



Cass Business School
City, University of London

MSc in Innovation, Creativity and Leadership
Project report
2018

**Doing better with less; could a frugal approach to
design thinking help humanitarian innovation?**

Ben Holt

Supervised by: Neil Maiden

Advisor: Harry Scarbrough

January 2018

Declaration

By submitting this work, I declare that this work is entirely my own except those parts duly identified and referenced in my submission. It complies with any specified word limits and the requirements and regulations detailed in the coursework instructions and any other relevant programme and module documentation. In submitting this work I acknowledge that I have read and understood the regulations and code regarding academic misconduct, including that relating to plagiarism, as specified in the Programme Handbook. I also acknowledge that this work will be subject to a variety of checks for academic misconduct.

Signed:

A handwritten signature in black ink, appearing to be 'Ben King', written in a cursive style.

Acknowledgements

I am forever grateful to Neil and Harry – thank you for challenging, pushing, questioning and bringing out my developer while I explored.

Thank you to Polly for making this possible and believing in me.

I'm indebted to the experts who gave me their time and insight across time zones and dodgy internet connections; I hope I've produced something that will help.

Above everything, all my love and thanks to Lucy for all the support, space and encouragement over the past two-and-a-half years. Nothing would have been possible without you. And to Rita, for helping me with my homework and not stealing all my pens.

Abstract

Humanitarian non-governmental organisations (NGOs) tackle some of the most complex problems on the planet. This dissertation examines NGO innovation practice and identifies a gap in theory and practice between the needs of experienced frontline staff and the output of remote experts collaborating on innovation projects. A new model for humanitarian innovation is proposed which combines frugal innovation theory with design thinking.

This exploratory research project develops, tests, iterates and evaluates the new framework via an extensive literature review across three domains – humanitarian innovation, frugal theory and design thinking – and input from domain experts.

The research illustrates that frugal innovation has strong relevance for the humanitarian sector and that the new framework is a potential improvement on current practice with scope to scale.

Key words

Humanitarian, frugal, innovation, design thinking, NGO

Table of contents

Declaration	i
Acknowledgements	ii
Abstract	iii
Table of contents	iv
List of figures	vi
List of tables	viii
Glossary	ix

1. Introduction	1
1.1 Context.....	1
1.2 Background.....	2
1.2.1 Frugal innovation.....	2
1.2.2 Humanitarian NGOs and frugal innovation.....	5
1.2.3 Design thinking and frugal innovation.....	5
1.3 Objectives and beneficiaries.....	6
1.4 Research strategy.....	8
1.5 Structure.....	9
1.6 Chapter conclusions.....	9
2. Literature review	10
2.1 'BOP' and resource-constrained Innovation.....	10
2.2 Frugal innovation.....	13
2.3 Design thinking.....	18
2.4 Humanitarian innovation.....	23
2.5 Chapter conclusions.....	27
3. Research design and methods	28
3.1 Research design.....	28
3.2 Research methods.....	33
3.3 First stage: Examine and understand the context.....	35
3.3.1 Context: Diagnosis.....	35
3.3.2 Context: Planning action.....	38
3.3.3 Context: Acting.....	38
3.3.4 Context: Evaluating.....	41
3.4 Second stage: Develop, test and iterate a prototype.....	43
3.4.1 Constructing the issue.....	43
3.4.2 Planning action.....	44
3.4.3 Taking action.....	46
3.4.4 Evaluate the prototype.....	47

3.5 Third stage: Evaluate the project.....	48
3.6 Chapter conclusions.....	49
4. Results.....	50
4.1 Construction of issues.....	50
4.1.1 Is frugal innovation the correct framework?.....	51
4.1.2 Is design thinking a useful approach?.....	54
4.1.3 Is there a need for a new toolkit?.....	56
4.2 Planning action – Creating a frugal design thinking framework.....	57
4.3 Taking action.....	60
4.3.1 A new framework (1.0)	60
4.3.2 Feedback on the framework.....	64
4.3.3 A new framework (2.0).....	67
4.3.4 New techniques.....	70
4.4 Chapter conclusions.....	74
5. Discussion.....	76
5.1 Achieving the research objectives.....	76
5.1.1 Objective A: Identifying the gap.....	77
5.1.2 Objective B: Customised innovation framework.....	78
5.1.3 Objective C: Test and iterate the framework.....	80
5.1.4 Objective D: Recommendations.....	80
5.2 Validity, scope and generalisability.....	82
5.3 Conclusion.....	83
6. Evaluation, reflections, and conclusions.....	85
6.1 Choice of objectives.....	85
6.2 Approach.....	86
6.3 Conclusions.....	87
6.4 Personal reflections.....	87
7. Bibliography.....	91
8. Appendices.....	97
a) Project Definition Document	
b) Ethics approval form	
c) Consent form	
d) Participant information sheet	
e) Interview request email	
f) Interview questions	
g) HART test	
h) 1.0 feedback instructions	
i) Feedback questionnaire and results	
j) Interview recordings	
k) Logline development	
l) Conceptual space mapping	
m) Consent forms	

List of figures

Figure 1 The attributes of frugal innovations according to scholars Radjou and Prabhu.....	3
Figure 2 Radjou and Prabhu’s principles of Frugal innovation (2016).....	4
Figure 3 Jugaad farm equipment.....	13
Figure 4 A jugaad rickshaw.....	13
Figure 5 A jugaad shower.....	14
Figure 6 Frugal principles.....	15
Figure 7 Incremental versus radical innovation.....	19
Figure 8 The Double diamond.....	20
Figure 9 Dieter Rams’ design principles.....	22
Figure 10 Humanitarian principles.....	23
Figure 11 McClure and Gray’s Missing Middle model.....	25
Figure 12 Creswell’s “interconnection of worldviews, design and research methods.....	29
Figure 13 The research onion.....	31
Figure 14 Qualitative vs quantitative research approaches.....	32
Figure 15 The cycles of the action research spiral.....	33
Figure 16 An illustration of overlapping conceptual spaces.....	38
Figure 17 Conceptual space 1 – Low-resource innovation.....	37
Figure 18 Conceptual space 2 – Design thinking.....	37
Figure 19 Conceptual space 3 – Humanitarian innovation.....	37
Figure 20 Interview questions.....	39
Figure 21 Innovation ecosystem.....	40
Figure 22 Innovation pipeline.....	40
Figure 23 The coding key and coded pages of notes taken during interviews	42
Figure 24 Isaksen and Tidd’s CPS toolkit.....	44
Figure 25 Initial sketches for the proposed toolkit.....	45
Figure 26 The original framework sketch	47
Figure 27 The low-resource innovation conceptual space.....	51
Figure 28 The essential practices and values of frugal innovation aggregated by this research.....	52

Figure 29 The essential practices and values of design thinking	54
Figure 30 The double-diamond, developed by the British Design Council in 2005.....	60
Figure 31 The researcher’s frugal innovation prism design representing core values.....	61
Figure 32 The new frugal innovation prism inserted in to the discover/define phase.....	62
Figure 33 The prism is designed for reflection referencing core frugal values.....	62
Figure 34 The prism focuses on frugal values – constraining but strengthening outcomes.....	63
Figure 35 Discover/define passes a tight brief to develop/deliver.....	63
Figure 36 The final output will embody the core values of frugal innovation.....	64
Figure 37 Responses to feedback questionnaire, Q1.....	65
Figure 38 Responses to feedback questionnaire, Q3.....	65
Figure 39 Responses to feedback questionnaire, Q6.....	66
Figure 40 The initial cycle of the new <i>Surpas</i> innovation model.....	69
Figure 41 A double <i>Surpas</i> cycle.....	69
Figure 42 A repeated cycle of the new <i>Surpas</i> innovation model.....	70
Figure 43 Sketching and ideation for toolkit ideas (1).....	71
Figure 44 Sketching and ideation for toolkit ideas (2).....	71
Figure 45 Frugal design thinking toolkit ideas developed during this research.....	74
Figure 46 The <i>Surpas</i> framework designed by this research project.....	79
Figure 47 Nielsen’s graph of declining returns for elaborate user tests (2000).....	82

List of tables

Table 1	The project vision, objectives, question and outcome.....	7
Table 2	Resource-constrained innovation models.....	12
Table 3	Attributes of frugal enterprises mapped against NGOs.....	18
Table 4	Santa Clara University Frugal Innovation Hub framework.....	26
Table 5	HARP test scores.....	30
Table 6	Mapping the objectives against the project stages.....	34
Table 7	Draft attributes for ‘frugal design thinking in the humanitarian sector’	38
Table 8	The coding categories and definitions.....	42
Table 9	The practices and values of frugal innovation and design thinking.....	57
Table 10	The frugal design thinking principle and rationale developed by this research.....	59
Table 11	Qualitative feedback (Q6 and 7).....	67
Table 12	Research objectives and achievements.....	77

Glossary

Design thinking

A practical “methodology for innovating routinely” (Kelley and Kelley, 2013, p4) which involves exercises, tools, toolkits and creative approaches to problem solving, idea generation and solution design

Beneficiaries

The individuals receiving healthcare, shelter, food or other services from humanitarian NGOs

Emergency coordinator

Individual coordinating an NGO’s rapid response to emergencies, such as earthquakes or health infrastructure failure, as well as change management during mission transition from normal operations to emergency footing

The field

The places where humanitarian assistance is delivered by NGOs – the frontline of their interventions and focus of their work with beneficiaries

Frontline

See ‘the field’ – these words are used interchangeably

Humanitarian aid

“Aid and action designed to save lives, alleviate suffering, and maintain and protect human dignity during and in the aftermath of emergencies.” (Global Humanitarian Assistance, 2017)

Frugal innovation

A theory of innovation which recasts constraints as opportunities and designs products and services specifically for low-resource settings while also seeking to make a positive contribution to the wider context

Low-cost innovation

A form of innovation seeking to maximise the impact of existing resources and expertise to deliver cheap, practical and ingenious solutions

Low-resource innovation

A variety of innovation methods which address shortages in materials and low-income markets

Médecins Sans Frontières/Doctors Without Borders (MSF)

The world’s leading international emergency humanitarian medical aid NGO

Non-governmental organisation (NGO)

“A non-profit organization that operates independently of any government, typically one whose purpose is to address a social or political issue” (Oxford Living Dictionary, 2017)

Polycentric innovation pipeline

A network of individuals and organisations working together on innovation projects across national boundaries and disciplines

Chapter One: Introduction

1.1 Context

Humanitarian non-governmental organisations (NGOs) solve problems. They tackle some of the wickedest and messiest issues on the planet, from wars and natural disasters to epidemics and famines. The context in which these problems unfold are extreme – NGOs face severe resource constraints, logistical challenges and infrastructure failures.

These organisations have a history of innovation – from new HIV/AIDS drug regimens with global impact to the cheap, immediate solutions to life-and-death problems figured out every day by frontline staff (Bradol and Vidal, 2011). Recent advances in technology and connectivity have opened new opportunities for NGOs to work as dispersed networks, with polycentric innovation pipelines linking frontline ‘field’ staff with specialist innovation teams at headquarters (HQ) and partners from other sectors.

However, despite a huge investment across the humanitarian sector, few innovations have ‘stuck’ and scaled or disrupted and improved the system (McClure and Gray, 2015). Several culprits have been accused; some are systemic – related to management and decision making – while others are situational, linked to the urgency and unpredictability of the work. Another factor relates to design; there appears to be a gap between what current design thinking approaches deliver and what is appropriate and necessary on the frontline.

Experienced field staff are frequently disappointed when new products are delivered; all too often they “can say in five minutes why it won’t work here,” as one NGO innovator interviewed for this project put it. Similarly, experienced innovation and design experts are confounded by the complex constraints and unique needs of the humanitarian sector. This dissertation examines the gap

between these extremes and articulates a new model for humanitarian innovation which could allow dispersed networks to deliver powerful, appropriate solutions that scale.

The research explores the intersection of humanitarian practice, design thinking and frugal innovation theory, which seeks creative ways to “do better with less” (Radjou and Prabhu, 2016, p12), and considered the development of a new set of design thinking tools, or exercises, for humanitarian innovation.

1.2 Background

1.2.1 Frugal innovation

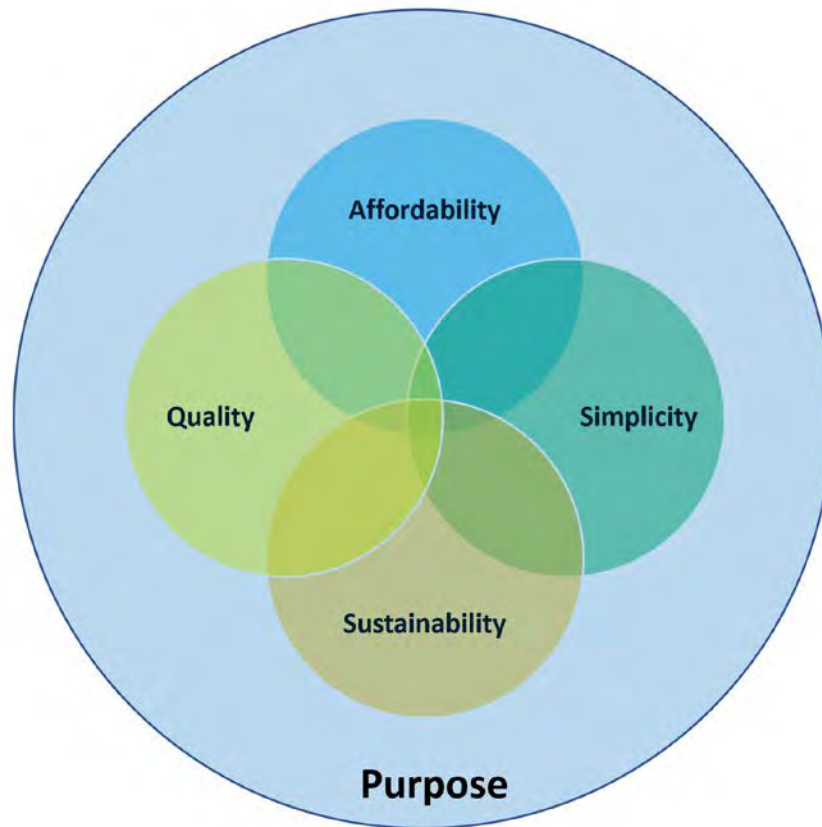
Frugal innovation has begun to receive interest from academics and enterprises as a powerful way to reimagine the Research and Development (R&D) process, as it recasts resource constraints as opportunities to devise ingenious solutions, rather than liabilities. These solutions “are not re-engineered products but originally developed products or services targeted at resource-constrained environments” (Zeschky et al, 2014, p8).

Leading frugal thinkers Navi Radjou and Jaideep Prabhu summarise the approach in a deceptively simple equation (Radjou and Prabhu, 2016, p11):

Greater value (for customers, shareholders and society)

Fewer resources (natural resources, capital time)

They go on to define frugal innovation by one intangible and four physical attributes (figure 1):



Affordability: A solution which is far more affordable than what is available today, or which can reach a wider market through cost efficiencies.

Simplicity: A solution which is understandable, straightforward to maintain and repair, and focused on its core objective.

Sustainability: A solution which consumes less in its production and distribution, which maximises the impact of all elements, and is aware of its impact and lifecycle.

Quality: A solution which does not compromise on quality or safety.

Purpose: “The product or the service you are offering needs to have a larger meaning”, which introduces the concept of *values* becoming a key consideration alongside value.

(Radjou and Euchner, 2016, p15)

Figure 1 The attributes of frugal innovations according to scholars Radjou and Prabhu

Extreme claims have been made for frugal Innovation since the term first reached the public consciousness in 2010 (Economist, 2010). It will either “make consumers of the poorest billion people in the world or alternatively increase their exploitation” (Baud, 2016, p122; Pesa, 2016).

Forward-thinking multinationals, such as Renault, GSK, GE, Unilever and Leroy Merlin, take advantage of their international reach to connect different problem-solving styles within their organisations. Others – such as SNCF, giffgaff and Accor – leverage relationships with start-ups and consumers. The theory is that “...by combining the frugal ingenuity of developing nations with the advanced R&D capabilities of advanced economies, companies can create high-quality products and services that are affordable, sustainable and benefit humanity...” (Radjou and Prabhu, 2016, pXVI).

The approach requires “lean, flexible and highly networked” organisations to build relationships across sectors to “change the way employees think” (Radjou and Prabhu, 2016, p65) and develop rebel talent (Gino, 2016). Frugal innovation theory proposes six principles which must inform the approach (discussed in chapter two) but does not impose a strict process (figure 2):

- 1. Engage and iterate.** Observe and engage people in their natural environment; unearth new or unmet needs; involve end users in product design process; break down the linear R&D process to prototype; iterate and learn quickly and cheaply
- 2. Flex your assets.** Reorganise your processes and resources to be flexible and efficient; take advantage of new technologies and materials; design a frugal supply chain; cultivate flexible staff
- 3. Create sustainable solutions.** Adopt circular manufacturing and ‘cradle-to-cradle’ manufacturing; aim to continuously improve; turn waste in to wealth; design for reinvention
- 4. Shape customer behaviour.** ‘Nudge’ customers to change behaviour; use data to improve; help people feel richer while they consume less; design for longevity
- 5. Co-create value with prosumers.** Engage users during conception, development and commercialisation of new products and services; crowd-source solutions and feedback
- 6. Make innovative friends.** Collaborate with diverse external partners; sharing knowledge is power; continuously learn and unlearn; borrow from other sectors

Figure 2 Radjou and Prabhu’s principles of Frugal innovation (2016)

1.2.2 Humanitarian NGOS and frugal innovation

The frugal approach tallies closely with the way NGOs work – these organisations are experienced working with financial, logistical or infrastructure constraints. They are dealing with the same problem as those frugal innovators seeking to ‘compete with non-consumption’ – how to reach and improve the lives of marginalised people (Christensen, 2006).

Humanitarian innovation increasingly relies on partnerships with the commercial sector – both paid and pro bono – and an influx of new staff, who are often technical experts with little field experience, to invent for the frontline. Unfortunately, there is often a gap between what is built and what is needed, what is possible and what is practical. In other words, a lot of new stuff is being built that is not as useful as it could be.

As “frugal innovation can be considered the pinnacle of innovation capabilities in resource-constrained environments” (Zeschky et al, 2014) it is appropriate to apply the theory to the humanitarian sector, yet there is a paucity of research into the potential of linking frugal innovation with humanitarian action.

1.2.3 Design thinking and frugal innovation

To derive value from frugal innovation theory it must be used to design new and useful products or services. This could require a design thinking approach tailored to the theory. Design thinking, in the context of this research, is “a methodology for innovating routinely” (Kelley and Kelley, 2013, p4).

No design thinking processes have been discovered by the researcher which apply frugal theory to practical exercises. Decades ago, design pioneer Dieter Rams developed a model for assessing value and relevance of products – “Weniger, aber besser” or “Less, but better”. While this is echoed in frugal theory, no explicit connection was found in existing literature.

For Nobel laureate Herbert Simon, the act of design “devises courses of action aimed at changing existing situations into preferred ones” ([Kilian et al, 2015](#)). This is also a core purpose of humanitarian action, and so a design-centred approach to the application of frugal theory appears to be a valid and potentially exciting research focus.

1.3 Objectives and beneficiaries

This research explored the integration of frugal theory, design thinking methodologies and the delivery of humanitarian innovation to create a new and useful model, which was tested and assessed by practitioners.

The specific objective was to bridge the gap between frontline humanitarian action and the network of support staff, third party developers and commercial enterprises producing new tools, products and processes designed for use ‘in the field’ (table 2).

Vision
Better use of resources, greater impact and more highly-functioning networks of experts in the humanitarian sector's innovation streams
Objective
<p>Bridge the experience and knowledge gap between frontline humanitarian staff and innovators producing new tools and processes for the field</p> <p>Broken down into sub-objectives:</p> <ol style="list-style-type: none"> a) Map the humanitarian innovation pipeline and validate the existence of a gap between the novelty and utility of the output b) Combine frugal theory, design thinking and humanitarian innovation practice to devise a <u>new innovation</u> framework tailored to the humanitarian sector c) Test and iterate this framework d) Make recommendations for any new toolkit development or systemic adjustments to improve humanitarian innovation based on the research
Research question
"Doing better with less; could a frugal approach to design thinking help humanitarian innovation?"
Outcome
Fugal innovation design thinking model for humanitarian action and potential toolkit ideas

Table 1 The project vision, objectives, question and outcome

The beneficiaries were anyone working in a humanitarian innovation pipeline or affected by the outcomes:

- **NGO innovation staff and partners** have a new and improved conceptual model to apply to their design process
- **NGO field staff end-users** benefit from more appropriate, powerful innovations and involvement in their design
- **Patients and host communities** benefit if NGOs can reach and treat more people, and leave a more sustainable legacy

The research objective has changed during the study. The original intention to design and prototype a full 'frugal design thinking' toolkit for the humanitarian sector, which would be ready for any practitioner to pick up and use. Over the course of the project it became clear that a new model must be developed first, as any new tools must be rooted in a coherent framework to be useful.

1.4 Research strategy

This was exploratory research as an examination of the literature did not uncover any design thinking tools based on frugal innovation theory for humanitarian NGOs.

There is a growing body of research into frugal innovation and other 'low-cost' innovation strategies but the majority focuses on for-profit enterprises and the impact of frugal innovation on developing economies (Hadengue et al, 2017; Agarwal et al, 2017). In Agarwal et al's recent systemic literature review of 432 journal articles, conference papers and proceedings on constraint-based innovation, only one focused on NGOs.

Design thinking is a well-established research subject, which decades of practice and theoretical analysis to draw on. However, while there are toolkits for NGOs, the researcher uncovered no design thinking toolkits based on frugal innovation theory tailored to the humanitarian sector.

Consequently, this dissertation used an examine-develop-test-evaluate method. This is an inductive approach using action research to develop new ideas based the existing literature, user-research and domain knowledge. Action research is "well suited to the needs of people conducting research in their workplaces, and who have a focus on improving aspects of their own or their colleagues' practices" (Blaxter et al, 2010, p68) which relies on insider knowledge rather than rejecting it as biased (Greenwood and Levin, 1998). The expectation was that a new practical toolkit would emerge as the research developed.

The research drew on data generated by semi-structured interviews with domain experts, such as frontline humanitarian staff, NGO innovators and commercial enterprises working with the

humanitarian sector. These interviews and existing theories were coded and crosslinked to identify key trends and gaps, which will inform new ideas.

From this initial research, a new theoretical model was prototyped and a potential set of tools developed using creative problem solving and design thinking techniques. The model was tested with practitioners and iterated based on feedback.

Once the toolkit was refined as far as the capacity of this project allowed, an evaluation of the research, the outcomes and the potential for further application of the toolkit and ideas was carried out.

1.5 Structure

The report is presented as follows:

1. **Introduction** – Why this project?
2. **Literature review** – What is already out there?
3. **Methods** – How will the research be conducted?
4. **Results** – What did the research deliver?
5. **Discussion and conclusions** – What are the outcomes, next steps and lessons?
6. **Reflections** – What has the researcher learnt and how can others improve on the approach?
7. **Appendixes** – the research evidence, data, interviews and prototypes

1.6 Chapter conclusion

This chapter introduced the research, proposing that there is a gap between what the humanitarian innovation process delivers and what is actually needed on the frontline. It argues that frugal innovation is a promising theory which could bridge this gap if it is used to develop a customised design thinking model and exercises for the humanitarian sector. This hypothesis will be examined and tested in detail in subsequent chapters.

Chapter Two: Literature review

This chapter reviews the existing literature to examine and understand the context for this research. It explains the current state of the topic, in practice and theory, by describing recent relevant work and findings.

The review explores several domains including frugal and resource-constrained innovation theory, design thinking and humanitarian innovation practice to create an integrated understanding of the elements underpinning the objectives of this study. Several sources have been used including journal articles, academic books and papers, industry media, conference proceedings and working papers.

2.1 'BOP' and resource-constrained Innovation

Globally, billions live in poverty; the United Nations identify 2.7 billion people living on less than USD\$2.50 a day (Malik, 2014). In 1998-9, management scholar CK Prahalad introduced *bottom of the pyramid* (BOP) economic development to target disadvantaged communities, arguing “poverty can be alleviated through financially profitable activity” (Kolk, 2014, p351). That is, multinational corporations (MNCs) can reimagine products, business models and supply chains to access emerging markets (Trimble, 2012; Hadengue et al, 2017) and make profit while simultaneously sparking economic development by providing employment and entrepreneurial opportunities (Prahalad, 2004). This ‘competing with non-consumption’ disrupts the traditional economic model of evermore sophisticated products targeted at high-income countries (Christensen, 2006).

It must be noted that Prahalad did not provide a concise definition of the BOP. A systematic literature review a decade later concluded that no standard definition had emerged and consequently “the usage of the term is blurred and frequently imprecise, leading to different articles studying very different “bases” of the pyramid” (Kolk, 2014, p214; see also Karnani, 2007; Hadengue et al, 2017).

Despite this imprecision, BOP economics disrupted companies as well as markets. For decades, MNCs relied on glocalization – the ability to “develop great products at home and then distribute them worldwide, with some adaptations to local conditions” – targeted at affluent upper classes in developing countries (Immelt, 2009, p57).

But as the BOP concept gained traction, forward-thinking businesses retooled innovation processes to reach new consumers (Wright et al, 2005; Zeschky, 2014), seeking business models “characterized by high value at affordable costs” (Zeschky, Winterhalter and Gassmann 2014, p5). At the vanguard, it was recognised that “a better approach [than glocalization] is to study the market you want to serve and understand first-hand the customer you are trying to serve” (Radjou and Euchner, 2016, p16).

Various resource-constrained innovation practices emerged to address this (table 2):

Name	Key scholars	Characteristics	Product examples
Jugaad	Radjou et al, 2012	Ingenuity, hack, opportunities in adversity, more with less, keep it simple, start with the problem	Modified rickshaws Mitticool fridge Franklin stove
Good-enough	Christensen, 1997 Gadiesh, Leung and Vestring, 2007 Hang, Chen and Subramian 2010	Cheap, specialised, low-end, compete with non-consumption, mass appeal	Micro-compact pick-up trucks, Logitech M215 Saurer textiles
Grass roots	Brem and Wolfram, 2014	Social integrity, networking, sustainability, community	Honey Bee Network, desert reforestation, System of Rice Intensification (SRI)
Catalytic	Christensen et al. (2006)	Scalable, sustainable, system changing, replicable, low-cost, unusual resources,	Grameen Bank of Bangladesh MinuteClinic Meningitis Vaccine Programme
Gandhian	Prahalad and Mashelkar, 2010	Serve the unserved, ambitious entrepreneurship, disrupt business models, affordability, sustainability	Tata Nano EKA supercomputer Bharti Airtel

Resource constrained	Ray and Ray, 2011	An umbrella term for all of these innovation approaches	All of these
Reverse	Immelt, Govindarajan, and Trimble 2009 Trimble 2012 Govindarajan 2012 Govindarajan and Ramamurti (2011)	Products built on low-resource innovations for developed markets	Mettler Toledo weighing scale GE ultrasound scanner Logitech M215 wireless mouse
Frugal	Radjou and Prabhu, 2016 Zeschky, Widenmayer, and Gassmann, 2011	Values driven, scalable, sustainable, affordable, simple	M-Pesa careHPV device Logiq Book ultrasound

Table 2 Resource-constrained innovation models (Soni and Krishnan, 2014; Altmann and Engberg 2016; Zeschky et al 2014; Zeschky, Winterhalter and Gassmann, 2014; Brem and Wolfram, 2014)

All these approaches delivered successful BOP innovations (table 2) but five core characteristics emerged (Hadengue, 2017):

- Quality
- Affordability
- Accessibility
- Scalability
- Sustainability

However, scholars have recently challenged “the very notion of profitability at the BOP” and noted that NGOs played a significant role in many successful BOP initiatives, which in turn “points to a more complex relationship between profitability and poverty alleviation than originally thought” (Kolk, 2014, p235).

How, then, should NGOs adapt low-resource innovation practice to their own needs?

