displayed in Figure 11. The grouping diagrams generally implied combination of social and

natural components are required in a transition; however, as there were so few examples of grouping diagrams, this possible content theme could not be confirmed.



Figure 11. Examples of Grouping Diagrams

*Written text* was the form of graphical representation for t-Squares that relied heavily on text in order to convey their visual depictions of transitions. Six in total were contributed: three from the TT sample and three from STRN. Although written text also appeared across other t-Squares only those that were predominantly written text were classified this way.

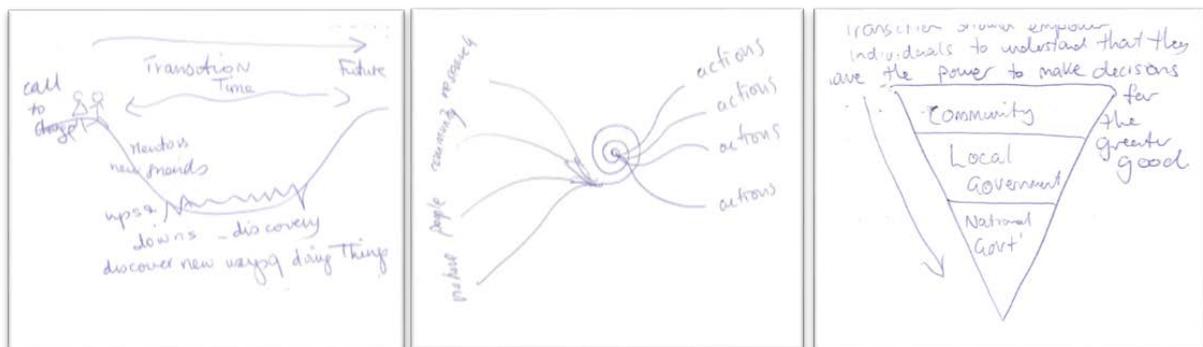


Figure 12. Examples of Written Text Diagrams

### Summary

Interestingly the t-Squares showed that TT members visually define a transition as a pathway to specific sustainability outcomes such as: connected community, abundance of nature, wellbeing and clean technologies. On the other hand STRN interpreted a transition without clearly specified outcomes, drawing conceptual models of a transition as a change process. This corroborates the previous work of Audet (2012; 2014) and Seyfang and Haxeltine, (2012) who demonstrated that the differences in worldviews between STRN and TT were being played out in both networks' activities and knowledge frameworks.

The visual interpretations closely reflect the frameworks and images provided by TT and STRN online websites and used in their communication strategies. TT members define a transition as shifting society and industry towards specific sustainable outcomes, with connected community as a central process driving this shift as well as a desired outcome in itself. This idea is consistently presented and promoted throughout TT's branding materials. STRN on the other hand define a transition from a conceptual standpoint, representing transition as a complex change process of interacting variables leading to a new but unspecified state. This idea strongly correlates to the visual frameworks published by STRN's most recognized authors.

Also notable was the similarity among STRN drawings, despite most participants having never met each other and residing in different locations around the world. This indicates that while the topic of the study, transition, is quite complex and hard to draw, STRN participants were familiar with the common symbology developed through their academic papers and they were able to represent these symbols in a simplified form in our draw and write research. This finding shows that transition knowledge is transferable across transitional contexts and in particular points to the power of visual frameworks in crossing transitional boundaries, languages and demographical variables.

Overall the visual findings present a variety of visual frameworks being disseminated, interpreted and applied according to TT and STRN. The disparity in form and content between the two communities' graphical representations also indicates that, despite sharing the transition name, members from each sample are being exposed to different types of transition knowledge, which in turn are reflected in their visual representations of a transition.

## **4.2 Textual Findings**

The textual data revealed a variety of definitions for transition across and within the TT and STRN samples. Forty six TT and 37 STRN textual definitions were collected and analysed. Unsurprisingly, most definitions pointed to a transition as a form of change. However, the process and significance of this change varied. Furthermore, while some participants opted for lengthy explanations others were simpler, using only one or few words. STRN participant

4 for example stated, '*difficult*'; STRN participant 2, '*Inevitable Equilibrium*'; STRN participant 22, '*More community*'; and STRN participant 28, '*A rapid system change*'. Of the more elaborate definitions TT participant 11 provided:

*Change to another state-in a town: groups of people with ideas of positive sustainable living coming together and making a whole greater than the sum of its parts.*

STRN participant 8 commented:

*Something which seems has happened but there is always a part to learn from and engaging uncertain future. Actors are continually experimenting with novel and changing institutional structured and gradually scaling novel experimental initiatives.*

The findings showed there was often a relationship between the visual definitions and the textual definitions: participants sometimes wrote a description of what they had drawn. However these were rarely direct description, rather general interpretations of what the visuals represented.

Table 4. Examples of respondents' textual definitions of a transition

Transition Towns	Sustainability Transition Research Network
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>Building Community Resilience for Change</b> </div> <p><i>‘A global movement to support us putting resilience back into our local communities from bottom up’</i></p> <p><i>‘An intention to reconnect with others in our area and strengthen our ability and resilience to change’</i></p> <p><i>‘Sharing of knowledge skills, stories and ideas to create resilient community able to move into a challenging future and changing planet’</i></p> <p><i>‘Building communities, resilience against climate change, having fun, having meaningful life, co-creating the world where we want to live in’</i></p>	<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>A Process of System Change</b> </div> <p><i>‘A process that leads towards a transformation of a system’</i></p> <p><i>‘About system change investing in transformative ways of thinking, doing and organizing.’</i></p> <p><i>‘A process of systematic change’</i></p> <p><i>‘Is a Transformation in all parts of a system from the system to a new dynamic state of being’</i></p> <p><i>‘Moving from one way of fulfilling societal needs to another way of organising it that fits better with new ideas, challenges, worldviews, beliefs etc’</i></p> <p><i>‘A rapid system change’</i></p> <p><i>‘The replacement of an old social technological political and economic arrangement by a new one’</i></p> <p><i>A process of transformation from one state into another includes a change of the system – be its organic, mechanic or societal – involved’</i></p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>Building Community towards Sustainability</b> </div> <p><i>‘Person by person moving (street by street, town by town, state by state) – a low carbon future to build a better world that we know in our hearts is possible’</i></p> <p><i>‘People encouraging people to build a community to care for people, land, economy, environment’</i></p> <p><i>‘The community-led movement to low-carbon, sustainable, happier, more connected and supportive community’</i></p> <p><i>‘Taking action together to develop sustainable life choices, supporting and sharing with each other to strengthen our local community in an enriching and sustainable way’</i></p> <p><i>‘Empowering and encouraging people in a local community to connect with each other to create a socially and economically sustainable society’</i></p>	<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>Linking Top-Down and Bottom-Up for Change</b> </div> <p><i>‘Long-run and cumulative process of technological change in a large socio-technical system which gradually takes place through intersections in a bottom up process as well as coordination in a top down way’</i></p> <p><i>‘Both a slow incremental movement of grassroots individual actors AND fast radical disruptive transformation drivers of change interacting at the same time in a interrelated way’</i></p>
<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>A Change towards Sustainability</b> </div> <p><i>‘A change in the way we live, think, feel + progress, both ourselves + the planet, for a better (balance +wellbeing)’</i></p> <p><i>‘Transcending from mediocre to excellence, from consumer to contributor, from disconnect to connectivity’</i></p> <p><i>‘A process of transformation from a fragmented, individualistic, polluted, disconnected and abstract, anthropocentric world to a holistic connected relational ecocentric world’</i></p> <p><i>‘A series of ‘doors’ or obstacles needed to be experienced/solved in order to be more closer to the ideal sustainable community living’</i></p> <p><i>‘Moving towards balance in our community between people, places, plants, wildlife, business and government’</i></p>	<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>A Multi-Dimensional System Change</b> </div> <p><i>‘A process, a complex interlinked system of people rules and artefacts which is moving in a direction towards a goal –but not all directly or only just forward’</i></p> <p><i>‘The change from a state of disconnected units to form a complex unit that incorporates all aspects of societal concern’</i></p> <p><i>‘Many different things changing at the same time and influencing each other, with some changing more than others’</i></p>

Notably, the patterns identified in the visual findings were again revealed in the textual findings: TT predominantly defined a transition as either '*building community towards sustainability*', '*building community resilience for change*,' or a '*change towards sustainability*'. On the other hand STRN participant's definitions produced themes such as '*a process of system change*', '*linking top-down and bottom-up for change*' or '*a multi-dimensional system change*'. Although few participants defined a transition in identical terms, the TT sample collectively emphasised a transition with specific details of possible sustainability outcomes whereas the STRN sample collectively focused on the process of systems change.

In the analysis of the textual data, words were designated as keywords if they occurred at a high frequency across the sample and indicated a particular theme. These keywords were first manually identified and later confirmed by an online automated assessment. Some participants mentioned a keyword more than once or used a keyword in their job title so these were not included in the frequency count. Table 5 presents the number of individual participants who mention a keyword at least once, rather than the total frequency of the keyword.

Table 5. T *Frequency of Participants Using Keyword*

<i>Keyword</i>	<i>Frequency of Participants</i>		
	<i>TT</i>	<i>STRN</i>	<i>Totals</i>
<i>Change/ing</i>	<b>22</b>	<b>13</b>	35
<i>Community</i>	<b>14</b>	1	15
<i>System/s</i>	2	<b>13</b>	15
<i>Sustain/ability</i>	<b>12</b>	1	13
<i>Process</i>	5	<b>7</b>	12
<i>State</i>	4	<b>7</b>	11
<i>People</i>	7	3	10
<i>Movement</i>	6	1	7
<i>Dis/re/Connect/ivity</i>	5	2	7
<i>Transform/ative</i>	2	5	7
<i>Future</i>	5	1	6
<i>Environment</i>	5	0	5
<i>Shift</i>	1	3	4
<i>Technology</i>	0	4	4

Table 5 shows the keyword *change/ing* was mentioned the most, with 22 participants in TT and 13 participants in the STRN samples choosing it as a part of their transition definition. In the STRN sample, *system/s* and *process* were popular keywords, while *community* and *sustainability* were dominant keywords cited by the TT sample. Interestingly, despite the divergence in visual depictions where STRN had a much higher number of graphical representations indicating a *process* the keyword *process* was mentioned by a similar number of TT and STRN participants, five and seven respectively.

Demographical information collected, such as gender, level of education, expertise, job title and age did not appear to provide any significant comparative variables. It should be highlighted that gender representation was not equal across the two sample groups: 70% of respondents identified as female within the TT sample and 40% of respondents identified as female within the STRN sample. This breakdown is representative of TT and STRN memberships, which supports the findings of Seyfang and Haxeltine (2012) who also found a female majority amongst TT Norwich members. However the visual and textual definitions provided did not correspond to gender.

## 5. DISCUSSION AND CONCLUSION

Methodologically, both a strength and weakness of the draw and write technique is its simplicity and speed. The technique is quick and easy to apply among busy participants in a meeting or conference, and does not require the delivery of a complex stand-alone workshop. It could be applied in situations where participants have few written skills such as some ethnically diverse contexts. Our experience with the technique supports the claims of Hartel (2014) who also promotes the value of the data collection process and important insights the result provide. The results obtained can be strongly indicative of significant patterns. However, at the same time, the technique does not drill down to the depths of participants' understandings nor does it promote deliberation. It was appropriate to the context of the present study to develop a snapshot understanding of how the term transition is understood. In future studies, findings could be more robust if a larger sample was obtained.

Overall the findings and analysis demonstrate that when asked 'what is a transition?' TT and STRN responded quite differently. The visual and textual results from each sample group suggested several key themes. TT envisioned a transition as a societal change towards

sustainability driven by connected community. STRN conceptualised transition as a systematic change driven by multiple interacting variables. Again this corroborated the findings of previous studies (Audet, 2014; Seyfang and Haxeltine, 2012; Smith et al., 2016). Except in this study the findings were supported visually.

A notable result is the close alignment of key themes in the visual data with the knowledge frameworks presented and discussed in section 2.1 and 2.2. The draw and write technique was particularly valuable in providing this insight, showcasing how a transition is visually understood across a diverse sample. The similarities between conference participants' graphical representations and the visuals published in TT and STRN's materials indicate TT and STRN, as transnational networks, retain relative consistency amongst members who share similar perspectives with their peers. Perhaps communicating transition concepts using visual materials may act as an enhancing mechanism for this consistency.

A transnational transition hub with a central online platform appears to have substantial influence on the types of knowledge frameworks that are diffused, translated and applied across multiple geographically dispersed projects and individuals. The existence of shared perspectives and expectations is a demonstrated characteristic of the TT global movement, and an outcome of the TT network's continuous activities and presence (Seyfang and Haxeltine 2012; Nicolosi and Feola 2016). It appears that STRN has also successfully managed to maintain a collectively understood perspective of transitions, endorsed by STRN's platforms and dispersed across research centers worldwide. As STRN is a community of scholars with no individual or body responsible for managing and maintaining STRN's core concepts, their future interpretations of transition may evolve or even diverge.

What needs further clarification is whether the differences in STRN and TT drawings were a definite result of the promoted knowledge frameworks distinct to each network; or whether individual training and experience had a large influence on participants' textual and visual definitions; or both. For example, STRN's mostly academic membership may indeed draw more linear diagrams with arrows and other symbols because they are trained to think in systematic models and frameworks. TT's community activists, on the other hand, work on the ground, with people, and thus their diagrams highlight people and community. Future studies assessing visual depictions of transitions could improve the validity of these studies by

including a control group, who are neither STRN nor TT, but consist of academics, scientist and community members.

The dissimilarities between the TT and STRN samples can be used as an indicative measure of what TT and STRN conceptions of transition may be missing. The strong emphasis on social and community-led initiatives by TT respondents could be limited in situations where they lack the structural capabilities and perceived legitimacy to impact the practices of external stakeholders such as: government agencies, industry and other institutions (Smith et al., 2016). Few STRN respondents referred to specific sustainability objectives and goals as the outcome of a systematic change. This indicated that transition has been conceptualized rather abstractly in STRN. The absence of community and people as drivers for change perhaps supports the findings of Audet (2014), Shove and Walker (2007) and Seyfang and Haxeltine (2012) that STRN understanding of a transition places too much emphasis on technology and powerful frontrunners shifting 'socio-technical systems' on behalf of society.

The possibility for future synergies between TT and STRN perspectives could enable a more comprehensive understanding of transitions: one that truly accounts for all levels and social and technological aspects of sustainable change. These graphical representations can be treated as feedback for both the TT and STRN communities in order that they can better understand what transition knowledge is being effectively disseminated and what is being neglected or ineffectively promoted. Perhaps STRN visual representations could evolve past the Cartesian graph, two-dimensional matrix or hierarchical concepts that are central to conventional scientific discourse and instead publish images and visuals of real world sustainable outcomes and communities achieved through STRN. TT, on the other hand, could develop reflective conceptual knowledge frameworks of the process of TT project outcomes, in order to establish a more holistic understanding of what variables support the achievement of TT objectives.

TT and STRN, as growing transitional networks promoting the term transition, have the ability to frame and narrate the 'transition concept', shaping sustainability transitions in future. This study can help ensure the intended messages are shared, and future visual communication strategically represents transitions towards sustainability in order to advance it.

## **ACKNOWLEDGEMENT**

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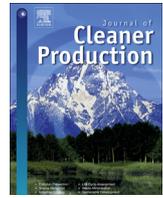
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# The role of policy labels, keywords and framing in transitioning waste policy



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## ABSTRACT

The last decade has seen a new wave of ambitious policies in order to address the mounting ecological damage caused by high levels of consumerism and the depletion of resources to manufacture short life-cycle products. In this paper 'Zero Waste' and 'Sustainable Materials Management' are examined as prominent labels of an evolving waste policy discourse towards waste prevention and reduction and material cycles. Using discourse analysis key documents are comparatively assessed, presenting the origins of these two concepts and how they entered the waste policy domain. The different framing tactics and governance models are then presented. The findings demonstrate that the different discourse paradigms around the concept of 'waste' and 'materials', influences what policy initiatives, measurement tools and outcomes are pursued. Although Zero Waste and Sustainable Materials Management are gaining popularity as indicators of shifting waste policy towards Sustainable Production and Consumption Policy, particularly with increasing discussion and application of Circular Economy governance models in Europe and China, a distinction still exists between the conceptualisation and implementation within and across the two concepts. It is in this transition towards a Circular Economy that it is valuable to review the role of policy labels, keywords and framing context in waste policy and the ability of enhanced waste management to assist in the development of more sustainable and environmentally acceptable economic and social behaviour models.

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## 1. Introduction

Environmental protection has been widely debated since the 1960s. It has closely informed the notions of sustainable development and sustainability which seek to integrate the often conflicting ideologies of environment conservation, social equity and economic growth (Brundtland et al., 1987). The concept of sustainable urbanisation in cities has received a great deal of attention in the last few decades, prompting actors across a wide range of sectors to explore sustainability case studies, projects, movements and directives. Although improvements are ongoing, notable sustainable achievements have already been realised in energy, transport, housing and water management. Waste is a prime example of a sector where environmental, social and economic considerations need to be further integrated in policy to achieve

sustainability. Waste exists as a guaranteed component of any urbanised city landscapes with studies indicating 70% of the world waste emerges from cities (Zaman and Lehman, 2013). In addition the rapid and decentralised manufacture of complex consumer products, such as electronics, is having immense environmental impact. Recently, the management of waste and material flows has also become more tightly embedded in the sustainability agenda and associated governance models, particularly around sustainable production and consumption (SPC) and the Circular Economy.

As a consequence of the Rio 20+ 10-Year Framework of Programmes on Sustainable Consumption and Production (10YFP on SCP), sustainable innovation in waste and materials management is now recognised as an urgent task in addressing the mounting ecological damage caused by high levels of consumerism and the depletion of resources to manufacture short life-cycle products. Furthermore, policy direction in the European Union and China in particular, have supported the development of Circular Economy (CE), which like SPC focuses on enhancing resource productivity and eco-efficiency in order to reduce the environmental impacts

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associated with production and consumption activities. CE's inherent focus on waste management involves the closed loop consideration of all material/energy flows in order to achieve enhanced resource productivity.

Circular Economy frameworks are working towards incorporating Zero Waste and Sustainable Materials management policies and governance structures within the development of an economic framework and business model that focuses on increasing the amount of energy and materials that can be recovered from waste. Encouraging new opportunities for business development in closing the loops in industrial production, ensures material and energy efficiency and the reduction of environmental impacts. It is in this transition towards a Circular Economy type model of sustainability management that it is valuable to review the role of policy labels, keywords and framing context in waste policy.

However there has been a lag in identifying adequate disposal options; policy directives, for the most part, have failed to provide viable solutions. The decrease in available land and raw materials and the increasing concern about CO<sub>2</sub> emissions have together made obsolete conventional incineration and landfill solutions. This evolving political challenge has instigated an opportunity to reconceptualise and reframe waste policy ideology, objectives and visions, as a new wave of ambitious policies and targets aimed at waste reduction and resource recovery is now gaining momentum (Cramer, 2013; Lauridsen and Jørgensen, 2010; Loorbach and Rotmans, 2010).

Key international documents produced in the last decade by key institutions such as Organisation for Economic Co-Operation and Development (OECD), US, Environmental Protection Agency (EPA) United Nations Environmental Programme (UNEP) the European Environmental Agency (EEA) the Group of Eight (G8) and the Group of Twenty Major Economies (G20) as well as industry reports reviewing recent waste policies, and the actual waste policies themselves, were reviewed. It is observed that two distinct general discourse orientations are emerging within the waste policy domain; the concepts of 'waste prevention and reduction' and 'materials cycles'. These concepts have been presented across many policy documents, under a diverse array of banners and titles. However amongst the variety of waste policy arrangements 'Zero Waste' has emerged as a common label for 'waste prevention and reduction' and 'Sustainable Materials' as a prominent label for 'materials cycles'. Although these concepts appear popular in their use and dissemination, some ambiguity exists as to what these key terms actually mean and how they are currently implemented practically.

Discourse is powerful not only in its capacity to communicate but also in activating concepts and understanding around environmental issues (Hajer, 1995). A central function in articulating environmental public policy and effectively disseminating the policy's messages is the selection of policy labels, keywords and associated frames. Although some work has been done to investigate waste discourse as well as the discourse around sustainable consumption and production (Lilja, 2009), no recent studies have comparatively investigated the 'Zero Waste' and 'Sustainable Materials Management' policy innovations by using discourse analysis.

This paper examined how these two discourses are represented in key policy reviews and in the academic literature. Using the keywords 'zero waste' and 'sustainable materials management' the first endeavour is to present the origins of these terms and how and when they entered the waste policy domain. Then using comparative waste policy programmes across cities, regions and industry, this paper aims to determine whether the contrasting sets of use of different keywords also indicate notable differences in policy objectives, governance structures and eventual outcomes. Finally, analysing how the different keyword and framing tactics inform

different discourse paradigms around the concept of 'waste' and 'materials', which in turn influence what policy initiatives, measurement tools and outcomes are pursued.

## 2. Sustainability, waste and discourse: a theoretical framework

The role of environmental policy in the transition towards sustainability as well as the significance of discourse in the policy process has been highlighted (see Coffey and Marston, 2013; Dryzek, 2005; Hajer and Versteeg, 2005; Oels, 2005; Späth and Rohrer, 2010; Takahashi and Meisner, 2012; Vink et al., 2013). Furthermore, it has been argued that the position of public policy makers as architects of discourse make them the most legitimate, urgent and powerful stakeholder group in enabling environmental protection (see Fineman and Clarke, 1996; Gago and Antolin, 2004; Murillo-Luna et al., 2008; Silva and Kingshott, 2011). The policy process often involves contested and negotiated narratives that eventually inform and construct the policy itself. Indeed, it is suggested "that discourses are constitutive of policy processes, rather than exogenous to them" (Paul, 2009, p. 249).

According to discourse analysts (Fairclough et al., 2011; Fairclough and Wodak, 2005; Hajer, 1995; Howarth et al., 2000; Jensen, 2012; Van Dijk, 1997) the accepted viewpoint across the field is that, first, language does not exist as an innate cognitive or neutrally representative construct. Rather it is indicative of socio-cultural, ideological and power paradigms. Second, written, spoken and multimodal discourse is perceived as a form of social practice, assuming a dialectical relationship between discursive events and the enveloping social structures. This implies that language is a mode of action that is embedded within a historical and social context (Fairclough, 2002).

As Lakoff (2008) stated in his work 'The Political Mind; why you can't understand 21st century politics with an 18th century brain'

*"language does not merely express identity: it can change identity. Narratives and melodramas are not mere words and images: they can enter our brains and provide models that we not merely live by, but that define who we are ... Language has a political force ... What makes language powerful is its capacity to activate, communicate, regulate, and even change all aspects of our understanding!"* (p. 231).

A central function in articulating environmental public policy and effectively disseminating a policy's messages is the selection of policy labels, keywords and associated frames by actors within governments, media, NGOs, academic institutions, and private corporations (Leitch et al., 2014). It is also suggested that repetition, increased visibility and intertextual links of certain terms directly contribute to the overall problem identification and wider sense making, hence shaping the solution space and the environmental policy in question (Dryzek, 2005). This is especially prevalent in a world dominated by keyword computational query log searches (Segev, 2010) and multi-channel bombardment of salient headlines such as the well documented keyword: 'terrorism' (Jackson, 2007). Pioneering the analysis of keywords in his 1976 book "Keywords, a vocabulary of culture and society," Raymond Williams demonstrates the significance of keywords and the vocabulary of meaning, in shaping and navigating cultural and societal processes (Williams, 1985). Although it has been argued that some keywords act as empty signifiers, purely used as communication strategies, other keywords are indicative of replicated memes such as specific frameworks, models or equations (Davidson, 2010; O'Halloran et al., 2011). The keywords associated with an environmental policy are often clearly visible in the title or description of the

responsible government agency or the specific policy document. Keywords may also appear as words with a high frequency rate in a policy document.

Just as important to public policy as policy label and keyword selection, is the selection of frames. Framing of policy is achieved by selecting a position linked to a particular set of values. Usually the frame is reflective of the prevalent values of the policy making group (Benford and Snow, 2000; Goffman, 1974; Dewulf et al., 2009). The framing process often involves interactive consultation with policy stakeholders in order to determine what themes resonate and where the policy is best situated within a larger narrative (Johnson et al., 2006). The policy process relies on framing tactics, not only to communicate and assimilate the policy to a wider audience, but also to steer the policy direction (Lieshout, 2014; Rein and Schön, 1996). For example, framing environmental policy may take the form of economic rationalism, such as 'resource efficiency' and 'resource security' or a more societal orientation, such as 'conservation for future generations'. Despite the tactic, framing significantly positions the policy and its associated conceptions.

The implication of specific keywords and framing tactics presented within environmental policy documents have been investigated in more recent years (Beunen, and Hagens, 2009; Pei-Chun and Hsin-Ning, 2010; Pralle, and Boscarino, 2011). In a study investigating the changing titles of New Zealand's science policy agency Leitch et al. (2014) conclude that "the titles given to government agencies arguably constitute the most public means of framing science policy" and "the loss of keywords from the titles of government agencies is potentially significant if it signals a change in the core purpose and focus of an agency" (Leitch et al., 2014, p. 123).

Discourse theorists and communications strategists have successfully demonstrated that ideologies inform keywords, title words and frames that then shape perceptions of what constitutes good or bad directions, actions and outcomes (Burr, 2003; Lakoff, 2005). Policy labels, keywords and frames thus inform story-lines and augment particular discourses which are both scientifically and politically important: through these our knowledge of the world is regulated (Jerneck and Olsson, 2011). For Snow and Benford (1988), conditions constraining successful framing resonance include careful and deliberate framing efforts to identify problems, provide suitable solutions and strategies and rationalise motivational plans of action. These policy labels, keywords and frames need credibility and narrative fidelity for the social changes to be achieved. Stewart et al. (2012) refer to the adoption of languaging strategies and tactics, which include the use of identification, framing, narrativisation and sloganising to transform perceptions, legitimise and sustain movements and prescribe courses of action, especially via the use of emerging communication technologies. This link of association between a text and its ability to indicate purpose and action is a central point in our discussion.

## 2.1. The evolving discourse of waste policy

Waste management has for the most part provided end of pipe solutions dictated by a kind of 'out of sight, out of mind' or 'swept under the rug' mentality. Until the mid-1980s waste and discarded materials were mostly buried, shipped out to sea or turned into ash, requiring further raw materials to be extracted and leaving wasteful consumerism to continue unchecked. The economic primacy given to consumption and capitalist growth models dominated political rhetoric. Any suggestion to decrease consumption was likely met with great contention, thus dealing with increasing

tangible outputs via waste management was seen as the way forward.

The discourse shaping earlier waste ideologies and framing consequent solutions lacked an environmental orientation. Rather, they were often linked to human health concerns such as disease risks, stench and unsightliness that resulted from inappropriate waste disposal practices (Rootes, 2009). Prominent keywords within the waste discourse included: *cleanliness, disposal, dumping, garbage, throw away, rubbish, litter and landfill*, words that focus thinking far from the concepts of reusable materials and valuable resources. Keeping places 'clean' was the main doctrine of societal perceptions and government interventions in managing waste (Paredis, 2011).

Traditional governance strategies and policy directives relevant to waste management often fell under the responsibility of the local municipalities within cities and regions, thus management of waste was geographically constrained. The nature of waste generation and management was seen as geographically situated, that is, waste (municipal, industrial or commercial) generated at specific localised sites was managed by geographically local logistics companies which physically removed the waste to specific localised landfill sites (Boyle, 2001). Waste management was also bounded by a Not In My Back Yard (NIMBY) culture, so disposal solutions often negotiated around the least resistant, powerless and vulnerable communities (D'Amato et al., 2013). However as production and consumption patterns changed and waste volumes increased considerably in volume and complexity, the established waste management policies as well as the waste discourse required a makeover.

### 2.1.1. Focussing on 'end of life solutions' as a paradigm

During the sustainability movements of the early 1980s, environmental concerns start to penetrate the waste discourse. Increasing local landfill site costings as well as public contestation focused attention on alternative end of pipe solutions and *recycling* became the new keyword that is linked to reducing environmental impacts. From a linguistic perspective, the term indicates an action, with the pre-object being recyclables and the post-object being recycled materials. The term was quickly disseminated and adopted across many geographical borders and waste management policy documents, leading to numerous recycling programmes. Recycling was especially popular in developed economies that could more easily adjust and expand the available waste collection infrastructure and systems to incorporate a recycling programme (Karani and Jewasikiewitz, 2007). At the same time these developed economies also tipped the higher end of consumption but were disconnecting from manufacturing and production creating a large geographical distance in the supply chain. This also induced new governance systems as waste and recycled goods started to flow according to market demands and capabilities. D'Amato et al. (2013) found price did not impact waste trade movements but rather landfill and recycling limitations increased exports while imports were dictated by proximity in conjunction with a lack of environmental policy and low domestic wages.

This saw the flow of materials beyond localised jurisdiction and across to Asia, Africa and South America. Waste governance and management also shifted from an isolated, localised and centralised structure to one that was inclusive of wider stakeholder involvement (Davies, 2005). Governance also widened to include the embedding of municipal and city waste policy within regional and national directives (Davoudi and Evans, 2005).

Although the recycling concept remained central to numerous waste policies' environmental goals (and can still be seen as one of the major waste management solutions implemented today), a necessitating extension of the recycling concept was that of the 3

R's: reduce, reuse, and recycle. Landfill diversion and increased recycling rates became prominent policy indicators of waste reduction success. At the same time, incineration capacity enabled a decline in landfill reliance, especially in Europe (Davies, 2005). However, two significant issues have emerged; the first is the inability for recycling, as an end of pipe initiative, to address increasing generated household and commercial material output (waste generation). The second is a lack of market incentives that truly economically validate and valorise recycled materials, both from a manufacturing and end consumer perspective (Hamzaoui Essoussi and Linton, 2010). It is becoming increasingly evident that diverting waste from landfill, even to recycling, is a reductionist mechanism that falls short of offering a long term holistic solution.

### 2.1.2. Shifting towards a new paradigm of sustainable production and consumption

It is now argued that waste management should not focus on diversion of waste from landfill and increased recycling rates, but rather through front end solutions that prevent over-consumption and waste generation (Andrews-Speed et al., 2012; Buijs and Sievers, 2011; EEA, 2014a,b; UNEP, 2010). The consequent evolution of the waste hierarchy (prevention, reuse, recycle, recovery, and disposal) has downgraded 'recycling's' position and promoted 'prevention'. Consequently we are now seeing policy frameworks that are shifting from an end of pipe paradigm towards a SPC paradigm (European Commission, 2011). The latter emergent paradigm is represented by two major competing discourses: 'Waste Prevention and Reduction' and 'Materials Cycles'.

Coinciding with the sustainability agenda on material and natural resource scarcity, the mid 2000s witnessed a surge in political debate and initiatives that shifted away from the 'throw away' culture towards SPC (Andrews-Speed et al., 2012; Buijs and Sievers, 2011; EC, 2014a; EEA, 2014a,b; UNEP, 2010; PBL, 2011). The reasoning for this shift has been linked to volatile material prices and increased global demand for resources (Happaerts, 2014), a greater awareness and acknowledgement of the scarcity of some raw materials, a growing concern for national resource and materials security, and the emerging unwillingness and incapability of countries such as China to deal with the West's discarded materials (such as China's Green Fencing movement)<sup>1</sup> (Tibbetts, 2015). These contextual conditions can also be recognised through the realignment of the policy discourse that is moving beyond waste management towards resource and materials cycles.

The emergence of a range of new evaluation tools, such as life-cycle assessment, cradle to cradle production, materials flow analysis, resource efficiency indicators, full cost accounting in addition to wider systems thinking such as the Circular Economy principles, industrial ecology and material chain management, have all combined as a driving force towards a new waste discourse paradigm. Perhaps not surprisingly the EU, China and Japan, relying heavily on raw material imports, have emerged as front runners in this waste prevention and materials policy narrative. This emerging ideology about SPC is no longer based on linear systems thinking but rather a shift to cyclical systems thinking (UNEP, 2010, 2011). Inherently focussing on preventing further waste related environmental degradation, whilst conserving scarce resources, in China in particular, the Circular Economy model and its call for sustainable materials management was seen as critical in allowing China to leapfrog into a more sustainable economic system (Su et al., 2013).

<sup>1</sup> <http://www.theguardian.com/sustainable-business/china-green-fence-global-recycling-innovation> and <http://www.theguardian.com/sustainable-business/china-recycling-waste-Circular-economy>.

## 3. Methods

Undertaking an analysis of key international, regional and corporate documents produced in the last decade, such as OECD, EPA, UN, Government and industry reports reviewing recent waste policies, as well as the waste policies themselves, two key discourse orientations were identified: 'waste prevention and reduction' and 'materials cycles'. Then focussing in on two respective waste policy labels: 'Zero Waste' and 'Sustainable Materials Management', based on an understanding of keywords and frames as reflective of ideologies and policy objectives, these two concepts were comparatively analysed.

The key documents, on which the analysis is based, were selected on the grounds of their authoritative standing and level of influence. These include policy instruments, political documents and significant research and industry reports discussing the waste transitions in question. Although several corporate documents were explored, this paper focuses on city and regional programmes as they were perceived to have larger overall implications. The selected documents are produced within the timeframe of 2004–2014, as this is when significant waste policy changes emerged. These documents were combined, enabling two corpuses to be built for analysis. Each corpus was then uploaded into an online corpus analysis tool (ANTConc), as well as manually evaluated and coded to determine the key findings.

Each concept (zero waste and sustainable materials management) was analysed by identifying the dominant, goals, key success indicators and measurement tools emerging out of the principal documents promoting each concept, as well as the governance structures in place to manage the waste transition in question. How the dissemination of the keywords: 'zero waste' and 'sustainable materials management', have also lead to shared interpretations and therefore policy outcomes was also explored.

## 4. Results

In the below sections a deeper analysis is presented of the above two concepts by developing two case studies of the new approaches to a waste transition programme: 'Zero Waste' and 'Sustainable Materials Management'.

### 4.1. Waste prevention and reduction

Prevention and reduction are dominant philosophies dictating how environmental policies are positioned. The philosophies underpin the goals of becoming 'carbon neutral' or having 'zero impact' and are the guiding vision for numerous sustainability policies that seek to prevent and reduce the impact of human activities on the environment. Central to prevention and reduction is the keyword 'zero': 'zero carbon', 'zero growth', 'zero ecological footprint', 'zero emissions', 'mission zero' and 'get zero'. In his recent book *Zeronauts*, John Elkington (2012) describes the commercial viability of the term 'zero', which has been used to promote 'zero injuries', 'zero tolerance', 'zero defaults', 'zero defects' and 'zero waste'. Elkington (2012) suggests that perhaps 'zero' is symbolic of an idealist counterpoint to western society's preoccupation with high levels of growth and production. The numerical reference to 'zero' may be viewed as an idealist ambition as well as a subjective term open to multiple interpretations of action. However it has been stated that preoccupation with environmental policy solutions that aim at becoming 'less bad is not good enough' (Braungart et al., 2007).

The waste prevention and reduction discourse has also informed policy documents that use the terms directly, such as the EU's Waste Prevention (WPr) goals, as set out in the 2008 European

Commission's Waste Framework Directive. The term waste prevention is a signifier of goals to prevent waste before it emerges, usually using success indicators that relate to Material Flow Accounts (MFA) and household waste generation and consumption (Bortoloto, 2014). However, the EEA's 9th report (2014) assessing WPr in the EU, found the majority of WPr objectives are embedded in policy plans using alternative labels, such as resource efficiency, Circular Economy and environmental strategies. Only Flanders and Brussels have integrated WPr throughout their waste management plan (EEA, 2014a,b), indicating that WPr outcomes normally emerge outside of policy labels using the term 'waste'. Although using WPr as a policy label is notable, zero waste has received wider promotion and acquisition outside of the EU as a waste prevention and reduction moniker. For this reason the focus is on zero waste.

In the below section this paper introduces the commonly referred to waste prevention and reduction strategy 'Zero waste', and discusses the policy direction and outcomes this concept induces.

#### 4.1.1. Zero waste

Although the term 'zero waste' (ZW) emerged in the 1970s, evidence of increased momentum in the last decade is evidenced by its use across a vast range of waste management documents, reports, visions, policy directives and grassroots efforts within both government and non-government agencies alike (Krausz, 2012). "Like establishing zero defect goals for manufacturing or zero injury goals in the workplace ... zero waste is a revolution in the relationship between waste and people" (GAIA, 2012, p. 2). The familiarity and managerial application of the term 'zero' may have inspired major transnational organisations such as Toyota, DuPont, General Motors and Dell to adopt the keyword in promoting their recently initiated 'zero waste' programmes.

In 1996 Canberra, Australia pioneered the first serious attempt at a 'zero waste' programme at a city level. The campaign was labelled 'No Waste' and aimed to have zero waste sent to landfill by 2010. In this sense, the policy reflected an 'end of pipeline' paradigm. Almost inevitably, their objective was not achieved and the programme was dropped. However, this initial movement inspired many other 'zero waste' projects to arise. Today 'zero waste' is a keyword that is universally recognised across languages and translations. Importantly, the term has now become explicitly linked to the new waste prevention and material cycle paradigm rather than to the old end of pipeline paradigm.

The marketability of the term zero becomes increasingly apparent when accounting for the numerous ZW networks and platforms that have since emerged including: Zero Waste Europe, Zero Waste International Alliance, Zero Waste Institute, Zero Waste Network, Zero Waste San Francisco, Zero Waste California and Zero Waste Australia. Multiple grassroots projects have also been realised such as the Zero Waste Ohio Stadium, Zero Waste Youth, Spain's Gipuzkoa Province Local Zero Zabor (zero waste) groups and the Zero Waste Alaminos project. The dissemination of the ZW concept and its apparent dominance in representing waste transitions over spatial and geographical boundaries is unquestionable and it is often referred to as an ambitious approach to minimise the effects of waste on the planet.

The commonly referred to definition of ZW as adopted by the Zero Waste International Alliance and Zero Waste Europe states that:

*"Zero Waste is a goal that is both pragmatic and visionary, to guide people to emulate sustainable natural cycles, where all discarded materials are resources for others to use. Zero Waste means designing and managing products and processes to reduce the volume and toxicity of waste and materials, conserve and recover*

*all resources, and not burn or bury them. Implementing Zero Waste will eliminate all discharges to land, water, or air that may be a threat to planetary, human, animal or plant health."* (ZWIA, 2013)

Despite the term's interpretative openness, our analysis shows that the main principles and the intentions in the concept's definition are clearly to establish this waste preventative, holistic and Circular approach of materials cycles. Linking the ZW construct to that of the waste hierarchy and 3 R's mirrors the merging global trends to limit landfill capacities and reduce the environmental burden caused by current waste management practices (Zero Waste Australia, 2013).

However, somewhat perversely, it is evident that in the actual implementation of policy and the delivery of outcomes generated through the ZW vision, the term 'zero waste' is actually commonly misinterpreted to imply a goal of zero waste sent to landfill and incineration<sup>2</sup> much like the initial aim of Canberra's 'No Waste' campaign. The result observed is also consistent with other studies (see Karani and Jewasikewitz, 2007; Krausz, 2012; Zaman, 2015). This goal towards waste diversion and reduction of waste to landfill is repeated and endorsed by most of those using the ZW moniker, particularly the ZW programmes at the city and corporation level. This interpretation is also especially apparent within the ZW strategies for regions with already existing well-developed recycling infrastructure. For example Table 1 below developed from Krausz (2012), demonstrates this trend clearly.

It should be noted that those promoting the ZW concept are also embracing a range of other frames and drivers: from the social justice ambitions of waste pickers in the Philippines to the economic efficiency goals of major transnational companies such as Toyota and DuPont. The evidence presented in Table 1 is supported by other evidence suggesting that economically advanced countries with extensive waste infrastructure and collection processes most closely adhere to the ZW goal of eventual 100% diversion from landfill (GAIA, 2012).

Of the ZW corporate documents explored (Toyota, DuPont General Motors and Dell) all referred to Zero Waste to Landfill or Landfill Free objectives. Dell was the only corporate that explicitly provided other ZW objectives beyond a landfill diversion, including a strategic packaging initiative that saw a 12% reduction in notebook packaging in 2008. Although it is assumed here that other companies, especially those heavily invested in manufacturing and production, have implemented preventative waste mechanisms beyond landfill diversion, there were few that explicitly linked this to a ZW plan, opting instead to use terms such as eco-efficiency or resource efficiency in labelling their plans.

The link between the term ZW and the diversion from landfill policy direction is significant in demonstrating the correlation of discourse orientation and action. Unlike other keywords that are argued to be empty signifiers or attempts at green washing (see Davidson, 2010), ZW has a strongly associated measurement that has transferred across policies. Unless significant reconceptualisation is promoted around the term, it can also be assumed future waste programmes adopting ZW will also establish a landfill diversion strategy.

From the main ZW promotional campaigns analysed for, Table 1 it is evident that a key measurement tool used to determine the success or failure of the zero waste to landfill objective is that of a diversion rate. This diversion rate is often presented as an overall

<sup>2</sup> Grassroots movements that strongly contested incineration as a diversion from landfill option contributed to incineration being removed from the Zero Waste definition and also downgrading it from the EU's Waste Hierarchy (Davies, 2005).

**Table 1**

This table provides examples of zero waste initiatives with diversion from landfill targets.

Location	Stated zero waste objective
Canberra, Australia	Zero waste to landfill by 2010 ( <a href="#">Australian Capital Territory, 1996</a> )
Christchurch, New Zealand	Zero waste to landfill by 2020 ( <a href="#">Christchurch City Council, 2006</a> )
Toronto, Canada	Zero waste to landfill by 2012 ( <a href="#">City of Toronto (2005)</a> )
San Francisco, USA	Zero waste to landfill by 2020 ( <a href="#">SF Environment, 2003</a> )
Austin, USA	Zero waste to landfill by 2040 ( <a href="#">City of Austin (2005)</a> )
Kamikatsu, Japan	Zero waste to landfill by 2020 ( <a href="#">Hill et al., 2006</a> ).
Scotland	95% diversion of waste from landfill by 2025 ( <a href="#">The Scottish Government, 2010</a> ).
Buenos Aires, Argentina	Zero waste to landfill by 2020 ( <a href="#">Lacunza, 2013</a> ).

percentage of waste being diverted from landfill (Table 2 below for the formula).

Research exploring landfill diversion emerging out of the EU (although often devoid of the term zero waste) has identified a large disparity between EU states, asserting high diversion rates often correlate to a high population density with economic incentives and waste collection systems in place ([Mazzanti et al., 2011](#)). Diversion from landfill is commonly driven by regionally diffused policy instruments with an economic orientation such as waste tariffs, landfill tax, landfill levies and pay-as-you-throw charges. Softer policy mechanisms such as recycling educational programmes community outreach programmes and or improved separation and collection facilities are also regionally diffused and managed. The issue of waste management autonomy is discussed by [Mazzanti and Montini \(2014\)](#), who demonstrate the performance gap existing between EU, national and local waste policy objectives. Exploring waste policy in Italy, they show how socio-economic factors differ across regions within a country, exposing poor performance hot spots and better performing regional clusters. For this reason holistic waste management evaluation at the national level may be misleading.