2.2 Frugal innovation

Frugal innovation grew out of an improvised, problem-solving mindset known as *jugaad*, which used resources at hand to deliver 'good-enough' solutions not designed to scale or disrupt markets (Soni and Krishnan, 2014).



Figure 3 Jugaad farm equipment (*image credit: uncommonindians.com*)



Figure 4 A jugaad rickshaw (*image credit: uncommonindians.com*)



Figure 5 A jugaad shower (image credit: uncommonindians.com)

Radjou et al (2012) examined jugaad innovation – identifying **resilience, frugality, adaptability, simplicity, inclusivity, and compassion** as key characteristics – and built a scalable theory called frugal innovation, which is now arguably the “pinnacle of innovation capabilities in resource-constrained environments” (Zeschky et al, 2014, p13). It is backed by a growing body of research, although extreme claims have been made: It will either “make consumers of the poorest billion people in the world or alternatively increase their exploitation” (Baud, 2016, p122).

It is important to note that frugal innovations are not re-engineered products but are developed for “very specific applications in resource constrained environments” (Zeschky et al, 2014, p23) and, as such, the theory has potential for all sectors operating in such contexts, including humanitarian NGOs (Kolk, 2014; Rangan, Chu, & Petkoski, 2011; Rivera-Santos et al, 2012).

Radjou and Prabhu argue that, increasingly, consumers want products to embody *values* as much as *value*; they want “high-quality products and services that are affordable, sustainable, and benefit humanity as a whole” (Radjou and Prabhu, 2016, pXVI). They want to do better with less, rather than

just getting more for less. Frugal theory pushes innovators to produce solutions which score highly on three apparently opposing measures:

- Affordability
- Quality
- Sustainability

Tiwari and Herstatt (2011) and others, argue that frugal innovations share other basic attributes:

“They must be (i) robust to deal with infrastructure shortcomings such as voltage fluctuation; (ii) fault resistant to cope with unsophisticated or even illiterate users; (iii) affordable for larger sections of society” (Pansera, 2013, p472).

Here is an essential point: Frugal innovation combines *practice* with *values*, as embodied in the attributes of the product, to deliver goods highly adapted to the real-world context in which they are deployed. To deliver these products, Radjou and Prabhu (2016) outline six principles of frugal innovation process (figure 6):

- 1. Engage and iterate.** Observe and engage people in their natural environment; unearth new or unmet needs; involve end users in product design process; break down the linear R&D process to prototype; iterate and learn quickly and cheaply
- 2. Flex your assets.** Reorganise your processes and resources to be flexible and efficient; take advantage of new technologies and materials; design a frugal supply chain; cultivate flexible staff
- 3. Create sustainable solutions.** Adopt circular manufacturing and ‘cradle-to-cradle’ manufacturing; aim to continuously improve; turn waste in to wealth; design for reinvention
- 4. Shape customer behaviour.** ‘Nudge’ customers to change behaviour; use data to improve; help people feel richer while they consume less; design for longevity
- 5. Co-create value with prosumers.** Engage users during conception, development and commercialisation of new products and services; crowd-source solutions and feedback
- 6. Make innovative friends.** Collaborate with diverse external partners; sharing knowledge is power; continuously learn and unlearn; borrow from other sectors

Figure 6 Frugal principles (Radjou and Prabhu, 2016)

In the application of these principles, scholars agree that “frugal innovations open opportunities for new business models and may well disrupt innovation processes” (Knorringa et al, 2016, p143). The prevailing wisdom is that innovation capacity should be located as close to end-consumers as possible so “frugal innovation can combine local ideas and knowledge with international expertise in inclusive value chains to develop low-cost products that enjoy maximum user value” (Peša et al, 2016, p148).

The approach requires “lean, flexible and highly networked” organisations, as it is impossible to develop a frugal mind-set shaped by “resource-rich, stable Western markets” – firms must look beyond their own employees, competitors, market sector and nation (Radjou and Prabhu, 2016, p4). Successful frugal innovation, it is argued, is best delivered by polycentric innovation pipelines.

However, Knorringa et al (2016), argue this model does not adequately address conflicts of interest. That is, the dynamic which created the global value chain – with burgeoning markets and ingenuity at one end and expertise and capital at the other – is no longer clear cut. Many ‘local’ actors, such as Tata, are highly capable of disrupting Western markets and challenging establish players. Indeed, “old business models can serve as constraint for innovation while new constraints, as those faced in emerging markets, can help trigger new business models”, which places them in direct competition with potential partners in a polycentric chain as "emerging markets offer a unique opportunity to gain competitive advantage" (Bhatti, 2012, p12).

Nevertheless, situating innovation capacity solely in emerging markets is challenged by Altmann and Engberg (2016, p48), who identified a critical factor: “the transferability of two important kinds of knowledge: 1) knowledge about the relevant market and 2) technical knowledge” (2016, p53). They argue that “in some cases, particularly where the technical knowledge is too difficult or risky to transfer, innovation may have to occur at home” (Altmann and Engberg 2016, p49).

Baud (2016, p123) counters that frugal innovation has surged because technology facilitates “expanding networks of knowledge production, exchange and contestation” so these projects are no longer solely the domain of “technical experts” and capacity can be dispersed.

As NGOs are not in direct competition with corporations, often work in unstable contexts, and are usually multinational, a polycentric innovation pipeline is highly appropriate.

Wherever R&D capacity is situated, influencing frugal innovation outcomes means intervening at a process level “by exercising lean principles for product design, or process reengineering” (Soni and Krishnan, 2014, p36). As such, this research will also examine design thinking theory.

The literature review was hampered by the immaturity of frugal innovation research, a domain only a few years old, and the subsequent lack of clear definitions. A recent review by Weyrauch and Herstatt addressed this and proposed three essential criteria: “substantial cost reduction, concentration on core functionalities, and optimised performance level” (Weyrauch and Herstatt, 2016, p2). But they acknowledged that “how the three criteria manifest in real products and services strongly depends on the user environment and the context” and so the exact nature of frugal innovation remains fluid and context-sensitive (*ibid*, p 11).

Furthermore, frugal innovation is discussed as both an outcome and a process but this dual identity is not always acknowledged by scholars. The current project seeks to design a frugal process which will generate frugal outcomes.

There is also very little in the literature about the scalability of frugal innovation, and the limited discussion focuses on market penetration and profit (Weyrauch and Herstatt, 2016). This leads to another observation; the current academic interest in frugal innovation is almost exclusively focused on for-profit enterprises, with virtually no consideration of the application to the humanitarian sector. However, this researcher noted a close correlation between attributes of successful frugal businesses and NGOs (table 3):

Frugal enterprise attribute	NGO match	Example
Expertise and resources located close to end consumer	Yes	Frontline field projects, national staff, regional management hubs (e.g. Nairobi)
Networked	Yes	Partnerships across commercial and academic institutions, open-source approach, open to collaboration
Non-Western mindset input	Yes	Global organisations with multiple perspectives and mobile multinational staff
Polycentric innovation capacity	Yes	Frontline, HQs, external partners, consultants, research labs, innovation units, budget
Access to both experience and expertise	Yes	Experienced frontline staff move between HQ and field, project country access via presence, technical expertise and external partners available
Lean principles for product design	No	Not a systemic approach and only occasionally found in pockets or specific projects
Flexible delivery pipeline and assets	Partly	Emergency response organisations are set up to respond to the unexpected but the process and approach may be inflexible and bureaucratic
Ability to turn prototypes in to products	Partly	Resources are available but the track record of sustaining and developing long-term solutions from short term projects is weak

Table 3 Attributes of frugal enterprises mapped against NGOs

After consideration, frugal innovation was selected as the most appropriate low-resource theory for application to the humanitarian innovation system.

2.3 Design thinking

Design thinking is “a methodology for innovating routinely” which employs practical tools to find and refine ideas (Kelley and Kelley, 2013, p4). Indeed, ideas are raw materials for innovation but must be processed to extract value, and so organisation develop systems which transform ideas in to “new and improved ways of doing things” (Anderson et al 2014, p1298). Design thinking is one aspect of this system.

When designing the wider system, Govindarajan and Trimble argue for “disciplined experimentation and rapid learning” (2013, p156). This means “successful management of both exploration (e.g., creating new products) and exploitation (e.g., production and implementation of products)” (Anderson et al 2014, p1302). In an organisational context, this is known as ambidexterity theory (Tushman, 2002) or Janusian thinking (Isaksen et al, 2006). Essentially it is “...the ability of a complex and adaptive system to manage and meet conflicting demands by engaging in fundamentally different activities”, figure 7 (Bledow et al, 2009, p31).

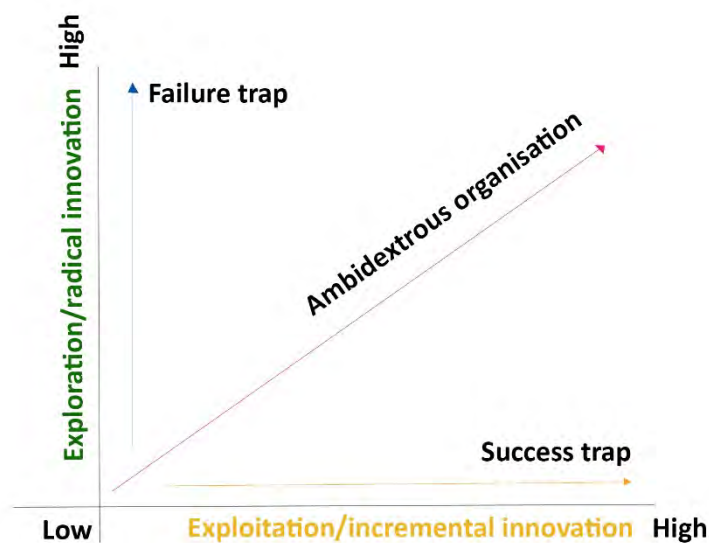


Figure 7 Adapted from Güttel et al (2011) and Mattes and Ohr (2004). Too much focus on incremental innovation of existing products can blind organisation to new opportunities, while invention without successful implementation leads to failure.

This ability to manage contrasting approaches and outlooks is fundamental to design thinking; too often “...businesses either excel at the creative side, in which case innovations usually fail, or they excel at the analysis side”, which can lead to stagnation (Lockwood, 2009, pIV). Successful design thinking requires open-mindedness, reflection, experimentation, fast prototyping, iteration, learning and business analysis (Lockwood, 2009).

A common model with which to apply specific tools to deliver well-designed solutions is the ‘double diamond’ (figure 8), developed by the British Design Council in 2005 to represent the creative process across disciplines. This framework is “a simple visual map of the design process” with two diverge/converge phases – “once to confirm the problem definition and once to create the solution. One of the greatest mistakes is to omit the left-hand diamond and end up solving the wrong problem” (Design Council, 2005).

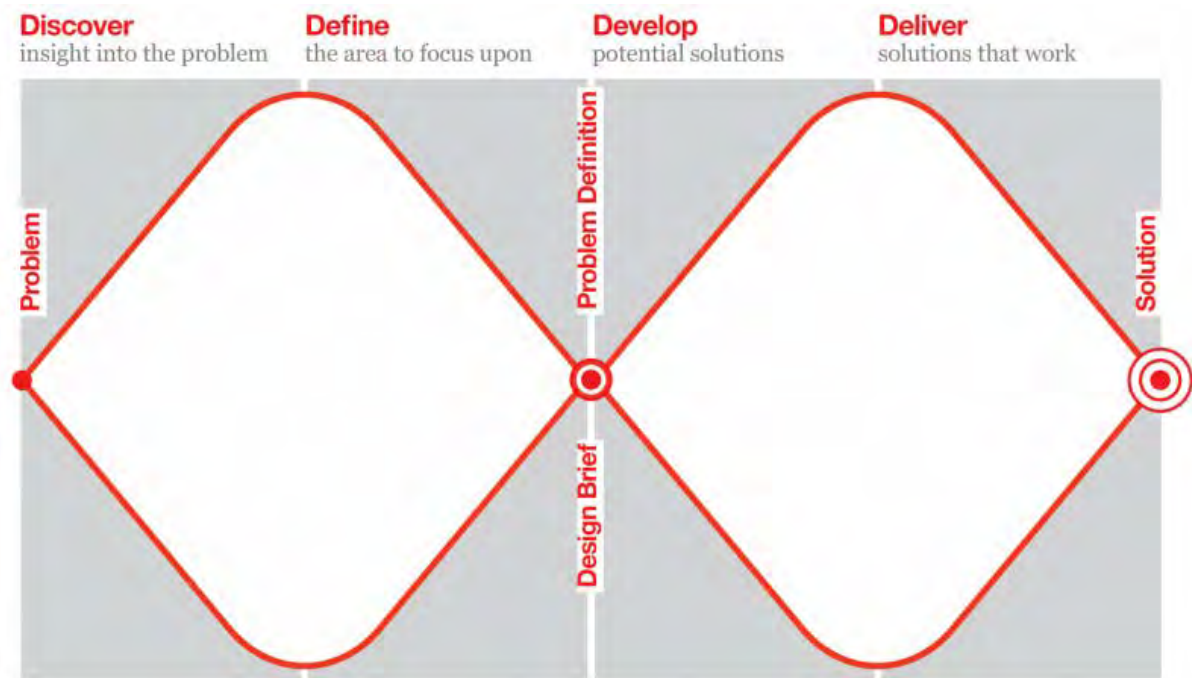


Figure 8 The Design Council’s double-diamond (2005)

Design thinking provides tools to apply to the double-diamond. Its driving concern is human experience; it is not solely focused on the look of a product – it is concerned with function and draws from diverse disciplines to help innovators explore and exploit ideas. At its core, design thinking is a flexible process which delivers seemingly simple solutions to apparently complex problems. Tim Brown, founder of IDEO, defines it as “a discipline that uses the designer’s sensibility and methods to match people’s needs with what is technologically feasible and what a viable business strategy can convert into customer value and market opportunity” (Brown, 2008, p86).

For Roger Martin, this means balancing “the quantitative focus of analytical thinking, with its impulse to standardization and preference for consistency, with the creativity and freedom of intuitive thinking” (Gobble, 2014, p59). This chimes with the ‘conflicting’ forces of ambidexterity theory and the notion of exploration and exploitation in creative problem solving (CPS) literature (Isaksen et al, 2006).

Although the term ‘design thinking’ has been around since the 1970s, the concept of human-centred, functional and sustainable design goes much further back. While acknowledging the contributions of William Morris, Phillipe Starke, Paul Rand and many others, it is Dieter Rams’ philosophy which dovetails with frugal theory. Rams’ ‘Weniger, aber besser’ – *Less, but better* – promoted sustainable development and criticised the practiced of engineered obsolescence, which undermines the inherent value.

The 10 principles he articulated (figure 9) are echoed in frugal innovation’s fundamental elements – purpose, affordability, sustainability and simplicity. This suggests a design thinking approach rooted in Rams’ principles would be well-suited to application in a frugal system of humanitarian innovation:

1. Good design is innovative
2. Good design makes a product useful
3. Good design is aesthetic
4. Good design makes a product understandable
5. Good design is unobtrusive
6. Good design is honest
7. Good design is long-lasting
8. Good design is thorough down to the last detail
9. Good design is environmentally friendly
10. Good design is as little design as possible

Figure 9 Dieter Rams' design principles

As frugal innovation has been identified as a potentially suitable for humanitarian innovation but there is little evidence of a standardised process in the literature, a design thinking approach rooted in this theory would be a novel and useful outcome of the research. A suite of design thinking techniques could allow diverse stakeholders to collaborate when exploring and exploiting new ideas in a polycentric innovation pipeline.

But, a word of caution has been sounded by Bruce Nussbaum, an early advocates of design thinking as a process to inject creative problem-solving into organisations: "Companies absorbed the process of Design Thinking all too well, turning it into a linear, gated, by-the-book methodology that delivered, at best, incremental change and innovation" (Nussbaum, 2011, fastcodesign.com).

Nussbaum argues that while design thinking made an "immense" contribution to society and business", it failed when "it was denuded of the mess, the conflict, failure, emotions, and looping circularity that is part and parcel of the creative process" (*ibid*).

Design and innovation expert Helen Walters concludes that you cannot import a design process and expect it to deliver results. It must be tailored, adapted and iterated to both fit and shape the culture of the host organisation: “Design thinking isn’t fairy dust. It’s a tool to be used appropriately. It might help to illuminate an answer but it is not the answer in and of itself” (Walters, 2001, fastcodesign.com).

As such, a customised approach is needed for the humanitarian sector.

2.4 Humanitarian innovation

Humanitarian action is founded on principles enshrined in international law and the Geneva Conventions. The sector, then, fuses *values* with *practice*, a mix echoed in frugal innovation (figure 10):

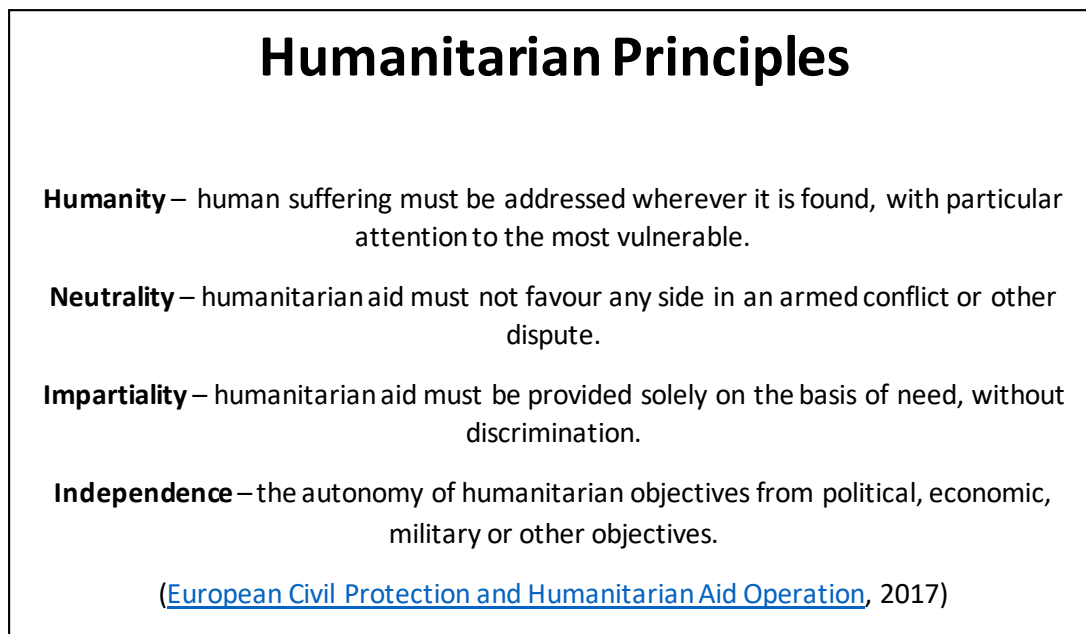


Figure 10 Humanitarian principles

Informal innovation is inherent in the humanitarian sector’s mission to provide aid to people in the greatest need as obstacles must be overcome. In the humanitarian sector, innovation is defined as

creating value from ideas and “successful innovations are those that result in improvements in efficiency, effectiveness, quality or social outcomes/impact” (Humanitarian Innovation Fund, 2017).

But in recent years there has been a rush of investment in formal innovation capacity and partnerships (Scriven, 2016). From the Global Humanitarian Lab – a partnership between the UN and leading NGOs to provide ‘rapid prototyping and design thinking to support solutions from, with and for the field’ – to the cross-sector Humanitarian Innovation Fund (HIF), innovation has become a strategic consideration.

Despite this, a major study by the Centre of Research in Innovation Management (CENTRIM) at the University of Brighton for DFID (2015) found that “in a number of critical ways, [the humanitarian innovation system] falls some way short of the ideal” (*ibid* p3), with specific need for improvements in six key areas:

Priority 1: Address resource gaps and approaches.

Priority 2: Address the lack of innovation information and evidence.

Priority 3: Strengthen skills, capacities and enablers of innovation.

Priority 4: Strengthen and facilitate ecosystem interactions and relationships.

Priority 5: Strengthen innovation management processes.

Priority 6: Build a global alliance to strengthen the innovation ecosystem.

Of specific relevance to this research is the call (under priority four) to “strengthen and facilitate interactions and relationships across the ecosystem, both within and across sub-sectors”; and the “need to strengthen innovation management processes across the ecosystem, to make them more objective and less partial to the vagaries of biases and fashions” under priority six (*ibid* p4).

The study goes on to state that an effectively functioning humanitarian innovation ecosystem needs “a means for generating new ideas including ‘outside the box’ creativity-enhancing tools and processes” (*ibid* p15).

The current humanitarian innovation ecosystem is failing in one essential respect: “there are few great ideas that have been deployed at scale, impacting large populations and serving needs in varying environments” (McClure and Gray, 2015, p3). However, scale is not the only measure of success; in common with many industries, improvement of practice and impact would also be valid metrics.

It appears that the investment in innovation is producing a proliferation of pilot projects but it not producing new and useful tools and processes which disrupt, improve or scale across the sector (McClure and Gray, 2015). McClure and Gray call this ‘pilot-it is’ and identify the ‘missing middle’ as the key to unlocking the potential of the new ideas (figure 11):

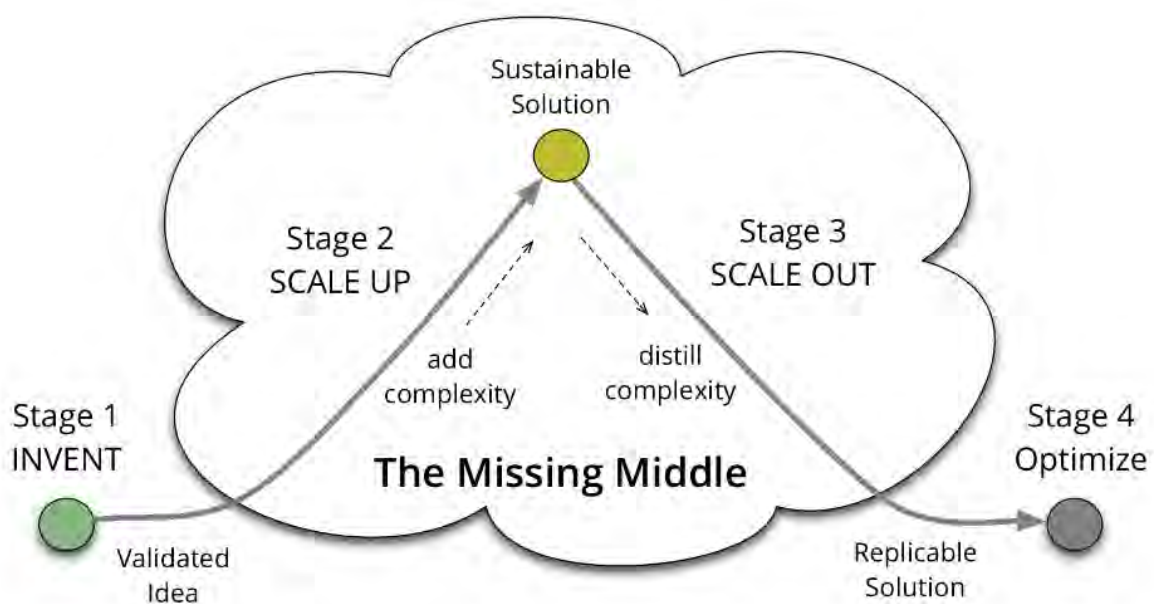


Figure 11 McClure and Gray’s Missing Middle model detailing the elements need to turn new ideas in to useful products (2015)

In this model, “‘Invent’ is the first stage of the innovation lifecycle. This is where Pilot programs are widely used. The great challenge here is that problems are often poorly understood, and there are potentially many ideas for addressing them” (McClure and Gray, 2015, p6). A more robust design thinking process could improve humanitarian innovation, encouraging problems to be examined

through a system designed specifically for the constraints that frontline deployment will force on any new inventions.

Insofar as this researcher could ascertain, frugal theory has not been applied to design thinking in the humanitarian system. The Santa Clara University Frugal Innovation Hub designed a frugal framework specifically for technology partnerships with the humanitarian sector but this identifies attributes of products, rather than a theoretical underpinning for a new design thinking process (table 4):

<p>The 10 Core Competencies of successful frugal innovation for humanitarian projects are:</p> <ol style="list-style-type: none">1. Ruggedization2. Lightweight: portable for varying transportation options3. Mobile Enabled Solutions: connectivity anytime, anywhere4. Human Centric Design: easy-to-use, intuitive designs that require little to no prior knowledge or training to utilize5. Simplification: minimalist features and functional requirements6. New Distribution Models: non-conventional channels and access.7. Adaptation: leveraging existing products, inputs and services8. Use of Local Resources: sourcing without importing equipment or materials9. Green Technologies: powered by renewable resources10. Affordability: low input and operation costs
--

Table 4 Santa Clara University Frugal Innovation Hub framework

So, there is space for an investigation of frugal innovation for the humanitarian sector, and specifically for the application of new design thinking tools to solve problems and provide solutions which will scale or improve practice.

This is an exciting prospect, but humanitarian innovation risks falling into the trap of “*problematization*, the linking of problems with actionable solutions”, which occurs when “humanitarian advocates construe immensely complex crises as ‘manageable problems,’” and

advocate the promotion of simple technical panaceas rather than nuanced, appropriate and needs-led innovations (Abdelnour and Saeed, 2014 p145).

To avoid this, any new design thinking process must be underpinned with a rigorous, disciplined theoretical framework while still allowing the 'messy' and uncertain creative process to unfold in unexpected and inspiring ways to deliver powerful and appropriate solutions.

2.5 Chapter conclusions

This chapter has examined the roots, theory and practice of frugal innovation, design thinking and humanitarian innovation. It has identified failings in the humanitarian system which could be addressed by a better design thinking process.

Frugal innovation – with its fusion of *values* with *practice* and its focus on extreme, resource-constrained contexts – offers a promising framework on which to build this new approach. But a new theoretical model, tailored to the humanitarian sector, must be designed before new tools can be invented.

Chapter Three: Research design and methods

This chapter describes the research design and methods used to develop, test and evaluate the research hypothesis, objectives and outcomes. It details the process to enable scrutiny, reveal any flaws, biases or influential assumptions, and allow replication of the study to validate or challenge the conclusions.

3.1: Research design

Research design is the framework for collection and analysis of data, as distinct from the research methods, which are the specific techniques or tools deployed (Creswell, 2014). Sound research design is critical to avoid conclusions based on flawed data.

The core objective of this study was to understand whether an existing theory – frugal innovation – could be applied to other domains in the form of design thinking techniques for humanitarian innovation. The research is designed to exploit the space between current reality and the hypothesis – or vision of the future – proposed: a more successful humanitarian innovation system. The gap between the two is a space of potential, uncertainty and conflict, which can generate new and useful ideas (Senge, 2003).

However, it is impossible to draw valid conclusion if the examination of ‘current reality’ is inaccurate. Creswell asserts that the researcher’s worldview – defined as “a general philosophical orientation about the world and the nature of research that the researcher brings to a study” – must be acknowledged as it impacts the design, methods and approach (Creswell, 2014, p6) figure 12.

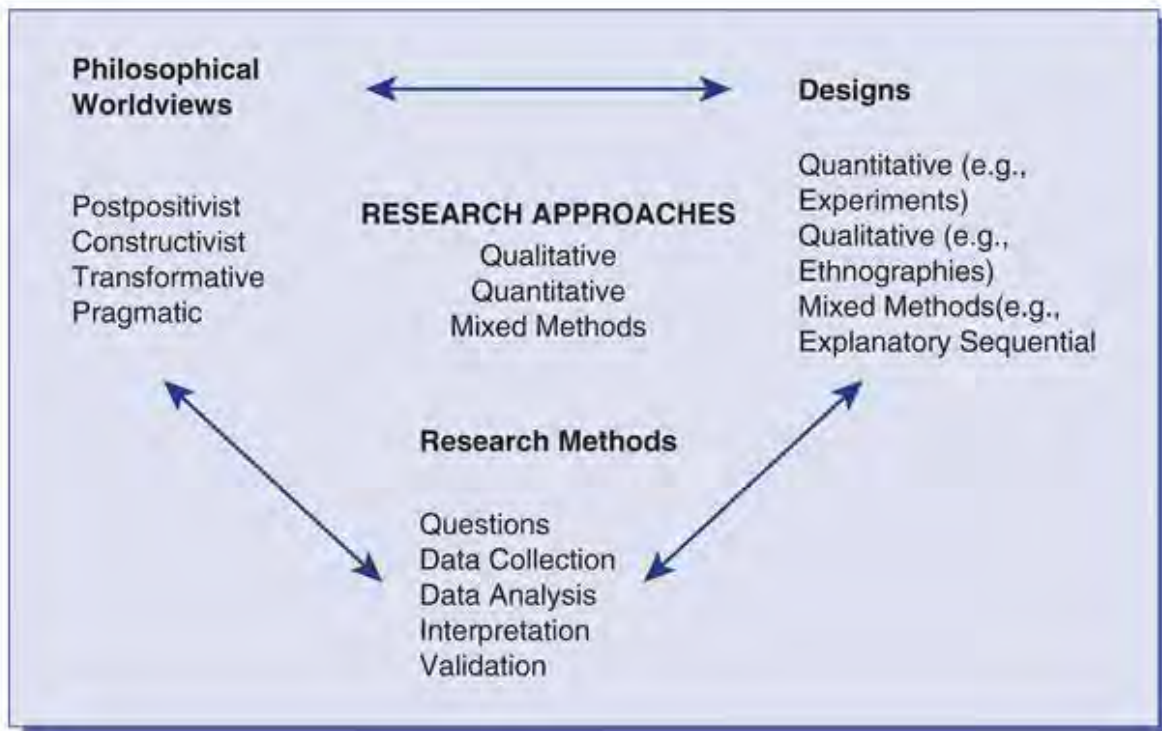


Figure 12 Creswell's "interconnection of worldviews, design and research methods" (2014, p5)

Using reflective practice, the psychometric *View* results, and a *Heightening your Awareness of your Research Philosophy* (HARP) test, "a reflexive tool... to help you explore your research philosophy" (Saunders 2016, p153. See appendix G), the researcher identified *pragmatism* as the dominant worldview due to its concern with "what works and solutions to problems" and its flexible approach that allows researchers to "choose the methods, techniques and procedures... that best meet their needs and purposes" (Creswell, 2014, pp10-11) table 5.

Research philosophy	HARP Score
Positivism	-5
Critical realism	+2
Interpretivism	13
Poststructuralism/post-modernism	10
Pragmatism	15

Table 5 HARP scores – appendix G for full test

The selection of pragmatism prompted further consideration of the research design using the ‘Research Onion’ (Saunders, 2007). Saunders’ model breaks down research into a series of ‘skins’, in which the outer layers – defining the research philosophy and nature – are “crucial to the development of an appropriate and coherent research design” as they “provide the context and boundaries within which data collection techniques and analysis procedures will be selected” (Saunders and Tosey, 2013, p58).

The research onion imposes a structured model to uncover the most appropriate methods for the study by determining, in order, the:

- nature
- approach
- design
- strategy
- time horizon
- method

Each phase is informed by that preceding and requires analysis of options and reflection on the research focus. The outcomes for this project are discussed below (figure 13):

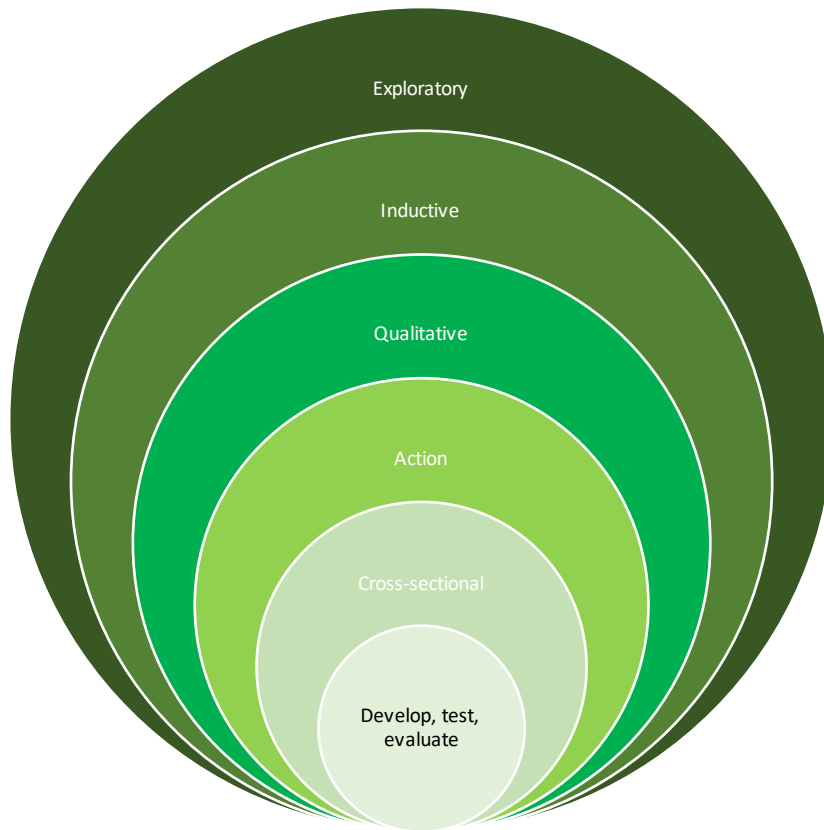


Figure 13 The research onion – (from outer layer) nature, approach, design, strategy, time horizon, method as chosen for this study

The **nature** of this project was exploratory; it took an existing theory, frugal innovation, and applied it to new phenomena, specifically humanitarian NGO innovation. The project did not aspire to develop a new theory but to “clarify [the researcher’s] understanding of an issue, problem or phenomenon” (Saunders 2016, p174).

Following this decision, an inductive **approach** allowed data to be generated and applied to a theory. In this instance, data was generated by a literature review, semi-structured interviews, and the development, testing, feedback and iteration of a prototype, which will be detailed further in section 3.4.

The research **design** had to be qualitative, given the prior methodology decisions. Qualitative research is “empirical research where the data are not in the form of numbers” (Punch, 2005). It examines the relationships between entities – people, groups or organisations, for example – and

the impact of new phenomena on them, rather than the relationship between variables, as illustrated in figure 14.

Box 3.4 The differences between qualitative and quantitative research	
Qualitative paradigms	Quantitative paradigms
<ul style="list-style-type: none"> • Concerned with understanding behaviour from actors' own frames of reference • Naturalistic and uncontrolled observation • Subjective • Close to the data: the 'insider' perspective • Grounded, discovery oriented, exploratory, expansionist, descriptive, inductive • Process oriented • Valid: real, rich, deep data • Ungeneralizable: single case studies • Holistic • Assumes a dynamic reality 	<ul style="list-style-type: none"> • Seeks the facts/causes of social phenomena • Obtrusive and controlled measurement • Objective • Removed from the data: the 'outsider' perspective • Ungrounded, verification oriented, reductionist, hypothetico-deductive • Outcome oriented • Reliable: hard and replicable data • Generalizable: multiple case studies • Particularistic • Assumes a stable reality
(Source: Adapted from Oakley 1999: 156)	

Figure 14 Qualitative vs quantitative research approaches (Blaxter et al, 2010)

The **strategy** was action research, which is “well suited to the needs of people conducting research in their workplaces, and who have a focus on improving aspects of their own or their colleagues’ practices” (Blaxter et al, 2010, p68) and relies on insider knowledge rather than rejecting it as biased (Greenwood and Levin, 1998). In many instances, the researcher is part of the system being studied, as in this project where the author was a digital innovation specialist at Médecins Sans Frontières/Doctors Without Borders (MSF). Action research aims to produce practical outcomes which have been iterated based on testing and evaluation, such as a new framework or toolkit. Action research proposes iterative cycles of *diagnosis or construction of issues, planning action, taking acting and evaluating*, with each cycle informing the next stage of the research “to explore and evaluate solutions to organisational issues and to promote change within organisations” (Saunders, 2016, p191) figure 15. For this research, the three stages were: 1. Examine and

understand the context (delivered in the literature review and interviews); 2. Develop, test and iterate a prototype (delivered in the results); 3) Evaluate and propose action (delivered in the discussion and conclusions).



Figure 15 The cycles of the action research spiral (Saunders, 2016)

In terms of **time-horizon**, this is a cross-sectional study which will provide a snap-shot of the situation as it is now, rather than a longitudinal study of the impact of the research or behaviour over time.

This concludes the description of the research design, which had to be approached systematically to ensure the most appropriate methods were chosen to explore this problem space.

3.2 Research methods

Next, research methods – the tools to gather and process data – were chosen for each ‘*diagnosis, planning, acting and evaluating*’ cycle by mapping the objectives against the project stages (table 6):

Objective	Approach	Stage	Methods
Map the humanitarian innovation pipeline and validate the existence of a gap between the novelty and utility of the output	Thoroughly examine the conceptual spaces (Boden, 1990) to test assumptions, validate the focus of the study and understand the context	Examine and understand the context	Diagnosis Literature review Planning Reflective practice Conceptual mapping Acting Semi-structured interview Evaluating Coding interviews
Combine frugal theory, design thinking and humanitarian innovation practice to devise a new model tailored to the humanitarian sector	Define a set of frugal innovation principles tailored to the humanitarian sector and apply creative problem-solving methods to prototype a new design thinking framework and techniques	Develop, test and iterate a prototype	Diagnosis Mapping core concepts Planning Sketching Apply Rams' principle Acting Brainstorming SCAMPER ALUo Loglines Evaluating Expert feedback – Questionnaire
Test and iterate the framework	The alpha version (V1.0) of the framework ideas was circulated for feedback via a follow-up questionnaire. This informed the production of a beta version (V2.0) and a deeper understanding of the potential value and utility of the new framework	Develop, test and iterate a prototype	Diagnosis User testing Feedback via questionnaire Planning Diffusion theory Acting Redraft CPS LCD techniques - Evaluating Apply Rams' principles Apply frugal humanitarian principles Apply Boden's model
Make recommendations for any new toolkit development or systemic adjustments to improve humanitarian innovation based on the research	The process and the output were scrutinised to examine the legitimacy of the outcome and the potential for further development or deployment of the toolkit	Evaluate and propose action	Diagnosis Analyse objectives vs outcomes Consider user feedback Planning Reflective practice Compare outcomes to Roger's diffusion theory Acting Answer core questions Free energy principle Evaluating Conclusions chapter written

Table 6 Mapping the objectives against the project stages

Each of stages, and the specific methods used in each, will now be explained.

3.3 First stage: Examine and understand the context

3.3.1 Context: Diagnosis

This was a creative research project aiming to deliver something new and useful. Here, it is important to differentiate between two related concepts, both used in the research: Firstly, creative *processes* are techniques deployed to generate more inventive, unusual and imaginative ideas; The second is creativity as a *domain* – the study of what creativity is and how it is enhanced and measured.

Margaret Boden shaped the domain debate and defines creativity as “the ability to come up with ideas or artefacts that are *new, surprising and valuable*” in relation to their conceptual space, which is a community of ideas or objects which society recognises and values (Boden 1990, p1). The first stage of this project, then, had to establish the conceptual space otherwise evaluation of the output as ‘new or useful’ would be difficult. As Ritchie argues, choosing relevant artefacts is complex and can be heavily influenced by the assessor’s experience (Ritchie 2006; Brown 2012). This issue is addressed by action research and not considered a hindrance.

This research began by establishing three domain centroids – low-resource innovation, design thinking, and humanitarian innovation – to examine these conceptual spaces and identify potential crossover (figure 16). A thorough literature review was conducted (chapter 2) to map and connect existing research.

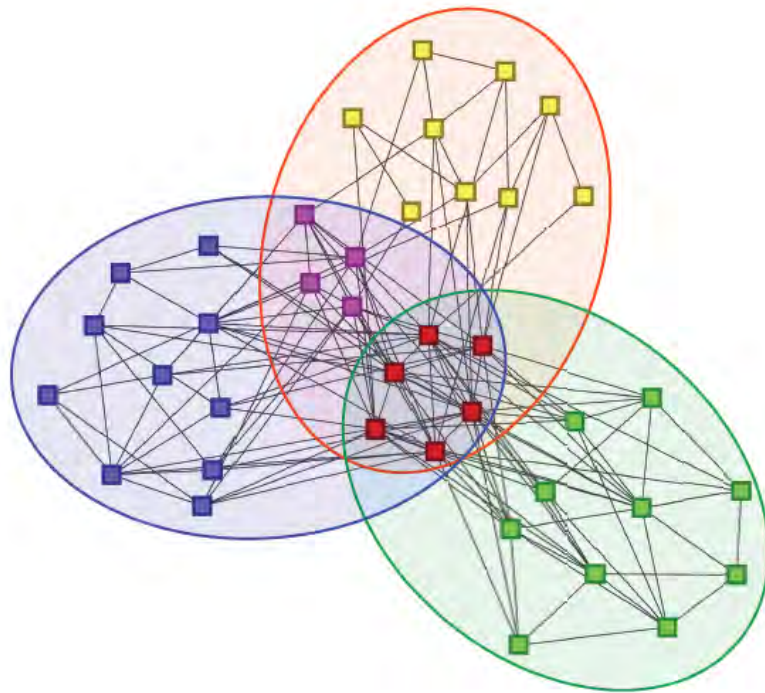


Figure 16 An illustration of overlapping conceptual spaces, adapted from Leskovec, 2014

Reflective practice was employed to produce novel and unexpected links between diverse ideas; sketchbooks allowed the researcher to capture flashes of insight or questions for further examination. Personal observations and links between domains and theories were added to extensive academic notes.

Through this process, a trio of 'conceptual space maps' was produced (figures 17-19), and data and theories uncovered by the literature review were mapped against the key domain characteristics (chapter 4):



Figure 17 Conceptual space 1 – Low-resource innovation



Figure 18 Conceptual space 2 – Design thinking



Figure 19 Conceptual space 3 – Humanitarian innovation

Information which appeared in the top right quadrant of each map was considered the most promising for further investigation, which in turn allowed the research to move further from the established centroids into new areas, where the outcomes could satisfy Boden’s definition of creativity.

3.3.2 Context: Planning action

Frugal innovation had been confirmed as the most appropriate theory in its conceptual space. The core features – as articulated by key scholars or evident on analysis – were mapped against theories in the top right quadrants of the other domains to produce draft attributes for ‘frugal design thinking in the humanitarian sector’. This was done by listing and cross-referencing key words (table 7).

Potential attributes
Engage and iterate
Flex
Co-create
Network
Purpose
Affordability
Simple
Robust
Behaviour change
Sustainable

Table 7 Draft attributes for ‘frugal design thinking in the humanitarian sector’

This created a potential conceptual space within which the *develop* phase of the research could take part. But first, the proposed conceptual space had to be assessed against the reality for practitioners in the humanitarian innovation pipeline.

3.3.3 Context: Acting

The literature review and emerging conceptual space informed the design of a semi-structured interview script, with a rationale for each question and space for unexpected information to surface (figure 20 and appendix F). Semi-structure interviews are flexible and allow new information to be unearthed, which may be missed with a more formal approach

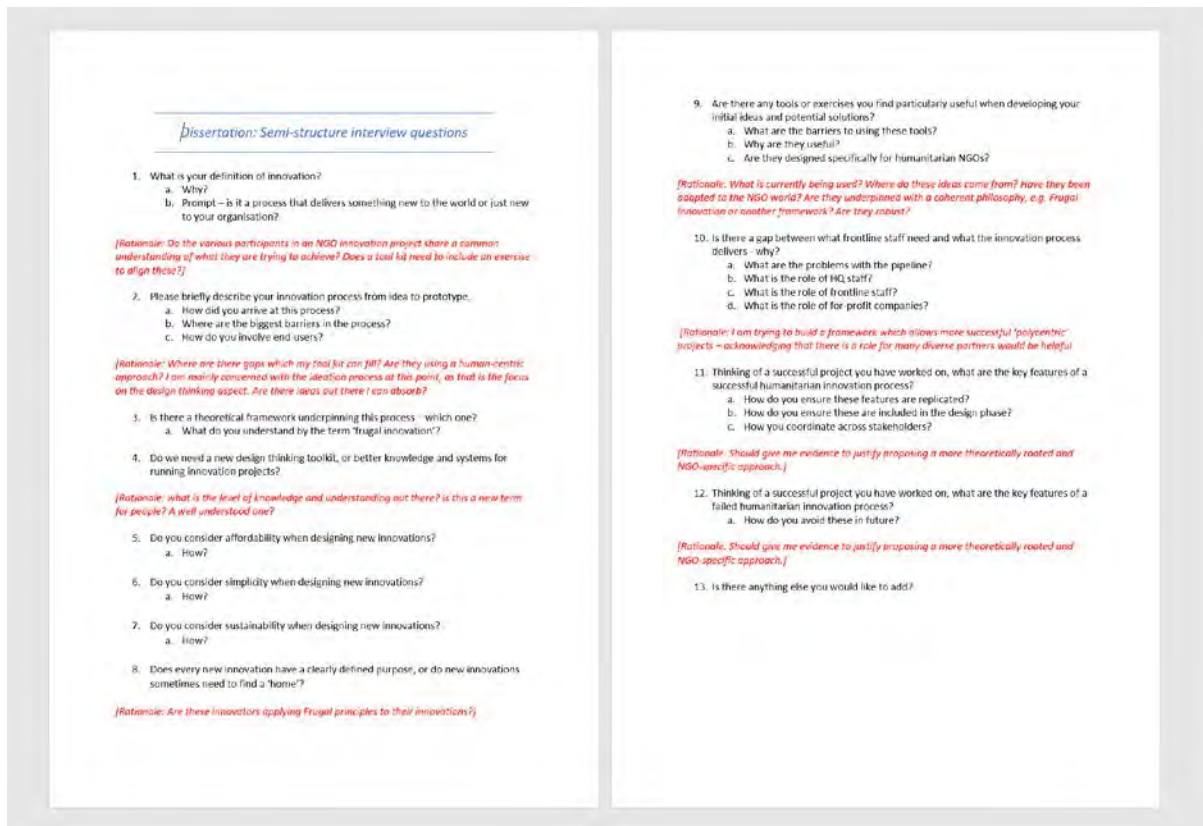


Figure 20 Interview questions

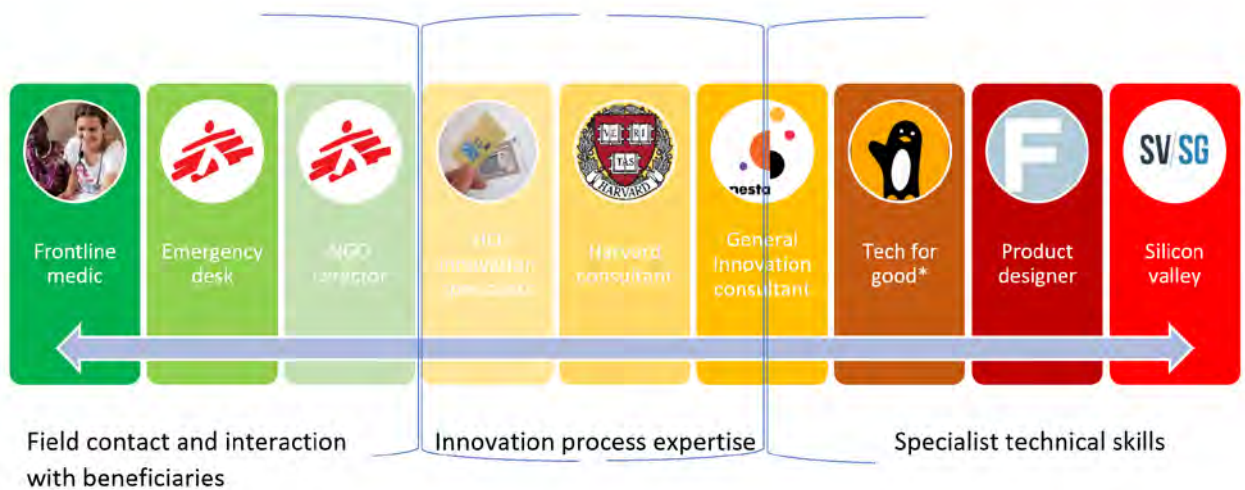
Potential interviewees were emailed a request explaining the project (appendix E) and those available received a consent form (appendix C). At all times, the ethical guidelines and agreements were considered and applied.

The participants were drawn from diverse disciplines but all were involved in the humanitarian innovation ‘ecosystem’, and all had contact with Médecins Sans Frontières/Doctors Without Borders (MSF), figure 21. They were found through the researcher’s personal and professional networks.



Figure 21 Innovation ecosystem

Everyone had worked on innovation projects for humanitarian contexts, but not all had worked directly in frontline missions. Their expertise spanned field experience and NGO management, through innovation practice to specialist technical skills, such as software development (figure 22).



*In this instance, the interviewee also has over a decade of field experience but currently works in the commercial sector

Figure 22 Innovation pipeline

Interviews took around 40 minutes each and were recorded to allow natural flow and facilitate later analysis (appendix J). The researcher also took detailed notes, flagging new arguments or powerful quotes, which formed the basis of the coding which took place next.

3.3.4 Context: Evaluating

A coding process was essential to check conclusions from the literature review reflected reality for practitioners and to highlight any variance in experience and expectation between stakeholders in the humanitarian innovation pipeline. In addition, evidence was sought to validate the assumption that a gap exists between what is produced by the humanitarian innovation pipeline and what is needed in the field. The outcome of the coding process defined the brief for the prototype detailed in chapter four.

The interviews were coded against the emerging attributes identified during the literature review (see section 3.3.2) – table 8. The notes were annotated (figure 22) to identify key trends, and then the recordings were revisited to extract exact quotes and check for additional information. The extracted information was analysed against the trends and theories extracted from the literature review and formed a critical part of the evidence for decisions reported in chapter 4.

Coding categories	Definition
Engage and iterate	Evidence of beneficiary or end-user consultation Evidence of use context assessment Evidence of feedback informing improvements
Flex	Evidence of a flexible approach to partnerships, stakeholders or supply chains
Co-create	Evidence of beneficiary or end-user involvement in the design and testing process
Network	Evidence of active research into potential partners, contacts, contributors or existing solutions
Purpose	Evidence of a clear articulation of a core objective or desired impact
Affordability	Evidence that delivery and unit cost are considered in the design process or deployment
Simple	Evidence that usability, maintenance, management or training have been considered
Robust	Evidence that the product is, or needs to be, designed to survive extreme end-use contexts
Behaviour change	Evidence that innovation approaches address human activity and behaviour as well as product attributes
Sustainable	Evidence that the environmental and community impact of the innovation product or process has been considered

Table 8 The coding categories and definitions

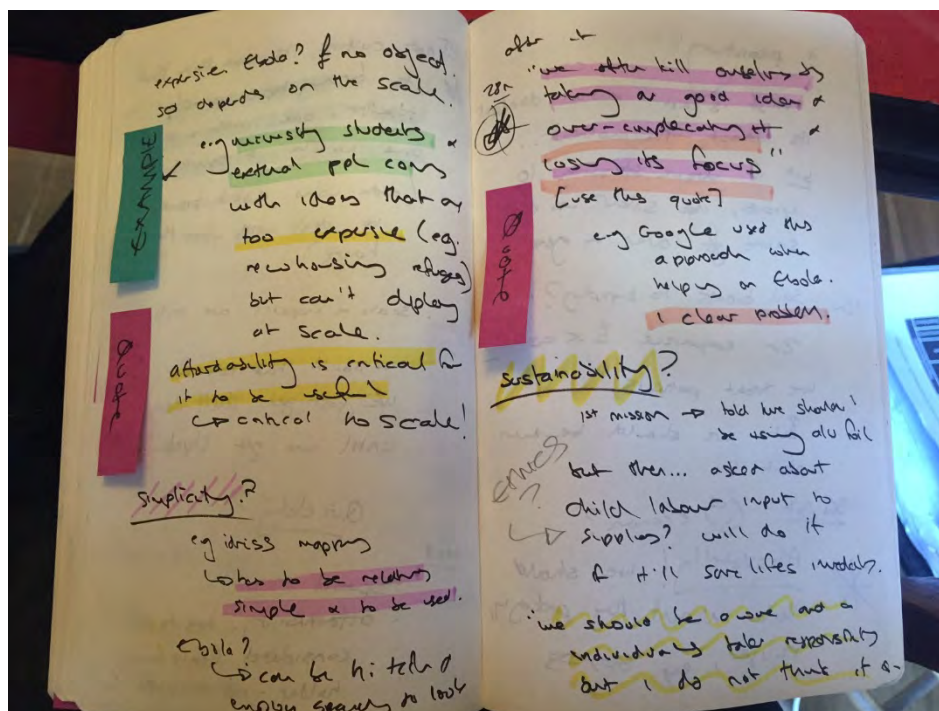


Figure 23 Coded pages of notes taken during interviews

This concluded the *'examine'* element of the research.

3.4 Second stage: Develop, test and iterate a prototype

3.4.1 Constructing the issue

Three key questions had to be answered before the material generated could be turned in to new model using creative problem solving (CPS) and design thinking techniques:

- **Frugal approach** – is this the most appropriate model for humanitarian innovation?
- **Design thinking** – can this domain be modified by applying a specific theoretical framework or does this undermine the purpose of design thinking?
- **Humanitarian innovation improvements** – would the framework be a new and useful product for the humanitarian sector?

Once these were answered, CPS techniques could be applied by the researcher. Isaksen et al (2011) describe the “heartbeat” of CPS as the interplay between:

- **Generating**: exploring “many, varied, and unusual options” and;
- **Focusing** – “analysing, develop, or refine options” by making effective judgements

Several tools can be used:

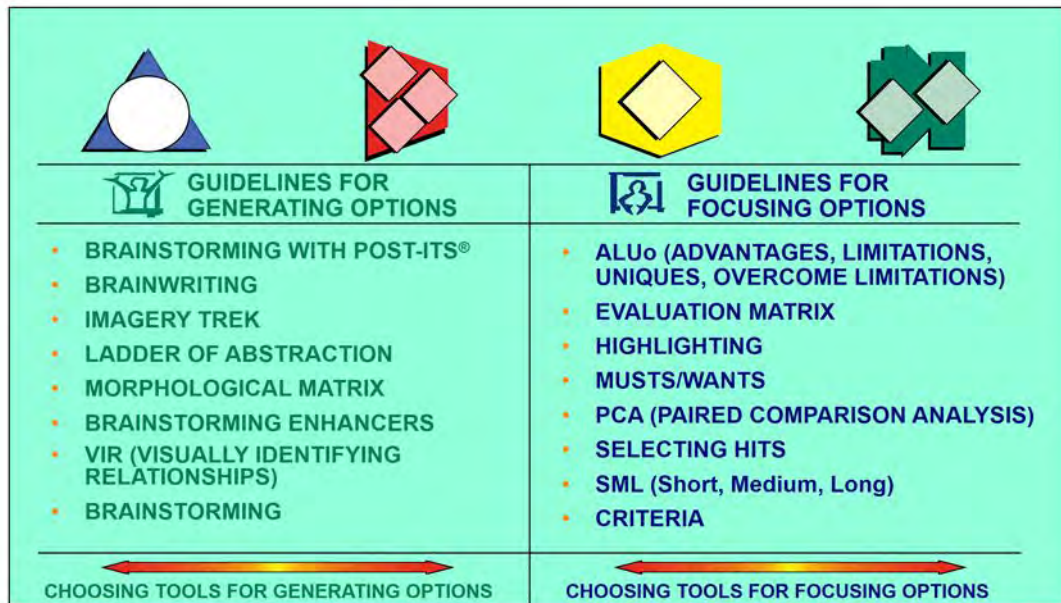


Figure 24 Isaksen and Tidd's CPS toolkit

The researcher ran an *individual* brainstorming session with Post-it notes, applying Osborn's two principles – reach for quantity and defer judgement – and four guidelines:

- Go for quantity
- Withhold criticism
- Encourage freewheeling
- Look for combinations

In practical terms, this meant an open-ended period of idea generation, in which no idea was re-read, edited, or discarded. Speed and quantity were key considerations. Music was used to enhance the atmosphere. Prompts were used, such as photographs of field locations, beneficiaries, ideation labs and key figures in the three domains under consideration in this research.