The overall EU aim to decouple absolute waste generation from GDP and the difficulty in providing umbrella solutions while offering autonomous EU waste directive implementation may together explain why ZW as a large scale centralised waste prevention goal has been less popular in the EU.

The [European Commission's \(2014b\)](#) communication to the European Parliament, Councils and Committees, 'Towards a Circular Economy: A zero waste programme for Europe' is the one of the few recent EU documents using the ZW label within the title. However notably the term is not used again throughout the entire 6064 word document, whereas materials is mentioned 36 times and Circular Economy 31 times. Perhaps this is evidence of an effort to link the popularity of the ZW term within the 'waste' to 'materials' discourse transition and the overarching and increasingly discussed, Circular Economy narrative.

**Table 2**

This table presents the key success indicators for Zero Waste.

	Key measurement tools equation	Target
Zero Waste = diverting waste from landfill and incineration	$\frac{\text{Diversion} = \text{weight of recyclables}}{\text{Weight of waste} + \text{Weight of recyclables}} \times 100$ Source: <a href="#">Zaman and Lehmann (2013, p. 122)</a> .	100% Landfill diversion
Policy instrument examples		
<ul style="list-style-type: none"> <li>• Waste tariffs</li> <li>• Pay-as-you-throw</li> <li>• Landfill levy and taxes</li> <li>• Improved collection and separation rollouts</li> </ul>		

Sceptics of the ZW movement argue that an increase in diversion rates is often also associated with an increase in the overall weight of waste being produced, demonstrating that reducing goods consumption in economic systems that promote it is a far greater challenge than implementing diversion and recycling policies. As stated by [Zaman and Lehmann \(2013\)](#) the inaccuracy inherent in cities using their "waste diversion rate as a tool to measure the performance of their waste management systems ... as it does not give a holistic picture of zero waste performance" (p. 123). An alternative indicator is provided by [Zaman and Lehmann \(2013\)](#): the 'zero waste index'. This aims to assess a city's ZW performance by forecasting "the amount of virgin materials, energy, water and greenhouse gas emissions substituted by the resources that are recovered from waste streams" ([Zaman and Lehmann, 2013, p. 123](#)).

Other critics of the term ZW suggest that policy solutions that start by reaffirming waste's existence at the centre, gravitate towards forming waste based solutions. Similar criticism applies to the term Waste Prevention instead of Material efficiency (MEf) (see [Lilja, 2009](#)). [Lilja \(2009\)](#) concludes that "based on more than a decade of experience in Finland, it seems that the avoidance of waste is not a sufficient driving force for a transition in the consumption and production patterns" (p. 135). Suggesting that "MEf more naturally brings on board the life-cycle approach than WPr" and thus be more highly promoted in the BREF-Documents (Best Available Technique Reference Document) (p. 135). Our study also finds WPr data beyond waste diversion (such as material inputs, outputs, production and consumption) is more applicable to national directives at the macro-level and households at the micro-level. This may explain why cities, local councils and industry have more readily applied the term ZW.

The aim of "turning waste into a resource is part of the 'closing the loop' in Circular Economy systems" ([EC, 2014b, p. 8](#)). Considering the legal definitions of waste as an unwanted output with no perceived economic value, using the term in policy plans that wish to change perceptions in society seems counterproductive ([Pongrácz, and Pohjola, 2004](#)). This type of criticism suggests that the ZW concept requires further conceptual development, more inclusive of cyclical based policy and implementation than is currently the case. Alternatively it should be accepted that the term results in an emphasis on landfill diversion and is ambiguous, unachievable and therefore inappropriate in promoting sustainable production and consumption and Circular Economy closed loop sustainable materials management practice.

#### 4.1.2. Governance

When investigating examples of ZW programmes, initiatives, frameworks and policy directives, a spatially confined governance structure and a central focus on physically viable proximity are commonly found, coinciding with other research on innovation and proximity ([Boschma, 2005; Cox, 1998](#)). Often the programme is initiated and managed by the city government, or a corporation's waste management personnel, in partnership with a major waste/

recycling contractor and the public. This is consistent with the geographically bounded waste management configurations evident in traditional waste management practices and processes (Davies, 2005; Rootes, 2009).

Although this governance model seems fairly centralised with limited actor inclusion, it can also be considered as decentralised from regional and national policy programmes. Other studies show that the success of waste diversion often relies on quantity for economies of scale, reached through highly dense populous areas or amalgamation of separate regional areas (Nicolli et al., 2012). Although this local geographically confined and relatively centralised governance structure enables rapid dissemination and implementation of some policy directives, limitations may include a lack of ownership and inclusivity amongst major industry players and other relevant stakeholders outside of the governance structure's periphery. This may explain the tendency for ZW programmes to adopt a landfill diversion goal: the governance structure of ZW falls in the hands of actors separated from manufacturing or production processes and wider material flow systems (Clay et al., 2007).

Thus the challenge to implement these types of full-cycle material policy innovations remains because material flows and economic activities lie outside a Zero Waste city's jurisdictional control. If the ZW movement's goal of moving towards a full cycle approach is to be realised then the current 'three tier' governance model will need to be expanded to include a multitude of additional actors.

#### 4.2. Materials cycles

The concept of 'materials' is well established; it builds upon the resources and capital stock narrative, and recently reconstructs 'waste' as a valuable economic commodity. Numerous reports and investigations have alluded to the significant role of material flows in constructing our current mainstream capitalist growth model. However the term 'material' remained relatively absent from the waste management discourse and only made a noteworthy emergence in the last decade. Although initially the shifting discourse appeared to be driven by environmental concerns, economic primacy quickly dominated.

In 2011, some prices of raw materials (also referred to as rare earth elements (REEs) skyrocketed at the influence of China's REE export controls. This trend quickly raised concerns and tensions across the globe, including several complaints of a breach of trade made to the World Trade Organisation (WTO) against China (Wübbeke, 2013; Binnemans et al., 2015). Subsequently the term 'materials' has become increasingly visible within policy documents such as EU WPr plans and attempts to decouple waste generation from economic growth, as set out in the 2008 European Union Waste Directive and Japan's 2008 Fundamental Plan for Establishing a Sound Material-Cycle Society. This is leading to a booming interest in 'Secondary Raw Materials' (SRMs) industries, providing a potential avenue to resolve national resource security concerns as well as opportunities to relieve raw material costs to manufactures (Binnemans et al., 2015). Across 10 industries, material input costs averaged 42% of total turnover, a large proportion of overall business expenditure (Clay et al., 2007).

Thus from a corporate perspective, especially those with both manufacturing and retailing capabilities, Extended Producer Responsibility (EPR) should not be framed as a restriction but as an opportunity to bring back material assets in to the organisations processes and reduce costs over the long term.

Although material recovery through end of life product recycling has existed as a well-established source of SRMs, other less explored sources of SRMs such as 'technospheric mining' of landfill

stocks and industrial process residues have become more viable (Johansson et al., 2014; Binnemans et al., 2015). However under current market conditions extractive raw material mining is significantly subsidised by governments worldwide, which masks the true costs, not only economically, but socially and environmentally (see Johansson et al., 2014). For SRMs to truly gain momentum, market drivers as well as new governance models are required that incentivises a reduction in raw materials inputs and an increase in SRM use. Central to this process is valuing and labelling 'waste' as 'materials' in order to reconceptualise policy solutions.

The risk of this materials solution is that it may deflect from sustainable consumption by supplying additional material sources. As stated by Krook and Baas (2013):

*"Urban and landfill mining are not necessarily disruptive to existing resource extraction systems but could even be catalytic by offering complementary sources for feeding the ever-increasing market demand for materials and energy"* (p. 7).

In order to holistically address current consumption and production concerns, policy solutions require long term visions that cognitively and practically transform waste into materials.

The below section introduces the recent materials based narrative, 'Sustainable Materials Management'. This represents policy innovations that shift beyond the objective of waste management, end-of-pipe solutions and diversion from landfill, by emphasising the value of waste as materials and emphasising the full-life cycle framework.

##### 4.2.1. Sustainable materials management

Sustainable Materials Management (SMM) can be recognised as an umbrella policy approach<sup>3</sup> that dictates how materials are managed from production to disposal. Replacing the term waste entirely, the label 'materials management' automatically suggests expanding beyond the concepts of waste and end-of-pipe solutions which is also recognisable in the published available definitions. For example the United States' Environmental Protection Agency (EPA) defines sustainable material management as an

*"approach to serving human needs by using/reusing resources most productively and sustainably throughout their life cycles, generally minimising the amount of materials involved and all the associated environmental impacts"* (EPA, 2009, p. 11).

The OECD working definition for sustainable materials management is

*"an approach to promote sustainable materials use, integrating actions targeted at reducing negative environmental impacts and preserving natural capital throughout the life-cycle of materials, taking into account economic efficiency and social equity"* (OECD, 2012b, p. 6)

The term has most prominently been adopted within the European states, particularly the Netherlands, Belgium and Germany, although some US authorities such as the EPA have also made use of the terminology (Happaerts, 2014). The Japanese also adapt the

<sup>3</sup> Identifying SMM policy instruments as specifically under the SMM label is difficult as a large breath of policies exist that address aspects of SMM and fall under the sustainable production and consumption definition, whether deliberately or not. Even if the policies are not designed as specific SMM policy instruments they none the less contribute to the SMM vision objectives.

term by introducing their 'Fundamental Plan for Establishing a Sound Material-Cycle Society (SMCS). This is consistent with other studies that describe the materials transition as prevalent within regions that no longer have rare-earth material deposits domestically (Binnemans et al., 2015). Beyond national agendas, SMM has also gained considerable traction within the larger international governance bodies such as the OECD, UNEP, G8 and G20.<sup>4</sup> Significant work on SMM started in 2005 with such programmes as the OECD's *Green Growth Strategy* holding meetings in Seoul (South Korea), Tel Aviv (Israel) and Mechelen (Belgium). At a regional level Flanders, Belgium's Plan C has most explicitly incorporated the notion of materials into their waste management plans.

The basis of economic, national and state sovereignty driving the SSM transition is evident in several of the assessed document's stated key principles, such as strengthening national capacity to measure and analyse material flows, reduce material outputs and increase material life-cycle longevity within geopolitical boundaries (Happaerts, 2014; OECD, 2012a; UNEP, 2011). Also highlighted across the SMM texts were references to volatile raw material prices due to protectionism and global increases in demand (Happaerts, 2014; Ministry of the Environment Japan, 2008; OECD, 2012a). For example in the EU a key objective of SMM is "to turn the European Union into a resource-efficient, green and competitive low carbon Economy" (EC, 2011). This is no surprise considering the EU and Japan depend on imports for most of their material needs (Binnemans et al., 2015).

For this reason, framing the SMM label as a concept has been closely aligned to elements of resource scarcity, raw material security, resource productivity and efficiency and global competitiveness as well as climate change and CO<sub>2</sub> emissions (Happaerts, 2014). Emerging from this new materials cycle discourse, strong market based economic rationalism is found, observed through a keyword and framing analyses. Studies suggest that environmental policies offering market-based monetary incentives resulted in stronger technological and sector progression towards SMM (Requate, 2005; Vollebergh, 2007). However policy design, stringency, predictability and timing are also direct determinants of policy efficacy (Kemp and Pontoglio, 2011). This is also leading policy makers to focus on market based instruments such as material resource taxation to encourage SMM. Policy design, stringency, predictability and timing are also direct determinants of outcomes (Kemp and Pontoglio, 2011).

Environmental discourse is no stranger to the paradigms of 'economic speak' and framing environmentally based initiatives are often subservient to economic sense making. One only has to critically review the common terminology used, such as 'sustainable development', 'ecological capital', 'resource efficiency' and 'degrowth' to grasp this point (Jessop, 2000). Connecting SMM to other already existent but structurally independent frames is known within the discourse literature as 'frame bridging'. This strategy enables unconnected frames to be closely associated together building a more powerful narrative and shared discourse ideology (Benford and Snow, 2000). This approach has enabled the

SMM concept to resonate with other regional and national agendas beyond environmental groups, building traction and legitimacy.

The deployment of the SMM transition provisions built upon a range of case studies on specific materials, such as aluminium, copper, wood fibres and plastics and established a variety of instruments, principles and reforms to further progress the SMM agenda (OECD, 2012b). The European Commission in 2010 also published a list of materials<sup>5</sup> susceptible to instability, labelling these 'critical raw materials' (CRMs) (Massari, and Ruberti, 2013). This has linked the SMM transition with concepts such as urban, landfill and technospheric mining.

The tendency to divide and classify output as specific material streams reverts back to describing them as they were at input, assisting in the promotion and value of SRMs as well as policy instruments that target specific materials. For example the fertiliser tax in Austria was aimed at reducing phosphate use and associated negative environmental impacts. This is different from waste, which linguistically classifies output as one collective unwanted object. However this approach on its own does not fulfil material reduction (also known as dematerialisation) and waste prevention. Encouraging solutions based on individual material flows, expands solutions beyond just critical raw materials to include regionally managed materials such as bio and food waste materials. Evidently these different material streams will also drive towards different policy solutions.

A recent assessment by the European Topic Centre Sustainable Consumption and Production and the European Topic Centre on Waste and Materials in a Green Economy, explores taxation opportunities at different levels of the supply chain for selected non-renewable materials (iron, steel, copper, phosphorous). The potential implications of an extraction tax, material input tax and a consumption tax were explored. With all three instruments the suggested taxation mechanism was to help achieve more resource efficiency in production and design, the substitution of resource-intensive materials and more sustainable consumption behaviours (ETC/SCP and ETC/WMGE, 2015). Other ideas on improving non-renewable material use have included additional higher taxes on the sale of all single-use one way material products using current tax mechanisms such as the Goods and Service Tax (GST) and Value Added Tax (VAT) (Silva and Raphaely, 2015).

Although still very much at an informational and voluntary stage, the main documents reviewed in this study were: 'Sustainable Materials Management: the Road Ahead' (EPA, 2009) 'Roadmap towards a Resource Efficient Europe' (EU Commission, 2011), 'Sustainable Materials Management; Green Growth Policy Brief' (OECD, 2012a), 'Sustainable Materials Management; Making better use of resources' (OECD, 2012b), 'Fundamental Plan for Establishing a Sound Material-Cycle' (Ministry of the Environment Japan, 2008) and Plan C (Flanders, 2012). They all specifically address the need for waste policy to put a higher value on resource reduction by focussing on the earlier stages of the material life cycle. The short history of SMM is yet to provide extensive examples of actual policy implementation. However some progressive steps worth mentioning include the Integrated Product Policy rollouts in Denmark and Sweden, the EU Directive on Eco-Design for Energy Using Products, The EU Directive on Green Public Procurement and Germany's and the Netherlands's Dematerialisation initiatives (OECD, 2012a). These SMM experiments and findings integrated and expanded the already existing waste policies, uniting the

<sup>4</sup> However it should be noted that although the specific SMM label is being applied across multiple agencies, policy directives and official documents, the existing framing tactics and actual policy outcomes do differ. The Policy Research Centre for Sustainable Materials Management recently published a report 'International Discourses and Practices of Sustainable Materials Management' (2014) in which a variety of framing and policy directions are discussed. Four major international organisations are identified as significant to the SMM discourse (UNEP, OECD, G8 and G20) as well as a regional exploration of SMM in the European Union (EU). The report concludes that the framing tactics and outcomes can be differentiated.

<sup>5</sup> 12 Materials are on the list; antimony, beryllium, cobalt, fluorspar, gallium, germanium, graphite, indium, magnesium, niobium, tantalum and tungsten: as well as two groups of platinum group metals; iridium, osmium, palladium, platinum, rhodium and ruthenium (EC, 2011).

**Table 3**

This table presents the key success indicators and policy instrument examples for Sustainable Materials Management.<sup>a</sup>

	Key measurement tools	Targets
Sustainable Materials Management = closing material loops and incorporating full life-cycle thinking	<ul style="list-style-type: none"> <li>• Life cycle impact assessment results</li> <li>• Multi criteria analysis</li> <li>• Matrix of high potential areas for waste prevention:</li> <li>• Decoupling GDP from waste generation (tonnes)</li> <li>• General waste statistics</li> <li>• Composed complex indicators</li> <li>• Total material requirement</li> <li>• Material flow accounting derived indicators</li> <li>• Direct material input</li> <li>• Material input per unit service</li> <li>• Substance flow analysis</li> <li>• Domestic processed output</li> </ul>	Too complex to be specified (see OECD, 2012b 'Sustainable Materials Management: Making Better Use of Resources')
Policy instrument examples		
<ul style="list-style-type: none"> <li>• Integrated product policy</li> <li>• Extended producer responsibility</li> <li>• Directive on eco-design for energy using products</li> <li>• Green public procurement</li> <li>• Material resource taxation (extraction, production input, consumption)</li> <li>• Increased goods tax (through GST or VAT)</li> </ul>		

<sup>a</sup> Due to the complexity of some of the mathematical equations and workings of these KPI's and measurement tools and the limited scope of this paper; the above table superficially introduces some of the key success indicators and measurement tools associated with the EU's Sustainable materials management transition. For a detailed explanation please refer to OECD (2012).

traditionally separate policy paradigms of manufacturing and production management with waste management.

The SMM is a relatively new approach and therefore investigating the success of outcomes at this stage is difficult. However, the work that has already been done positions SMM as a holistic, integrated life cycle approach that can incorporate the economic component of SRMs. This also exposes the transition to a more complex array of key success indicators and measurement tools than that of the ZW transition. Therefore most SMM documents only provide a general overview of the SMM tools, equations and targets (see Table 3 below).

The Japanese 'Fundamental Plan for Establishing a Sound Material-Cycle' is perhaps the most elaborate in providing descriptive and detailed measurements and specific assigned targets (see Table 4 below).

Due to the geopolitical nature of national and union state boundaries (such as that of the EU and Japan) the flow of materials via import and export values and statistics are more readily available than that of city material flow indicators.<sup>6</sup> This enables the development of measurement tools and KPIs that address the complexity of the SMM agenda in creating solutions for full product life cycle efficiencies.

Although the SMM agenda is still very much at an assessment stage, in terms of developing and evaluating conceptual frameworks applied to materials management, it should be noted that the principles informing the SMM discourse and directions paint a very different picture to that of the ZW agenda. Even at an early stage it is still possible to assert that the SMM has so far been based more on a cyclical systems perspective than has the ZW transition.

#### 4.2.2. Governance

The governance structure in place to manage a SMM transition is still very much emerging. Many aspects of the SMM discourse correlate to future material security and assurances for Japan and the EU's economic and political safeguarding. Therefore, policy

communication and recommendations are being promoted by the centralised governance bodies at national and state levels. The necessary positioning of SMM outside the scope of a particular traditional sector (waste management, recycling or manufacturing and production) may have induced a more systematic approach than has been the case for ZW. Another positive of this centralised model is if economies of scale are required to legitimate solutions, then investment and governance at this level may be practical.

However, from a public good provision perspective, raw material governance is affected by the countries and regional states where raw materials are initially deposited (mainly Australia, Brazil, Canada, China, Dominican Republic of Congo, United States and Russia). Materials then become the property of the privatised extractive company, manufacture, producer, and finally the end consumer. When these materials are discarded as "waste", in current systems, they then fall back under the governance and ownership of the regional councils where the waste output is produced. For this reason the centralised institutions may be able to affect shifts towards SMM but will rely on the cooperation of many smaller regional and non-regional actors, necessitating a decentralised implementation plan. This will especially be relevant in governing more locally produced and managed material streams such as discarded food and bio materials (Mazzanti and Montini, 2014). This poses a major governance and policy implementation challenge.

SMM implementation strategies at a micro-level resemble the centralised governance model of zero waste, in terms of the regional confinement and proximity of the significant involved actors. However SMM governance has to be much more complex and less centralised than that commonly found within the local city approach to the ZW transition. The number and diversity of the actors involved in the SMM transition, taking in to account the full material life-cycle, is much greater. This is especially true in relation to the required inclusion of manufacturing and production entities still largely outside of Japan's and the EU's legal jurisdictions. The transition will necessitate international centralised governance bodies and agreements at the top, in conjunction with decentralised implementation models at grassroots: a governance partnership will be required. The governance re-modelling of a complex array of actors established to manage linear material systems will be required in order for a cyclical material system to emerge, playing a crucial role in the SMM transition being realised.

<sup>6</sup> Border protection and legislative impositions require that under most circumstances information can be retrieved in correlation to what enters and leaves these jurisdictional boundaries, differing from city processes that experience unrecorded mobility and material movement.

**Table 4**

This table presents the key success indicators for Japan's Sound Material Cycle Society.

	Key measurement tool equation	Target
Resource productivity	GDP/Natural resources input	60% Improvement on 2000s figures by 2015 (420,000 yen per ton by 2015)
Cyclical use rate	Amount of cyclical use/(amount of cyclical use + natural resource input	14–15% by 2015
The quantitative final disposal amount		60% Reduction from 2000 to 23 million tonnes by 2015

Source: Ministry of the Environment Japan (2008).

The differences and similarities amongst and in between the policy documents upholding the ZW and SMM discourse, demonstrates how different discourse orientation can also emerge into different policy realities. Table 5 below provides a comparative summary.

#### 4.3. Perspectives for future research

Although ZW and SMM are gaining popularity as signifiers of shifting waste policy towards SPC Policy, distinction exists between conceptualisation and implementation within and across the two concepts.