3.4.2 Planning action

Once a large quantity of ideas was generated, hits were selected and the SCAMPER process was applied. SCAMPER proposes a series of prompts which “are helpful in stimulating flexibility or

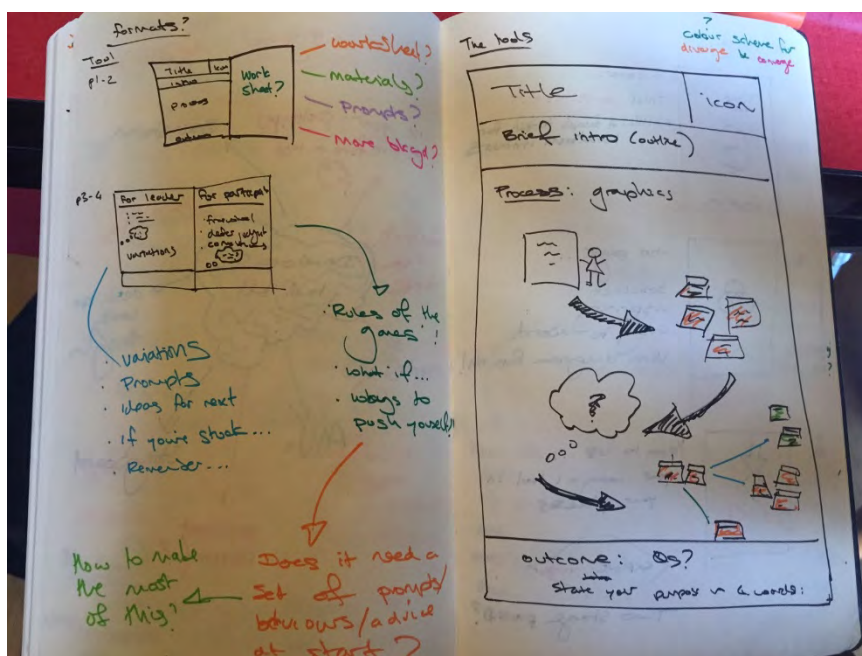
changes in viewpoint or perspective” and can “take an option in a new or different direction”

(Iskasen et al, 2011, p97):

- Substitute
- Combine
- Adapt
- Modify, minify, magnify
- Put to other uses
- Eliminate
- Rearrange, reverse

Practically, this task was completed over several days. The researcher removed themselves from the habitual space and ‘took the problem outside’ by taking bike rides, walks and discussions with neutral third parties – such as contacts in different fields – to apply the SCAMPER process. Prompt cards were produced to keep sessions focused.

In addition, a sketchbook was kept by the researcher to make links between disparate areas of the data and external knowledge. Sketching also allowed the research to prototype initial ideas:



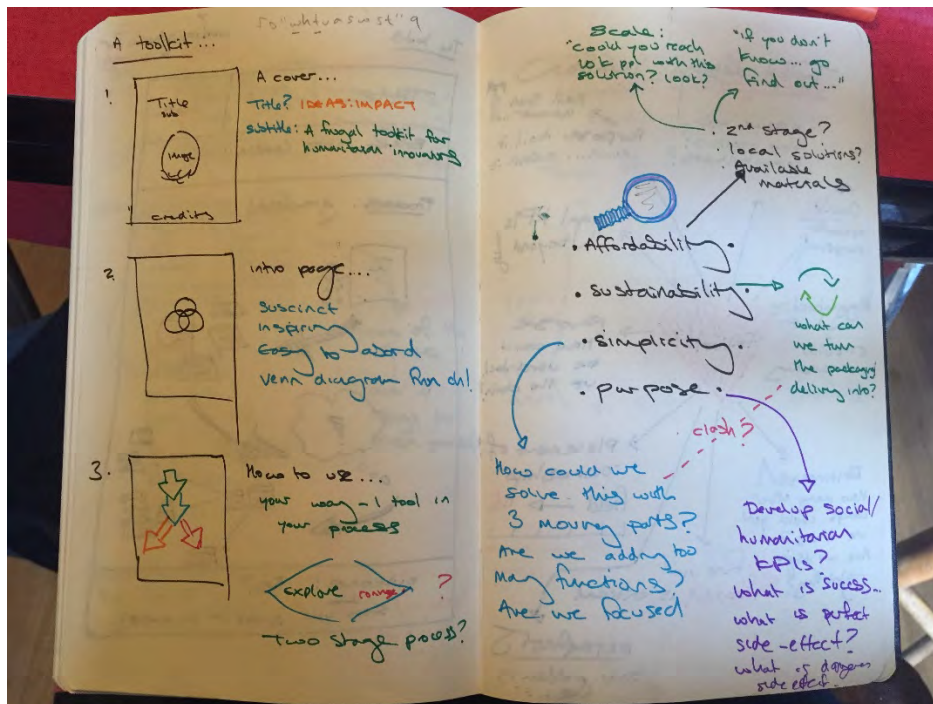


Figure 24 Initial sketches for the proposed toolkit

3.4.3 Taking action

As this stage progressed, it became clear that developing a set of new design thinking techniques required an entirely new theoretical framework – existing models were not suited to the application of frugal innovation theory to the design of humanitarian innovations. A gap had been identified in both practice *and theory*.

A new phase was initiated to develop this framework. Firstly, the ALUo process was used to examine the **A**dvantages, **L**imitations, **U**nique qualities and how to **O**vercome the limitations of the ubiquitous ‘double diamond’ approach to design when applied the research objectives. Again, ideas were brainstormed and a new model sketched and developed into a prototype (1.0) using Photoshop. A logline or elevator pitch was generated to concentrate the core issues for the design (appendix K). The outcome of this phase was a prototype framework.

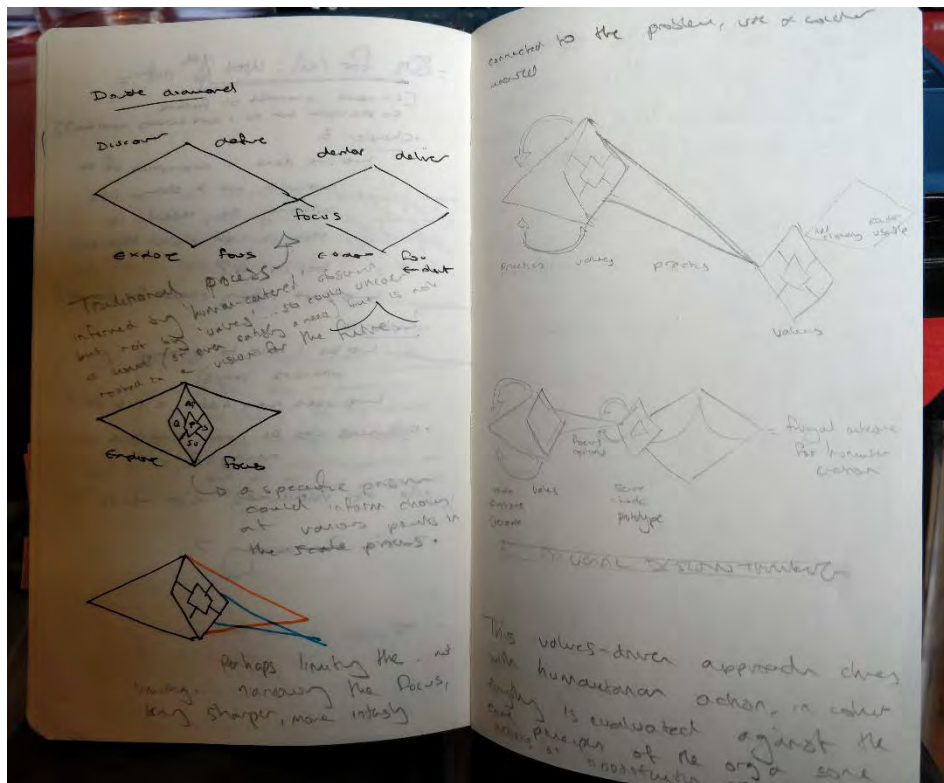


Figure 26 The original framework sketch

Potential toolkit ideas – the methods to apply the new model – were also captured through a cross-referencing of existing design thinking techniques with the core attributes of frugal innovation. Gaps, limitations, opportunities and new ideas were sketched and linked to valid academic research (see chapter 4).

3.4.4 Evaluate the prototype

The new design thinking model (1.0) – on which any toolkit would be based – had to be placed in the hands of potential end-users. A document was produced to introduce the new ‘frugal design thinking framework for humanitarian innovation’ (appendix H) and a feedback questionnaire (appendix I) was drafted based on Rogers’ theory of innovation diffusion, which argues successful innovations must be assessed on:

- **Relative advantage** – the potential improvement offered by the innovation relative to current options

- **Compatibility** – would the innovation work with the current system?
- **Complexity** – how easy or difficulty would it be to learn how to use the innovation?
- **Trialability** – could the innovation be tested in the appropriate context?
- **Reinvention** – is the innovation flexible and could it be used in multiple ways? (Rogers, 2003)

The questionnaire was created in a digital tool – SurveyMonkey – and distributed to the original interviewees via email. The results were analysed against Rogers’ theory using graphs to spot trends and assess the new model’s potential to scale. Qualitative feedback was scoured for novel ideas or surprising critiques to inform the next iteration.

The original design was then re-evaluated considering the feedback and scrutinized against Rams’ 10 design principles, which exposed flaws and opportunities for improvement. The prototype was modified using brainstorming, sketching and reflective practice. This iterative process ensured that improvements are made based on feedback from end-users and solid theoretical models. At this point, the research was reaching the final stages and had delivered a well-design theoretical model ready for ‘live’ testing and the application of practical techniques.

3.5 Third stage: Evaluate the project

Once this research delivered its output, the project was evaluated against the original question: *“Doing better with less; could a frugal approach to design thinking help humanitarian innovation?”*. The objectives were revisited and assessed against feedback from users, academic theory, and insight gathered through reflection.

Further, the researcher sought evidence to confirm the existence of a gap between actors in a polycentric network which hampers innovation. The evaluation considered whether the new model and proposed toolkit would be useful to diverse stakeholders or more suited to one group by analysing questionnaire data and the role of the respondents.

An evaluation of the entire process, lessons learnt and ideas for further investigation was undertaken. This involved reflective practice and a project assessment using ALUo.

Personal reflection was critical as a project may 'fail' to deliver a new and useful tool or product, but simultaneously succeed in enhancing the capabilities, insights and ambitions of the researcher.

Neuropsychologist Karl Friston's *free energy principle* argues that conscious beings actively seek experiences, sensory inputs and knowledge to expand their mental model and so reduce the chances of being surprised by the unexpected (Friston, 2010). According to the theory, "policies that will minimise our free energy... will be ones that mandate motion, search, discovery and constructive action" (Clark, 2013, p183). This leads to creativity through unexpected connections and "...it is even possible that such associations might be 'fuel' for a transformation of the conceptual space" (Brown, 2012, p6). So, the final evaluation assessed whether this research contributed to a reduction in 'free energy' and an expanded mental model for the researcher. This assessed whether the project *in and of itself* produced new and useful outcomes, regardless of the status of the tangible outcomes of the project.

3.6 Chapter conclusion

This chapter has detailed the approach designed to answer the project's key question and achieve the objectives. It applied a solid theoretical framework – the research onion (Saunders, 2007) – to ensure that the most appropriate research design and methods were used. With the exhaustive literature review and input from domain experts, these methods allowed the researcher to fully examine the research question and address the research objectives.

The output of the process was then tested and iterated with domain experts and end-users to ensure it would work in practice, rather than just on paper. Finally, the research outcomes and process were evaluated to draw lessons from the project, propose future actions and suggest applications of the ideas developed, tested and evaluated.

Chapter Four: Results

The chapter presents the results of the research. The information generated in the literature review and interviews during the first stage of the research – *examine and understand the context* – is interpreted and delivers objective A:

Objective A:	Map the humanitarian innovation pipeline and validate the existence of a gap between the novelty and utility of the output
---------------------	--

The output of the second project stage – *develop, test and iterate a prototype* – is also presented. It is structured around the cycle of *construction of issues, planning action, taking action, and evaluating*, as described in the methods. Specifically, the delivery of objectives B and C are examined:

Objective B:	Combine frugal theory, design thinking and humanitarian innovation practice to devise a new framework tailored to the humanitarian sector
Objective C:	Test and iterate this framework

Objective D is then introduced before being fully examined in chapters five and six:

Objective D:	Make recommendations for any new toolkit development or systemic adjustments to improve humanitarian innovation based on the research
---------------------	---

4.1 Construction of issues

The first phase of the research generated insight into the current state of the three fields being examined via a literature review (Chapter 2) and data from interviews with practitioners (see 3.3.3)

and the mapping of conceptual spaces (figure 26). Three key questions then had to be answered before a prototype could be developed (see 3.4.1).



Figure 27 The low-resource innovation conceptual space

4.1.1 Is frugal innovation the correct framework?

Through literature analysis, the researcher recognised two distinct elements to frugal innovation – **practices** (*practical approaches*) and **values** (expressed as attributes of the outcome) – and created figure 28 to present them. The broad practices are not radically different from ‘traditional’ innovation processes *until* they are meshed with the values, which alter the practice focus and methods and, in turn, shape the outcomes.

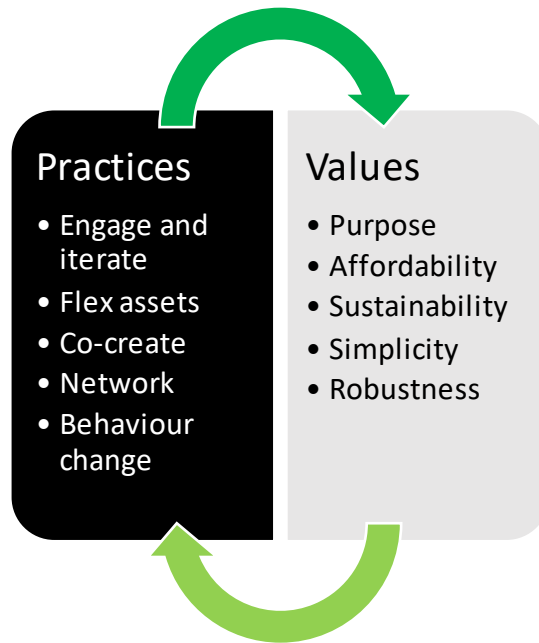


Figure 28 The essential practices and values of frugal innovation aggregated by this research

In effect, the application of specific values acts as a prism through which innovation is focused, altering outcomes: Frugal theory is built around the idea that values *should* influence practice. This pre-emptive constraint would be controversial if outcomes were poor but frugal innovation delivers, as evidenced in the literature. Conversely, this research revealed faults with humanitarian innovation practice, which applies no theoretical ‘prism’.

The researcher found values influence humanitarian innovation *informally* – when the interviews were coded (see 3.3.4) it was discovered that no interviewee, at any position in the pipeline (see 3.3.3), applied a specific value framework or theoretical model to their practice but all referenced values as influential or responded positively to frugal attributes. Director of MSF Sweden’s Innovation Unit, David Veldeman, stated: “It is not written in stone” but innovation should “ideally also be something which is useful to the people who live there” once the emergency response is over, rather than solely benefiting NGO performance.

Eric D Perakslis, Visiting Scientist in Biomedical Informatics at Harvard University and MSF collaborator, said: “I think frugality is a great aspect of innovation; I think frugal people collaborate... I like it as an underlying driver of real change.”

Frugal values were acknowledged as potentially useful for humanitarian innovation. However, the imposition of overly-strict theoretical frameworks was criticised by some, as “an inflexible process can kill creativity” (Nils Aksnes, Project Lead at Fearsome Product Design). He argued that a flexible approach to practice must supersede adherence to specific values.

NESTA innovation consultant Glen Mehn argued frugal innovation is “one good tool in the toolbox” but traditional R&D is needed for some NGO projects, citing the example of cold-chain diabetes research. However, the Head of the Emergency desk at MSF Amsterdam, Karline Kleijer countered that the outcome of *any* innovation process must embody frugal values – such as robustness and affordability – to be useful in the field. She was backed by Eric D Perakslis who said: “You can argue that what you are doing is so good you ‘couldn’t put a price on it’, but the fact is that at some point you would”.

Interestingly, those with greatest contact with the frontline were more forthright in their support for the values of frugal innovation, strongly agreeing that all humanitarian innovation should seek to embody them. Practitioners at a remove were keen to protect the flexibility of their innovation approaches.

This was an unexpected real-world expression of the interplay between practice and values identified by the researcher (figure 28, above). This is crucial evidence that the gap at the heart of this project’s hypothesis exists – frontline staff want products which embody the values of frugal innovation, but remote contributors to the humanitarian innovation pipeline have not adjusted their practice to deliver these outcomes, which highlights the need for the frugal innovation model proposed by this research.

In conclusion, there is a strong correlation between the practices and values of frugal innovation and the humanitarian sector, with stakeholders along the pipeline recognising the potential benefits of applying frugal theory to their work if the application does not constrain the creativity or flexibility of the innovation process.

4.1.2 Is design thinking a useful approach?

The literature review and subsequent analysis also exposed a set of practices and values for design thinking, drawing on Rams, IDEO and others, which the researcher aggregated in figure 29. The recognition that design thinking could also be driven by practices *and* values was important as it allowed the domain to be mapped against frugal innovation.

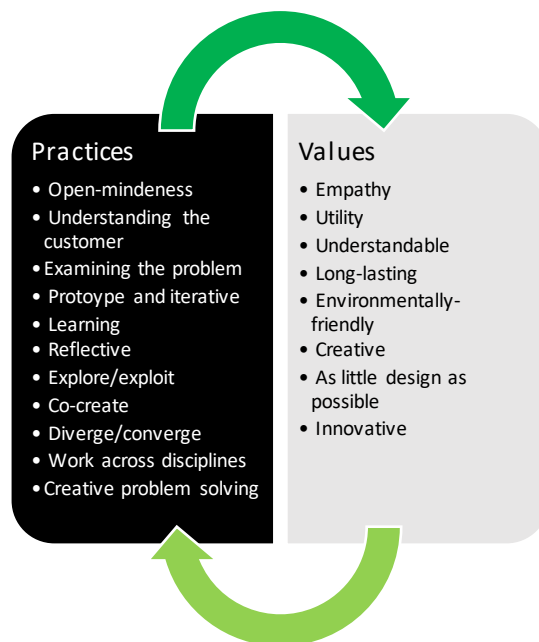


Figure 29 The essential practices and values of design thinking as aggregated by the researcher

When coded (see 3.3.4), the interviews (see 3.3.3) exposed another intriguing trend: innovators with greater proximity to the field relied more heavily design thinking **values** (as embodied in attributes), whereas remote technical or innovation experts favoured **practices**. Critically, both sides recognised the need for greater engagement with their less-favoured aspect.

Josie Gilday, an MSF and Red Cross nurse, argued there is little time in the field for strict processes: “This is where one of the biggest divides between the field and HQ is. The field are ‘now, now, now’ – I am watching my patients suffer now and I need something to fix it now – whereas HQ have a much bigger, larger perspective”. On the other hand, Josie identifies cost, utility and longevity as critical values/attributes of product design: “In the field we try not to waste anything because everything is so precious... These [attributes] are really important to remember if you want your project to run continuously.”

Karline Kleijer, an MSF emergency coordinator, argues: “The process of innovation can almost become more important than the innovation itself... As an emergency desk, we don’t have time for processes or inputs, we just get the stuff done”. Again, Karline cites values/attributes as more relevant for the field: Affordability is critical to deploy at scale; simplicity (even for high-tech solutions) is essential for usability; focus is vital for speed; minimal waste is essential to maximise impact of resources.

Pete Masters, Medical Innovation Manager at MSF UK, makes the case for more thorough design processes, arguing most “field staff start off thinking a week doing research and exploration is crazy” but by the end are convinced. Indeed, nurse Josie participated in an HQ innovation process and reported: “No one [in the field] seems to have time to unpack the problems and it was really eye-opening to be given the time”.

Pete adds: “[One medic] said if half the things that come to field had gone through that process they wouldn’t have made it” because they were poorly designed. But, equally, when ideas are developed remotely without a true understanding of the problem, field staff “can say in five minutes why it won’t work”.

In conclusion, remote practitioners mainly considered values as a by-product of robust practices, rather than core attributes which defined practice. Field staff felt the values/attributes embodied in the final design were the critical issue and process was less important. This is a clear fault in the

system – end-users want products with very specific attributes but the search for these attributes is not a systematic element of current humanitarian innovation practice.

Both side, however, agreed that design thinking approaches could help collaboration between frontline and remote stakeholders on innovation projects if the tools and processes deployed were specifically designed to bridge the gap between frontline experience and technical expertise.

4.1.3 Is there a need for a new toolkit?

All participants deployed a customised design-thinking process, built from both publicly-available and personally-designed tools. Many spoke of ‘taking inspiration’ from others, such as IDEO, and then reinventing the exercises. Frontline staff called on remote innovation experts when immediately available solutions were insufficient.

However, a gap was identified where innovation is detached from frontline experience. Consultant Glen Mehn criticised various innovation streams – including student challenges at MIT and Harvard – which delivered inappropriate outcomes. He argued that NGOs “shouldn’t outsource the innovation but get people the skills to do it themselves” as close to the frontline as possible, with well-informed remote support. He added: NGOs “end up outsourcing lots of stuff and then saying, ‘innovation doesn’t work for our sector’”.

So, a toolkit designed for the humanitarian sector, which laces frontline and remote experts into a coherent system could be valuable. However, a toolkit alone would not address the systemic issues which undermine humanitarian innovation, or alter the underlying processes which deliver new solutions to complex problems. A toolkit would be a valuable outcome, but only if designed around an entirely new model of humanitarian innovation based on frugal principles, and flexible enough to be modified for specific use-cases.

4.2 Planning action – Creating a frugal design thinking framework

Having examined the potential of frugal innovation and design thinking for the humanitarian sector, the next step was to map the disciplines against each other and reimagine the innovation process.

This was required as this research identified **values influencing practices** as potentially powerful in humanitarian innovation, but illustrated that the polycentric pipeline was misaligned, with greater focus on **values** (expressed as product attributes) on the frontline, and on **process** for experts removed from the end use-case. Frugal theory is highly appropriate for resource-constrained environments and so developing a new model founded in its values and practices was considered valuable. The intention was to root any new tools in a well-defined theoretical model to avoid what one interviewee called “flavour of the week fatigue” – that is, new approaches which are not designed for humanitarian needs but follow the ‘fashions’ of the commercial or academic worlds.

As illustrated in table 9, there is a strong alignment of practices and values:

	Frugal innovation	Design thinking
Practice	Engage and iterate	Examining the problem, prototype and iterate, learning, understanding customer
	Flex assets	Creative problem solving, work across disciplines, exploit, open-mindedness
	Co-create	Co-create, understanding customer, explore, reflect
	Network	Work across disciplines, open-mindedness
	Shape behaviour	Creative problem solving, reflection, understanding customer
Values	Purpose	Utility, understandable, creative, empathy, innovation
	Affordability	Honest
	Sustainability	Environmentally friendly, long-lasting
	Simple	Understandable, as little design as possible, creative
	Robust	Long-lasting, utility

Table 9 The practices and values of frugal innovation and design thinking mapped against each other

From this, a set of 'frugal design thinking' principles for humanitarian action were drafted, which could inform the design of new tools and provide guidance for eventual users:

1. Engage and iterate with empathy and insight
2. Think beyond the solution to the system
3. Work with others
4. Ensure everything has purpose
5. Make an impact, leave a legacy
6. Simple solutions can solve complex problems
7. Strong and scalable

The draft was re-examined against the interviews and existing processes. The next iteration was informed by insight gathered from both field-focused and technical-specialist stakeholders (table 10):

Principle	Rationale
<p>Engage and empathise <i>Listen, observe and understand who you are building for and where your ideas will be used – don't guess.</i></p>	<p>Challenge practitioners to root their thinking in the context where their innovation will be used, rather than where it is created. Focus on the essential characteristics for adoption and impact where the problem/opportunity occurs.</p>
<p>Co-create and iterate <i>Work with your end-users; test, listen, improve and re-test.</i></p>	<p>Understand how end-users and beneficiaries will use the innovation, not how the practitioner would use it. Challenge assumptions and don't settle for the first outcome of the process – strive to improve and design down to the last detail.</p>
<p>Combine expertise and experience <i>Frontline experience mixed with specialist expertise is a powerful combination</i></p>	<p>The gap uncovered by the research is between experience and expertise; combining the two should deliver better outcomes. Explicitly addressing this division and turning it in to a strength could neutralise the negative impact.</p>
<p>Everything has purpose <i>Stay focused on the essence and the impact of your ideas – make a powerful difference</i></p>	<p>This focuses thinking on what is needed, not what is technically possible – articulating the essential impact or attributes prevents 'mission creep' and over-complication of the design, as well as creating a clear reference point for all participants in a dispersed innovation pipeline.</p>
<p>Leave a legacy <i>Your ideas must make a positive mark that lasts, wherever and whenever they are used</i></p>	<p>Innovations, problem-solving and projects do not exist in a vacuum – they create chain reactions of consequences and impact the context where they are deployed. Considering these issues will encourage designs with sustainability built in and negative impact designed out, as far as possible.</p>
<p>Simple, strong, scalable <i>Make it robust – the ideas, the build, and the impact</i></p>	<p>This principle references the essential attributes of a frugal design and apply the creative constraints which will increase the likelihood of an innovation functioning, sticking, and scaling in the field, as uncovered by this research.</p>

Table 10 The frugal design thinking principle and rationale developed by this research

These principles were the distilled insights from professional experience, academic research, stakeholder interviews and an applied creative-problem-solving process. They have the potential to inform the design of any new toolkit but it proved impossible to jump from core principles to a new set of design thinking techniques without introducing a customised theoretical framework to clearly articulate the results of this research – this is detailed in the next section.

4.3 Taking action

4.3.1 A new framework (1.0)

The intention had been to prototype a frugal design thinking toolkit for the humanitarian sector. However, the research revealed that a new theoretical model must be designed first because established approaches do not impose frugal *values*, which increase an innovations chances of success in low-resource contexts.

For example, the double-diamond is an established approach to creative problem solving used by many interviewees. There are two periods of idea generation and focusing: The first (discover-define) leads to a brief; the second (develop-deliver) to a potential solution.

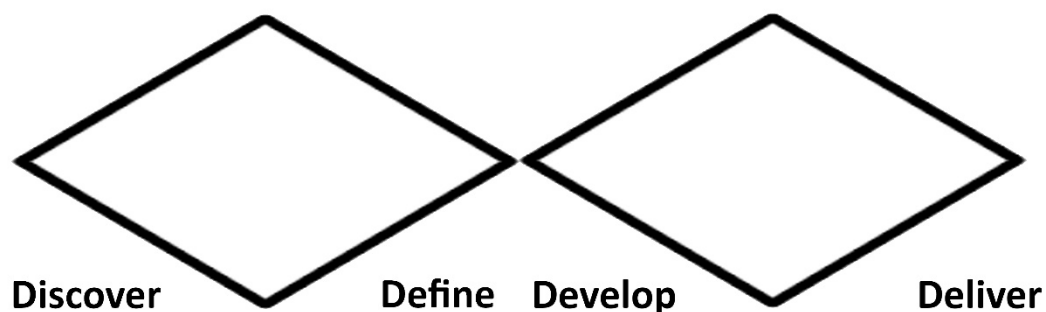


Figure 30 The double-diamond, developed by the British Design Council in 2005

As detailed in the literature review, humanitarian innovation has been criticised for failing to deliver many powerful new outputs which have scaled or change sector working practices. The interviews also identified this failure. This lead to the conclusion that the application of standard models designed for other contexts is failing humanitarian innovators.

The researcher designed a 'frugal innovation lens' to the modify the double-diamond process, the hypothesis being that it would ensure innovators consider the core attributes critical to success in low-resource environments identified by this research:

- Simplicity
- Purpose
- Affordability
- Robustness
- Sustainability

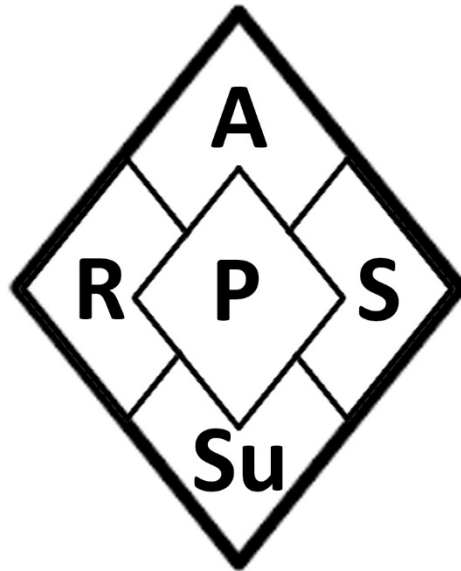


Figure 31 The researcher's frugal innovation prism design representing core values

In the new theoretical model, the lens is inserted in to each diamond to encourage reflection, disciplined exploration and to root thinking in values which this research demonstrates are useful considerations for field-deployment of innovations. All new design thinking tools developed for this process would reference the desired values and 'force' all solutions through the lens.

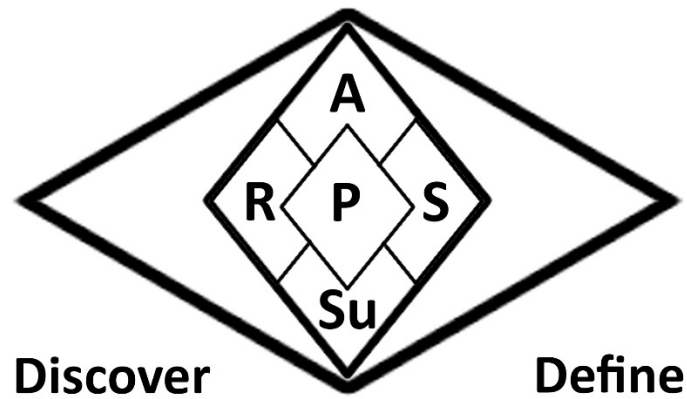


Figure 32 The new frugal innovation prism inserted in to the discover/define phase

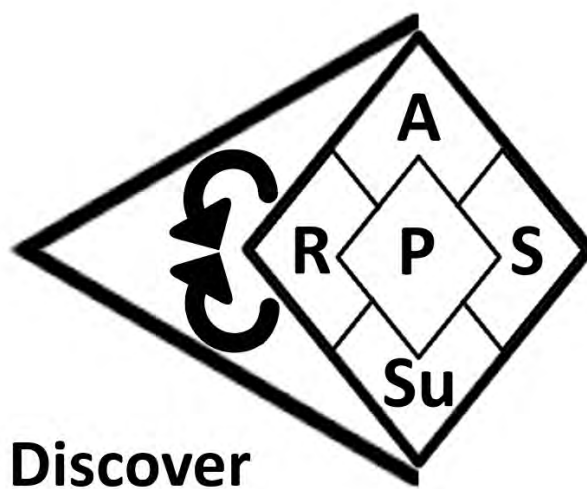


Figure 33 The prism is designed for reflection and generation of ideas referencing core frugal values

The hypothesis was that by applying a lens designed specifically for the humanitarian sector, multi-disciplinary innovation teams, including contributors with no field experience, could develop appropriate, field-ready solutions as everyone would focus on the same values/attributes rather than imposing assumptions derived from their professional background.

This is not a substitute for observation, co-creation or other established methods – indeed the full process under development encouraged these practices– but it would apply critical constraints within which creativity can flourish and so outcome should be more sharply focused on the sector’s

real needs and context. The lens appears to limit the options but, in fact, the intention is to focus more inventive problem-solving on the end-use context, rather than the pursuit of inappropriate solutions.

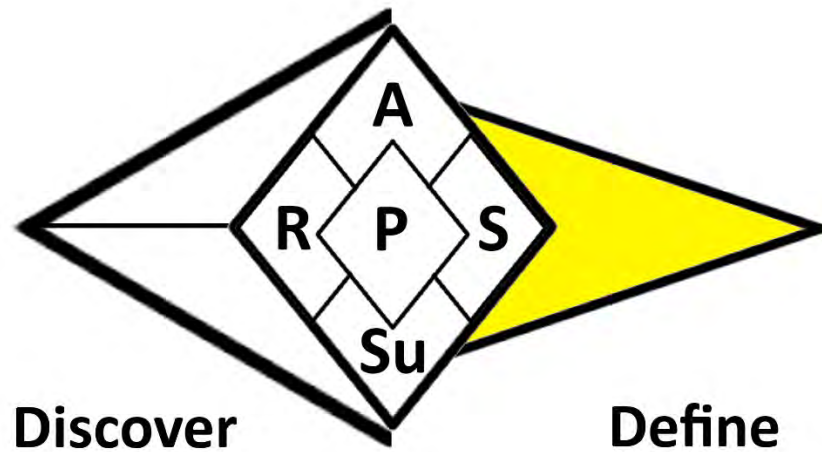


Figure 34 The prism focuses on frugal values – constraining but strengthening outcomes

The same lens would be applied twice in a new-look double-diamond, so both ‘brief’ and ‘solution’ could have a higher chance of sticking, scaling and solving real problems in resource-constrained contexts. This addresses McClure and Gray’s ‘Missing Middle’ (2014) as the end-context challenges and constraints should be better articulated, understood and addressed throughout the design process rather than as a prototype is tested.

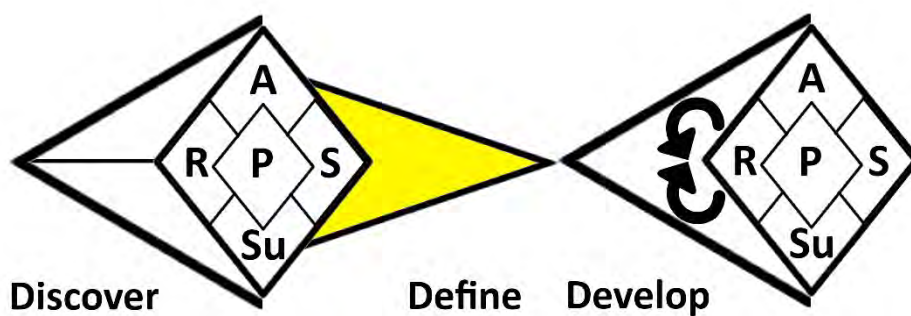


Figure 35 Discover/define passes a tight brief to develop/deliver, where the frugal prism is reapplied

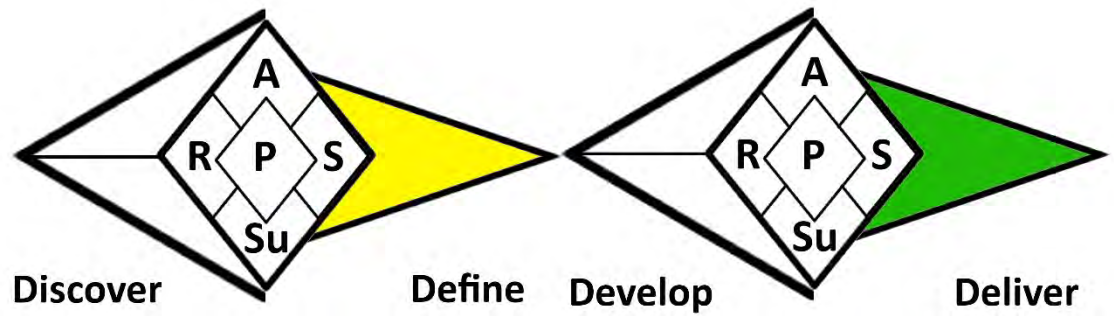


Figure 36 The final output will embody the core values of frugal innovation

This proposed framework was sent to the original interviewees for feedback. The results of the survey informed the next iteration of the framework.

4.3.2 Feedback on the framework

Feedback questions (appendix I) were based on Rogers' theory of innovation diffusion, which assesses key attributes to predict the likely adoption of an innovation (Rogers, 2003):

- Complexity or difficulty to learn
- Compatibility with current system
- Advantage relative to current options
- Trialability
- Potential for reinvention

The results showed opinion was divided over the clarity of the new framework:

The proposed framework is:

Answered: 6 Skipped: 1

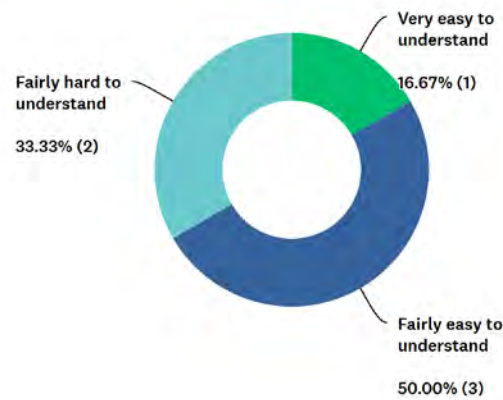


Figure 37 Responses to feedback questionnaire, Q1

However, 6 of 7 respondent said it could 'easily' or 'possibly' be used to complement existing practice, with 1 neutral and none thinking it would be difficult or impossible (Q2). And despite the apparent complexity, the model was considered an improvement on existing systems (Q4):

The proposed framework is:

Answered: 7 Skipped: 0

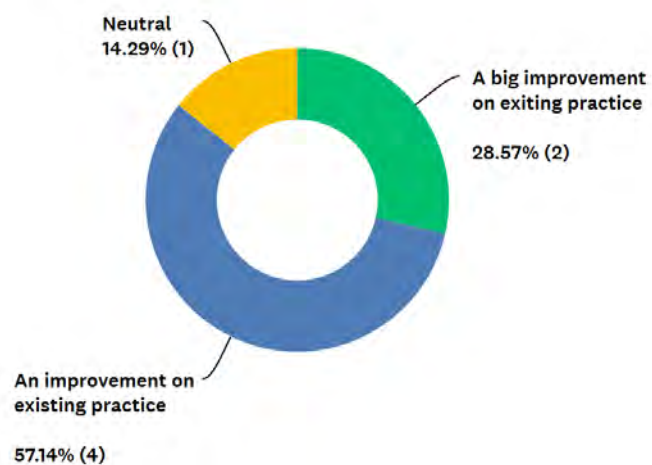


Figure 38 Responses to feedback questionnaire, Q3

All respondents felt the framework could 'easily' or 'possibly' be tested in the field (Q5). Crucially, the framework was considered flexible, which is another positive indicator of an innovation's likelihood to scale (Q6):

The proposed innovation practice appears:

Answered: 7 Skipped: 0

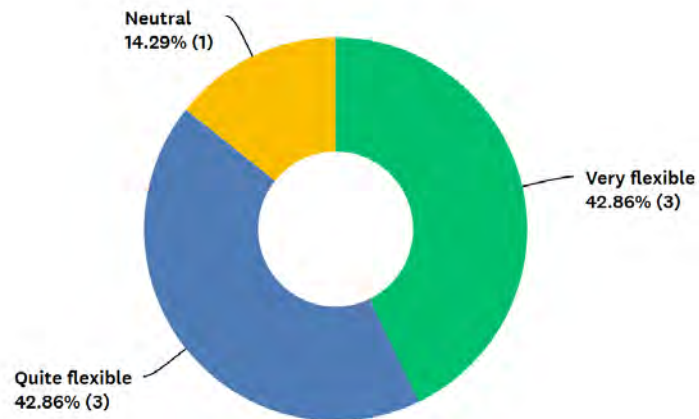


Figure 39 Responses to feedback questionnaire, Q6

Respondents were also asked to supply qualitative feedback on the positives and negatives of the framework (Q6 and 7, table 11):

Positive feedback	Negative feedback
The concepts are simultaneously incremental and transformative which is brilliant	I found the narrative easy to understand but not the graphics. That appeared more complex to me at first look.
Simple and visual, making people think about each aspect	I'd be interested in field testing it & <u>whether or not</u> it should be applied in the "middle" of the diamond or "between" diamonds. Our experience suggests that the double diamond is a bit simplistic - that it's essentially a start of a series of diamonds
It applies constraints in a useful way. It is an issue that if you haven't been to the field it is super hard to design for the field, or even just to ideate. I like that it is simple. Being able to effectively explain it in a short amount of time (which this does) is important	Add simple explanations of what you mean with the different core attributes. Then also one or two very simple tools that you could use to reflect upon these core attributes and come up with new ideas on how to address these dimensions
Practical steps on feedback loops	It doesn't directly enough communicate 'context'. One of the biggest challenges for designers is understanding the context of the challenge they are designing for. Without the key, the visualisation is quite confusing. Maybe there's a better way to graphically represent it?
The key benefit is as a "reflection tool" that can help stakeholders to critically reflect on process and outcomes. I think sustainability, simplicity and purpose are normally reflected in just about any design process but affordability and robustness are things that we often miss	I would consider this process better as currently I did not know of one that was being used. However, I think it will be hard to find people who have these expertise and feel confident to carry this process through. I think there needs to be a division of tasks, for example, the expats in the field discover and define and then designers develop and deliver with the constant assistance of the expats.
It is designed for humanitarian innovation - there aren't many others like it. It will challenge some ideas!	It could be clearer to remember and explain
Cycles rather than linear processes	More explicit notion of quick prototyping

Table 11 Qualitative feedback (Q6 and 7)

In conclusion, the feedback demonstrated that the new framework meets Rogers' criteria for the diffusion of innovation, meaning it has potential to scale, but the graphical representation and explanation must be improved to allow ease of use.

4.3.3 A new framework (2.0)

The researcher re-visited Rams' design principles to reconsider the presentation of the frugal

innovation framework 1.0 in light of the feedback (table 9). The idea was stripped back to its core concept – a lens for focusing thoughts on appropriate solutions – and a new design direction was explored via sketching, brainstorming, brainwriting and taking inspiration from different domains, such as optometry.

The new version had to be intuitive, useful, understandable, honest and as simple as possible. It had to be easy to remember and explain so that it could be used widely with little specialist knowledge or training. It had to be something which could be passed from user-to-user, rather than diffused by experts, so that it could penetrate all parts of the innovation pipeline.

The first breakthrough was the recognition that the key attributes could be combined to create a memorable acronym – SuRPAS (**S**ustainable, **R**obustness, **P**urpose, **A**ffordability, **S**implicity): Users could easily remember this when attempting to *Surpas* expectations.

Studying optometry, it was observed that light from different sources is focused by a single lens, which echoed the various sources of ideas in this innovation pipeline. The feedback on 1.0 had questioned the two-step double diamond, suggesting answers may be found after just one, or many, cycles and so the process was redesigned to reflect this, with a decision point after each cycle (represented by '?'). Each cycle has a period to generate ideas, which are then focused through the frugal constraints in the lens into potentially powerful and appropriate solutions:

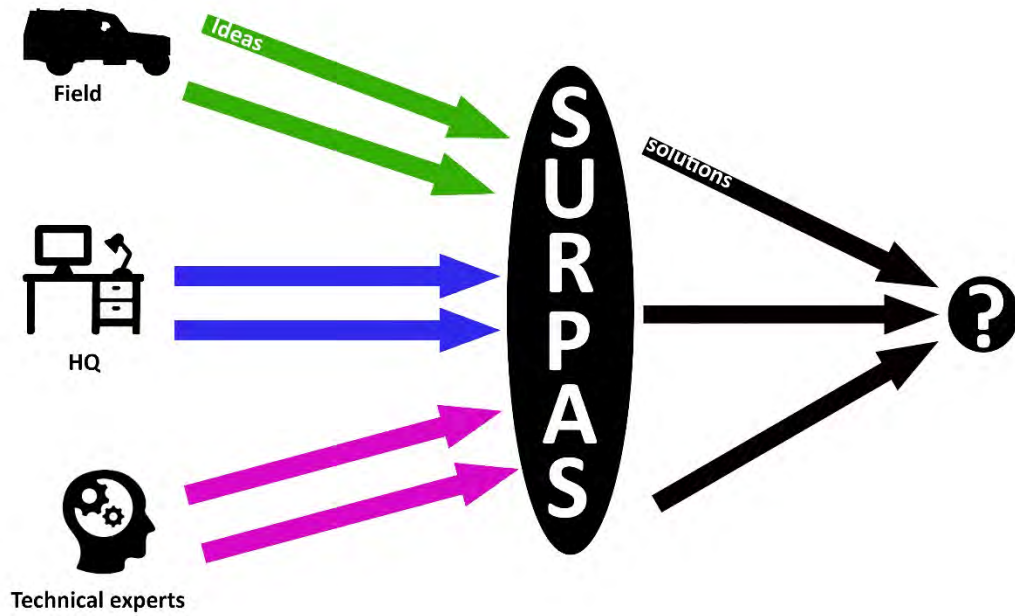


Figure 40 The initial cycle of the new Surpas innovation model

If the decision is made to continue, another cycle of idea generation and focusing on solutions is initiated:

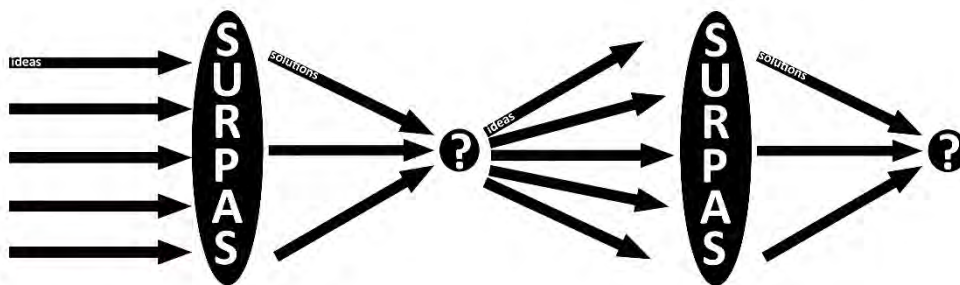


Figure 41 A double Surpas cycle

The new design allows cycles to continue until an appropriate solution is devised, which is then ready for prototyping and deployment for testing:

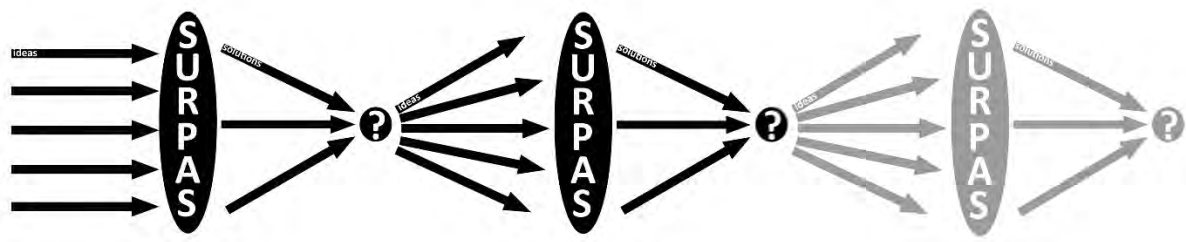


Figure 42 A repeated cycle of the new *Surpas* innovation model

The new version is simple enough to be remembered and drawn by anyone who needs it, addressing concerns raised in the expert feedback (4.3.2) and making it a frugal solution as it does not need sophisticated equipment or infrastructure to deliver. But for it to work, it needs to be accompanied by a set of tools or exercises to generate and focus the ideas at each stage. This was examined next.

4.3.4 New techniques

The six principles and *Surpas* framework delivered by this research were used to generate potential new ‘frugal design thinking’ toolkit ideas. These practical tools would be used to apply the theoretical framework and embody the principles developed by this research. The rationale was that, on their own, neither the new principle or framework would be effective – exercise are needed to guide participants through the process to ensure the new model is applied effectively.

Potential ideas were gathered throughout the research, with sketching and ideation sessions at all stages (figures 42-3). As the process unfolded, the most promising ideas, which tallied with academic theory and existed in the confluence of the three conceptual spaces (Chapter 3) were developed further. The ideas that were considered for further development are those which could not be found in existing design thinking techniques.

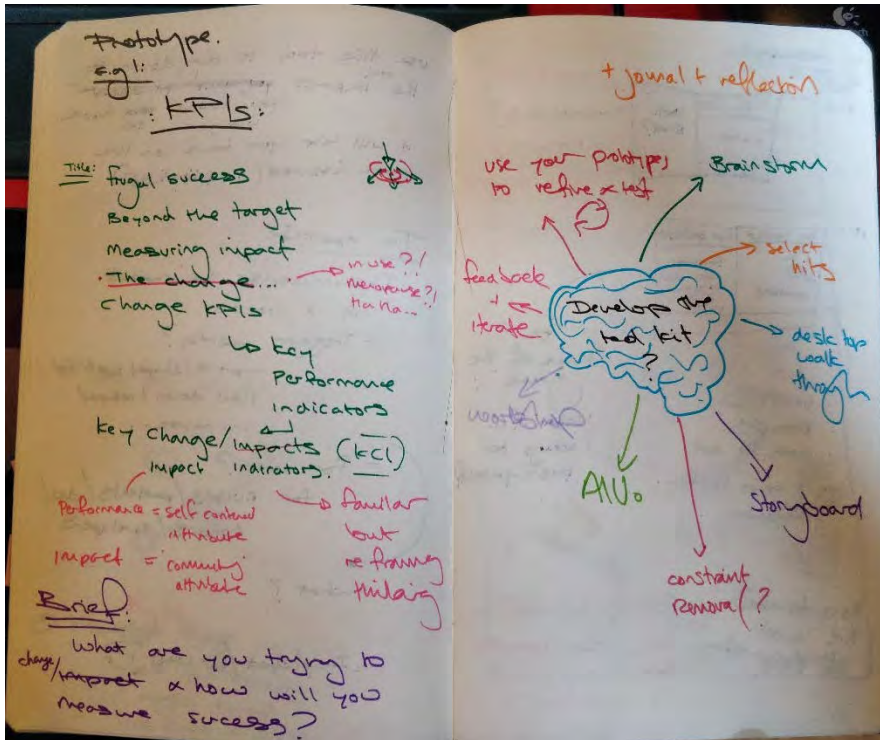


Figure 43 Sketching and ideation for toolkit ideas (1)

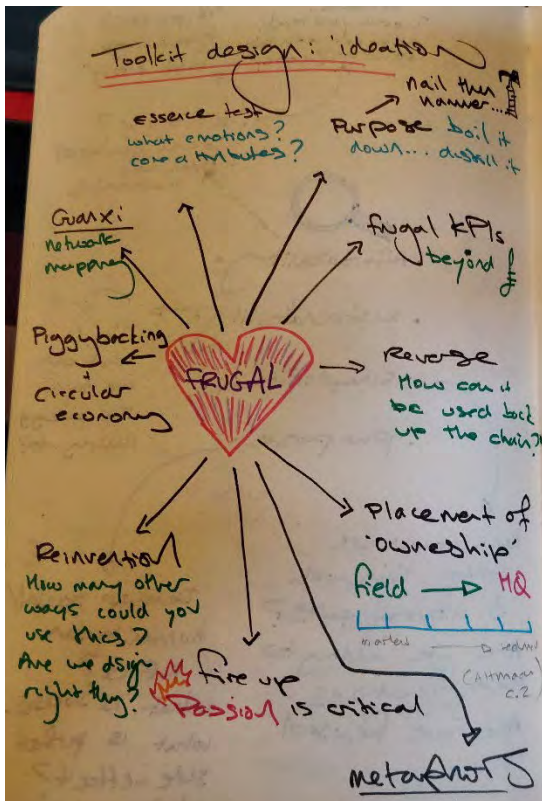


Figure 44 Sketching and ideation for toolkit ideas (2)

The final outcome of the generation and focusing process lead to a set of ideas ready to be developed and delivered as finished tools (see figure 44 below). However, these were not prototyped, tested and iterated due to time and capacity constraints of the dissertation, but this would be a valuable continuation of the study.

Principle	Tool name	Questions tool will answer	Reference
Engage and empathise			
	Reinvention	How will it be used in ways you never intended? What needs might people also solve with this? What needs are we missing? How could it be reconfigured?	Radjou and Prabhu (2016)
	Metaphors (my problem is like a...)	How are radically different domains same problem? What can you compare problem to? How are similar problems solved?	Jean Hartley (2014)
	What's already in the field?	What resources do field teams have? What's readily available in projects? What's abundant in end-use context? What skills exist?	Radjou et al (2012)
Co-create and iterate			
	Map the context and inputs	Who should be involved and where are they? What is expert/experience balance? Where should ownership sit – field or remotely? Can expertise/experience be transferred?	Knorringa et al, 2016
	Questions for collaborators	What unique insight can participants in this innovation process bring? What if we...? Can you get a...? Why not...? How do you...?	(Govindarajan and Trimble, 2013) (Isaksen et al, 2006)
	Remote observation walk through	Go to the [place], what do you see? Look at the... what's it made of...? How is [this problem] solved there? What do people already do?	Radjou and Prabhu (2016)

Combine expertise and experience			
	Placement of ownership/R&D	Where should ownership sit – field or remotely? Can expertise/experience be transferred? What is right balance of experience/expertise?	Altmann and Engberg (2016)
	Guanxi	Who do we know who can help? Where can we call in favours? Can we map our networks of contacts? Who will have valuable insight?	First Break all the rules, Economist (2010) Baud (2016)
Everything has purpose			
	Fire up and boil down	What’s the larger purpose? How do we want to change the world? What’s the most concise articulation of the project?	Radjou and Prabhu (2016)
	Frugal KPIs	How will you measure success? What will mean the problem is solved? How will you focus on core issue? What change you are trying to initiate?	Kolk (2014)
	Essence test	What do you want to change? What emotion do you want to evoke? What is the single most important thing?	Radjou and Prabhu (2016) Basu, Banerjee, Sweeny (2013)
	Nail and hammer	What are 3 core attributes of this problem? How will you build a hammer to hit those nails?	Radjou and Euchner (2016)
Leave a legacy			
	Reverse	Once we’ve found a solution, where else can it be used? What can we disrupt with this invention?	Govindarajan and Ramamurti (2011)
	Piggybacking	How do we get tool, expertise, spares etc. distributed to where the impact is needed? What existing supply chains can we tap into? What can we partner with?	Pearson (2010).

	The circle (circular economy)	What happens to the packaging, leftovers, side-effects? How do we achieve zero waste? What else can this project fuel?	McDonough and Braungart (2009)
	Frugal KPIs	See details above	
Simple, strong scalable			
	Hide it...	How can we make it... ...understandable? ...simple? ...usable? ...self-explanatory?	McClure and Gray (2015)
	Constraint imposition	How do you make it... ...for \$X? ...without electricity? ... with a [six-week] supply chain for parts? ...with dial-up not broadband? ...from [3] parts?	Pansera (2013) and Tiwari & Herstatt (2011)
	Break it	How many ways could you break this...? How will people fix it...? What happens when it goes wrong? Is it robust?	Rams (XXX) Soni and Krishnan (2014)
	Moving parts	How do you do it with half the number of parts? How do you replace customised part with something else? How do we make it simpler?	Soni and Krishnan (2014)

Figure 45 Frugal design thinking toolkit ideas developed during this research

The tools outlined above would form the toolkit which delivers the *Surpas* framework. Developing, testing and iterating these tools across the polycentric innovation pipeline is the logical next step for this research or any organisation wanting to deploy *Surpas*.

4.4 Chapter conclusions

This chapter has presented the results of the research and demonstrated that a new model for humanitarian innovation based on frugal theory has potential to deliver solutions better designed and more likely to be adopted in humanitarian NGO contexts. The importance of combining values

with process was illustrated, and these qualities were identified and mapped across frugal innovation and design thinking.