ZW discourse explicitly links to the new waste prevention and material cycle paradigm at an ideological level. However is commonly implemented through governance models that were built to manage linear material streams, therefore is actioned as a diversion from landfill policy goal. This explains why the 'zero waste' label was found to have greater resonance with agents pursuing waste transition from a relatively centralised and localised governance structure such as; businesses, universities, schools,

stadiums and cities that adopt the diversion from landfill conception. These actors often do not control production or manufacturing processes, therefore are limited in policising beyond managing their material outputs. Although effort has been made to evolve this policy label beyond landfill diversion outcomes, it is argued here that by reinstating the term 'waste', reaffirms waste as the starting problem identification, leading to policy directions that manage the problem rather than reconceptualise it.

SMM advances the new waste prevention and material cycle paradigm by establishing 'materials' as the cornerstone of policy objectives. However so far this has evolved the notion of sustainable production: by seeking to reduce raw material inputs and incorporating emerging SRM opportunities. Notably neglecting ideas of managed sustainable consumption and possibly incentivising a continuation of over consumption. The circumstances driving sustainable materials management increases governance complexity as well as the associated frameworks; this may explain the label's popularity amongst larger and more complex governance bodies such as, the UNEP and OECD.

**Table 5**

This table provides a comparative summary of the key findings.

Keywords	Documents included in the corpus	Key frames	Key performance Indicators	Governance structure
Zero Waste	On the road to zero waste. Successes and lessons from around the world (GAIA, 2012) San Francisco Zero Waste Policy (SF Environment, 2014) No Waste by 2010: Action Plan 2004–2007 (Australian Capital Territory, 2004) Toward Zero Waste – Waste Management Plan 2006 (Christchurch City Council, 2006) City of Toronto's Waste Diversion Initiatives: Zero Waste to Landfill by 2012 (City of Toronto (2005))	Limited land-fill capacity or land-fill closure  The 3 R's: waste reduction, reuse and recycle Becoming a waste free society  Becoming a green city exemplar Reducing the impact of waste on the environment  Recovering resources from waste streams	Diversion rate from landfill	Centralised  Small number of official players Initiated at the city, organisational or state level
Sustainable Materials Management	Sustainable Materials Management: the Road Ahead (EPA, 2009) Roadmap towards a Resource Efficient Europe (EU European Commission, 2011) Sustainable Materials Management; Green Growth Policy Brief (OECD, 2012a) Sustainable Materials Management; Making better use of resources (OECD, 2012b) Fundamental Plan for Establishing a Sound Material-Cycle (Ministry of the Environment Japan, 2008) Plan C (Flanders, 2012)	Current unsustainable production and consumption  Volatile resource availability and price due to protectionism and increases in demand National resource management and security  Minimising national reliance on resource imports  Reducing environmental impacts  Preserving natural capital	Resource productivity  Reduction in raw material inputs  Cyclical use rates  Final disposal amounts	More decentralised  Large number of official players  Initiated at a regional, state, national or international level

The SMM policy objective, framed towards alleviating resource scarcity and import reliance, does not incentivise or incorporate resource abundant regions and countries that currently seek to maximise on their extractive industries and resource exports. This also supports why the EU, and Japan, as raw resource deficient regions, are driving this kind of policy shift.

In order to holistically address current production and consumption concerns, policy solutions require long term visions that cognitively and practically transform waste into materials, while considering externalities such as unsustainable consumption. This involves erecting governance and business development models that address the challenges of cross boundary governance and merge currently distinct policy arenas. Looking forward, how can we instigate frameworks and linguistic symbols that more holistically deal with the challenges of cross boundary waste prevention, material cycles and conservation of raw materials? Especially if these new semiotic structures need to inclusively overlap trade discourse and embed global production and supply chains.

Although currently ZW and SMM have been treated as two distinctly separated policy areas, integrating them together and under the umbrella narrative of CE would likely merge the implementation challenge of waste and materials policy across different geographical scales. Similarly and by comparison, the main focus of the Circular Economy model, particularly in China, has evolved from a narrow waste recycling narrative to a broad material efficiency oriented closed loop system including all stages of production, distribution and consumption (Su et al., 2013). Furthermore, governance and governments are seen as critical players in the strategic development and promotion of the Circular Economy, by reforming existing laws and policies, enacting new regulations, promoting the application of new environmental technologies and organising public education (Geng and Doberstein, 2008).

On one hand, ZW could continue to be used to increase collection and recycling, diverting waste from landfill and incineration at local, retailing industry and regional levels. Whilst on the other hand, SMM could establish markets and infrastructure to handle these outputs and reduce overall raw material requirements at national and multi-national levels. Beyond this, the three key principles driving CE;

- *Reverse logistics* develops systems and infrastructure to encourage material flows back to the producer,
- *Functional Economy* incentivises the sale of a service over the sale of a tangible product (see Philips initiative; selling light not light bulbs<sup>7</sup>) and
- *Industrial symbiosis* encourages industrial partnerships to trade waste materials as resources amongst each other.

Provide an opportunity to more systematically incorporate sustainable production and the often missing link to sustainable consumption.

This is especially prevalent to the notions of a functional economy (also referred to as servitisation or product-service systems) whereby a business model adapts to selling the function of a product (while keeping ownership) instead of selling the tangible product itself. This establishes a strong case against inbuilt product obsolescence which consequently encourages the purchase of a new tangible good, disregarding the product deemed obsolete. As when ownership remains with the producer, product innovation towards

longevity is more valuable. The significant appeal of this model for industries aiming to dematerialise and minimise on the impacts of volatile resource costs associated with large economies of scale production (Heck et al., 2014), as well as the wider environmental and social benefits are extensively discussed (see Beuren et al., 2013; Tukker and Tischner, 2006). However this body of research remains relatively absent from waste policy transitions.

The opportunities presented by the Circular Economy model in both increasing business opportunities, decreasing environmental impact, improving resource efficiency and strengthening business competitiveness involve the objectives of both the Zero Waste and Sustainable Materials Management discourse. This recent adoption of the Circular Economy model encourages design for re-use and improved material recovery representing a closer association with Sustainable Production and Consumption thinking and focus (Genovese et al., 2015). Intrinsically this move towards a Circular Economy will involve, significantly different and more innovative ways of collecting, processing and reutilising materials, new forms of waste related governance, policy and metrics and a more holistic understanding of how to motivate both consumers and industry in their uptake of closed loop production materials management.

The recent proliferation of Chinese research and publication in Circular Economy design, frameworks and application (Geng et al., 2012; Park et al., 2010; Su et al., 2013), is confirmation of the value of enhanced waste policy being a key area of future research in sustainable development.

Other future considerations should explore the changes in production and manufacturing technology. Particularly prevalent is the emergence of 3-D printing, enabling production at the realms of individual consumers, impacting current material flows and governance frameworks. Perhaps insights drawn from the decentralisation of the energy markets, through localised instillation of solar polyvinyl chloride (PVC) and battery systems, may be of significance to the possible end of large scale centralised production and manufacturing.

The growing connectivity and consumer market trends such as the service, experience and sharing economies, propelled by expanding peer to peer and open source platforms may also provide insights into policy directions aiming to drive economic growth while pursuing a reduction in the consumption and output of raw materials.

## 5. Conclusions

This review and analysis examined the evolving discourse of waste policy by identifying ‘waste prevention and reduction’ and ‘materials cycles’ as two distinct general discourse orientations to have emerged in the last decade. ‘Zero Waste’ has emerged as a common label for ‘waste prevention and reduction’ and ‘Sustainable Materials Management’ as a prominent label for ‘materials cycles’. The waste transitions presented also support the notion of an overall discourse adaptation within the waste arena; where the concept of waste and how it is managed are seen to be on an evolutionary track, moving away from the end-of-pipe linear based models of the past towards a future understanding of resource recovery, reusable materials and life cycle thinking. It is in this transition towards a Circular Economy type model of closed loop waste management that this paper has considered the role of discourse in both supporting and or detracting from the development of waste policy.

The results demonstrate that the difference in policy label, keywords and framing tactics has also resulted in different discourse paradigms around the concept of ‘waste’ or ‘materials’, which in turn influences what policy initiatives, measurement tools and outcomes are pursued, validating the importance of deeper

<sup>7</sup> “Philips is already selling light as a service – where customers pay for the performance of lumens, measures of light output, rather than the physical hardware of a light bulb or light fitting” <http://www.philips.com/a-w/innovationandyou/article/extended-story/Circular-economy.html>.

consideration when selecting labelling and keywords to promote policy reforms. This paper suggests that policy practitioners and academics should refrain from using the single term ‘waste’ within policy development, with an aim to strategically take this important discussion away from ‘wasteful’ end-of pipe solutions. Alternative terms, such as “materials”, “resources” or “tangible output” help widen the applicability and inclusivity of important actors and industry players currently outside the waste paradigm, encouraging the much needed reformation and transition of current waste governance structures and the reconceptualisation of waste policy as the management of underutilised or unutilised materials. Waste prevention and reduction is clearly a complex policy and governance challenge. However, it is also an opportunity to reframe policy solutions with ideologies, strategies and paradigms that build capacity for waste management to move from its current wasteful focus on end-of-pipe solutions to the provision of sustainable consumption and production material flow and waste utilisation. The real meaning of Zero Waste and Sustainable Materials Management.

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## Abbreviations

- 10YFP on SCP*: Rio 20+ 10-Year Framework of Programmes on Sustainable Consumption and Production
- 3 R's*: reduce, reuse, and recycle
- BREF*: Best Available Technique Reference
- CE*: Circular Economy
- CRMs*: critical raw materials
- EEA*: the European Environment Agency
- EPR*: Extended Producer Responsibility
- G8*: the Group of Eight
- G20*: the Group of Twenty Major Economies
- GDP*: gross domestic product
- GST*: goods and service tax
- KPIs*: key performance indicators
- MEF*: material efficiency
- MFA*: material flow accounts
- NGOs*: Non-Governmental Organisations
- OECD*: Organisation for Economic Co-Operation and Development
- PVC*: polyvinyl chloride

*REEs*: rare earth elements

*SMM*: sustainable materials management

*SPC*: sustainable production and consumption

*SRMs*: secondary raw materials

*SMCS*: Fundamental Plan for Establishing a Sound Material-Cycle' Society

*UNEP*: United Nations Environmental Programme

*VAT*: value added tax

*WPr*: waste prevention

*WTO*: World Trade Organisation

*ZW*: zero waste



## Review

# From waste to sustainable materials management: Three case studies of the transition journey



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## ABSTRACT

Waste policy is increasingly moving on from the 'prevention of waste' to a 'sustainable materials policy' focused agenda recognising individual wastes as a resource. In order to comparatively analyse policy developments in enhanced waste management, three case studies were selected; San Francisco's *Zero Waste Program*, Flanders's *Sustainable Materials Management Initiative* and Japan's *Sound Material-Cycle Society Plan*. These case studies were chosen as an opportunity to investigate the variety of leading approaches, governance structures, and enhanced waste policy outcomes, emerging globally. This paper concludes that the current transitional state of waste management across the world, is only in the first leg of the journey towards Circular Economy closed loop production models of waste as a resource material. It is suggested that further development in government policy, planning and behaviour change is required. A focus on material policy and incorporating multiple front runners across industry and knowledge institutions are offered as potential directions in the movement away from end-pipe land-fill solutions.

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**Abbreviations:** 10YFP on SCP, Rio 20+ 10-year framework of programmes on sustainable consumption and production; 3R's, reduce, reuse, and recycle; CE, circular economy; CR's, circulative resources; EEA, the European Environment Agency; EPR, extended producer responsibility; EU, European Union; GDP, gross domestic product; KPIs, key performance indicators; MFA, material flow accounts; MOEJ, Ministry of Environment, Japan; MSW, municipal solid waste; NGOs, non-governmental organisations; OECD, organisation for economic co-operation and development; OVAM, public waste agency for Flanders; SMM, sustainable materials management; SRMs, secondary raw materials; SMCS, fundamental plan for establishing a sound material-cycle society; TM, transition management; UNEP, United Nations environmental programme; ZW, zero waste.

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## 1. Introduction

Waste is a guaranteed component of any urbanised landscape and the management of waste has existed for centuries. Propelled by an economic philosophy of exponential growth through consumerism, the availability, complexity and rapid manufacturing of consumer products is creating highly unsustainable levels of 'waste' material outputs. These point to the urgent need to remodel the way waste is managed (Rootes, 2009; UNEP, 2011).

Waste management has for the most part provided end of pipe solutions, whereby increasing amounts of discarded materials are buried, dumped out at sea or turned into ash, creating the need for the extraction of further raw materials. These methodologies do not make the best use of the waste as a resource or do not deliver satisfactory environmental outcomes. The waste sector is better understood as a necessary part of the sustainability agenda, requiring more holistic solutions that take into account the concepts of sustainable production and consumption and the circular economy.

The waste industry is now recognised as an underutilised 'resource industry' in its own right, with increasing focus on waste having inherent economic value. Formal and informal recycling practices have emerged as a dominant force, central to most waste management programs in the developed world (Karani and Jewasikiewitz, 2007). Furthermore, increasing focus on economic innovation and entrepreneurialism during recent times of slow international growth has also seen more economic policy focus on waste management.

Significant policy innovations in waste management have emerged over the last decade to address the growing demand for materials and mounting evidence of ecological and societal impacts of our throw-away consumerist economy. Whilst some policies aim at reforming the traditionalist waste management frameworks, others fundamentally reconceptualise and reframe it altogether (Cramer, 2013; Lauridsen and Jørgensen, 2010).

The world of waste management is moving away from conventional landfill and recycling of both municipal and industrial waste towards integrated waste policy. Programs involving zero waste targets and 100% diversion from landfill are increasingly noted with rising urban densities and land prices in major cities across the world. Sustainability outcomes, sustainable production and consumption behaviours and circular economy programs all underpin new standards in governance structures and waste policy intervention. Furthermore, environmental regulations, material cost and material scarcity are also creating an awareness of eco-design benefits in linking end of life waste materials as recycled/returned inputs to earlier production stages (Andrews-Speed et al., 2012; EEA, 2014; UNEP, 2011).

Although Circular Economy thinking has shown closed loop systems can provide greater social and environmental benefits when confined to bottom-up supply-chain management systems, advantages of waste governance at multiple spatial levels can also be noted (Mazzanti and Montini, 2014; Ghisellini et al., 2016).

The following review will focus on three exemplar case studies to illustrate three different approaches to waste management across the world and the increasing value seen in the policy management of waste as a resource. Each case is considered an

exemplar of a local, regional or national enhanced waste management policy program

## 2. Methodology

In order to comparatively analyse policy developments in enhanced waste management, three case studies were selected; San Francisco's *Zero Waste Program*, Flanders's *Sustainable Materials Management Initiative* and Japan's *Sound Material-Cycle Society Plan*. These case studies were identified as opportunities to investigate the variety of leading approaches, governance structures, and enhanced waste policy outcomes, emerging globally.

A review of academic literature as well as authoritative assessments conducted by key government bodies and research agencies produced substantive understandings of each case. Political documents, policy instruments, industry reports and published quantitative results were analysed. Interviews with relevant officials were conducted and the authors of existing case study materials were also engaged.

### 2.1. Case studies

#### 2.1.1. San Francisco (Zero Waste Program): 100% diversion from landfill

In the first case study the details of the San Francisco Zero Waste program are presented. This case was selected because it is one of the more publicised and recognised recent zero waste initiatives and is often used as a zero waste exemplar. Since 2002 this city has had considerable success in driving a zero waste program having achieved their goal of 75% diversion of waste from landfill and incineration in 2010, with current estimates stating an 80% diversion rate. It is also recognised as the national leader in waste management within the US. We provide a brief overview of San Francisco's actions, examined through publicly available government and policy documents produced and published by the San Francisco Environment department as well as building upon the work of Krausz, 2012 and other secondary academic and industry reports.

#### 2.1.2. Flanders (Sustainable Material Management): Selective collection and recycling

A prominent example of the transition from conventional waste management to an integrated materials policy is the Flanders's Sustainable Material Management (SMM) program. The case was selected on the premise that the initiative was one of the first regional attempts at such a policy. This case has been selected since the change trajectory has been the focus of in depth study and multiple publications (Paredis, 2013) which enabled deep insights into how the initiative took shape and the relevant outcomes that ensued. In this case study the emergence of the concept of materials in the waste discourse within Flanders is analysed and some of the activities, outcomes and future directions are outlined.

### 2.1.3. Japan (Sound Material-Cycle Society): Improving resource productivity whilst simultaneously reducing waste output

Japan's recycling initiatives date back to the late 1970s. However the urbanisation of Japan's major cities in the mid 1980s combined growing economic affluence, high density population and mass-consumption, creating difficulties to resolve and manage waste and recycling within Japan's municipalities. Responding to these changes, Japan experienced a policy shift in waste and recycling management towards a national framework founding a 'Sound Material-Cycle Society'. Three fundamental plans were produced and published by the [Ministry of Environment, Japan \(2001, 2008, 2013\)](#). These available documents, as well as other significant academic and industry reports assessing the Japan Sound Material-Cycle Society plan, guide the findings outlined in this article.

## 3. Description

### 3.1. Diverting waste from landfill: San Francisco (Zero Waste Program)

In 1989, 90% of waste in California went straight into landfills. However the Integrated Waste Management Act, Assembly Bill 939 (1989), established goals to divert 25% of waste by 1995, 50% by 2000 and 58% of all waste by 2007. This initiative driven by the State of California prompted San Francisco City to further improve its waste management goals, exceeding the state's legislative requirements. In 2002, the Board of Supervisors in San Francisco took a leadership role in assembling a waste policy and program package that sought to divert 75% of waste by 2010 and 100% by 2020 ([SF Environment, 2014](#)). Specific waste streams were targeted through successive measures such as the Construction and Demolition Debris Recovery Ordinance in 2006 and the Food Service Waste Reduction Ordinance in 2007. In 2009 the Universal Recycling Ordinance involving a three-cart collection program was also rolled out to both private and commercial establishments and was the first for a major US city ([Sullivan, 2011](#)); the actual diversion rate is currently 80% ([SF Environment, 2014](#)).

The key player driving the program is SF Environment, a government body responsible for environmental policy development and implementation. The 2020 target of 100% diversion from landfill was marketed and labelled 'Zero Waste'. Awareness that several other known jurisdictions had adopted the term and similar diversion goals objectives (such as Toronto, Canada and Seattle, Washington) was the stated motivation for the Board of Supervisors to move forward with it ([Krausz, 2012](#)). Although no systematic process is linked to applying the Zero Waste label, extensive exposure and recognition has been achieved by successfully enacting the term through media channels and in the San Francisco waste reports and future vision documents, such as the Environment Code.

San Francisco's Zero Waste objectives were framed through the city's culture and vision of being recognised as a leading example of a sustainable city. This overall ambition is coming to fruition for San Francisco: the city received a United Nations award for best green building policies, and it also topped the North American Green Cities Index ([SF Environment, 2014](#)).<sup>1</sup>

Diverting waste from landfill and incineration was seen as a viable waste policy outcome supported by an increase in landfill levies, an already established 'pay-as-you-throw' mechanism and a strong anti-incineration mentality. The program enforced garden and food waste to be separated and processed into mulch or compost rather than co-mingled with general waste. With organic

materials often accounting for two thirds of general waste weight, especially for large standalone dwellings, the third-cart program had clear cost-benefit outcomes. Measuring diversion was based on California's diversion calculation methodology which applied to all cities and counties under the state's jurisdiction. San Francisco ascertained their diversion rate according to weight data gathered from San Francisco's waste service contractor Recology (see [Table 1](#)). The current success of diverting 80% of waste from landfill can be attributed to an already existing recycling culture, which enabled societal openness to civic engagement and educational programs and readiness to make behavioural changes. The existing waste and recycling infrastructure, processes and systems also enabled adjustments to take shape.

Although the city's ambition to reach 100% diversion from landfill and incineration by 2020 has been highly regarded, many have pointed out the limitations and uncertainties in using mass recovered statistics and recycling percentages as it does not account for social or environmental externalities (see [Pires et al., 2011](#)). [Zaman and Lehmann \(2013\)](#) demonstrate that a focus on diversion rates can hide actual increases in waste generation. Thus the real merit of San Francisco's Zero Waste objectives is debatable within the context of an increasing need for sustainable production and consumption goals

Furthermore, in San Francisco reductions in waste at the production and manufacturing side of the product lifecycle are incentivised by soft voluntary based policy rather than a regulatory approach. By contrast, greater investment and policy measures are focused more aggressively on managing end of life cycle processes. Therefore the policy is still effectively directed at diversion rates from landfill. Whilst this is still a very positive effort, it does not fulfil the true intention of the zero waste philosophy, which is defined by the Zero Waste International Alliance ([ZWIA, 2013](#)) and Zero Waste Europe:

*"Zero Waste is a goal that is both pragmatic and visionary, to guide people to emulate sustainable natural cycles, where all discarded materials are resources for others to use. Zero Waste means **designing and managing products and processes to reduce the volume and toxicity of waste and materials**, conserve and recover all resources, and not burn or bury them. Implementing Zero Waste will eliminate all discharges to land, water, or air that may be a threat to planetary, human, animal or plant health."* (our emphasis)

Strong industry lobbying behaviour has potentially disabled stricter front-end approaches. This pressure was particularly evident in the clashes experienced in implementing the earlier Plastic Bag Reduction Ordinance. During this time the American Plastics Council, American Chemistry Council and large supermarkets launched a campaign and legal attack against the City, which they eventually lost. The City was able to establish a Plastic Bag Reduction Ordinance in 2007 which then developed into the San Francisco's Extended Bag Reduction Ordinance in 2012. However whilst it has been difficult enforcing policy on industry, the Mayor and City Hall have taken a 'lead by example' philosophy, banning single-serve plastic bottled water containers within government departments by introducing an Executive Directive on Bottled Water, as well as an Ordinance for Environmentally Preferable Purchasing for Commodities ([SF Environment, 2014](#)). Although these attempts have been well received by the general community, gaining the approval of industry remains a challenge.