The results of the initial design process (model 1.0) were detailed. Feedback revealed flaws in the visual presentation but certified the thinking behind the model, with clear indicators that the new model should be tested in the field and had potential for widespread diffusion. A second iteration was produced (model 2.0) using Rams' design principles. Potential tools for delivering the new model were scoped but not prototyped.

This chapter completes objectives A, B and C and introduces D. The results, process and insights generated are discussed further in the following chapters.

Chapter Five: Discussion

The results are dissected further in this chapter; outcomes are compared to the original hypothesis and objectives, and then against the wider perspective of theoretical and applied work uncovered in the literature review. Their validity, scope and generalisability are considered, along with a critique of the approach. The implications and recommendations for next steps or practical application are discussed.

5.1 Achieving the research objectives

At the heart of this project was the hypothesis that a gap exists between frontline humanitarian needs and the output of NGO innovation, which could be bridged by applying frugal innovation theory to design thinking techniques to create a customised process for the exploration and exploitation of ideas. In essence, it was an attempt to make the 'new' more 'useful' in the humanitarian sector.

This hypothesis was presented in the research question: *Doing better with less; could a frugal approach to design thinking help humanitarian innovation?* To address this question, an objective, broken down in to measurable sub-objectives, was drawn up (table 12):

Objective	Achievement
Bridge the experience and knowledge gap between frontline humanitarian staff and innovators producing new tools and processes for the field:	
a) Map the humanitarian innovation pipeline and validate the existence of a gap between the novelty and utility of the output	Success
b) Combine frugal theory, design thinking and humanitarian innovation practice to devise an innovation framework tailed to the humanitarian sector	Success
c) Test and iterate this framework	Partial success
d) Make recommendations for any new toolkit development or systemic adjustments to improve humanitarian innovation based on the research	Success

Table 12 Research objectives and achievements

These objectives and achievements will now be critiqued before the validity, scope and generalisability of the results is considered.

5.1.1 Objective A: Identifying the gap

This objective was successfully completed. The literature review revealed significant evidence for failure in the humanitarian system, as well as issues with scaling or deploying disruptive inventions (McClure and Gray, 2015). However, domain experts do not prescribe practical solutions, and neither do experts in frugal innovation focus on the specific needs of the humanitarian sector.

The sector's polycentric innovation pipeline was mapped and participants interviewed, providing evidence for the systemic failure to sustain meaningful connection between remote technical expertise and field-focused experience. Therefore, this study identified a gap in both theory *and* practice and attempted to fill it by developing a new model tailored to the humanitarian sector.

This research revealed the gap to be a difference of focus, with *practices* dominating the approach of technical experts, and *values*, ultimately manifested as tangible attributes, being the predominant concern of field staff. In other words, for remote practitioners the process was important as it

allowed a systematic approach to problem-solving without imposing constraints on the outcome – good practice should lead to good results. For field staff, the outcome was more important than process – outcomes had to have certain attributes to stand any chance of being useful, and the process was secondary.

While other researchers had identified the existence of an experience/expertise gap (Radjou and Prabu, 2016; Altmann and Engberg, 2016), the researcher did not uncover any analysis of how the differences manifested in the stakeholders' approach or affected innovation outputs. In addressing this omission, this research has contributed new insight to the study of humanitarian innovation.

These results were based on extensive reading but a limited sample of interviewees, plus the researchers own professional experience could have coloured the interpretation of the results. However, the research design took this into consideration, deploying an inductive approach, which is concerned with context and where, in fact, “the study of a small sample of subjects might be more appropriate than a large number” (Saunders, 2016, p147).

5.1.2 Objective B: Customised innovation framework

This research found that practitioners on both sides of the gap recognised their bias (towards *practice* or *values*) and acknowledged that exposure to other approaches could be beneficial. A system to link the two problem-solving approaches, then, should be valuable: The research went on to design a model for this, which is a new and useful contribution to the domain (figure 46).

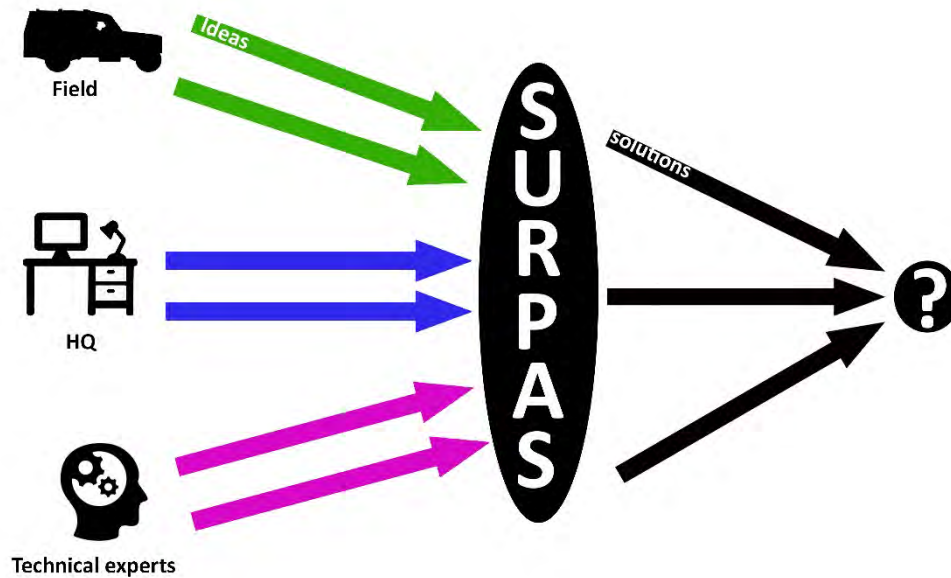


Figure 46 The *Surpas* framework designed by this research project

Essentially, a new problem space was discovered but no existing theory or toolkit could be identified which could be transplanted ‘off-the-shelf’. Three domains – humanitarian innovation, low-cost innovation and design thinking – were mapped and intersecting theories were analysed (Chapter 3). This informed the creation of entirely new principles for humanitarian innovation based on frugal theory and manifested in a design thinking process. Significantly, this new framework imposes shared values on practice and allows dispersed networks to collaborate on projects which deliver outcomes with attributes essential for success in the field.

While many frameworks and design thinking toolkits exist, for both the commercial and humanitarian world, this was recognised as new and useful by the domain experts whose feedback informed the iteration of the prototype.

The design approach was robust, with multiple rounds of generation and focusing to hone the brief and realise the initial iteration of the framework (see 4.3.1), which was then sent for feedback.

5.1.3 Objective C: Test and iterate the framework

A new framework was designed, evaluated and refined. Practitioners were given version 1.0, with detail of how to use it, and fed back via a questionnaire which employed Rogers' diffusion principles to test whether the model had potential to scale. It was adjudged to be a novel and useful addition to the domain. However, it was considered overly complex and lacking design clarity, and so it was redrafted as 2.0 (see 4.3.3).

To fully realise the potential of the new iteration, it needs to be used at all points on the polycentric innovation pipeline to witness the reinvention of the tool and run live tests (Rogers, 2003). If the overarching objective had remained the delivery of a fully-realised toolkit, this process would have been crucial but the theoretical model (*Surpas*) had to be drafted first, which shifted the focus.

In *theory*, the new framework is highly suited to address the gap identified above and has high potential to scale as an innovation in and of itself, based on expert feedback (see 4.3.2). It now needs to be used *in practice*.

The application of an “emergent and iterative” Action Research approach was appropriate because, as Saunders argues, “each stage of the research involves a process of diagnosing or constructing issues, planning action, taking action and evaluating action” (2007, p147). So, the framework was tested and iterated as it emerged from an analysis of the existing literature and practical approaches, through the conception and refinement of the guiding principles and values and then in the design and presentation of the final model (see 4.3.3).

5.1.4 Objective D: Recommendations

Once the *Surpas* framework was designed, tools and exercises were drafted to practically apply the new theory (see 4.3.4). This is a key recommendation; to fully realise the potential of the new model – which addresses a real need and is an improvement on current approaches with the potential to scale – the specific exercises should be developed.

It is recommended that investment is made to turn *Surpas* into a suite of design thinking tools. These must be co-created with end-users and should themselves be subjected to scrutiny through the *Surpas* lens to ensure they are appropriate for use in the field, HQ and by third parties. Once tools are developed, the innovations delivered by their application should be monitored to assess whether, in the medium- and long-term, they work better in the field, scale easier and last-longer in reality, as predicted by the theory underpinning the *Surpas* model as described in this research.

It must be noted that the research does not address the systemic issues which may be hampering humanitarian innovation. Potentially rich areas for analysis could be whether systemic over-promotion of field experience at the expense of technical expertise affects organisational performance; or how the culture of humanitarian innovation is affected by the ingrained emergency footing, field-mission length and subsequent short-term management cycle; or what impacts the apparent systemic inability to transfer from successful pilot project to a fully-resourced 'product' which alters 'business as usual' practice.

Such questions about the fabric of humanitarian organisations may prove to be more valuable in the long-term than customised frameworks designed to allow the best performance of the current system.

5.2 Validity, scope and generalisability

The research has made a positive theoretical contribution to the domain of humanitarian innovation, but more work is needed to produce the practical tools which would disrupt the sector.

This research required far more theoretical investigation than anticipated, with much effort applied to mapping the three intersecting domains to produce a new conceptual space for the *Surpas* model.

The literature review was exhaustive and so the foundations for the new model are sound, an argument validated by a cross-section of domain experts and field staff. The thoroughness of the research exposed a gap in both theory and practice – not only did the correct tools for humanitarian innovation not exist, neither did the theoretical model on which to base them – and so proven

design techniques were deployed to create the new theoretical model. This model (version 1.0) was evaluated as an important and valid contribution to the domain, and iterated to produce *Surpas*.

This second version was not subject to further feedback and so is as yet untested, which is a risk for future work and should be addressed in any next steps.

Here also is the major limitations of the current research; a sound theoretic model has been developed and tested, but the practical tools for its deployment do not yet exist. The research clearly indicates that there is a need for these tools and they could improve the output of the humanitarian innovation system, but they are beyond the capacity of the current project.

In terms of generalisability, during the *Surpas* design, feedback on version 1.0 was drawn from only eight respondents, which may appear to challenge the validity of the outcome. But the diversity and experience of the contributors (see 3.3.3) suggests the conclusions are valid and generalisable.

Also, as one concern was usability – whether the new model self-explanatory – the research considered user-testing theory, which indicates that the maximum benefit is derived from five-to-six respondents (Nielsen and Landauer, 1993) figure 47:

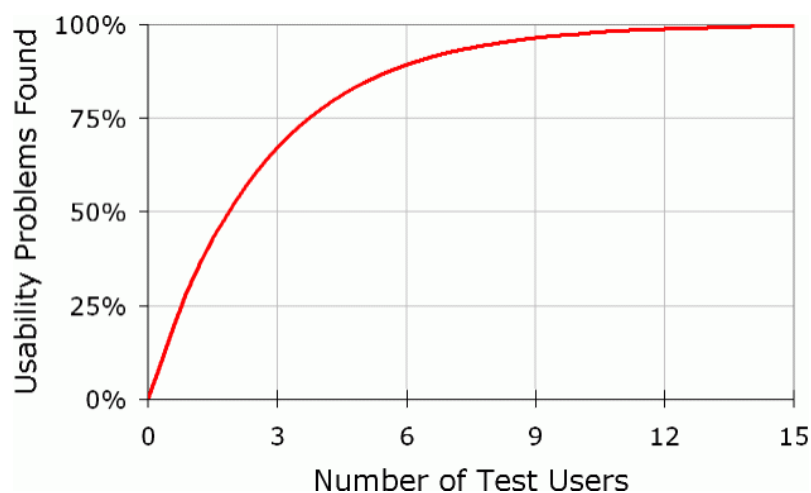


Figure 47 Nielsen’s graph of declining returns for elaborate user tests (2000)

The researcher also applied Rogers' theory of innovation diffusion to assess the likely scalability of the framework – the users sampled were probable earlier adopters and their feedback indicated the new framework has the characteristics of a scalable innovation. As such, the scope is large – *Surpas* could potentially be used to help humanitarian innovation at scale.

However, many theoretically sound ideas fail to make an impact in the humanitarian sector as systemic issues, internal politics or lack of resources hamper implementation. Care must be taken to nurture the further development and deployment of *Surpas* or it may fail not through any design fault but thanks to flaws in the humanitarian system.

Interestingly, however, as this sector uses a polycentric innovation pipeline with input from actors in non-humanitarian industries, the new framework has the potential to cross boundaries and spread to other sectors, especially those designing products or services for low-resource and bottom of the pyramid contexts.

5.3 Conclusion

The research created a prototype framework – *Surpas* – with recognised potential to improve humanitarian innovation practice. It has not been tested on a live innovation project as this was beyond the capacity of this study, and so it has not been proven to work, but domain experts have identified advantages over current practice and assessed it as an improvement on existing models and, therefore, appropriate for development. The creation of the specific techniques needed to deliver the *Surpas* framework, and then a period of testing, evaluation and iteration with end-users, is recommended.

The advantages of *Surpas* include a sound foundation in frugal theory, which is a powerful and proven approach to problem-solving in resource-poor settings, such as humanitarian interventions. It also allows dispersed collaborators to maintain a shared focus on appropriate attributes,

considerations and constraints, which give the outcomes of such innovation pipelines a greater chance of success in the field.

Critically, the attributes of the innovations delivered by *Surpas* are determined by the values baked-into the framework. The application of values to shape outcomes is highly appropriate for the humanitarian sector, which is based on the same idea.

Some limitations have been identified and improvements made during the research. More work needs to be done to prepare the framework and associated tools for launch as a product, which is accessible to anyone. Overcoming these limitations is beyond the capacity of the current research but the strength of the framework and feedback from domain experts indicates that further work should be done to fully realise the ideas described in this work; it has the potential to help improve the outcomes of humanitarian innovation.

Chapter 6: Evaluation, reflections, and conclusions

This chapter reflects on what has been achieved during the dissertation process. The research focus, approach, direction shifts and conclusions are considered. The chapter finishes with personal reflections on the experience.

6.1 Choice of objectives

The focus of this project was a consequence of participation in an imperfect system with unrealised potential and huge needs: The humanitarian innovation system does not have the tools it deserves to capitalise on the energy, ambition and brainpower dedicated to some of the world's most complex problems.

The decision to first verify the existence of a gap between inputs and outcomes was sound – the research has contributed original evidence to illustrate that systemic faults are hampering humanitarian innovation.

The ambition to prototype an entirely new design thinking process, based on a novel interpretation of frugal innovation, which would improve the entire humanitarian sector was bold and proved to be beyond the scope of the project. This was a 'Big Hairy Audacious Goal (BHAG)' of the type encouraged by the MICL (Collins and Porras, 1994), and the scale of the ambition generated creative tension between current reality and future vision, which proved fertile ground. Insight from this research allowed the creation of a new framework, which testing indicates is an improvement on existing systems and provides a robust foundation on which to build. However, the downside is a cost in time, effort and research focus, which could have been used to advance the delivery of a new model if the original scope had been more restrained and realistically focused.

On reflection, the author would continue to set BHAGs as overreaching in the initial ambitions for a project pushes the outcomes beyond the limits imposed by a timid and 'safe' scope. Thanks to the choice of objectives, the research has identified a gap and provided a promising solution.

6.2 Approach

The research examined and combined three distinct domains to create a novel problem space, which in turn allowed the generation of useful insight and ideas. The decision to generate a new conceptual space proved important to the outcome of the project – it took a great deal of time to read and synthesise the necessary information and examine current practice. And as the outcome was uncertain, the delivery of the subsequent objectives had to be flexible and shift from the delivery of a full toolkit to the *Surpas* framework. This flexibility should have been built into the original project definition, with the outcome of the three-domain integration explicitly informing the next steps of the research.

On reflection, this research could have been split in to two projects, with one examining the theory and practice of frugal innovation, design thinking and humanitarian action to create a new conceptual space, and a second to build on this theoretical insight to create new practical tools. Either could consume an entire dissertation.

However, the chosen research design and methods proved flexible enough to allow the project to successfully shift focus. Action research generates evidence from various perspectives, including the researcher's own, allowing surprising and novel insights to surface, which proved extremely valuable and allowed greater confidence in the outcomes. The cyclical style encouraged a reflective, iterative and self-critical approach, which is a valuable personal outcome as this can be applied to other projects.

This was a creative project, and so academic rigour had to be paired with a fluid creative workstream, which generated the framework and toolkit concepts. This interplay of academic

practice, creative problem solving and original creativity is highly appropriate for the MICL and a great deal of confidence in the researcher's creative capacity was gained.

Given greater resources, it would have been valuable to test the framework on real-world innovation projects with all participants. However, as the interviewees spanned seven countries in three continents, this was not possible. A strong recommendation is made to test and iterate the framework further with end-users on 'live' projects, as the theory and structure has been validated and endorsed by this cohort.

6.3 Conclusions

The project has successfully illustrated that a frugal approach to design thinking *could* help humanitarian innovation and has delivered a new model with which to do this. The next steps to realise the potential of this model is to definitively prove that it *can* improve humanitarian innovation but running live trials and fully realising the exercises sketched in chapter 4.

The research has proven a strong affinity between frugal and humanitarian innovation, with transferable insight and practices, and that new design thinking process built to enhance this connection could improve outcomes; the *Surpas* model is a significant step towards realising this.

6.4 Personal reflections

The dissertation itself has proven to be a wicked problem. The exploration of three domains which have not previously been combined, to generate something new, useful and understandable for end-users, has been complex. Emotions have swung from the thrill of discovery in uncharted territory to the fear and isolation of travelling without a proper map.

And it has not been without risks. At times, the sheer volume of information clamouring for attention has been overwhelming, intruding on dreams, filling sketchbooks and collapsing back into anarchy just as it appeared to be on the brink of finally getting organised. The value of reflective

practice cannot be overstated – without journals, Post-Its and the willingness to commit absurd ideas to paper, this project would never have been completed.

The MICL values, which seemed abstract on the induction day, have hardened into practical tactics for dealing with wicked problems:

- **Open-mindedness**

As there is no clear solution to wicked problems, all options must be considered. This flexibility allowed the research focus to shift from the production of a fully-fledged product to the development of an innovation framework. It also allowed the researcher's opinions, expectations and understanding of the *real* issues to shift in course of the project.

- **Encouraging diversity**

This dissertation actively sought out diversity, pulling together various domains and experts to articulate a solution. The research was fueled by the variety of perspectives of the MICL students, lecturers and academic disciplines which make up the course.

- **Co-operation**

The humanitarian innovation approach is built on cooperation between a bewildering array of people. The ability to listen and appreciate other perspectives was critical; it would be impossible to conceive of a useful new approach to innovation without valuing, and understanding the complexity of collaboration and cooperation.

- **Risk-taking**

This entire Masters programme was a risk. During the dissertation, risks had to be taken when developing the new framework, with flashes of intuition and leaps of faith helping solve some tricky issues. Understanding that periods of uncertainty would be followed by insight, like the creative writing process or CPS modules, were vital.

- **Leading and following**

The ability to switch roles was important – the dissertation demanded the application of a range of skills, attitudes and approaches, many of which have been honed by the MICL course.

- **Grit**

The dissertation demands grit; there are times when it feels like an insurmountable problem or an overwhelming amount of work. Skills learnt throughout the MICL – from the bravery to step on stage to the detailed planning of a team LCD project – provided the determination, self-belief and trust in the creative process to keep moving forward.

- **Stretching**

Peace had to be made with apparent chaos – all the ideas and evidence had to be unpacked, reconsidered and recombined. The ability to think in metaphors and to abstract concepts – honed in Leading Creative Design and the Creative Industries modules – were invaluable.

- **Active involvement**

The MICL student network has provided a sounding board, sense-checker and a constructively-critical companion throughout. Engagement has provided the insight, breadth-of-knowledge and exposure to new character aspects which have sustain this dissertation. The course rewards commitment and contribution.

As with any journey, reaching the destination encourages a re-evaluation of the route taken. On reflection, a limited focus on either the theory or the practice may have been more manageable as a dissertation process, but the personal lessons learnt and insight gained through attempting much more have been as valuable an outcome as the research itself. For future projects, the volume of domain exploration needed prior to fixing the project scope would be factored in.

6.4 Final word

Humanitarians help their fellow humans, regardless of apparent differences. During emergencies, humanitarian NGOs act to solve complex problems and alleviate suffering by applying a well-defined

set of principles to all operational decisions. The application of these values colours everything, to the extent of refusing money from tainted sources, quitting countries in protest, or speaking out against regimes; the application of values shapes practice and outcomes.

This research, as a tiny echo within the larger space, has illustrated that the application of frugal values to shape the practice and output of humanitarian innovation is desirable, appropriate and potentially powerful. The hope is that this work speeds up the search for solutions which make a positive contribution to humanitarian action and, ultimately, people's lives.

-----End of dissertation-----

Words: 14,972

Bibliography

- Abdelnour, S and Saeed, A. (2014) 'Technologizing Humanitarian Space: Darfur Advocacy and the Rape-Stove Panacea', *International Political Sociology* (8), pp. 145-163
- Agarwal, N., Grottke, M., Mishra, S., Brem, A. (2017) 'A Systematic Literature Review of Constraint-Based Innovations: State of the Art and Future Perspectives', *IEEE Transactions on Engineering Management*, 64 (1), pp. 3-15
- Altmann, P., Engberg, R. (2016). 'Frugal Innovation and Knowledge Transferability: Innovation for Emerging Markets Using Home-Based R&D', *Research-Technology Management* (1) pp. 48-55
- Amabile, B., and Hennessey, T. (2010). 'Creativity'. *Annual Review of Psychology* (61) pp. 569–98
- Anderson, N., Potočnik, K., Zhou, J. (2014) 'Innovation and Creativity in Organizations: A State-of-the-Science Review, Prospective Commentary, and Guiding Framework', *Journal of Management* 40(5) pp. 1297– 1333
- Arasaratnam, A., Humphreys, G. (2013) 'Emerging economies drive frugal innovation', *Bull World Health Organ* (91) pp 6–7
- Australian Government (2017). *The Very Long List of Innovation Toolkits and Resources*. Available at: <https://innovation.govspace.gov.au/very-long-list-innovation-toolkits-and-resources> (accessed 27th September 2017)
- Basu, R., Banerjee, P, Sweeney, E. (2013) 'Frugal Innovation: Core competencies to address global sustainability', *Journal of Management for Global Sustainability* (2) pp. 63–82
- Baud, I. (2016) 'Moving Towards Inclusive Development? Recent Views on Inequalities, Frugal Innovations, Urban Geo-Technologies, Gender and Hybrid Governance', *European Journal of Development Research* (28), pp. 119–129
- Bhatti, Y., 'What is Frugal, what is innovation? Towards a theory of Frugal Innovation', *Working Paper Said Business School and Green Templeton College*. Available online at at: <http://ssrn.com/abstract=2005910>
- Blaxter, L., Huges, C., Tight, M. (2010). *How to research*. 4th ed. London: Open University Press
- Bledow, R., Frese, M., Anderson, N., Erez, M., & Farr, J. (2009). 'A dialectic perspective on innovation: Conflicting demands, multiple pathways, and ambidexterity'. *Industrial and Organizational Psychology: Perspectives on Science and Practice*, 2 pp. 305-337
- Boden, M. (1990) *The Creative Mind: Myths and Mechanism*. 2nd Ed. London: Routledge.
- Bradol, J, and Vidal, C ed. (2011) *Medical Innovations in Humanitarian Situations – The Work of Médecins Sans Frontières*. USA: MSF-USA
- Braungart, M., McDonough, W. (2009) *Cradle to cradle: Re-making the way we make things*. UK: Vintage

- Brem, A., Wolfram, P. (2014) 'Research and development from the bottom up - introduction of terminologies for new product development in emerging markets' *Journal of Innovation and Entrepreneurship* 3(9)
- Brown, D. (2012) 'Creativity, surprise and design: An introduction and investigation'. *Proceedings of the 2nd International Conference on Design Creativity*. 1 pp.75-86
- Brown, T and Wyatt, J. (2010) 'Design Thinking for Social Innovation', *Stanford Social Innovation Review* (winter), pp. 31-36
- Brown, T. (2008). 'Design Thinking'. *Harvard Business Review*. 86(6) pp. 84-92
- Christensen, C., Baumann, H., Ruggles, R., & Sadtler, T. (2006). 'Disruptive Innovation for Social Change'. *Harvard Business Review*. 84(12) pp. 94-101
- Clark, A. (2013) 'Whatever next? Predictive brains, situated agents, and the future of cognitive science'. *Behavioural and Brain Sciences*. 36, pp. 181–253
- Collins, J., Porras, J. (1994) *Built to Last: Successful Habits of Visionary Companies*. London: Random House Business Books, 2005 ed.
- Creswell, J. (2014). *Research Design: Qualitative, quantitative and mixed methods approaches*. 4th ed. London: Sage Publications
- Drummond, A. (2012) 'Research on emerging economies: Challenges are always opportunities'. *Global Strategy Journal*. 2, pp.48–50
- European Committee for Standardisation (2010) 'Ergonomics of human-system interaction Part 210: Human-centred design for interactive systems'. *International Organization for Standardization* [online]. Available at <https://www.iso.org/standard/52075.html> (accessed 22 June 2017)
- Farh, L., and Farh, C. (2010). 'Task Conflict and Team Creativity: A Question of How Much and When'. *Journal of Applied Psychology* 95(6) pp. 1173–1180
- Friston, K. (2012) 'Prediction, perception and agency'. *International Journal of Psychophysiology*, 83 pp. 248–252
- Friston, K., Thornton, C., and Clark, A. (2012). 'Free-energy minimization and the dark-room problem'. *Frontiers in psychology*, 3 pp. 1-7
- Gino, F (2016). 'Let your workers rebel'. *Harvard Business Review* [online]. Available at: <https://hbr.org/cover-story/2016/10/let-your-workers-rebel> (accessed 28 June 2017)
- Glaser, B., Strauss, L. (1967) *The Discover of Grounded theory: Strategies for qualitative research*. Transaction Publishers 2017 ed. New York: Routledge
- Gobble, M. (2014) 'Design Thinking', *Research-Technology Management* (57,3) pp.59-61
- Govindarajan, V., and Trimble, C. (2013) *Beyond the idea*. London: Macmillan
- Greenwood, D and Levin, M. (2007). *Introduction to Action research: Social research for social change*. 2nd ed. London: Sage
- Hadengue, M., de Marcellis-Warin, N., Warin, T. (2017) 'Reverse innovation: a systematic literature review', *International Journal of Emerging Markets*, 12(2), pp.142-182

- Hill, L., Brandeau, G., Truelove, E., Lineback, K. (2014). 'The Inescapable Paradox of Managing Creativity'. *Harvard Business Review* [online]. Available at <https://hbr.org/2014/12/the-inescapable-paradox-of-managing-creativity> (accessed 12 March 2017)
- Hill, L., Brandeau, G., Truelove, E., Lineback, K. (2014). *Collective Genius: The art and practice of leading innovation*. USA: Harvard Business Review Press
- IDEO (2015) *The Field Guide to Human-Centered Design*. IDEO [online]. Available at <http://www.designkit.org/resources/1> (Accessed 27 June 2017)
- Immelt, J., Govindarajan, V., Trimble, C. (2009) 'How GE is Disrupting Itself' *Harvard Business Review* (Oct.) pp. 56-65
- Isaksen, S. and Tidd, J. (2006). *Meeting the innovation challenge*. UK: John Wiley & Sons
- Isaksen, S., Stead-Dorval, B., Treffinger, D. (2011). *Creative Approaches to Problem Solving: A Framework for Innovation and Change*. 3rd edition. London: Sage Publications
- Hartley, J. (2014) 'New development: Eight and a half propositions to stimulate frugal innovation'. *Public Money & Management*. 34(3) pp. 227-232
- Kahle, H., Dubiel, A., Ernst, H. (2013). 'The democratizing effects of frugal innovation Implications for inclusive growth and state-building'. *Journal of Indian Business Research*. 5 (4), pp. 220-234
- Kelley, T., and Kelley, D. (2014). *Creative confidence: unleashing the creative potential within us all*. London: William Collins
- Keown, O.P., Parston, G., Patel, H., Rennie, F., Saoud, F., Al Kuwari, H. and Darzi, A. (2014). 'Lessons From Eight Countries On Diffusing Innovation In Health Care', *Health affairs*, 33(9), pp. 1516-22
- Knorringaa, P., Pešab, I. van Beers, C. (2016). 'Frugal Innovation and Development: Aides or Adversaries?', *European Journal of Development Research* (28, 2) pp. 143–153
- Koetzier, W., and Alon, A. (2012). 'Why "Low Risk" Innovation Is Costly: Overcoming the Perils of Renovation and Invention'. *Accenture* [online]. Available at www.innovacion.cl/wp-content/.../Accenture-Why-Low-Risk-Innovation-Costly.pdf (accessed 21 February 2017)
- Kolk, A., Rivera-Santos, M., Rufin, C. (2014) 'Reviewing a Decade of Research on the "Base/Bottom of the Pyramid" (BOP)', *Concept Business & Society* 53(3) pp. 338–377
- Lackner, H., Güttel, W., Garaus, C., Konlechner, S., Mueller, B. (2011). 'Different Ambidextrous Learning Architectures and the Role of HRM Systems'. Danish Research Unit for Industrial Dynamics [online] Available at https://www.researchgate.net/publication/239804695_Different_Ambidextrous_Learning_Architectures_and_the_Role_of_HRM_Systems (accessed on 5 May 2017)
- Leskovec, J. (2014). 'Model-based Approach to Detecting Densely Overlapping Communities in Networks'. *Sandford University*. Available at <http://snap.stanford.edu/agm/> (accessed 19 June 2017)
- Lockwood, T (ed.) (2009). *Design Thinking: Integrating innovation, customer experience and brand value*. London: Allworth Press
- Maiden, N., Jones, S., Karlsen, K., Neill, R., Zachos, K; Milne, A. (2010). 'Requirements Engineering as Creative Problem Solving: A Research Agenda for Idea Finding'. *Paper presented at the Requirements Engineering Conference* available at <http://dblp.uni-trier.de/db/conf/re/re2010.html>

- Malik, K (2014). 'Chapter 1: Vulnerability and human development' *Human Development Report: Sustaining Human Progress*. New York: United Nations Development Programme, pp.15-33 [available at <http://www.hdr.undp.org/sites/default/files/hdr14-report-en-1.pdf>]
- Mandal, S. (2014) 'Frugal Innovations for Global Health', *IEEE Pulse* (1.14) pp. 11-13
- Mattes, F., and Ohr, R. (2013). 'Balancing Innovation Via Organizational Ambidexterity'. *Innovation Management* [online]. Available at <http://www.innovationmanagement.se/2013/05/29/balancing-innovation-via-organizational-ambidexterity> (accessed on 9 September 2017)
- McClure, D., Gray, I. 'Scaling: Innovation's Missing Middle', *Submitted for the transformation through innovation theme for the World Humanitarian Summit*. Available at <https://www.thoughtworks.com/insights/blog/scaling-innovations-missing-middle> (Accessed 6 May 2017)
- Moore, G. (2014) *Crossing the chasm: marketing and selling disruptive products to mainstream customers* 3rd ed. New York: Harper Collins
- NESTA (2014) *Development Impact and You toolkit*. Available at diytoolkit.org (accessed 28 June 2017)
- Nielsen, J., and Landauer, T (1993). 'A mathematical model of the finding of usability problems'. *Proceedings of ACM INTERCHI'93 Conference* (Amsterdam, The Netherlands, 24-29 April 1993), pp. 206-213 [online]. Available at <https://dl.acm.org/citation.cfm?id=169166>
- Nielsen, J., Mathiassen, L., Newell, S. (2014) Theorization and translation in information technology institutionalization: Evidence from Danish Home Care', *MIS Quarterly*, 38 (1), pp. 165-186
- Nussbaum, B. (2011). 'Design Thinking is a failed experiment. So what's next?'. *Fast Codesign* [online] Available at <https://www.fastcodesign.com/1663558/design-thinking-is-a-failed-experiment-so-whats-next> (access 9 July 2017)
- Pansera, M. (2013) 'Frugality, Grassroots and Inclusiveness: New Challenges for Mainstream Innovation Theories', *African Journal of Science, Technology, Innovation and Development* (5:6) pp. 469-478
- Papanek, V. (2016). *Design for the real world: Human ecology and social change*. London: Thames & Hudson
- Patterson, F., Kerrin, M., Gatto-Roissard, G., and Coan, P. (2009). 'Everyday innovation: How to enhance innovative working in employees and organisations'. *NESTA* [online] available at <https://www.nesta.org.uk/publications/everyday-innovation> (accessed 1 March 2017)
- Pennycook, G., Cheyne, J., Barr, N., Koehler, D., Fugelsang, J. (2015). 'On the reception and detection of pseudo-profound bullshit'. *Judgment and Decision Making* 10(6) p. 549-563
- Prahalad, C.K., Mashelkar, R. (2010.) 'Innovation's Holy Grail', *Harvard Business Review* 88(7/8), pp. 132-141
- Punch, M. (2005). *Introduction to Social Research: Quantitative and qualitative approaches*. 2nd ed. London: Sage
- Radjou, N., Euchner, J (2016). 'The Principles of Frugal Innovation An Interview with Navi Radjou', *Research-Technology Management* (July-August), pp. 13-19

- Radjou, N., and Prabhu, J. (2016). *Frugal Innovation: How to do better with less*. London: Profile Books
- Radjou, N., and Prabhu, J., Ahuja, S. (2012). *Jugaad Innovation: Think flexible, be flexible, generate breakthrough growth*. San Francisco: Josie-Bass
- Ramalingam, B., Rush, H., Bessant, J., Marshall, N., Gray, B., Hoffman, K., Bayley, S., Gray, I., Warren, K. (2015). 'Strengthening the humanitarian innovation ecosystem'. *Humanitarian Innovation Ecosystem Research Project Final Report, Centre for Research in Innovation Management (CENTRIM) at the University of Brighton* [online]. Available at <https://www.brighton.ac.uk/pdf/research/centrim/humanitarian-innovation-ecosystem-research-project-final-report-with-recommendations.pdf> (accessed on 5 May 2017)
- Rangan, V. K., Chu, M., & Petkoski, D. (2011). 'Segmenting the base of the pyramid'. *Harvard Business Review*, 89(6) pp. 113-117
- Rao, B. (2014) 'Alleviating Poverty in the Twenty-First Century Through Frugal Innovations', *Challenge*, 57(3) pp. 40–59
- Rivera-Santos, M., and Rufin, C. (2010). 'Global village vs. small town: Understanding networks at the base of the pyramid'. *International Business Review*, 19 pp. 126-139
- Ritchie, G (2006). 'The Transformational Creativity Hypothesis'. *New Generation Computing* (24) pp. 241-266
- Ritchie, G (2001). 'Current Directions in Computational Humour'. *Artificial Intelligence Review* (16) pp. 119–135
- Rogers, E. (2003). *Diffusion of Innovations*. 5th ed. New York: Free Press
- Rogers, M. (2009). *The design of business: why design thinking is the next competitive advantage*. Boston: Harvard Business Press
- Rogers, Y., Sharp, H., Preece, J. (2013). *Interaction design: beyond human-computer interaction (3rd ed)*. New Delhi: Wiley Press
- Sijbom, R., Janssen, O., and Van Yperen, N. (2015). 'How to get radical creative ideas into a leader's mind? Leader's achievement goals and subordinates' voice of creative ideas'. *European Journal of Work and Organizational Psychology* 24(2) pp.279-296
- Saunders, M., Lewis, P., & Thornhill, A. (2007). *Research Methods for Business Students*. 6th ed. London: Pearson
- Saunders, M., Lewis, P., and Thornhill, A. (2016) *Research Methods for Business Students*. 7th ed. Edinburgh: Pearson
- Saunders, M., Tosey, P. (2013). 'The Layers of Research Design'. *Rapport* (winter) pp. 58-59
- Scott, R. (2015) 'Let's Stop Misusing the Word "Disruptive"'. *Forbes* 195(3) pp. 38-42
- Scriven, K. (2016). 'Humanitarian innovation and the art of the possible'. *Humanitarian Exchange*. 66 pp. 5-7
- Schwartenbeck, P., FitzGerald, T., Dolan, R., and Friston, K. (2013). 'Exploration, novelty, surprise, and free energy minimization'. *Frontiers in Psychology* (4) pp. 1-5

- Simonson, I., Rosen, E. (2014). *Absolute Value*. New York: Harper Collins
- Sohmen, Victor S. (2015). 'Reflections on Creative Leadership'. *International Journal of Global Business*, 8 (1) pp. 1-14
- Soni, P., Krishnan, R. (2014). 'Frugal innovation: aligning theory, practice, and public policy', *Journal of Indian Business Research* 6 (1), pp. 29-47
- The Economist (2010). *The charms of frugal innovation*. Available at: <http://www.economist.com/node/15879359> (accessed 17 March 2017)
- Tiwari, R., Herstatt, C., (2013). "'Too good" to succeed? Why not just try "good enough": Some deliberations on the prospects of frugal innovations', *Working Paper No. 76*, Centre for Frugal innovation, Hamburg University of Technology, pp. 1-11
- Tran, V. and Ravaud, P. (2016). 'Frugal innovation in medicine for low resource settings', *BMC Medicine* (14:102) pp. 1-3
- Venugopal, S., Viswanathan, M., Echambadi, R., Sridharan, S., (2013). 'Intertwined Destinies: How Subsistence Entrepreneurs and Consumers Harness Social Capital to Overcome Constraints and Uncertainties', *Advances in Consumer Research* (40), pp. 788-790
- Viswanathan, M., Sridharan, S. (2012) 'Product Development for the BoP: Insights on Concept and Prototype Development from University-Based Student Projects in India', *Product Development & Management Association* 29 (1), pp. 52-69
- Walters, H. (2011). "'Design Thinking" isn't a miracle cure, but here's how it helps?' Fast Codesign [online] Available at <https://www.fastcodesign.com/1663480/design-thinking-isnt-a-miracle-cure-but-heres-how-it-helps> (accessed 9 July 2017)
- Weyrauch, T., Herstatt, C. (2016). 'What is frugal innovation? Three defining criteria', *Journal of Frugal Innovation* 2(1), pp. 1-17
- Wright, M. et al. (2005). 'Strategy Research in Emerging Economies: Challenging the Conventional Wisdom'. *Journal of Management Studies*, 42(1), pp.1-34
- Yang, J., and Leskovec, J. (2014). 'Overlapping Communities Explain Core-Periphery Organization of Networks'. *Technical Report: Stanford InfoLab (Proceedings of IEEE, December 2014)*. Available at <http://ilpubs.stanford.edu:8090/1103/>
- Zeschky, M., Winterhalter, S. Gassmann, O. (2013). 'From Cost to Frugal and Reverse Innovation: Mapping the Field and Implications for Global Competitiveness', *Journal of Management for Global Sustainability* (2): pp. 63-82.
- Zeschky, M., Winterhalter, S., Gassmann, O, (2014). "'Resource-constrained innovation": Classification and implications for multinational firms', *paper presented at The XXV ISPIM Conference – Innovation for Sustainable Economy & Society, Dublin, Ireland on 8-11 June 2014*
- Zeschky, M., Winterhalter, S., Gassmann, O., (2014) 'What is Frugal Innovation? Conceptualization and empirical evidence', *Research-Technology Management (RTM)*, 57 (4), pp. 2-28

Appendices

- a) Project Definition Document
- b) Ethics approval form
- c) Consent form
- d) Participant information sheet
- e) Interview request email
- f) Interview questions
- g) HART test
- h) 1.0 feedback instructions
- i) Feedback questionnaire and results
- j) Interview recordings
- k) Logline development
- l) Conceptual space mapping
- m) Consent forms

Appendix A: Project Definition Document

Name: Ben Holt

E-mail address: Ben.Holt@city.ac.uk

Contact Phone number: 07872469237

Project Title: “Doing better with less; could a frugal approach to design thinking help humanitarian innovation?”

Supervisor: Neil Maiden

Advisor: Harry Scarbrough

Project objectives

To bridge the gap between frontline humanitarian action and the network of support staff, third party developers and commercial enterprises producing new tools, products and processes designed for use ‘in the field’.

This will be broken down in to:

- a period of research to examine current practice and to describe a theoretical framework based on frugal innovation theory
- production and testing of a prototype design thinking process or toolkit specifically designed for the humanitarian sector

Rationale and background

Advances in technology and connectivity have opened new opportunities for Non-Governmental Organisations (NGOs) to work as dispersed networks, developing sophisticated new tools using internal innovation capacity and a range of remote partners. However, despite a huge investment of time and money across the humanitarian sector, very few innovative products have ‘stuck’ and scaledⁱ.

Experienced field staff are frequently disappointed when new products are delivered. “I could see immediately why it wasn’t going to work here, where we need to use it”ⁱⁱ is a depressingly common sentiment. Similarly, experienced innovation and design experts are confounded by the complex constraints and unique needs of the humanitarian sector.

This dissertation will develop a new set of design thinking tools, derived from the lessons of failure and insight from end-users, to help back office and third party innovators develop more appropriate solutions for ‘the field’.

This toolkit will be underpinned with frugal innovation theory, which seeks to uncover creative ways to ‘do better with less’. This echoes Dieter Rams’ design principles for assessing value and relevance of products, which he summed up as “Weniger, aber besser” – “Less, but better”. Rams believed in

sustainable development and criticised the practiced of engineered obsolescence, attitudes which chime with NGO practice.

Frugal innovation recasts resource constraints as opportunities, rather than liabilities. Leading frugal thinkers Navi Radjou and Jaideep Prabhu argue that “...by combining the frugal ingenuity of developing nations with the advanced R&D capabilities of advanced economies, companies can create high-quality products and services that are affordable, sustainable and benefit humanity...”ⁱⁱⁱ.

Forward thinking multinationals, such as Renault, GSK, Unilever, Leroy Merlin and others, are taking advantage of their international reach to connect different styles of problem solving within their organisations. Others, such as SNCF, giffgaff and Accor, are leveraging relationships with start-ups and consumers.

The approach requires “lean, flexible and highly networked” organisations to build relationships across sectors in order to “change the way employees think” (Radjou and Prabhu, 2016) and develop rebel talent^{iv}. But it is impossible to develop a frugal mind-set shaped by “resource-rich, stable markets” – firms must look beyond their own employees, competitors, market sector and nation.

This approach tallies closely with the way NGOs work and the environments in which they operate. NGOs are solving pressing social problems and embracing innovation practice. These organisations are experienced working with financial, logistical or infrastructure constraints. They are dealing with the same problem as those frugal innovators seeking to ‘compete with non-consumption’ – how to reach and improve the lives of marginalised people^v. And yet there is a paucity of research in to the links and potential opportunities between frugal innovation and the humanitarian sector.

The humanitarian sector is currently experiencing an influx of technical and creative experts with little field experience, brought in to invent, design, test and deploy innovative new tools and approaches. NGOs are also developing new relationships with businesses. Unfortunately, there is often a gap between what is built and what is needed, what is possible and what is practical. In other words, a lot of new stuff is being built that is not as useful as it could be.

My dissertation will focus on developing a frugal innovation system which draws on the experience and expertise of frontline NGO staff. The aim is produce a toolkit which help headquarters staff, contracted agencies and commercial enterprises better understand and build for humanitarian needs on the frontline. The outcome, once the system is tested and deployed, should be new and useful tools which work in the environments they are deployed, rather than in the ‘lab’.

Research approach

This will be an exploratory piece of research which examines current practice and identifies opportunities for new tools. A prototype will then be produced, tested and analysed. A clear hypothesis is not appropriate at this point as there is a lack of existing research on which to base it.

The initial research will ask whether frugal innovation theory is an appropriate framework for humanitarian innovation practice. This will necessitate more detailed research into frugal innovation and the development of more focused interview and research questions.

Existing Creative Problem Solving (CPS) and design thinking approaches will be examined in light of this understanding of frugal innovation theory, identifying promising tools and potential modifications.

Interviews will then be conducted to gather qualitative evidence. Interviewees will be selected from both the humanitarian and commercial sectors. These could include:

- Members of the 'Innovation Club' at MSF – these are experts with experience of the successes, failures and limitations of the current system
- Representative from the [Global Humanitarian Lab](#), a partnership between the UN and Save the Children
- Ivan Gayton – an experienced MSF Head of Mission, hacker, innovator and disruptor
- Operations staff – experienced field staff expected to use new tools and processes (I have identified a nurse, epidemiologist, emergency coordinator and Head of Mission)
- A product design engineer from [Fearsome](#), a product design engineering company
- Representative from the [Silicon Valley Software Group](#) (SVSG)
- Dan McClure – Innovation Design Practice Leader, ThoughtWorks
- Ian Gray – Director, Gray Dot Catalyst
- Eric D Perakslis, Ph.D. – Visiting Scientist in Biomedical Informatics, Harvard
- Glen Mehn – Head of Development Innovation, Innovation Skills team, Nesta

The interviews will be coded in light of the theoretical framework developed in the earlier phases, with existing tools and techniques mapped against needs and issues in order to identify potential gaps for new approaches.

A prototype design thinking toolkit can then be produced and tested, with feedback from frontline humanitarian staff and innovation experts. The data from these tests will be analysed before final conclusions are drawn.

The dissertation research will include:

- Review of existing literature
- Analysis of failed humanitarian innovation projects
- Development of interview scripts
- Subject matter expert (SME) interviews
- Mapping current theory and practice against the frugal innovation theory
- Prototyping and testing new tools/techniques
- Follow up interviews and/or workshops
- Critical analysis of results and objectives

I will ensure ethical considerations are included. I will gain participants' consent and inform them:

1. of the purpose of my research
2. that their comments will be unattributed
3. that they will be provided with a copy of the research
4. that they can withdraw at any time, even after interview
5. how long it will take and what is expected
6. of possible risks and benefits to them

Project feasibility

My employer, Médecins Sans Frontières/Doctors Without Borders (MSF), has given me permission to work on this project and use contacts made through my work as subjects for this research.

Risk factors include:

1. **Failing to find the relevant experts for interview.** I am part of a global network of MSF innovators and have trusting professional relationships with them. I can leverage this group to reach the frontline field staff whose input is critical for this project.
2. **Lack of time to complete the research.** I am negotiating time 'in working hours' to focus on this project and seeking to tie it to organisational strategic objectives to ensure I am given the support and space needed.
3. **Difficulty 'field testing' the prototype.** Input from frontline staff is critical if the outcome is to be both new and useful. Field visits are expensive and logistically challenging. However, working in a key MSF office means I have access to a steady stream of field staff who I can engage with and meet face-to-face.
4. **Motivation.** This is a demanding project which will compete for time with my professional and personal life. I am aware that at times I will struggle to progress and feel overwhelmed. I have put in place and reflection and exercise schedule to mitigate against this, and ensure my family life will not be compromised. Also, the subject matter is of great interest and the outcome of this project will impact my future career.
5. **Lack of skills.** This is a major piece of academic research and I am not an academic. However, I have excellent support from my supervisor and advisor, plus professional contacts in innovation academia at Harvard and the Blekinge Institute of Technology, Sweden.
6. **Scale of project.** This is an ambitious project which seeks to analyse existing literature and create and test a new toolkit. I will mitigate against this by focusing on the MSF use-case and constantly ensuring the research is relevant and focused on the deliverables.

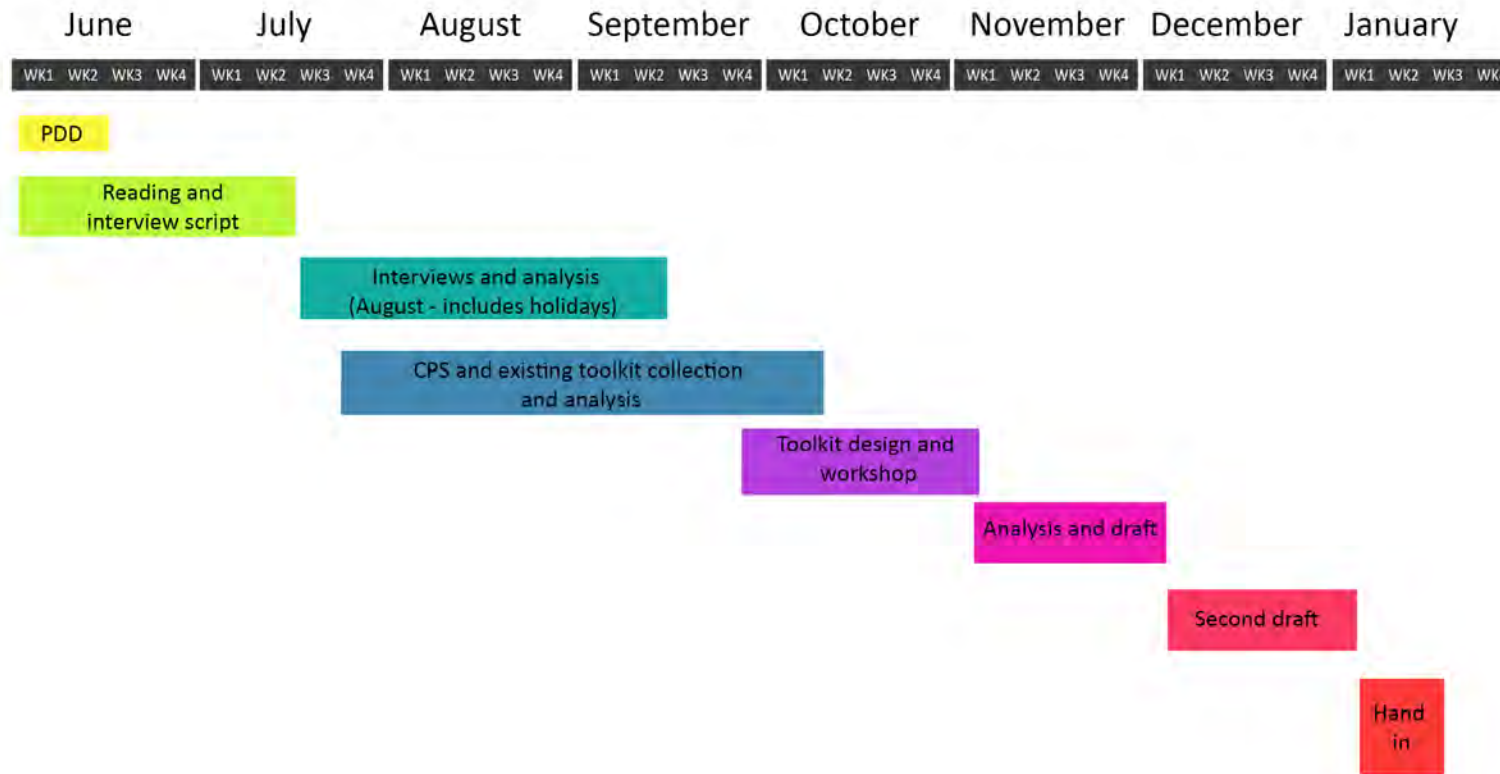
Timeline and project plan

This project will be managed using Agile methodology, specifically the Scrum framework. JIRA project management software will be used to ensure the work is delivered in well-defined, focused and achievable Sprints of two weeks.

A backlog of tasks will be created and refined based on the project requirements and the ongoing needs of the researcher. This will be an ongoing process. Sprints will be reviewed every two weeks before the next Sprint is launched.

The supervisor and advisor will be offered JIRA log ins to monitor progress, or they can request a Sprint review summary each fortnight.

In terms of the workflow the following pipeline is proposed:



Reading and theoretical background

The following sources have been consulted in the development of this project definition proposal:

Brown, Mark et al. PricewaterhouseCoopers Innovation survey

Hill et al: *Collective Genius: The art and practice of leading innovation* Harvard Business Review Press, 2014

Isaksen, Scott G: *Creative Approaches to Problem Solving: A Framework for Innovation and Change* 3rd edition Sage Publications, 2011

Isaksen, Scott and Tidd, Joe: *Meeting the innovation challenge*, John Wiley & Sons Ltd, 2006

Koetzier, Wouter and ALon, Adi. *Why “Low Risk” Innovation Is Costly: Overcoming the Perils of Renovation and Invention*. Accenture, 2012

Frederic Laloux: *Reinventing Organizations* Nelson Parker, 2014

McClure, Dan and Gray, Ian [Scaling: innovations missing middle](#)

Moger and Rickards: *How Benign Structures can Support and Retain Creative Performance in Teams*. Creativity and Innovation Management. Blackwell Publishers, 1999

Radjou, Navi and Prabhu, Jaideep: *Frugal Innovation: How To Do Better With Less*. Profile Books, 2015

Roger, Everett M. s: *Diffusion of innovations*, Free Press (2003)

<https://hbr.org/cover-story/2016/10/let-your-workers-rebel>

<http://www.christenseninstitute.org/blog/non-consumption-is-your-fiercest-competition-and-its-winning/>

Interview with Karline Kleijer, Head of the Emergency Desk, Médecins Sans Frontières/Doctors Without Borders (MSF)

ⁱ [Scaling: innovations missing middle](#). Dan McClure, Ian Gray

ⁱⁱ Interview with Karline Kleijer, Head of the Emergency Desk, Médecins Sans Frontières/Doctors Without Borders (MSF)

ⁱⁱⁱ *Frugal Innovation: How to do better with less*. Radjou and Prabhu. The Economist and Profile Books (2016)

^{iv} <https://hbr.org/cover-story/2016/10/let-your-workers-rebel>

^v <http://www.christenseninstitute.org/blog/non-consumption-is-your-fiercest-competition-and-its-winning/>



Appendix B: Ethics approval form

Low Risk Application for Approval of Research Involving Human Participants

Checklist to see if your research project is low risk

This form should be completed in full. Staff should email it to Claire.Molloy.1@city.ac.uk (PA to Professor Paul Palmer, Associate Dean for Ethics, Sustainability & Engagement).

Students should email it to their supervisor.

Does your research involve any of the following? <i>For each item, please place a 'x' in the appropriate column</i>	Yes	No
Persons under the age of 18		X
Vulnerable adults (e.g. with psychological difficulties)		X
Use of deception		X
Questions about potentially sensitive topics (e.g. bullying, discrimination)		X
Potential for 'labelling' by the researcher or participant (e.g. 'you are stupid')		X
Potential for psychological stress, anxiety, humiliation or pain		X
Questions about illegal activities		X
Invasive interventions that would not normally be encountered in everyday life (e.g. vigorous exercise, administration of drugs)		X
Potential for adverse impact on employment or social standing		X
The collection of human tissue, blood or other biological samples		X
Access to potentially sensitive data via a third party (e.g. employee data)		X
Access to personal records or confidential information		X
Anything else that means it has more than a minimal risk of physical or psychological harm, discomfort or stress to participants.		X
Confidential Business Information that is privileged to the organisation		X

If you answered 'no' to all the above questions your application may be eligible for light touch review. Please complete the Low Risk Form enclosed. We aim to send you a response within 7 days of submission. However, review may take longer in some instances, and you may also be asked to revise and resubmit your application. Thus you should ensure you allow for sufficient time when scheduling your research.

If you answered 'yes' to any of the questions, your application is NOT eligible for light touch review. Please request the 'Standard Research Ethics Form'. We aim to send you a response within 7 days of the next Research Ethics Committee Meeting. Note that you may be asked to revise and resubmit your application so should ensure you allow for sufficient time when scheduling your research.

If you are unsure about your answers to any of the above questions, please contact the Chair of the Business School Research Ethics Committee, Paul Palmer (profpalmer@city.ac.uk)

Low Risk Application for Approval of Research Involving Human Participants

I confirm that I have reviewed the relevant checklist(s) and that my research project is suitable for low risk review. **YES X NO**

Tick this box if you do not grant the University permission to use your application form for training purposes.