The 100% diversion goal has not yet resolved the issue of non-recyclable or compostable materials which will need to be managed or methods that assess specific material value and externalities. Higher density living and inner city apartments have also raised challenges for the City, with previous building codes

<sup>1</sup> <http://www.sfenvironment.org/video/san-francisco-tops-the-the-us-canada-green-cities-index>.

**Table 1**

This table presents the key success indicator for Zero Waste, San Francisco.

	Key Measurement Tool	Latest published diversion rate	2020 Target
Zero waste diverting waste from landfill and incineration	Diversion rate = $\frac{\text{weight of recyclables}}{\text{weight of waste} + \text{weight of recyclables}} \times 100$	80% landfill diversion	100% landfill diversion

Developed from Silva et al. (2016) pp 229.



**Fig. 1.** San Francisco's zero waste governance structure.

requiring a single waste disposal chute not supportive of a three bin program. The City recently passed legislation ensuring new apartment buildings implement a 3 chute system.

Beyond the waste reduction activities imposed within the City's departments and sectors under their direct control, 'preventive' policies at the front end of product lifecycles, such as producer responsibility frameworks, are quite limited in San Francisco. The SF Environment staff are well aware of this challenge as well as the misleading nature of using a diversion rate as the main indicator for waste management success. The future intention of the SF Environment's Zero Waste program is to shift towards more full-life cycle and reductionist thinking (Krausz, 2012).

### 3.1.1. A three pronged approach to governance

From a governance perspective San Francisco's Zero Waste program was implemented through a centralised and relatively simple governance and leadership structure. Most of the program's activities were enacted through the City's waste legislators SF Environment and its waste service partners, Recology, in consultation with San Francisco citizens (see Fig. 1). Many of the policy measures required serious economic investment and a hard policy approach which left little room for noncompliance. This tactic is best implemented from a centralised and locally positioned governance structure that enables close proximity for direct stakeholder consultation but does not require the approval of multiple and diverse actors.

Another mechanism that supported the centralised governance structure was the exclusive waste management rights provided to the innovative and forward thinking waste servicer, Recology, who had a long standing historic relationship with the City of San Francisco as well as significant investments in recycling infrastructure. The San Francisco authorities awarded a long term contract to Recology to handle all waste including recycling and landfilling until 2025. Although the regulated monopoly came under some fire by those that opposed the decision, the majority (71%) of San Francisco residents surveyed approved the decision (Krausz, 2012). The allocation of almost the entire San Francisco waste service to Recology was seen to allow for more direct engagement and experimentation with less time-wasting. This structure also ensured a greater economic incentive for Recology's further invest-

ment in composting and recycling capabilities and infrastructure (Tam, 2010).

Although this geographically confined and relatively centralised governance structure enables rapid dissemination and implementation of some policy directives, there are also limitations to it. These may include a lack of ownership and inclusivity amongst major industry players and other relevant stakeholders outside of the governance structure. The geographical containment is an interesting element of 'zero waste'. Examples of zero waste programs, initiatives, frameworks and policy directives, beyond the San Francisco case often reveal a spatially confined governance structure with a local or regional focus. This is consistent with the geographically bounded waste management configurations evident in traditional limited waste management practices and processes (Davies, 2005; Rootes, 2009).

If SF Environment's future goals of moving towards a full life cycle approach is to be reached then the complexities of the current 'three tier' governance model will surely escalate to include a multitude of additional actors. Therefore the challenge to implement closed-loop material policies remains, because material flows and economic activities lie outside San Francisco's jurisdictional control.

### 3.2. Re-conceptualising and re-governing waste policy: Sustainable material management in Flanders

Flanders, in Belgium, has been able to promote itself as one of the top regions in the EU for selective collection and recycling since the beginning of the 21st century. The earlier Flemish waste policies were considered satisfactory until in 1995 the Flemish government developed the environmental multi-year plan (MINA-plan) and determined that previous waste plans would be abolished in favour of a new waste policy direction that would integrate more holistically into the region's future strategic environmental visions. Although these new directives have produced wins such as a reduction down to 3% in household waste sent to landfill in 2006 and an increase in selective collection of household waste from 18% in 1991 to 71% in 2006, the total amount of household waste being produced hit an all-time high of 550 kg per person in 2000 and plateaued at that level (MIRA, 2011; Paredis, 2011, 2013). A growing concern amongst policy makers to prevent increasing generation of waste was evident in the policy debate and it was around this time that the Flemish government embarked on a transformation of waste policy.

A coupling of three evolutions inspired this transformation process: an evolution in thinking about waste policy, general environmental policy, and the organisation of government administration (Paredis, 2013). Pioneers from the Public Waste Agency for Flanders (OVAM) acknowledged the role of OVAM in initiating and supporting the transition and proposed Transition Management (TM) as a way to operationalise a shift towards materials policy. Transition Management was at the time gaining a reputation in the Netherlands as a viable framework to instigate policy and social change towards sustainable outcomes - one in which a government is aware of its limitations in steering system change and takes on an active role in networks, uses multi-actor

approaches and stimulates learning and experiments (see [Loorbach and Rotmans \(2010\)](#)). In an attempt to re-conceptualise and re-envision innovative waste management solutions, Flanders's TM process encompassed actors beyond the traditional waste management governance silo, who were open to change and innovation.

After consultation with the prominent Dutch scholar and practitioner Jan Rotmans and his team of Transition theorists at ICIS Maastricht, the Flemish waste authority adopted transition management as the appropriate process in creating the sustainable materials management program ([Paredis, 2011](#)). Shortly after, government officials set up a genuine transition trajectory, adopting a systems view which perceived conventional waste management as ineffective in resolving issues of unsustainability.

A new policy trajectory was developed: first introducing “prevention of waste”, then “resource flow management” and finally “materials policy”. There was a general consensus that the term ‘materials policy’ best encompassed the agency's new direction. The transition trajectory was anchored via the establishment of a transition platform for sustainable materials management, called ‘Plan C’. (Plan A = business as usual, Plan B = optimisation, Plan C = system change). Plan C was the result of the envisioning exercise of OVAM's transition approach and reflected the shift from an executive role to a role of catalysing innovation ([OVAM, 2011; Plan C, 2015](#)).

The involved government entrepreneurs were able to instigate a significant mind shift: to really benefit the environment, waste needs to be designed out of the whole life cycle of the economy. The likelihood of the existing and dominant waste paradigm standing in the way of such a transformation prompted an acknowledgment by OVAM that the waste sector itself needed to change to accommodate a totally new discourse and very different management practices. In order to nurture innovative thinking, Plan C was first conceived by a group of front runners, as an independent non-profit organisation that strived for a broker and incubator function for innovation trajectories, acting as an intermediary in the quadruple helix (state, industry, civil society and science) ([OVAM, 2011](#)). From 2006 to 2008 significant time was spent building legitimacy and awareness amongst larger regime actors involved in the waste and materials sector. Eventually the push to focus policy innovation towards sustainable materials management started to gain much more salience and permanency amongst Flanders' decision makers. After a Round Table on Sustainable Materials Management in 2011, the Flemish government decided to embrace ‘Sustainable Materials’ as a spearhead policy related to the major societal challenges of the region ([Regerin, 2011](#)). The developed Flemish Materials Program encompassed 10 new levers;

1. Sustainable design	7. Bio based economy
2. Transparent materials	8. Critical metals in a permanent cycle
3. Smart cooperation	9. Sustainable housing and building
4. Smart investment	10. Sustainable chemistry and plastics in a permanent cycle
5. Better regulation	
6. New materials in a permanent cycle	

It is generally acknowledged that the transition approach of OVAM, resulting in the transition network platform Plan C, played a decisive role in the shift from a waste to resource/materials discourse and embedded ‘materials thinking’ into the Flanders waste sector and beyond. As stated by [Paredis \(2011\)](#);

*“All in all, the change in discourse from waste to sustainable materials management is undeniable. It is not only taken up in the Materials Decree and propagated by OVAM as main government actor, it also seems to find support with all actors involved in the waste/materials system: advisory councils, different sectors of the industry, knowledge actors such as universities and VITO, and NGO's. Politically, the build-up of the discourse coalition benefited from the possibility to link it to ongoing developments at European level and to the innovation and green economy debate at Flemish level”* (pp. 147).

The updated policy also sought to ensure that the program incorporated more players within the materials sector.

### 3.2.1. A transition management approach: Multi-actor governance in action

As mentioned the TM principles dictate a systems approach to innovation encouraging OVAM to include multiple actors who are front-runners in their fields of expertise. This significantly reconceptualised the governance from the traditional waste three tier model (government, households, waste company) to a multi-level and multi-actor governance structure. Although OVAM was at the centre of the governance model, heavy investment was made in participatory and collaborative processes that included participants from knowledge institutes, industry, expert consultants, the NGO sector and community in general. This encouraged creative risk and visionary solutions which eventually led to the production and installation of Plan C and later the Flemish Materials Program.

The actors within the transition arena did change and evolve with the process, as new players enter the policy arrangement and old actors either leave or reformulate their roles. However effort was made to ensure a wider inclusion beyond OVAM was maintained throughout ([Paredis, 2011](#)). [Fig. 2](#) illustrates the current governance model of the Sustainable Materials Management program in Flanders.

The number and diversity of the actors involved in the Flemish waste to materials transition led to some opportunities and challenges for both OVAM and Plan C. Challenges arose with conflicting interests, overlaps in jurisdiction and confusion over funding arrangements and responsibilities. However the opportunities have included the acceptance of the materials concept by regime players in Flanders such as the chemical industry. The materials discourse was also successfully integrated in the ViA Agenda 2020 ([Vlaanderen in Actie, 2012](#)), which articulates the future vision for Flanders. The materials orientation also gained traction within the Environmental ministries at the European level (i.e. in the EU) ([Paredis, 2011](#)).

The Transition process used in the Flanders Materials Program expanded the often narrow concept and governance model of waste management by incorporating an inclusive participatory approach that brought together frontrunners across knowledge institutes, industry, consultancy, and the NGO sector. This collective process encouraged holistic innovative thinking and new industrial systems to unfold, including a booming interest in secondary raw materials, technospheric/urban mining and investment into sustainable plastics chemistry. Breaking away from the waste management silo, Flanders was able to move towards a material management program, highlighting the conceptual and governance changes necessary for innovation, sustainability and resilience.

Even though the transformation from waste to materials management is still in progress, early studies point out that changing mentalities around resource use are also dispersing into civil society. For example, there was an increase in home composting from 41% in 2006 to 52% in 2012 driven by the compost master strategy

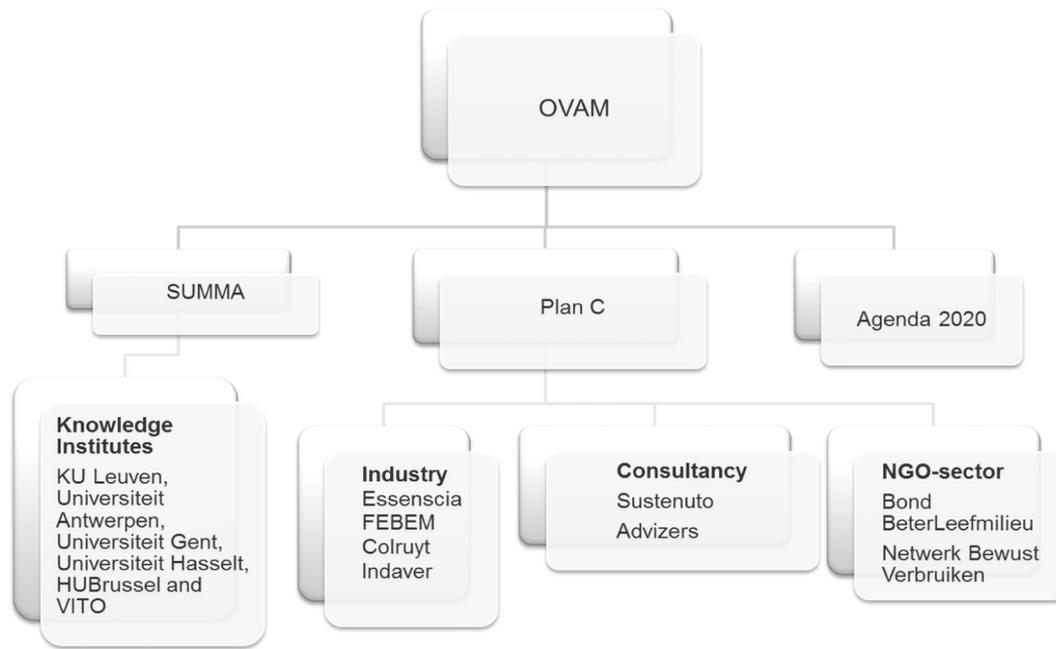


Fig. 2. Flanders's sustainable materials management governance structure.

Table 2  
Key success indicators for Japan's sound material cycle society with targets.

	Key measurement	Improvement on 2000 based on the most recent data	2020 Targets
Inlet: Resource productivity	GDP/natural resources input	51% improvement to 374,000 yen/ton	460,000 yen/ton
Inlet: Resource productivity excluding input of earth and rock	GDP/Natural resources input – earth and rock	10% improvement to 602,000 yen/tons	680,000 yen/tons
Circulation: Cyclical use rate	Amount of cyclical use/(amount of cyclical use + natural resource input)	15.3%	17%
Output: The quantitative final disposal amount	Final weight of waste sent to landfill	67% reduction to 19 million tons	17 million tons

Developed from Ministry of Environment, Japan (2013).

of OVAM, which has effectively reduced household waste (Claes and Smet, 2012; OVAM, 2013). In addition, indirect evidence shows that for the whole of Flanders collection of donated goods increased 7% yearly from 2002 to 2010, effective re-use of collected goods per resident increased from 3.12 kg in 2003 to 4.32 kg in 2012 and the number of customers going to local re-use shops has increased to more than 5 million in 2014, generating a turnover of 45.5 million euro (KOMOSIE, 2014). In addition, there is a growing number of European companies involved in shifting to circular materials management (C2CN, 2015).

Other developments, such as the EU resource efficiency strategy and external pressures on resource availability and price, reinforced the conceptual and long term vision of Plan C and its policy community. Also, a growing number of front running companies embraced sustainable materials use as a corporate strategy, either based purely on economic logic or on a desire to show leadership in socially and environmentally sound business models (Nevens et al., 2014). Evolutions in product-service systems, chemical leasing, landfill-mining, closed loops of materials, product design, and local production and consumption, are all examples of system changes well beyond conventional waste management.

The Flanders materials program initiated by OVAM, was the first larger scale waste to materials policy restructure in the world (OVAM, 2013). In 2016, the main theme for Plan C is the circular economy, with the Flemish Materials Program having won a Circular award at the World Economics Forum for its dedication

to shift towards a circular economy, the impressive amount of projects that have been started and its participatory nature in shaping sustainable materials management.

Not only did OVAM significantly promote a new materials discourse across the waste industry, it also initiated long term visions of practical application. Although relatively new in conception and requiring improvement, material management is making headway globally as a strong policy pillar in addressing the sustainable development goals to build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation and ensure sustainable consumption and production.

### 3.3. The 3Rs guiding Japan's National Policy towards a Sound Material-Cycle Society

The policy logic of the waste hierarchy (reduce, reuse, recycle, recovery, and disposal) prioritises the reduction and reuse of materials ahead of recycling and disposal solutions in order to reduce mass-consumption and waste generation (EEA, 2014; UNEP, 2011). Consequently Japan's Fundamental Plan towards Sound Material-Cycle Society incorporates reduce and reuse principles to enhance the existing recycling, recovery and disposal treatment processes.

Japan's vision to establish a 'Sound Material-Cycle Society' (SMCS), originated in 2000 through the successive development of the first Fundamental Plan, initiated by the re-structured Ministry

of Environment, Japan (MOEJ). By 2008 a second ‘Fundamental Plan for Establishing a Sound Material-Cycle Society’ was published addressing goals until the end of 2015. More recently in 2013, a third Fundamental Plan was published, which revised the plans in light of the 2011 East Japan earthquake disaster, setting goals to 2020. The principles guiding the plan focused on the 3R concept (Reduce, Reuse, and Recycle). The policy required centralised government control in order to implement a legal framework adequate to ensure compliance and provide centralised subsidisation for the roll out of high-tech materials management infrastructure nationally.

The motivations to move towards SMCS shares a similarity with the geo-political and economic drivers of the Flanders SMM. Key reviewed documents alluded to Japan’s desires to become less reliant on imports especially after the oil crises of 1978, and to achieve long term economic sustainability (OECD, 2012). Japan’s international positioning as a leader in technology and innovation is also identified as a motivation for SMCS in persisting with Japan’s global competitiveness in the emerging ‘Secondary Raw Materials’ industries (Ministry of Environment, Japan, 2008; Silva et al., 2016).

The Japanese ‘Fundamental Plan for Establishing a Sound Material-Cycle Society’ is perhaps the most elaborate Policy document in providing descriptive and detailed measurements and specific assigned targets in relation to the 3Rs principles. Resource productivity is measured by a reduction in resource inputs (inlets, imports) and the reuse of materials by ensuring an increasing cyclical use rate. Reduction is also measured by decreasing the final disposal amounts in tons (see Table 2).

The Fundamental Plan’s (2008; 2013) Key Performance Indicators (KPIs) utilise a variety of already existing policy agenda and legislative frameworks, incorporation with newer directives. Some of the newer KPIs include a list of ‘Effort Indicators’ including: emissions measurements, number of recycling plans drawn up by local governments, average use years of durable consumer goods, resource consumption per capita and the reuse and sharing market size. Effort indicators are used as supplementary indicators to the main Inlet/Circulation/Outlet goals.

### 3.3.1. Recycling

The sophistication of Japan’s existing recycling initiatives and infrastructure enabled a smooth rollout of legislation that further developed the collection of specific end of life materials. Acts include: Construction Materials (2000), End of Life Vehicles (2002), Container and Packaging (2006), Food Waste (2007) and Home Appliances (2012) (Hotta, 2013). Separation at source has been a popular mechanism, with a seven bin system commonly found across Japan’s Municipalities. However Japan’s reliance on high rates of incineration has led to relatively low recycling rates. In order to improve and implement initiatives that promoted the SMSC policies and the 3R’s principles on the ground, MOEJ partnered with and subsidised the Eco-Towns program, which acted as a cornerstone of recycling performance through Eco-Industrial development implemented across selected towns (Hosomi, 2015). The MOEJ aims to develop Recycling Zones specialising in the management of specific materials. These areas will likely expand beyond one Municipality’s control, requiring MOEJ to facilitate collaboration amongst the relevant stakeholders. The Fundamental Plan demonstrates the need to develop recycling industry locally and advance the quality of recycling processes in order to achieve material reuse and waste reduction.

### 3.3.2. Reuse

The SMSC Policy framework also expanded beyond recycling to Extended Producer Responsibility (EPR) with a law to promote effective utilisation of resources enacted in 2001 and the expansion of the Home Appliance Recycling Law where Japanese retailers and manufactures are held accountable in taking back home appli-

ances. The law considers an item recycled only when, after take back, it is later ‘re-sold’ as a ‘resource’ in the market. This policy encourages higher quality design and disassembly considerations at the manufacturing point (Ongondo et al., 2011). The Fundamental Plan also introduces the notion of high quality housing, designed for longitudinal generation reuse as well as outcomes pursued through the promotion of ‘Common ownership’ products, such as car sharing and shared housing.

Reuse is measured by a steady increase in the Cyclical Use Rate, which provides an indication of the utilisation of existing materials rather than those newly imported. The reuse and recycling mechanisms work closely together to ensure this KPI is met.

The Fundamental Plan’s (2013) recently established ‘Effort Indicators’ include power generation and heat utilisation from waste within the circulation (reuse) strategies. Power and heat recovery through incineration debatably does not align with the reuse concept (Silva et al., 2016). However Japan has positioned incineration solutions across the 3Rs, particularly due to tightening landfill limitations and increasing land costs.

The concept of Circulative Resources (CR’s) is a slightly alternative labelling approach used by the Japanese. Referencing the cyclical and circulative terminology continuously throughout the Fundamental plan is coherent with the more recent cyclical systems/circular economy discourse.

### 3.3.3. Reduce

In 2010 93% of Municipal Solid Waste (MSW) was treated through incineration processes, with only a small number of plants linked to recovered energy (Pariatamby and Tanaka, 2014). Although reports produced by the MOEJ promote a significant decrease in MSW generated, reliance on incineration has the tendency to obscure waste generation data by only accounting for land-filled waste. Although reliance on incineration is shown to be slowly decreasing, land restrictions in Japan enforce strict limitations on available landfill sites, thus incineration has been implemented widely; latest incineration plant numbers standing at around 1220 (Pariatamby and Tanaka, 2014). Despite the possible social or environmental penalties Japan’s spatial limitations posit incineration favourably. It is important to recognise these different variables when assessing waste policy across geo-political regions.

Unlike San Francisco’s Zero Waste program, aimed at an increased diversion rate from landfill and incineration, Japan’s SMCS objectives focus on reducing the weight of waste disposed, by tonnage. Establishing quantitatively measured waste weight reduction rather than a diversion rate or targeted material recovery focus, perhaps provides a clearer indication of actual waste generation. However by not including materials sent to incineration, Japan’s waste reduction progress does not fully account for materials lost in this process; thus the foundations of the 3R philosophy (Reduce, Reuse, Recycle), especially ‘reduce’, are not sufficiently met, or well developed (Connett, 2013).

Investigating the key documents associated with the SMCS transition produces similar findings to that of SMM with respect to the emphasis on the life cycle of materials. However use of the term ‘society’ here presents a new philosophy in policy direction with a focus of societal aspirations and community engagement. This suggests that SMSC moves beyond an objective focus on material management and is rather more encompassing. The Fundamental Plan refers to the philosophy of ‘mottainai’<sup>2</sup>: a tradi-

<sup>2</sup> “In the first decade of the twenty-first century, Japan experienced a surge in the evocation of the word “mottainai” most simply translated as “wasteful.” Children’s literature, mass-market nonfiction, magazines, newspapers, songs, government ministries, corporations, and nongovernmental organizations deliberately used and defined the term as they took up the question of what was to be deemed wasteful” (Siniawer, 2014).

tional cultural discourse suggesting that you only take what you need and wasteful behaviours are perceived as uncouth. This is line with the Japanese vision of a society living in harmony with nature (Siniawer, 2014). Drawing on 'mottainai' as a traditional Japanese value in the campaigning for SMCS provides a pertinent community engagement message, quite different to capitalism's promotion of consumerism. As stated in the 'Fundamental Plan for Establishing a Sound-Material Cycle Society' (2013);

*"We seek to establish a sustainable society where we switch from a mass-production and mass-consumption and one-way style life-style established in the second half of the 20th century to a lifestyle enabling affluent life to coexist with environmental conservation. .In this society, people will "know they have enough", "Reduce" will progress and "Reuse" will take root" (pp. 15).*

Although this policy agenda relies on less concrete legislative instruments, enacting a cultural discourse encouraging less wasteful consumption may further encourage sustainable behaviours amongst Japan's population, assisting with the Fundamental Plan's reduce goals.

### 3.3.4. A top-down 3Rs National Governance Policy

From a governance perspective SMCS is centrally driven by Japan's National governance body MOEJ. The MOEJ is responsible for the Fundamental plans enactment, however and relies on the cooperation of multiple stakeholders. This positions MOEJ also as an intermediary, facilitating partnerships and collaboration across the regional and municipal departments as well as integrating input from non-governmental actors, industry, knowledge institutions, community, special interest groups and

experts. Although centrally driven, many aspects of the Fundamental Plan must be decentralised when implementation occurs on the ground. This is to allow for appropriate adaptations to regional conditions. For example the cooperation of many smaller regional and local actors is necessary in collecting recyclables deposited within the Municipalities particularly for locally embedded bio materials such as discarded food (Mazzanti and Montini, 2014).

Pursuing a SMCS from a National level enables the enactment of appropriate legislative frameworks expanding beyond a particular industry sector (waste management, recycling or manufacturing and production). The economies of scale required to erect and legitimise high-tech infrastructural solutions have been made viable through MOEJ subsidisation. This is also true for new emerging markets that are not yet ripe for large scale business investment such as product 'Reuse' industries, in which product guarantees are required in order to prevent stolen or non-functional items flooding the market. This centralised plan also validates the widespread dissemination of the traditional Japanese cultural discourse of 'mottainai' values.

As an island, Japan has tighter jurisdiction over its borders, enabling the monitoring of resource imports and exports nationally, validating the Fundamental Plan's inlet, circulation and outlet KPIs to be measured nationally. This is perhaps why a national materials strategy, directed and measured by holistic indicators, is being pursued.

It should be noted that within the Fundamental plan Japan has made significant headways to detail frameworks that demonstrate material flows from a domestic capacity as well as flows occurring over international geographies (see Fig. 3).

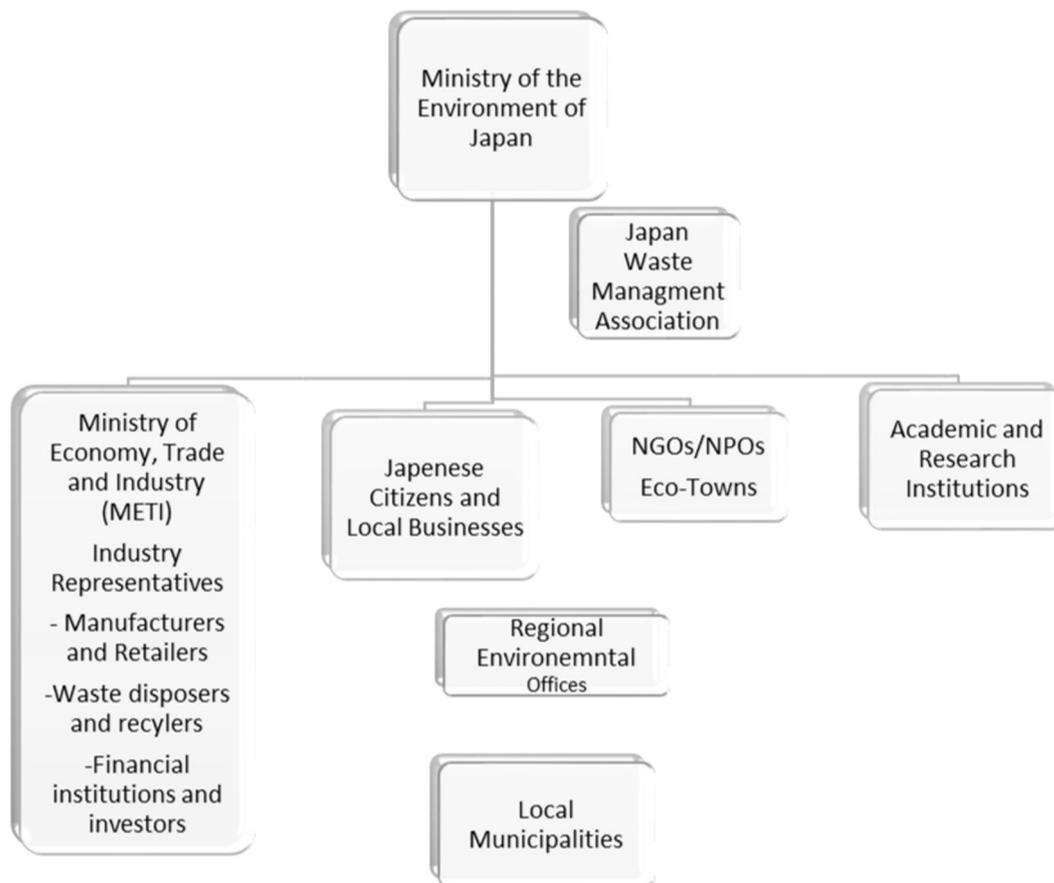


Fig. 3. Japans sound material-cycle society governance structure.

#### 4. Discussion

Waste policy is increasingly moving on from the ‘reduction of waste’ to a ‘sustainable materials policy’ focused agenda recognising individual wastes as a resource. The examined case studies bring to light policy directions, governance frameworks and regional conditions, propelling waste management towards resource and materials systems thinking encompassed in the sustainability agenda. In each case the waste department was amalgamated with an environmental authority illustrating the benefits of embedding waste policy within a wider sustainability program. Rather than analysing the cases in opposition to each other, value can be gained from viewing the cases as collaborative contributions to waste and materials management, viable to different levels of governance.

San Francisco’s Zero Waste program is an example of implementing enhanced recycling policy through landfill diversion. Predominately this is achieved by improving recycling infrastructure capabilities and processes. The policy reach is limited to the geographical confinement of the city of San Francisco, where we find a relatively enclosed three tier governance structure similar to traditional waste management (government/waste-recycling company/community-service users). However the case also exemplifies some of the benefits of a locally confined governance structure.

Although the limitations in using diversion and recycling percentages as measures of success has been noted, the case demonstrates the positive flow on effects of close civic engagement. San Francisco’s Zero Waste program is an example of a local authority incrementally shifting from its origins in waste management to reduction and production mechanisms and full-life cycle assessment thinking.

As a commonly used exemplar of a city reducing its waste, many external cities and businesses worldwide have since adopted the term Zero Waste in initiating similar diversion from landfill programs. This is evident in the diverse range of grassroots Zero Waste programs emerging across communities and businesses. The three-cart system emphasising localised management and distribution of food and garden waste as an agricultural resource has been particularly well received and applied across many regions and cities sharing similar contextual conditions.

Flanders’s Sustainable Materials Management program is a significant regional level attempt in restructuring the waste governance system and linking end of life materials to inputs at an earlier production stage. SMM expands beyond recycling and landfill diversion goals, focusing on sustainable production and material reuse. This is pursued through secondary resources markets, which are nurtured by better secondary material source extraction and collection technologies, replacing landfilling and incineration. The program has also encouraged a booming secondary goods market, fuelled by a shift in consumer purchasing behaviours.

It has used a Transition Management approach, which incorporates multiple actors considered front runners in their areas of expertise, to enact inter-sectoral collaboration and solutions. This approach was particularly successful in engaging knowledge institutions and industry in the visioning and implementation of sustainable materials management. Flanders’s SMM policy started at a regional level however has since gained considerable attention and interest across the EU and internationally.

Japan’s Fundamental Plan towards a Sound Material-Cycle Society is a noteworthy attempt at implementing a national policy framework honouring the 3R philosophy. Enhancing an already sophisticated recycling and materials collections scheme, Japan is now shifting focus towards a ‘sustainable society’ with reduction and reuse objectives. Although the plan is initiated centrally by the Ministry of Environment in Japan, it also includes a diverse

array of government and non-government actors both nationally and regionally. The plan has been successful in linking the Japanese cultural narrative of the ‘mottainai’ value as well as the Eco-Towns movement, whilst encompassing specific and quantitatively measured KPI’s and monitoring mechanisms.

The influences of cultural and social motivators is evident within each case; San Francisco’s culture of recycling and their desire to be perceived as a sustainable city, Japan and Flanders’s concerns for future resource security as well as their capacity for technological innovation. Demonstrating the importance for waste and materials policy to be autonomously adapted and applied with the existing contextual conditions at the forefront of decision making (Mazzanti and Montini, 2014).

However these international programs illustrate that even as global leaders in waste management policy and practice, these programs are still in transition towards the integrated waste management models required for sustainable materials management in circular economy thinking. For example:

- Promoting diversion from landfill and increasing recycling percentages does not account for full-lifecycle assessment results and is therefore limited in accounting for wider social and environmental impacts.
- Whilst Flanders and San Francisco are focused on the restructuring of their waste management systems, they neglect ideas of managed sustainable consumption which aims to limit the increasing amounts of waste being produced.
- Japan has invested significantly in waste management recycling systems, governance and social systems for behaviour change, but they are still heavily reliant on incineration as their main waste management approach with much less focus on materials/resources recovery needed to achieve a “sustainable society”.

Policy outcomes are also in a transition to a more inclusive model that involves local government, national government, industry and community in managing the change from waste management to materials management. The challenges include:

- Traditional governance for waste management is typically under municipality control due to localised waste generation and collection. Waste is typically managed as a cost-centre rather than as a potential value adding business. Little strategic focus is given to waste management other than through ‘cost efficiency’ imperatives.
- Transition in managing waste requires governments to lead the space with policy and potential infrastructure development in order to drive materials recovery and behaviour change. A governance re-modelling of a complex array of actors currently managing traditional linear material systems will be required in order for a resource recovery system to emerge.
- Industry involvement in the new resource recovery business model will be essential in extending the scale and integration of materials recovery through privatisation and commercialisation models. This is seen in San Francisco’s partnership with Recology, and Flanders’s and Japan’s inclusivity of the relevant business sectors contained within their multi-governance programs.
- The co-evolution of policy alongside sustainable grassroots community and business initiatives such as, transition and eco-towns, peer to peer platforms, design innovations, open source technology and servitisation or product-service systems, leverage new possibilities in policy directions. This co-evolution is crucial in accelerating systemic shifts and is central to sustainable change in production, consumption and materials management.

Production processes are now paying more attention to cost increases in raw materials and therefore are either trying to do more with less or reduce the raw materials required in their production processes. Policy incentives should be provided that maximise the use of materials already in the system in order to encourage closed loop production benefits.

- National interests in materials security and the desire to decrease reliance on external import quotas is consolidating national resource management strategies with waste and materials policy making.
- Material inputs costs account for a large proportion of overall business expense, particularly for those in manufacturing and production industries. This positions Extended Producer Responsibility as a reverse logistics opportunity to regain material assets lost to the supply-chain and reduce long-term costs.
- From a policy perspective, the risk of developing resource recovery solutions is that it may deflect from sustainable consumption behaviours by supplying additional material resources, possibly incentivising, or at least masking, the continuation of over-consumption (Krook and Baas, 2013). This should be considered in the development of policy for sustainable material management.

Together the cases present a vast range of metrics and tools used to analyse progress of diversion, productivity, cyclical use, material inputs, material cycles and sustainable design. This supports other studies demonstrating the expansion of multiple metrics and performance indicators applicable to enhanced waste management (Paredis, 2011). The key principles driving the Circular Economy, such as reverse logistics, functional economy and industrial symbiosis may also be valuable in providing holistic waste policy analysis.

Applying specific indicators in order to comparatively position the policy outcomes against each other was beyond the scope of this paper. However it is recommended that future research establish more concise metrics in which to investigate economic, social and environmental benefits and trade-offs for these different approaches. These opportunities and challenges act as a reminder that waste management necessitates greater innovative solutions and investment in order to drive it towards sustainable materials management. The traditional small step changes will not suffice, the complexities of material flows in production and consumption require a systems approach reconceptualisation and greater co-operation of engaged front runners who have the authority to implement changes. The global movement of materials and waste provides a platform for increased transnational cooperation. Future enhanced waste management programs should consider the experiences and lessons emerging from a variety of case studies in order to build upon best practices and avoid reinventing the wheel.

## 5. Conclusion

The last two decades have witnessed a shifting ideology away from the linear economy promoting a take-make-waste society towards holistic circular systems. Enhanced waste management is increasingly positioned as an opportunity to address the need for closed loop consideration of material/energy flows in order to achieve waste prevention and enhanced resource productivity (Ghisellini et al., 2016).

Since the release of Rio 20+ 10-Year Framework of Programs on Sustainable Consumption and Production (10YFP on SCP), more diverse sustainable innovation in waste and materials policy is emerging. This paper has explored three different enhanced waste and material transitions; the “Zero Waste” program in San

Francisco, the “Sustainable Materials Management” vision in Flan- ders and the “Sound Material-Cycle Society” in Japan. Some of the major documents informing policy directives, legislation and future vision associated with waste transitions were reviewed. The case studies examined provided an opportunity to compare leading policy directions in enhanced waste management and governance structure, offering valuable contributions for practitioners and academics engaging in waste and materials policy.

This paper concludes that the current transitional state of waste management across the world requires the development of further government policy, planning and behaviour change. Enhancing material policy has considerable potential in assisting with the redefinition of the word ‘waste’ and the movement away from end-pipe land-fill solutions. Emerging frameworks such as Transition Management may act as a catalyst to enhance future governance structures by incorporating multiple front runners across government, industry, knowledge institutions and community. The transition towards landfill diversion and Zero Waste programs is only the first leg of the journey towards Circular Economy closed loop production models of waste as a resource material, designing waste out of the economy to achieve sustainable materials management.

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# Collaborating for sustainability: the role of transition networks and shared names in creating powerful global niches

**ABSTRACT:** Transition managers must consider what marketers have known for decades, the value of branding. In this paper we present a novel perspective describing how a transition process can build an identifiable and legitimate transition brand which aligns niche actors globally; we conceptualise this as a *collective codified signifier*. Exploring the zero waste movement as an example of a discursive network, we argue that a shared transition name can play a significant role in connecting globally dispersed innovation pockets and expanding the uptake of certain transitions. The evidence suggests that the journey to collective codified signification often undergoes a process of contestation by actors employing the same name, with transnational network hubs, mobile experts and practitioners often acting as authoritative meaning makers. If a transition's name becomes mainstream so does the concepts it signifies, increasing the likelihood that the specified solutions will be undertaken. We propose that discursive networks and collective codified signifiers not only provide a platform from which to share significant knowledge and resources but they also establish a collective identity, building powerful global networks and promoting sustainable socio-technical change.

Keywords: *Transitions; Global Networks; Zero Waste; Signifiers; Sustainability Communication; Collaboration*

## Abbreviations <sup>1</sup>

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<sup>1</sup> ACT: Australian National Territory

BRT: Bus Rapid Transit

GAIA: Global Alliance for Incinerator Alternatives / Global Anti-incineration Alliance

ICT: Information Communication Technologies

MLP: Multi-Level Perspective

NGO: Non-Government Organisation

TAIA: Taiwan Anti-Incinerators Alliance

ZW: Zero Waste

ZWIA Zero Waste International Alliance

# 1. INTRODUCTION

Transitioning towards sustainability requires a reconceptualisation and reconstruction of many of our deeply entrenched social and technical systems as well as the emergence of new knowledge which must be shared. Sustainability knowledge, as an alternative narrative to 'business as usual', is often susceptible to challenge by powerful interests seeking to discredit new knowledge that may dissolve their current dominance. In this way, sustainability transitions and the knowledge it represents is in a battle to gain legitimacy, visibility and transferability. Strong reliance falls on the actions of change makers who, through an alignment process, help build power and wider system acceptance in challenging the incumbent regime. Opportunities to upscale and expand sustainability knowledge requires taking into account the frameworks of a knowledge economy, including globally expanding virtual spaces as key portals to disseminate information.

Transition Management (Loorbach, 2010) is a systems thinking governance approach based on the assumption that conventional governance structures are a limiting variable in the change process: existing silos tend to reinforce business as usual. The significance of transition management is that it highlights the importance of innovative governance structures that bring together change makers across traditional siloed boundaries in order to drive sustainable change (Spath and Rohracher, 2012). This collaborative philosophy is founded on the notion that individuals working in isolation are limited in their power (Bouwen et al., 2004; Ansell and Gash, 2007; Ali-Khan and Mulvihill, 2008; Coffey et al., 2013). Change makers must therefore collaborate and establish networks which builds collective agendas, mobilises resources, creates shared visions and expands sustainability knowledge (Loorbach, 2010).

The difference between grassroots movements and sustainability transition management is that transition management's governance structure emphasises the inclusion of policy makers and even large transnational companies when they take on an innovation role (Hansen and Coenen 2015). An alternative approach comparatively to grassroots movements, whom often perceive these actors in opposition to their sustainability objectives (Seyfang and Smith 2007). This representation of sustainability change agents, moves beyond the confinement of geographically local representation and 'small' players and instead is understood as networked innovation spaces occurring across multiple spatial paradigms (Coenen et al., 2012).

The traditional meaning of networks has in recent decades been radically reconceptualised at a global level, due to the mobility and connectivity of transnational experts, multinational corporations, and global citizen movements and world ideologies (Amin 2002). The connective

power of the Internet, with the availability of multiple platforms, interactive channels and opportunities for billions of people to engage online, is also establishing new understandings of collaborative networks that move beyond territorial borders and physical proximity. Collaboration is therefore no longer defined solely according to territorial borders and physical proximity as it was in traditional geography (Graham & Healy 1999). For example, actor alignments may take the form of networks that closely engage to: negotiate positions, circulate information, develop a shared discourse and identity, mobilise resources and act collectively (Pesch, 2015; Sengers and Raven 2015). Networks can also be defined as 'symbiotic alliances between people, organisations and the non-human realm in which resources, arguments and knowledge flow between nodes' but may not involve close engagement (Selman, 2000, page 119 as cited in Davies 2005 pp 379). This definition reveals networks can be a function of relative measures of proximity rather than physical geographical proximity. Proximity based on relative alignments can be categorised as cognitive, social or institutional proximities (see Healey, 2006 pp 534).

The notion that networks can be discursively described has been explored under a variety of terms including: epistemic communities (Haas, 1992) discourse / discursive coalitions (Hajer, 1995; Dryzek, 2005), communicative action groups (Habermas, 1996), symbolic isomorphism (Glynn and Abzug, 2002), advocacy coalition (Sabatier, 2006), narrative networks (Ingram et al., 2014), and discursive fields (Pesch 2015). These concepts imply that a group of actors are connected in time and space through an identifiable shared set of linguistic cues, establishing spaces of shared meaning and identity. Here we refer to 'discursive networks' to capture this concept in relation to sustainability transitions. Linguistic cues may be general discourse alignments such as shared storylines, or more specific and intentional discourse alignments such as shared names, labels, logos or frameworks (Leitch et al., 2013).

In an age of media sound bites, hashtags, search engines and rapid communication technologies, knowledge is encoded within and disseminated by smaller discursive units such as keywords and names (Silva, et al., 2016). The concept of a 'name' can be understood as the specific choice of keywords intentionally selected for publication across multiple channels. Essentially it is the 'marketed title' of whatever is being presented, whether it be a new policy instrument, theory, company, social movement, innovative technology, idea, NGO or governance body. Content necessitates a name in order to be sought after, disseminated and consumed or applied (Alkon et al., 2012; Longhurst, 2015). Through social processes of sense making a name can be loaded with meaning, used to categorise and signify specific content. In this way naming can act as an umbrella signifier of a collection of associated content that would otherwise be disconnected. For example each of the names 'Cradle to Cradle', 'Circular Economy', 'Industrial Symbiosis', 'Clean Energy' and 'Organic Farming' evokes a different and

specific set of ideologies, frameworks, information, governance structures, actors, networks and outcomes.

The current emphasis on competitive advantage means corporation and brand naming are almost always copyrighted; thus their name, logo and title cannot be readily or legally adopted by others. However within other domains, such as social movements, collaboration is desirable, thus the dissemination and adoption of a social movement's name can be used to build momentum and reach out to various actors, enclosing them under the same name banner. Transitions and sustainable innovative concepts are much the same in terms of the ability for their names to be freely disseminated and adopted. Sharing the same organisational title or logo is possible and even encouraged as a kind of franchise (Benford and Snow, 2000; Hunt and Benford, 2007; Hajer and Uitermark, 2008). Take for example the 'Transition Towns' movement which connects hundreds of geographically dispersed grassroots community projects, under the Transitions Towns network. Naming your town's sustainability initiative as a Transition Town signifies network status and grants automatic visibility and legitimacy. Other Transition projects in transport, energy and waste have fallen under numerous shared names; 'Bus Rapid Transit', 'Low Carbon Labs', and 'Zero Waste'.

Naming a transition is therefore a socially constructive choice, aligning a sub-set of content to specific story lines as well as a discursive network which can be politically loaded and thus strategically relevant to sustainability transitions. The study of transition names is crucial gap in the sustainability transition literature which presents a missed opportunity to investigate and identify the role that naming transitions plays in enabling collaborative networks to form and drive our society towards a sustainable future. Furthermore, it is worth exploring the influence exerted by bearing the same name across the globe on the transition's visibility, legitimacy and transferability (Johnson et al., 2006). Below we ask, what role do shared names play in discursively aligning globally dispersed actors and expanding or hindering the uptake of certain transition directions?

This paper first addresses and presents an overview of the literature discussing discursive networks and shared names. We then introduce the concept of *collective codified signifiers* and discuss its significance to transition studies. Finally we analyse 'zero waste' as an example of a transition name facilitating collaborative discursive networks and mobilising codified knowledge, within the transitioning sector, waste. We conclude by highlighting the processes and actors important to transition name signification, enhancing future transition collaboration and global niche network possibilities.

## 2. SUSTAINABILITY NETWORKS AND SHARED NAMES

The articulation of expectations and visions, the building of networks and the shared learning of relevant processes, enables sustainability innovations to unfold (Geels, 2011). Discursive networks, as platforms to collaborate, build collective agendas, and share information, informing and shaping wider sustainability change are encouraged to build innovative clusters interacting across translocal or transnational borders (Spath and Rohrer, 2012).

In relation to sustainability transitions, Spath and Rohrer (2012) investigate the energy transition of Murau, a rural district in Austria. The Murau case study showed how energy alternatives at a local level were legitimised and supported by a global network sharing similar energy transition storylines, demonstrating the importance of expanding local discourse to wider regional and global audiences. The accumulation and alliance of successful energy transition initiatives occurring globally assisted to further validate the feasibility of the project locally. Nicolosi and Feola (2016), describe how social movements are often diffused across countries through a transnational network hub, which facilitates connections, shares codified knowledge and provides political support. Geels and Deuten (2006), introduce the importance of intermediaries as mobile agents who are able to aggregate localised lessons and experiences in order to promote more generalised (non-context specific) frameworks. Erecting a global network, transition intermediaries can drive the adoption and deployment of specific action frameworks across diverse local contexts.

Sengers and Raven (2015) explore the diffusion of Bus Rapid Transit (BRT) programs across multiple cities which are geographically dispersed. They conclude that niche innovations travel globally and become embedded locally through a 'Global Production Network' of mobile experts labelled 'transfer agents' who exchange codified knowledge across multiple channels (buzz-pipelines). Although face to face interactions, supported by physical proximity, are found to be crucial learning and knowledge exchange platforms, other mechanisms such as print media, official websites, online communications and accessibility to published resources can inform a network's collective values and actions across multiple countries (Feola and Nunes, 2014).

The role of the search engine holds particular relevance in understanding how knowledge is disseminated amongst geographically dispersed actors, enabling the dissemination of similar sustainability actions across the globe. Increasingly the majority of information sought is via internet search engine platforms which require a keyword search (Van Laer, and Van Aelst 2010). What we type into the query log and the results that are consequently displayed are directly associated via the choice of keywords we select (Shiri, 2012). Pesch, (2015) refers to

this as mediated transfer of discursive fields. The vast amount of data available online emphasises the need for sustainability transition names to be readily searchable and identifiable in order to compete for attention with other movements. In such a contested process, narrow, exclusive or unfamiliar discursive cues have limited visibility and valuable knowledge may be missed altogether and never become a 'master signifier' (see the works of Lanca). In this case they will be an evolutionary *cul de sac*.

For example, Sengers and Raven (2015) mapped the BRT internationally by identifying key documents that represented BRT knowledge, using a text analysis software and a social network analysis software that visualised BRT projects and embedded them within a geographical location. The outcome was represented as 'the global mushrooming of 'Bus Rapid Transit' (pp 172). The method in which these key documents were identified was through the search term "bus rapid transit" typed into the Science Direct database. However, they missed an important variable in their study. Although they identified codified knowledge being exchanged through multiple channels, the authors do not investigate the significance of the shared BRT name itself.

Shared names have been explored in relation to collective identities in and across social movements (Di Gregorio, 2012) and more recently through social media activism (Gerbaudo, and Treré, 2015). The idea of collective identity suggests that an individual or group of agents consciously choose to identify with certain values and frameworks by using an existing signifier and becoming a part of the collectively signified group (Pesch, 2015). Accordingly, actors that would normally be territorially and geographically dispersed can become aligned through their associated use of the same signifier, forming more complex networks of overlapping connectivities. Interestingly, Transitions Management encourages a cross-sect of change agents from grassroots, knowledge institutions, industry and policy, who often share the same names in describing a particular transition. However these change agents may view the shared name from entirely different perspectives altering the meaning of the signifier, a significant factor which has not been explored in much depth.

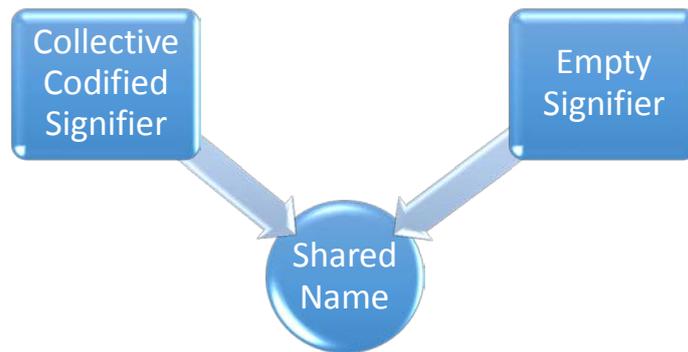
For example Di Gregorio (2012) argues that actors within social movements using shared names, and frames often have differing accounts of what the movement and its actors stand for. This supports Laclau's (2005) idea of 'empty signifiers', which suggest that although a signifier may be used and repeated over many platforms and across multiple temporal and spatial dimensions, it only loosely represents a body of content. Take sustainable development, as an empty signifier as explored by Davidson (2010), who suggests that the term 'sustainable development' often represents integration across social, environmental and economic constructs. However the outcomes, frameworks and objectives of a 'sustainable

development' program may vary significantly or even not amount to any practical outcomes. Jacobs (1999) argues that sustainable development as a highly contested concept is still in the process of establishing more concrete meaning. The notion of empty signifiers has also been explored in relation to the name 'Nanotechnology' (see Wullweber 2015).

Unlike 'empty signifiers' some signifiers represent specific codified knowledge. Knowledge acquired through experience ('tacit knowledge') becomes 'codified' when it is articulated and transmitted in order for others outside of the experience to understand, absorb or apply it consistently ('explicit knowledge') within their own context. Upscaling experiences formed within a specific context often requires the findings to have more generalised applicability. Capturing the experience, lessons and results from transition practitioners, in order to share valuable knowledge with external actors, necessitates packaging and disseminating that information strategically.

These transition projects may also be associated with an identifiable set of practices and outcomes which have been collectively defined through the use of a shared signifier that may include words, symbols or images, to represent specific codified knowledge. We term this occurrence a '*collective codified signifier*'; that is, *a signifier representing specific and fully codified knowledge, such as a set of practices and/or outcomes, disseminated and shared by different actors so as to create an identifiable network and discursive space.*

Although knowledge shared across geographically dispersed places is often open to interpretive flexibility, whereby a relatively high number of diverse meanings and practices are being played out according to local contexts. By establishing a more coherent body of shared codified knowledge, transition networks create collectively agreed upon meaning, rules and actions (Hargreaves et al., 2013). The replication of successful sustainability practices across multiple projects avoids reinventing the wheel and increases the visibility and legitimacy of those projects: they are no longer viewed in isolation but rather associated with a wider network (Featherstone et al., 2007; Johnson et al., 2006). This will hold true as long as the projects adhere to a basic set of principles and continue to be successful.



*Figure 1: A shared transition name as a collective codified signifier or an empty signifier*

In summary, a shared name can be an empty signifier whereby its exact meaning can be hard to pin down even though many people think they know what the name signifies. A shared name acting as a collective codified signifier is the opposite, that is, what is signified is clearly understood by all parties.

### **3. METHODOLOGY**

Waste is a significant area in addressing sustainability transitions and is an interesting example of a sustainability challenge that has expanded beyond the concerns of a few localised actors to a movement of global proportions. In order to explore shared transition names as a tool to create discursive networks and collective codified signifiers, 'Zero Waste' as a prevalent transnational movement within the waste arena is selected.

'Zero Waste' was explored as a signifier primarily through a review of key authoritative assessments, such as political documents, policy instruments, academic research, industry reports and published quantitative results. In order to assess how this signifier may be enacted into collective practical outcomes, materials published through city and regional programmes were selected as they were perceived to have larger overall implications. The selected documents are produced within the timeframe of 2004-2016, as this is when significant global waste movement activities emerged.

The analysis then delves into the transnational nature of Zero Waste as discursive network, exploring how the dissemination of this shared name may have also lead to shared interpretations and therefore transition outcomes. Based on this assessment, the Zero Waste movement was mapped out internationally, highlighting key actors and agencies that have played a significant role in promoting this signifier and the knowledge frameworks it represents.

## **4. WASTE, AS A GLOBAL CHALLENGE**

Waste transitions are as complex as any other socio-technical system and may differ slightly from case to case. The growing global nature of waste management and governance has been addressed by Boyle (2001), Davioudi and Evans (2005) and Silva et al. (2016). Waste transitions are discussed by Davies (2005), exploring the anti-incineration movement, Rootes (2009) investigating environmental movements and waste infrastructure, Kubal, (1998); Davies (2005) and Leonard, et al., (2009) who provide insights on waste discourses, framing and networks. Phillips et al., (2011) and Zaman and Lehmann (2013) expand discussions around the concept of zero waste.

Similarly to other sustainability transitions, transnational and relational conceptions of networks are becoming interwoven into waste transition governance. The discourse and the scalar constructions surrounding waste is transforming from a localised concern to one of worldwide proportions. Many government actors involved in waste transitions have significant results and learnings from their recycling and resource recovery programs that should be shared. In addition, there are many grassroots organisations that also have valuable lessons to share in relation to community engagement in waste management. In his investigation of environmental movements within waste and waste infrastructure Rootes (2009) states how:

*“the story of campaigns against waste infrastructure, especially against waste incinerators, can be told as one of the progression from isolated local struggles through national networking to a transnational, even possibly global, movement”* pp 828.

The privatisation of waste-disposal and waste-collection services in many areas has resulted in market forces increasingly influencing the spatial distribution of disposal sites and in the patterns of waste movement (Davoudi and Evans, 2005). As a result, the inequitable distribution of transboundary trade in waste and discriminatory exposure to waste-related risks has generalised demands for environmental justice and is gaining wider NGO attention (Schaffer Boudet 2011). Combining this with the national and transnational climate change agenda and the shift of waste governance from enclosed municipal government to a complex multi-stakeholder negotiation of government and non-government actors, termed multi-level governance (Davies, 2005), waste transitions are undeniably evolving beyond conventional territorial governance.

### **4.1 THE EMERGENCE OF ZERO WASTE**

The word ‘zero’ has been used as a guiding vision for a growing number of sustainable initiatives seeking to reduce the impact of human activities on the environment: ‘zero emissions’, ‘zero carbon’, ‘zero growth’, ‘zero ecological footprint’. The numerical reference

to 'zero' may be viewed as an aspirational outcome as it is certainly not a realistic one; therefore it is a subjective term open to multiple interpretations of action. However practical implementation of a Zero Waste program has been associated directly to a specific waste diversion from landfill and incineration framework and objective (see Karani and Jewasikiewitz, 2007; Krausz, 2012; Silva et al., 2016; Zaman, 2015).

The term 'Zero Waste' (ZW) was first coined in the 1970's by chemist Paul Palmer who established a business exchanging recovered chemical wastes, Zero Waste Systems Inc. The business received a lot of publicity, including multiple papers and commendations from the EPA in the US (Connett, 2013; Zaman, 2015). Since then the term has been used extensively across multiple disciplines, industries and organisations. Many of the network actors are identifiable through the use of the ZW term in the organisational title, for example; Zero Waste International Alliance, Zero Waste Europe, Zero Waste Institute, Zero Waste Youth, Zero Waste Network, Zero Waste San Francisco, Zero Waste California and Zero Waste Australia, as well as multiple grass roots projects, Zero Waste Ohio Stadium, Spain's Gipuzkoa Local Province Zero Zabor (zero waste) and the Zero Waste Alaminos project.

Zero Waste International Alliance (ZWIA) has emerged as a core group uniting the ZW movement, and can now be seen as a central authority disseminating and shaping what ZW should stand for. Acting as a transnational hub for change maker interested in establishing ZW initiatives, ZWIA define ZW as;

*“Designing and managing products and processes to systematically avoid and eliminate the volume and toxicity of waste and materials, conserve and recover all resources, and not burn or bury them. Implementing Zero Waste will eliminate all discharges to land, water or air that are a threat to planetary, human, animal or plant health.” (ZWIA, 2013)*

Well renowned experts in their fields with a deep desire to prevent and reduce resource wastage initially launched ZWIA. Individuals such as; Richard Anthony a highly practiced resource manager, Bill Sheehan a cradle to cradle expert, Dan Knapp, President of Reus Resale enterprise and Paul Connett a chemistry professor, united to create several forums that would pursue agreed upon ZW principles; diverting waste from landfills and incinerators. In 2004 an international planning board and the ZWIA website (<http://zwia.org>) were formed.

The first serious large scale attempt at a ZW program emerged in 1996 when the ACT Waste Department in Canberra, Australia launched a 'No Waste' initiative which aimed to have zero waste sent to landfill by 2010. Although the program did not achieve its 2010 objective, notable progress was made in increasing recycling rates. Restricted land availability, landfill capacity

and landfill site contention are key drivers in plans to divert waste from landfill (Lehmann, 2010). The capability of municipal governance to reform waste policy is also limited to end-of-pipe solutions, thus increasing recycling rates as an indication of successful landfill diversion has been a viable policy option (Silva, et al., 2016). Since then, a growing number of municipalities and private institutions have put forth plans dedicated to the delivery of ZW programs specifically for waste management outcomes.

#### **4.2 ZERO WASTE; A BATTLE TOWARDS A COLLECTIVELY CODIFIED SIGNIFIER**

Despite the conceptual holistic definition pursued by those in research, academia and NGO's, mainstream adoption of ZW has been hijacked by the waste management industry. Perhaps familiarity with the term waste (regardless of the zero) increased exposure of the zero waste concept, to waste industry actors, who see the name as appropriate and applicable to their waste policy ambitions. The sound bite often portrayed across ZW government policy initiatives, communication platforms and media outlets has been "Zero Waste to landfill". The legitimacy and power of government actors publicising their diversion from landfill goals using the ZW name has become notably dominant, causing some contention amongst those promoting ZWIA's full life-cycle avoidance of incineration definition of ZW (Zaman, 2015).

San Francisco's has actively promoted its Zero Waste initiative, spreading a landfill and incineration diversion example across the globe and gaining vast media attention (Silva et al., 2017). Since 2002 the city has had considerable success with current estimates stating an 80% diversion rate, with an aim to increase that rate to 100% by 2020 (SF Environment, 2014). The notoriety of San Francisco's Zero Waste program has perhaps propelled the name into the spotlight, attracting those working in waste management in other cities and municipalities.

The business sector is also taking up ZW in order to signify diversion from landfill and incineration plans. For example a Zero Waste Certification program initiated by the Zero Waste Business Council, awards businesses who divert a minimum of 90% diversion from landfill, incinerators and the environment (USZWBC, 2014). So far they have awarded the Whole Food Market stores in San Diego, which accomplished 90% diversion, and Sierra Nevada Brewing Company which achieved a 99.8% diversion rate.

*Table 1: This table provides examples of zero waste initiatives with diversion from landfill targets.*

<b>Location</b>	<b>Stated Zero Waste Objective</b>
<b>Canberra, Australia</b>	Zero waste to landfill by 2010 (Australian Capital Territory, 1996)

<b>San Francisco, USA</b>	Zero waste to landfill by 2020 (SF Environment, 2003)
<b>Toronto, Canada</b>	Zero waste to landfill by 2012 (City of Toronto, 2005)
<b>Austin, USA</b>	Zero waste to landfill by 2040 (City of Austin, 2005)
<b>Christchurch, New Zealand</b>	Zero waste to landfill by 2020 (Christchurch City Council, 2006)
<b>Kamikatsu, Japan</b>	Zero waste to landfill by 2020 (Hill, Hislop, Steel and Shaw, 2006).
<b>Capannori, Italy</b>	Zero waste to landfill by 2020 (ASCIT, 2007)
<b>Scotland</b>	95% diversion of waste from landfill by 2025 (The Scottish Government, 2010).
<b>Buenos Aires, Argentina</b>	Zero waste to landfill by 2020 (Lacunza, 2013).

When globally dispersed actors use the ZW name and attach it to a diversion from landfill goal, they are building upon an established discursive network, enabling pockets of initiatives to arise and alignments to appear through common identification. Although the network's actors may never interact face to face, they are engaging indirectly by replicating the ZW diversion from landfill framework.

Despite the diversion from landfill goal dominating the ZW narrative, ZW programs evolving in developing nations such as India (Pune) have not yet adopted or publicised a 100% waste diversion rate goal. Premature attempts to achieve 100% waste diversion without adequate technological infrastructure or governance are likely to fail. Perhaps for this reason, these regions have instead incorporated the ZW signifier by focusing on the movement's social justice ideologies which resonate with the wider cultural narrative of those physical places. Inevitably a model which is transferred to a new context undergoes some adaptive remodelling, allowing elements that resonate to be utilised whilst dismissing those that do not.

Although ZW does attempt to reduce waste sent to landfill, the mechanisms in which this can be achieved is not yet entirely collectively agreed upon. Thus not all actors using the ZW signifier are adhering to the ZWIA definition. A study by Zaman, (2015) analysing publications using the ZW label discovered 87% of studies focused on either municipal solid waste (47%) or industrial waste (40%). The study also found the majority of ZW publications were concerned only with waste management and regulatory policy, with little attention paid in the design and production phases of zero waste life-cycle.

Lombardi (2011), in his commentary 'Zero Landfill is not Zero Waste', claims many government, businesses and other actors are using the marketability of the Zero Waste as a

signifier to divert waste from landfill by adopting incineration methods. As a co-founder of ZWIA Lombardi states; “we were very clear in the mid-90s that zero waste to landfill was not the same thing as Zero Waste...The problem with having a singular focus on the landfill implies that making energy from waste by burning it is acceptable (2011, p.1).

#### **4.2.1 Aligning Zero Waste with Anti-Incineration Movement**

Movements against waste infrastructure developed in the 1970's against a backdrop of increasing public concern over industrialised effects on the environment and human welfare. In the US waste campaigners protested against hazardous waste, ill managed landfills and the 'inequitable distribution of waste dumps' (Rootes, 2009 pp 826). Around the same time France was succeeding considerably in creating diversion from landfill policy directives. Waste incineration was offered as an alternative and France quickly progressed as a waste incineration advocate. These cases in the US and France remained relatively local, until western countries faced increasing urgency to meet landfill diversion goals. Incineration, as the offered waste infrastructure alternative, was supported by powerful actors across industry and research institutions who positioned incineration as superior to recycling solutions. This movement saw the expansion of incinerator projects across other European states (Connett, 2013).

However, safety concerns emerged about waste incineration, notably in Britain, Greece, Ireland and the United States where incineration proposals were met with significant public resistance. This was especially the case in Greece, where waste incineration was quickly rejected as a risk to human health (Rootes, 2009). Actors fighting the incineration industry started to engage and share resources; they formed an anti-incineration movement, appropriately named 'anti-incineration'. This network significantly impacted on the discourse around waste incineration, causing policy havoc for governments considering the option (Connett, 2013).

The use of the term 'anti' has appeared historically across an assortment of protest narratives, such as anti-war, anti-nuclear and anti-globalisation. Problem and blame identification (diagnostic framing) combined with a term familiar to the protester discourse, established a clear positioning against incineration, easily resonating with actors who wished to align with this movement. Following on from this terminology, the 'Global Anti-incineration Alliance' (GAIA) also termed as the 'The Global Alliance for Incinerator Alternatives' (GAIA) was founded in 2000, quickly becoming the go to source for anti-incineration actors. This is also an example of leveraging extra discursive power from an acronym: GAIA of course also references James Lovelock's Gaia Theory about a self-organising planetary ecosystem, which

in turn refers to Gaia the Greek goddess who gave birth to Earth and the Universe (Lovelock and Lovelock, 2000). These intertextual references add discursive weight to the movement.

Von Hernandez GAIA founder states;

*“GAIA is a venue where we celebrate our community of activists, of creative people fighting for real and genuine solutions. Where one victory in one community is a validation of the struggle that is happening on the other side of the planet.”*

GAIA’s global network consists of many activist already working on environmental and health justice issues. According to GAIA’s various online publications, the network has now reached an alliance of “more than 650 grassroots groups, non-governmental organizations, and individuals in over 90 countries” (GAIA, 2015). Central to their alliance, was a recognition that collaborating together would enhance the group’s power to challenge incineration proposals and promote incineration alternatives through campaigning both locally and globally. This process involved identifying and consulting with relevant groups and activists in order to embed them under a global anti-incineration alliance.

GAIA’s mechanisms to build capacity and support local incineration disputes involves the sharing and dissemination of information and tools that assist members in building cases against incineration proposals. This information is provided in the form of scientific reports, factsheets, legal frameworks and educational resources maintained and made available through online platforms such as the GAIA’s website ([www.no-burn.org](http://www.no-burn.org)).

Beyond achieving a high level of macro-cultural resonance (Geels and Verhees, 2011), the anti-incineration network also managed to win support through the shared anti-incineration signifier’s alignment with various other environmental movements, especially those inclusive of the waste movement.

*“We work both against incinerators and for safe, sustainable and just alternatives. Our name reflects this dual purpose: The Global Anti-Incinerator Alliance mobilizes grassroots action against the spread of incinerators and other polluting, end-of-pipe waste technologies, whereas the Global Alliance for Incinerator Alternatives, builds on the movement for environmental justice, local green economies, and creative **zero waste** solutions” (GAIA, 2015).*

However, diagnostic framing does not offer an alternative solution. It points to the question: ‘If you are against incineration then what are you for?’ Therefore the strategy of frame bridging (see Benford and Snow, 2000) by aligning anti-incineration to the ‘zero waste’ movement

effectively created a link to the cyclical waste discourse and thus shifted anti-incineration from diagnostic framing towards prognostic framing, establishing a direction forward.

GAIA's hosting of the second Zero Waste conference in 2003, before ZWIA had become an official platform, acted as a possible catalyst for ensuring ZWIA's founders established Zero Waste as a signifier for diverting waste from landfill and incinerators. Both movements' actors often pollinate between the two movements activities. GAIA has also managed to source and facilitate funding and grant opportunities for grassroots zero waste partners. For example Cartoneros, (waste pickers) in Buenos Aires city through their alliances with the anti-incineration movement and with local and international organizations, saw a dramatic increase in the budget allocated to grassroots recyclers from \$300,000 in 2007 to US \$30 million by 2008, enhancing the critical capacity for these niche actors to gain the right attention from the right agents (GAIA, 2012). GAIA provided financial support to the Zero Waste Alaminos project 'for printing educational materials, buying shredders for organics and plastics, awarding mini-grants for barangays to build eco-sheds or purchase vehicles' (GAIA, 2012).

GAIA also acts as facilitator, matching local zero waste movement partners with global experts who can directly assist their efforts. Mobilised resources also transcend monetary aid, where stories of success, knowledge, training, technical information, assistance in strategic planning, and waste management support are also provided.

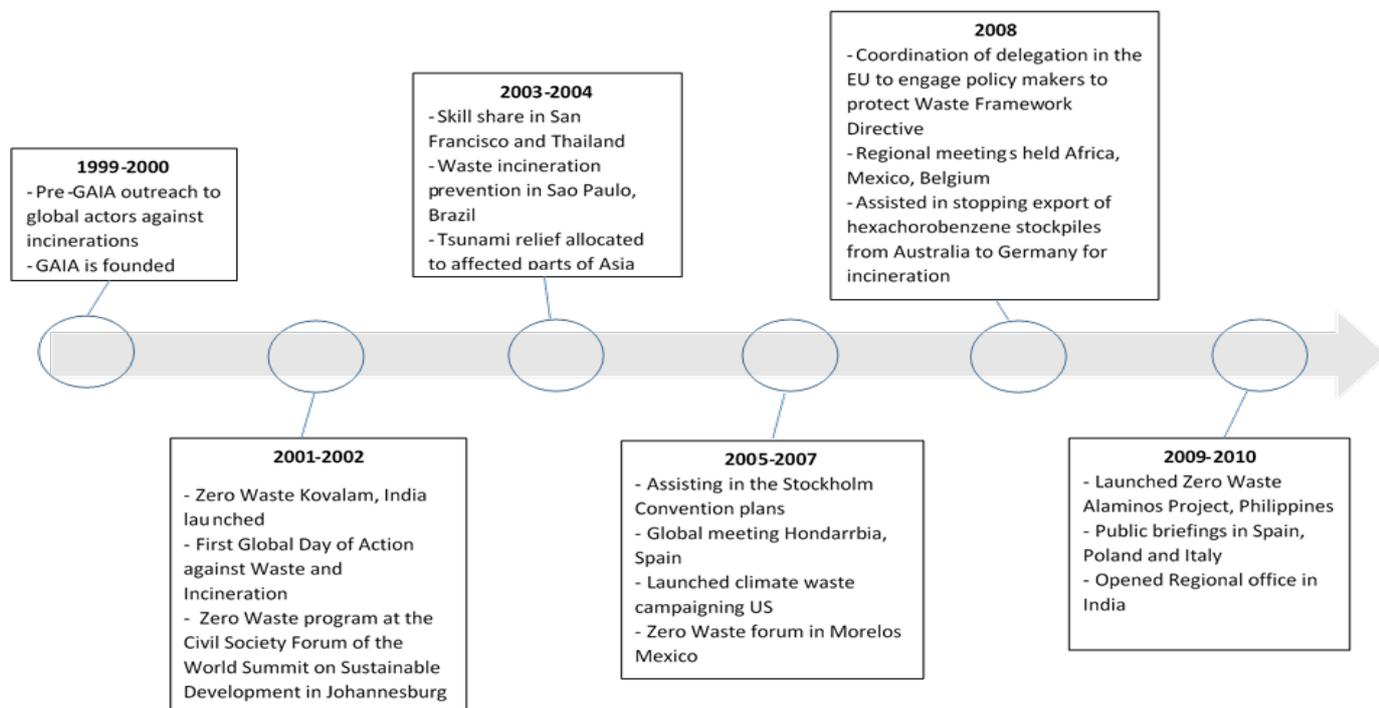


Figure 2: This figure lists GAIA's global collaborative efforts from 1999-2010

The ground work already established by GAIA is particularly helpful to ZWIA's co-founders, who have been focused on maintaining the meaning of Zero Waste to exclude incineration as a mechanism for landfill diversion. In fact, the anti-incineration name has emerged as a force to be reckoned with, so much so that the incineration industry has since launched a counter-strike, avoiding the term incinerator altogether and opting instead for alternative names such as; gasification, pyrolysis, waste to energy, energy recovery and even renewable energy (Connett, 2013). *"For all the fancy talk about "conversion technologies" the workhorse of the industry remains mass burn systems that make some of the dirtiest, most expensive electricity on the planet"* (Lombardi, 2011, pp. 2).

Remaining discursively interpretive may determine whether a signifier is adopted. However asserting a collective understanding of ZW in theory and practice is a primary goal for ZWIA who recently published a set of criteria that should be upheld if the ZW signifier is to be applied;

1. *Any term that includes "zero" in it must achieve at least 90% diversion from landfills, incinerators and the environment, and commit to a goal of reducing the amount of materials discarded, and any discards going to thermal processes as part of a continuous improvement system to zero.*
2. *Any waste diversion claims that includes "zero" in it also must note how much material is still being landfilled and how much material is going to thermal processes.*
3. *ZWIA urges businesses, government agencies, organizations and individuals to stop the use of the terms "zero waste to landfill" (or similar terms that use "zero" without complying with the ZWIA definition of Zero Waste) as that misrepresents the situation to consumers and hides the amounts of materials going to landfills and Incinerators (ZWIA, 2015).*

Sharing success stories and valuable learnings using the ZW signifier increases ZW's visibility and legitimacy as a waste transition program. As ZW conferences, seminars and meetings emerge, they escalate the chance of direct actor engagement. Those that identify with the ZW movement also attend events promoting the name. Conversely as a signifier spreads and is enacted by more actors it may lose its intended meaning. In this way, sustaining a strong ZW definition which signifies a goal of 'at least 90% diversion from landfill and incineration', may enhance ZW authority as a discursive network in waste.

Investigating the case from this perspective demonstrates some significant findings:

- The zero waste movement combined grassroots campaigners and experts from around the world in order to launch an influential narrative around waste transitions; positioned under the umbrella of GAIA and ZWIA.
- ZWIA and GAIA evolved as identifiable transnational hubs both physically and online, which provided actors involved in local waste transitions an opportunity to engage with a wider global networks, sharing knowledge and resources.
- The increased visibility of the anti-incineration name enabled it to emerge as an authoritative discursive network informing appropriate Zero Waste practices in solid-waste management. This linkage positioned anti-incineration to the more pro-active discourse of 'zero waste' enabling it to be more solution-oriented.
- ZW has emerged globally to signify a 'diversion from landfill' framework, especially among waste practitioners in government municipalities and is an example of a collective codified signifier, strategically positioned and packaged through the use of the ZW name; however
- The interpretability of 'diversion from landfill' has led to concerns that among the diverse actors who use ZW some are adopting waste incineration. This has ignited deliberate efforts by ZWIA to ensure ZW signifies '90% diversion from landfill and incineration'.

## 5. DISCUSSION

Zero Waste has emerged as a popular signifier across hundreds of initiatives globally, well known to imply specific diversion from landfill and incineration frameworks and outcomes. We therefore see Zero Waste as signifying specific codified knowledge that is being enacted. The dissemination of ZW as a signifier for diversion from landfill goals across global waste programs and waste management policies is no mere accident; it is evidence of how signifiers can be moulded and used to disseminate codified knowledge and influence policy direction and specific outcomes.

Although ZW has been adopted globally by a diverse set of change agents in government, research and industry, who enacted it to signify "diversion from landfill", there are differences in how ZW is implemented practically. This demonstrates that although a signifier can be highly collectively codified, it is never set in stone and is always open to contextual interpretation. The world of signification through a shared name is reliant on the actors who use it; if the signified content can come under contention and adaptation, then the signifier is always evolving in meaning. Nevertheless it is also important to state that a signifier that is too flexible or highly contested may lead to inaction and the signifier's demise (Laclau, 2005); it may become an empty signifier or it may disappear from usage altogether.

ZW as a collective codified signifier, reinforces transition management's conception that in order to achieve impactful sustainability, actor collaboration must span beyond only locally engaged participants. In this case socio-technical waste transitions occurred through processes that reconfigure engagement beyond geographical locales.

We demonstrated that change agents who are driving a transition locally recognise and engage with other experiments by bearing the same name. Geographically embedded actors closely engaging and aligning within a 'local' setting, are primarily constrained by the locality's absorptive capacity; availability of front runners, infrastructure, technology, and human resources. However similar transitions are occurring across geographical locations. The awareness that other local experiments exist and are taking form in other locales, enables a change makers to engage beyond their local actors and reach out (often virtually) to align. This establishes a 'global niche' in which these local niche experiments are embedded.

The role that computer mediated communications played in the dissemination and uptake of anti-incineration and zero waste is very significant. As stated by Connett (2013);

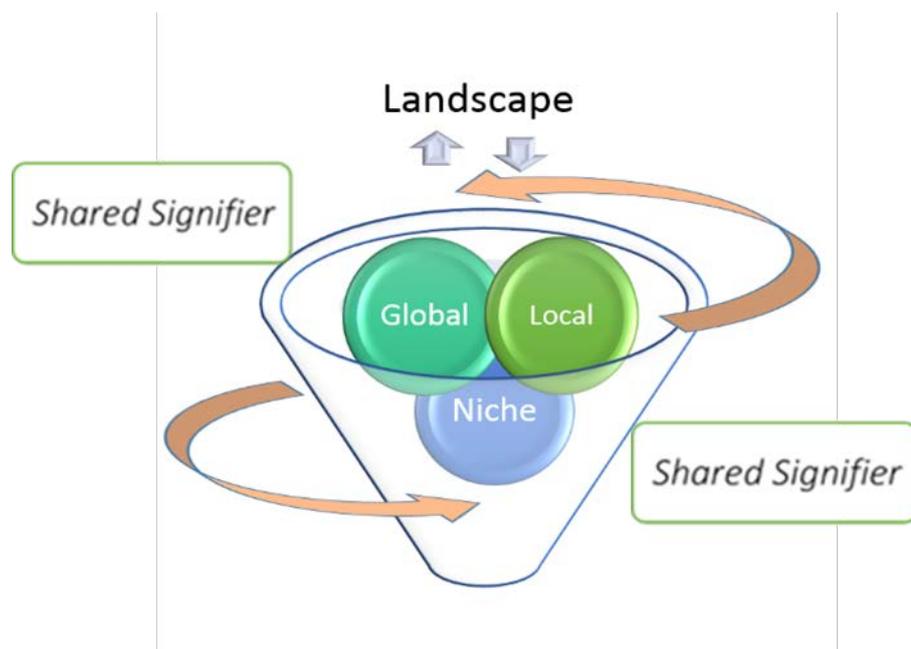
*“One of GAIA’s key functions is to help the network, via the Internet and the occasional international conference, the many grassroots groups fighting incinerators around the world so that they can help each other by sharing experiences, knowledge and resources.” (pp 54)*

Effective dissemination of ideas through ICT platforms requires strategic discourse tactics: creating effective signifiers that are clear in purpose, easily adapted to newsworthy sound bites, and able to gain publicity and power over competing discourses. This is especially significant in cases where the opposing discourse emerges through the invested interests of powerful regime players that may have access and influence over media and substantial resources (Jensen, 2012). Search engines and ICT platforms are likely to continue playing a significant role in disseminating important transition outcomes and lessons, which can then be incorporated in real life transition processes. This perspective reveals how technologies become enrolled in a complex recombination of social and spatial life; drawing together local and nonlocal relational connections (Graham, 1998).

Previous assumptions that discursive networks and collective identity arises from social movements born solely out of connected grassroots and community based projects fails to acknowledge a variety of different actors that are not only dispersed across wide spatial geographies but can also be perceived to exist at different hierarchical 'levels' of governance. Waste transitions have been initiated by government, transnational corporations, NGOs and community groups. What often inevitably links them together is a collective codified signifier

such as ZW, establishing a common identifiable variable which enables opportunities to further engage and align. Crucially, the homogeneity of networked groups, which may share values and objectives via a common frame of reference, is complemented by the diverse capacities of the wider range of heterogeneous agents involved (Molina-Morales et al., 2011). Although this may be the case, managing how a diverse group of agents utilise a shared name and thus contribute to its meaning is a complex process. The main objective is to negotiate what a shared name should specifically signify; as synergetic meaning creates a recognisable brand (Silva et al., 2016).

Shared names identify otherwise disconnected innovation pockets signalling to those within the transition and the outside world of possible alignments across globally dispersed actors. The existence of discursive connection acts as a platform where knowledge, resources success stories, technological achievements, processes and experience, can be exchanged and shared. As these innovations disseminate, pollinate and emerge as new transition experiments in different locations the shared name becomes more visible and stable, supporting a new discourse that may inspire sustainable system shifts. Discursive networks are therefore not only about sense-making or influencing attitudes and opinions but also about building powerful global networks that stabilise and institutionalise discursive practice (Tarrow, 1998 Burr, 2003). As shared names expand and become more deeply intertwined in the social-cognitive spheres, so too does the content that is being signified: leading to the structuration of practices (Garud and Rappa, 1994).



*Figure 3: The local-global niche's overlapping discursive space determined through a shared signifier*

### **5.1 CHALLENGES TO MAINTAIN A COLLECTIVE CODIFIED SIGNIFIER**

Although a shared signifier can be used in order to establish direct and indirect local-global niche collaborations, our findings suggest that a discursive network threatening the security of a regime's position may be susceptible to have their shared signifiers hijacked by powerful agents who use the same names, however adapt the narrative to better align to their interests. Sustainability transitions are often driven by problem solving objectives. Thus narratives evolving alongside these transitions often name and frame proposed solutions using the keywords of the problem; such as "waste" in ZW or "incineration" in anti-incineration. This may attract actors who have vested interest in the maintaining business as usual. In some cases giving "new life" to the regime's un-sustainable activities, by enabling them to re-position and align themselves to trending sustainability keywords.

In the outlined case, some regime actors within the waste and incineration industry have actively opposed both GAIA's and ZWIA's activities either by refraining from using a name, such as the re-branding of incineration in to 'waste to energy' or by using the name but defecting from its intended definition, such as not complying with ZWIA's definition of zero waste. Actor agency and power, plays an influential role in the signification of shared names. Those agents exerting high legitimacy such as government actors and policy makers often have access to influential platforms which offer opportunities to promote their version of a shared name over others. While change agents lacking agency and power in isolation are unable to ascertain their influence unless they build upon a network.

Perhaps re-naming the problem away from waste, opting for alternative keywords such as materials, will enable re-conceptualised innovative approaches and solutions to emerge. Not only would this increase capacity to attract actors outside of the traditional waste management siloes, it may also increase the likelihood of greater sustainability measurable outcomes. However it should also be noted that some shared names become more popular than others not only through the actors using the name (although this is very important), but because of the name itself. Zero Waste, for example increased its visibility by promoting a solution named and framed by the familiarised language of the identified problem, as this familiar language is most likely used to search for information. Silva et al., (2016) expand on this point, showing the reasons behind the high uptake of Zero Waste internationally, rather than Sustainable Materials Management orientated solutions.

The ZW case shows that several mechanisms can assist in building and maintaining a collective codified signifier, which may involve creating a new name or adopting an already

existing one. Once a name is selected signification can be accelerated by establishing three crucial components; *legitimacy, visibility, and transferability*.

- *Legitimacy* can be achieved by creating an official 'expert' panel involving a diverse range of actors who exude a certain amount of authority and agency both individually and as a networked group. Those perceived to be already legitimate actors, such as government agents and policy makers are particularly powerful (Silva and Kingshott, 2011). Label this panel using the words of the intended signifier. Secondly collaborate with influential grassroots movements who share a similar storyline and are seen to be autonomous and independent from corporate interests and influence. Amongst this group of members collectively establish a clear definition of what the shared name is to signify and promote this exact definition across multiple available platforms.
- *Visibility* can be firstly achieved by the name itself. The marketability of a name is increased by variables; such as clear positioning, appropriateness to media sound bites / click bait and the impact of keyword web-based searches. Next, ensure that success stories are associated to the signifier, in order to demonstrate 'real life' practical examples, which gain vast media attention. These real life examples should clearly adhere to a practical version of the definition as set up by the 'expert' panel. Awards or official certifications can also be distributed to projects which represent the signifiers intended outcomes.
- Finally in order to increase *transferability*, set-up an indorsed online platform that acts as a transitional hub for information and knowledge dissemination, maintaining authority and visibility globally. This online portal should be an official site for the networks information. To increase transferability via face to face platforms, pursue opportunities and activities under the banner of the particular shared name, engaging diverse actors and sharing knowledge internationally such as; conferences, round tables, meetings, training and transfer agent placements.

In order to maintain ZW networks legitimacy, visibility and transferability as a waste transition pathway, the ZW network must align discursively and in practice.

The process of creating a collective codified signifier demonstrates how shared names shape sustainability narratives and therefore directions and outcomes. However the direction and outcomes also dictates how a name is interpreted and framed. Hence the process of meaning making is in a continuous cycle of interpretation and application. The broader implications point towards a need to develop sustainability communication strategies which encourage innovative and diverse actor inclusion. While acknowledging the influence of agency,

networks, familiar keywords and the dominance of online platforms and search engines in disseminating sustainability knowledge.

## 6. CONCLUSIONS

In this paper, we explored the zero waste movement as an example of a discursive network and shared signifier. We demonstrate how strategic transition naming aids: collective learning, the articulation of expectations and visions, building an identifiable network and supporting niche innovations to unfold on an international scale. To describe this concept we developed the new term 'collective codified signifier' to mean a signifier that embodies *specific and fully codified knowledge*. The term contrasts with that of an 'empty signifier' (Lacan), a signifier that has no intrinsic or essential meaning, but which permits 'an endless succession of varying applications and extensions' (Hook & Vanheule 2015). It is crucial for niches to gain momentum through more precise and more broadly accepted transition agendas. However it is vital for this process to be implemented and continued beyond just a vision setting exercise: new multi-governance and spatial arrangements are necessary.

The power of discursive networks, shared names and collective codified signifiers is proven here by demonstrating how two prominent waste narratives and their practical outcomes emerged and exploded on an international stage. The evidence suggests that if transition experiments create a discursive network through a shared name, this enables a particular discourse to garner greater legitimacy, visibility and transferability. Shared names are a tool for not only connecting experiments, manifesting certain practices, enabling knowledge mobility beyond territorial forms of social organisation, but may also increase sustainability projects globally. Our findings are particularly relevant from the perspective of socio-technical systems transitions, which aim to create opportunities to transfer social thinking and the conceptual acceptance of sustainability innovations as well as support innovative technical developments and capabilities globally.

Transition managers must consider what marketers have known for decades, the value of branding. Building an identifiable and legitimate transition brand increases the likelihood that the transition, its success stories and outcomes will be up scaled and implemented beyond a once off localised case. This involves packaging and disseminating transition knowledge strategically. If a transition is observed in isolation it may lack visibility and credibility and not reach its full potential. Although the benefits of strategic transition naming and adoption of shared signifiers may seem obvious, many transition studies have failed to successfully market their transition frameworks and learnings beyond a narrow audience. The advantages of engaging with a wider global niche and building stronger discursive networks are also

missed by many transition practitioners. In seeking new socio-technical structures, future research should place greater importance on naming their transition and explore the applicability of collective codified signifiers in identifying opportunities to venture passed territorially bounded niches and regimes (also transnational / global regimes) which may inhibited a transition's progress.

Transition Management has emerged as an alternative governance framework that aims to support the change makers and front runners in the battle against unsustainable 'business as usual' ideologies. This battle is occurring on both the social and technical fronts. Taking on the dominant regime is no easy task; niche experiments must garner support and legitimacy by aligning to allies both at home and abroad. Ideas can become game changers if they are enabled to flourish and take form. Engaging through a shared signifier enables transitions to cultivate support, providing a relational and discursive space where networks can materialise and niche concepts can structurise. This is why we find developing a collective codified signifier is a crucial component in the transition process.

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