Applicant Details	
Principal Investigator (supervisor if student research)	Neil Maiden
Name of student (if student research)	Ben Holt
Degree programme (if student research)	MICL
Department/School	CASS Business School
Address for correspondence (if this is a student project, please note that all correspondence will include the supervisor)	58 Aveling Park Road London E17 4NT
University email (not private email)	Ben.holt@city.ac.uk
Name and status of others taking part in the project , e.g. students, research assistants, external collaborators	Harry Scarbrough (Advisor)

Project Overview	
Project title	<i>"Doing better with less; can a frugal approach to design thinking improve humanitarian innovation?"</i>
Duration of project Please note that no data collection can take place until the study has been approved.	Start date: June 2017 Estimated end date: January 2018
Lay summary Please provide a brief outline of the background, aims, key questions and significance of the project suitable for a lay audience (maximum 300 words).	
The project aims to bridge the gap between frontline humanitarian action and the network of support staff, third party developers and commercial enterprises producing new tools, products and processes designed for use 'in the field'.	

<p>Experienced field staff are frequently disappointed when new products are delivered. “I could see immediately why it wasn’t going to work here, where we need to use it” is a depressingly common sentiment. Similarly, experienced innovation and design experts are confounded by the complex constraints and unique needs of the humanitarian sector.</p> <p>This dissertation will examine frugal innovation theory, which seeks to uncover creative ways to ‘do better with less’, and current practice in the humanitarian sector.</p> <p>The research will focus on developing a frugal innovation system which draws on the experience and expertise of frontline NGO staff. The aim is produce a toolkit which help headquarters staff, contracted agencies and commercial enterprises better understand and build for humanitarian needs on the frontline. The outcome, once the system is tested and deployed, should be new and useful tools which work in the environments they are deployed, rather than in the ‘lab’.</p>	
<p>Research Methodology Please provide a summary and brief explanation of the design, methodology and plan for analysis.</p>	
<p>This will be an exploratory piece of research which examines current practice and identifies opportunities for new tools. A prototype will then be produced, tested and analysed.</p> <p>The initial research will ask whether frugal innovation theory is an appropriate framework for humanitarian innovation practice. Existing Creative Problem Solving (CPS) and design thinking approaches will be examined in light of this understanding, identifying promising tools and potential modifications.</p> <p>Interviews will then be conducted to gather qualitative evidence. A prototype design thinking toolkit can then be produced and tested, with feedback from frontline humanitarian staff and innovation experts.</p> <p>The data from these tests will be analysed by the researcher before final conclusions are drawn.</p>	
<p>Where will the research take place? If the research is taking place in participant’s homes, please describe the policy for lone working that you will be following.</p>	
<p>The research will take place in public places, university property or in the researcher’s office. There will be no lone working or risk to either the participants or researcher.</p> <p>Some research will be conducted via telephone, Skype or similar communications channels.</p>	
<p>Are there any health or safety issues?</p>	<p>YES <input type="checkbox"/> NO <input checked="" type="checkbox"/></p>

If yes, please provide details and information about how these will be mitigated.	
Has a risk assessment been undertaken?	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>
Is the research funded?	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>
If yes, please provide details.	

External approvals/international research

If any part of the investigation is being carried out under the auspices of an outside organisation, involves collaboration between institutions or individual external researchers, or institutions/organisations where interview s/fieldwork will take place, please give details and address of organisation(s).	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>
Has permission to conduct research in, at or through another institution or organisation been obtained?	N/A
If yes, please provide details and attach the supporting correspondence.	
Is any part of the research taking place outside of England/Wales? (if not go to the next section)	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>
If yes, please provide details of where.	
Have you identified and complied with all local requirements concerning ethical approval & research governance*?	N/A
Please provide details of the local requirements, including contact information.	
Please give contact details of a local person identified to field initial complaints locally so the participants can complain without having to write to or telephone the UK.	N/A

*Please note that many countries require local ethical approval or registration of research projects, further some require specific research visas. If you do not abide by the local rules of the host country, you will invalidate your ethical approval from City University London, and may run the risk of legal action within the host country.

Does the research involve any of the following:	
Children under the age of 5 years	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>
Clinical trials / intervention testing?	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>
Over 500 participants?	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>
Are you specifically recruiting pregnant women	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>
Excluding information collected via questionnaires (either paper based or online), is any part of the research taking place outside of the UK?	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>

If you have answered 'yes' to any of the above questions you will need to check that the University's insurance will cover your research. You should do this by submitting this application to insurance@city.ac.uk before applying for ethics approval.

Exclusion criteria Please justify.	
How are the participants to be identified and approached, and by whom ?	
Participants are being identified via personal and professional contacts and networks. Participation is voluntary. Contact will be made by the researcher or via common contacts where appropriate.	

Are you offering any incentives or rewards for participating?	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>
If yes, please provide details	

What is the proposed method of recruitment of participants? (Tick all that apply.)	
Mail out	<input type="checkbox"/>
Email (if yes, please attach a copy of the text of the email to this application)	<input checked="" type="checkbox"/>
Snow ball	<input type="checkbox"/>
Participants from previous study	<input type="checkbox"/>
Flyers (if yes, please attach a copy of the flyer)	<input type="checkbox"/>
Facebook (if yes, please attach a copy of the advertisement)	<input type="checkbox"/>
Tw itter (if yes, please attach a copy of the advertisement)	<input type="checkbox"/>
Online forums (if yes, please attach a copy of the advertisement)	<input type="checkbox"/>
Other online sources Please specify: (if yes, please attach a copy of the advertisement)	<input type="checkbox"/>
Organisations (e.g. companies, schools) Please specify: Médecins Sans Frontières/Doctors Without Borders (MSF)	<input checked="" type="checkbox"/>
Recruitment by researcher(s) Please specify:	<input type="checkbox"/>
Private sources Please specify (please attach copies of any recruitment material)	<input type="checkbox"/>
Advertisements (e.g. in new spapers or on websites, professional bodies) Please specify: (please attach copies of any recruitment material)	<input type="checkbox"/>
Other Please specify: (please attach copies of any recruitment material)	<input type="checkbox"/>

Consent			
Please tick Yes, No or NA (not applicable) to each of the following:	Yes	No	NA
All potential participants will be given an information sheet and be given adequate time to read it before being asked to agree to participate.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
All participants taking part in an interview, focus group, observation (or other activity which is not questionnaire based) will be asked to sign a consent form.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
All participants completing a questionnaire will be informed on the information sheet that returning the completed questionnaire implies consent to participate.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
All participants being asked to provide sensitive personal data will be asked for explicit consent for the collection and use of such data using the standard wording of the Data Protection Act statement.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
All potential participants will be told that they can withdraw at any time, ask for their interview tape to be destroyed and/or their data removed from the project until it is no longer practical to do so (e.g. when the data has been written up).	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

How will the results be made available to the participants? (Tick all that apply.)	
Written summary of results	<input type="checkbox"/>
Copy of final manuscript (article, thesis, etc.)	<input type="checkbox"/>
Verbal presentation (debriefing, information session)	<input type="checkbox"/>
Available if requested	<input checked="" type="checkbox"/>
Other – please explain	<input type="checkbox"/>
None – please explain	<input type="checkbox"/>

How will results be made available to peers and colleagues? (Tick all that apply.)			
Conference papers	<input type="checkbox"/>	Journal article(s)	<input type="checkbox"/>
Thesis	<input checked="" type="checkbox"/>	Book	<input type="checkbox"/>
Other – please explain	<input type="checkbox"/>	None – please explain	<input type="checkbox"/>

Data Collection, Confidentiality and Data Handling

Please indicate which of the following you will be using to collect your data <i>Please tick all that apply</i>	
Questionnaires (paper based)	<input type="checkbox"/>
Questionnaires (computer based)	<input checked="" type="checkbox"/>
Interviews	<input type="checkbox"/>
Participant observation	<input type="checkbox"/>
Covert observation	<input type="checkbox"/>
Observation of specific organisational practices	<input type="checkbox"/>
Focus groups	<input checked="" type="checkbox"/>
Audio/digital-recording interviewees or events	<input checked="" type="checkbox"/>
Video recording	<input type="checkbox"/>
Physiological measurements	<input type="checkbox"/>
Digital/computer data	<input type="checkbox"/>
Other	<input type="checkbox"/>
Please give details if you have ticked other	

Will the research involve:

<ul style="list-style-type: none"> • complete anonymity of participants (i.e. researchers will not meet, or know the identity of participants, as participants are a part of a random sample and are required to return responses with no form of personal identification)? 	<input type="checkbox"/>
<ul style="list-style-type: none"> • anonymised sample or data (i.e. an <i>irreversible</i> process whereby identifiers are removed from data and replaced by a code, with no record retained of how the code relates to the identifiers. It is then impossible to identify the individual to whom the sample of information relates)? 	<input type="checkbox"/>
<ul style="list-style-type: none"> • de-identified samples or data (i.e. a <i>reversible</i> process whereby identifiers are replaced by a code, to which the researcher retains the key, in a secure location)? 	<input type="checkbox"/>
<ul style="list-style-type: none"> • subjects being referred to by pseudonym in any publication arising from the research? 	<input type="checkbox"/>
<ul style="list-style-type: none"> • any other method of protecting the privacy of participants? (e.g. use of direct quotes with specific permission only; use of real name with specific, written permission only) 	<input checked="" type="checkbox"/>
Please give details if 'any other method of protecting the privacy of participants' is used.	

Which of the following methods of assuring confidentiality of data will be implemented?

Please tick all that apply.

<ul style="list-style-type: none"> • data to be kept in a locked filing cabinet 	<input type="checkbox"/>
<ul style="list-style-type: none"> • data and identifiers to be kept in separate, locked filing cabinets 	<input type="checkbox"/>
<ul style="list-style-type: none"> • access to computer files to be available by password only 	<input checked="" type="checkbox"/>
<ul style="list-style-type: none"> • storage at City University London 	<input type="checkbox"/>
<ul style="list-style-type: none"> • stored on an encrypted device (e.g. laptop, hard drive, USB) 	<input checked="" type="checkbox"/>
<ul style="list-style-type: none"> • stored at other site 	<input type="checkbox"/>
If stored at another site, please give details.	

Will the data be accessed by people other than the named researcher?	YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>
If yes, please explain by whom and for what purpose.	

Final Checks

Before submitting your application, please confirm the following, noting that your application may be returned to you without review if the reviewer/committee feels these requirements have not been met.

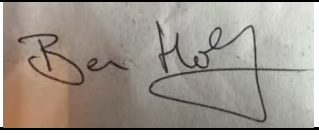
There are no discrepancies in the information contained in the sections of the application form and the materials for participants.	X
There is sufficient information regarding the study and materials to enable proper ethical review.	X
The application form and materials for participants have been checked for grammatical errors, typos and clarity of expression.	X
For students, the application form has been signed off by your supervisor.	X

Documents

You are expected to provide copies of relevant documents including all letters to be sent to participants and other individuals (such as GPs) and organisations involved in the research. Please follow the guidelines and templates.

Document Checklist		
Please place an 'X' in all appropriate spaces for all documents you are submitting		
	Attached	Not applicable
Copy of study advertisement (including recruitment emails/letters)		X
Participant information sheet	X	
Participant consent form	X	
Questionnaire(s)		X
Topic guide(s)		X
Confirmation letter(s) from / correspondence with external organisations		X
Confirmation that insurance is in place		X
Product information		X
GP Letter		X
Other (please provide details)		X

Declarations by Investigator(s)	
• I certify that to the best of my knowledge the information given above, together with any accompanying information, is complete and correct.	X
• I have read the University's guidelines on human research ethics, and accept the responsibility for the conduct of the procedures set out in the attached application.	X
• I have attempted to identify all risks related to the research that may arise in conducting the project.	X
• I understand that no research work involving human participants or data can commence until full ethical approval has been given	X

	Print Name	Signature
Principal Investigator(s) (student and supervisor if student project)	Ben Holt	
Associate Dean for Ethics and Governance (or equivalent) or authorised signatory		
Date	7 June 2017	



Appendix C: Consent form

Title of Study: *“Doing better with less; could a frugal approach to design thinking help humanitarian innovation?”*

Please initial box

1.	<p>I agree to take part in the above City University London research project. I have had the project explained to me, and I have read the participant information sheet, which I may keep for my records.</p> <p>I understand this will involve</p> <ul style="list-style-type: none"> • be interviewed by the researcher • allow the interview to be audiotaped • complete questionnaires asking me about innovation practice and deployment of new products • make myself available for a further interview should that be required • Participate in a moderated workshop if feasible 	
2.	<p>This information will be held and processed for the following purpose(s):</p> <ul style="list-style-type: none"> • Production of a Masters Dissertation <p>I understand that I have given approval for my name and/or the name of my workplace to be used in the final report of the project, and future publications.</p>	
3.	<p>I understand that my participation is voluntary, that I can choose not to participate in part or all of the project, and that I can withdraw at any stage of the project without being penalized or disadvantaged in any way.</p>	
4.	<p>I agree to City University London recording and processing this information about me. I understand that this information will be used only for the purpose(s) set out in this statement and my consent is conditional on the University complying with its duties and obligations under the Data Protection Act 1998.</p>	
5.	<p>I agree to take part in the above study.</p>	

Name of Participant

Signature

Date

Name of Researcher

Signature

Date

When completed, 1 copy for participant; 1 copy for researcher file.



Appendix D: Participant information sheet

Title of study *“Doing better with less; could a frugal approach to design thinking help humanitarian innovation?”*

We would like to invite you to take part in a research study. Before you decide whether you would like to take part it is important that you understand why the research is being done and what it would involve for you. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information.

What is the purpose of the study?

This study is a dissertation project for the Masters of Innovation, Creativity and Leadership (MICL) course at Cass Business School/City University of London.

The objective is to explore innovation practice in the humanitarian sector and to apply frugal innovation theory to the development of new design thinking tools. The ultimate aim is to bridge the gap between frontline humanitarian action and the network of support staff, third party developers and commercial enterprises producing new tools, products and processes designed for use ‘in the field’.

Why have I been invited?

The research requires input from professionals with experience in one or more of the following areas:

- Frontline humanitarian field work
- Humanitarian sector management, specifically:
 - Innovation processes management
 - IT infrastructure management
 - Digital development project management
 - Emergency response management
 - Operational management
- Product design and design thinking
- Commercial innovation practice
- Commercial developers working with humanitarian sector partners

You have been invited as you fit these criteria. Around twenty participants will be interviewed, with others invited to take an online survey.

Do I have to take part?

Participation in the project is voluntary, and you can choose not to participate in part or all of the project. You can withdraw at any stage of the project without being penalised or disadvantaged in any way.

Your name, position and organisation will be included to attribute quotes. You can request that your contributions are anonymised if you prefer.

It is up to you to decide whether or not to take part. If you do decide to take part you will be asked to sign a consent form. If you decide to take part you are still free to withdraw at any time and without giving a reason.



What will happen if I take part?

- You will be invited to participate in an interview of up to 45 minutes in length
- The study will run until January 2018, when the dissertation must be submitted
- Participants will only need to take part in one interview, but follow up questions or consultation may be requested if you agree to further contact
- You will be offered the opportunity to participate in a workshop to test and feedback on prototype design thinking tools developed by the research to date
- The research will include the following elements:
 - A semi-structured interview, with some predetermined questions plus space to explore ideas or provide new information
 - Personal details including name, job title, organisation will be collected – you can request that this information is not disclosed in the final report
 - Anonymous online questionnaires will be used for some participants
 - A design thinking session will be run to develop ideas – participation will be voluntary
 - Feedback will be sought on the proposed new toolkit via follow up interviews with those who have given consent for further contact
- This is an exploratory study using literature review, semi-structured interviews, prototyping and testing of new tools and analysis of data produced
- The research will take place in London, UK, with remote contributions from participants in other countries

Expenses and Payments (if applicable)

There will be no compensation for any costs incurred by participants

What do I have to do?

Research participants will be asked to take part in a semi-structured interview with the researcher. This can take place in person, on the telephone or via Skype or similar online channel. The participant will be asked to reflect on current innovation practice, the needs of frontline humanitarian actors, the issues of working across geographic and industry-sector divisions, the deployment and scale up of new tools and practices in the humanitarian sector, and the ideal future state of innovation practice in the humanitarian sector.

Participants will be able to volunteer to help with follow up questions, further research and analyses of proposed new tools or frameworks.

Participants will be invited to suggest contacts who may be able to contribute to this research.

What are the possible disadvantages and risks of taking part?

Participants' names, job titles and organisation will be used to attribute quotes unless otherwise requested. This could potentially cause unwanted attention or professional disagreements if the participants' views are critical of named individuals or organisations. The risk is low as participants can request that their contribution or quotes are anonymised.

Participants will be asked to set aside 45 minutes for a semi-structured interview. This will require a commitment which may clash with other work priorities. The interview will be kept as focused as possible to avoid taking too much time.



Follow-up participation may require more time. The risk is low as participation is voluntary and time demands will be kept to a minimum.

There is a risk that this project will fail to deliver a new and useful toolkit and the participant's name will be linked to this failure. However, it will be made clear that participants are only providing input data and are not responsible for the use and analysis of that data by the researcher.

What are the possible benefits of taking part?

This project has the potential to deliver new and useful tools which will help the humanitarian sector design and deliver innovative new products and processes, with a direct benefit for our operations and beneficiaries.

Participants will be able to contribute to a new study and build links across sectors and organisations, which could have professional network benefits.

Participants will get early access to potentially useful research and tools, with the possibility of professional advantage.

What will happen when the research study stops?

Personal data and records of participants' contributions will be stored securely on password-protected digital storage devices, including the researcher's laptop, stand-alone hard drive and secure cloud storage.

Participants may request copies of their information at any time. Participants may also request that their information is destroyed and deleted at any time.

This final research report will be published and stored as a dissertation in both electronic and hard copies. This will be accessible to students, faculty and the public.

Will my taking part in the study be kept confidential?

- The researcher, their academic supervisor and advisor will have access to the raw data, unless the participant requests restrictions
- Participants will be identified if their input is included in the final report, including transcripts of interviews and details of their contribution. This can be anonymised or excluded if requested. If anonymised, the final report will include no personally identifiable details but the anonymous quotes and contributions will be accessible to readers
- Audio recordings will be made of interviews for use by the researcher only. These will be stored securely and will not be publicly accessible at any time.
- Personal information will not be shared with other participants or third parties without the explicit consent of the individual concerned
- All data will be stored securely on password-protected electronic storage systems. Hard copies will be stored securely in a private residence.
- Confidentiality cannot be maintained if the participant reveals any information which breaches criminal law and must be reported to the police, e.g. reporting of violence, a abuse, self-inflicted harm, harm to others, criminal activity
- Records will be stored on password-protected digital storage devices, including a laptop, hard drive and cloud. Records will be deleted and destroyed on request.

What will happen to results of the research study?



This study will be published as a Masters Dissertation and made available via Cass University and City University London.

If the participants will receive a copy of the publication or a summary of the results, please contact the research, Ben Holt, via ben.holt@city.ac.uk or via +447872469237.

What will happen if I don't want to carry on with the study?

The participant is free to withdraw from the study without an explanation or penalty at any time. Please contact the research, Ben Holt, via ben.holt@city.ac.uk or via +447872469237 to initiate this process.

What if there is a problem?

If you have any problems, concerns or questions about this study, you should ask to speak to a member of the research team. If you remain unhappy and wish to complain formally, you can do this through the University complaints procedure. To complain about the study, you need to phone 020 7040 3040. You can then ask to speak to the Secretary to Senate Research Ethics Committee and inform them that the name of the project is:

.....

You could also write to the Secretary at:

Anna Ramberg
Secretary to Senate Research Ethics Committee
Research Office, E214
City University London
Northampton Square
London
EC1V 0HB
Email: Anna.Ramberg.1@city.ac.uk

City University London holds insurance policies which apply to this study. If you feel you have been harmed or injured by taking part in this study you may be eligible to claim compensation. This does not affect your legal rights to seek compensation. If you are harmed due to someone's negligence, then you may have grounds for legal action.

Who has reviewed the study?

This study has been approved by City University London [*insert which committee here*] Research Ethics Committee

Further information and contact details

Please contact the research, Ben Holt, via ben.holt@city.ac.uk or via +447872469237.

Alternatively, contact the project supervisor, Neil Maiden via Neil.Maiden.1@city.ac.uk

Thank you for taking the time to read this information sheet.

Appendix E: Interview invite email

Dear XXXXX,

I hope this finds you well. I am a digital and innovation specialist at Médecins Sans Frontières/Doctors Without Borders (MSF) in London. I am currently also studying a Masters in Innovation, Creativity and Leadership.

I am contacting you to discuss the possibility of your participation in research into innovation practice in the humanitarian sector, which is the focus of my MSc dissertation at Cass Business School.

The title of my thesis is *“Doing better with less; can a frugal approach to design thinking improve humanitarian innovation?”*. I am exploring the gap between frontline humanitarian action and the network of support staff, third party developers and commercial enterprises producing new tools, products and processes designed for use ‘in the field’.

I hope to gather evidence and insight from experts, examine current theoretical models and practical design thinking tools, and then prototype and test a new toolbox created specifically for the humanitarian sector. The hope is that these tools will help make new products more relevant and useful on the frontline.

Would it be possible to schedule a 35-45 minute meeting to discuss your experiences and insight? This would be a semi-structured interview, with pre-prepared questions and time to explore ideas as they develop.

If you are happy to participate, I will work around your schedule and timezone so please let me know when would suit in the next couple of weeks. Skype would be the best alternative to a face-to-face meeting, but I am open to any channel which is convenient.

I have attached a consent form as I would like to record the interview and then use the transcripts as part of my research, with the possibility of direct quotes in the final document (anonymised if requested).

I am very happy to share a copy of the thesis once it is completed in January 2018, if you would like to see the results.

If you have any questions, please don't hesitate to contact me. If you would like to speak with my academic supervisor, please contact Neil Maiden via Neil.Maiden.1@city.ac.uk

Many thanks for your time and support, I hope we can speak soon.

All the best,

Ben

Appendix F: Semi-structure interview questions

1. What is your definition of innovation?
 - a. Why?
 - b. Prompt – is it a process that delivers something new to the world or just new to your organisation?

[Rationale: Do the various participants in an NGO innovation project share a common understanding of what they are trying to achieve? Does a tool kit need to include an exercise to align these?]

2. Please briefly describe your innovation process from idea to prototype.
 - a. How did you arrive at this process?
 - b. Where are the biggest barriers in the process?
 - c. How do you involve end-users?

[Rationale: Where are there gaps which my tool kit can fill? Are they using a human-centric approach? I am mainly concerned with the ideation process at this point, as that is the focus on the design thinking aspect. Are there ideas out there I can absorb?]

3. Is there a theoretical framework underpinning this process – which one?
 - a. What do you understand by the term ‘frugal innovation’?
4. Do we need a new design thinking toolkit, or better knowledge and systems for running innovation projects?

[Rationale: what is the level of knowledge and understanding out there? Is this a new term for people? A well understood one?]

5. Do you consider affordability when designing new innovations?
 - a. How?
6. Do you consider simplicity when designing new innovations?
 - a. How?
7. Do you consider sustainability when designing new innovations?
 - a. How?
8. Does every new innovation have a clearly defined purpose, or do new innovations sometimes need to find a ‘home’?

[Rationale: Are these innovators applying Frugal principles to their innovations?]

9. Are there any tools or exercises you find particularly useful when developing your initial ideas and potential solutions?
 - a. What are the barriers to using these tools?
 - b. Why are they useful?
 - c. Are they designed specifically for humanitarian NGOs?

[Rationale: What is currently being used? Where do these ideas come from? Have they been adapted to the NGO world? Are they underpinned with a coherent philosophy, e.g. Frugal Innovation or another framework? Are they robust?]

10. Is there a gap between what frontline staff need and what the innovation process delivers - why?
 - a. What are the problems with the pipeline?
 - b. What is the role of HQ staff?
 - c. What is the role of frontline staff?
 - d. What is the role of for-profit companies?

[Rationale: I am trying to build a framework which allows more successful 'polycentric' projects – acknowledging that there is a role for many diverse partners would be helpful]

11. Thinking of a successful project you have worked on, what are the key features of a successful humanitarian innovation process?
 - a. How do you ensure these features are replicated?
 - b. How do you ensure these are included in the design phase?
 - c. How you coordinate across stakeholders?

[Rationale: Should give me evidence to justify proposing a more theoretically rooted and NGO-specific approach.]

12. Thinking of a successful project you have worked on, what are the key features of a failed humanitarian innovation process?
 - a. How do you avoid these in future?

[Rationale: Should give me evidence to justify proposing a more theoretically rooted and NGO-specific approach.]

13. Is there anything else you would like to add?

Appendix G: HARP test

HARP Statements							
Please indicate your agreement or disagreement with the statements below. There are no wrong answers.		Strongly Agree	Agree	Slightly Agree	Slightly Disagree	Disagree	Strongly Disagree
		Your views on the nature of reality (ontology)					
1	Organisations are real, just like physical objects.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Events in organisations are caused by deeper, underlying mechanisms.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	The social world we inhabit is a world of multiple meanings, interpretations and realities.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	'Organisation' is not a solid and static thing but a flux of collective processes and practices.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	'Real' aspects of organisations are those that impact on organisational practices.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Your views on knowledge and what constitutes acceptable knowledge (epistemology)							
6	Organisational research should provide scientific, objective, accurate and valid explanations of how the organisational world really works.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
7	Theories and concepts never offer completely certain knowledge, but researchers can use rational thought to decide which theories and concepts are better than others.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Concepts and theories are too simplistic to capture the full richness of the world.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*HARP and all materials relating to HARP are copyright © 2014 A. Bristow and M.N.K. Saunders.



Progressing your research project (continued)

Heightening your Awareness of your Research Philosophy (HARP)

HARP Statements		Strongly Agree	Agree	Slightly Agree	Slightly Disagree	Disagree	Strongly Disagree
Please indicate your agreement or disagreement with the statements below. There are no wrong answers.							
9	What generally counts as 'real', 'true' and 'valid' is determined by politically dominant points of view.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	Acceptable knowledge is that which enables things to be done successfully.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Your views on the role of values in research (axiology)							
11	Researchers' values and beliefs must be excluded from the research.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
12	Researchers must try to be as objective and realistic as they can.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
13	Researchers' values and beliefs are key to their interpretations of the social world.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	Researchers should openly and critically discuss their own values and beliefs.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	Research shapes and is shaped by what the researcher believes and doubts.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Your views on the purpose of research							
16	The purpose of research is to discover facts and regularities, and predict future events.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
17	The purpose of organisational research is to offer an explanation of how and why organisations and societies are structured.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
18	The purpose of research is to create new understandings that allow people to see the world in new ways.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19	The purpose of research is to examine and question the power relations that sustain conventional thinking and practices.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20	The purpose of research is to solve problems and improve future practice.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Your views on what constitutes meaningful data							
21	Things that cannot be measured have no meaning for the purposes of research.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
22	Organisational theories and findings should be evaluated in terms of their explanatory power of the causes of organisational behaviour.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



HARP Statements		Strongly Agree	Agree	Slightly Agree	Slightly Disagree	Disagree	Strongly Disagree
Please indicate your agreement or disagreement with the statements below. There are no wrong answers.							
23	To be meaningful, research must include participants' own interpretations of their experiences, as well as researchers' interpretations.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24	Absences and silences in the world around us are at least as important as what is prominent and obvious.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25	Meaning emerges out of our practical, experimental and critical engagement with the world.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Your views on the nature of structure and agency							
26	Human behaviour is determined by natural forces.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27	People's choices and actions are always limited by the social norms, rules and traditions in which they are located.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28	Individuals' meaning-making is always specific to their experiences, culture and history.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29	Structure, order and form are human constructions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
30	People can use routines and customs creatively to instigate innovation and change.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Now please complete the scoring key below.

Your answer scores

Give yourself the points as indicated above for each answer within each philosophical tradition. The different philosophies are represented by specific questions in the HARP as indicated below. Fill each philosophy table with your answer scores, then total up the numbers for each philosophy. (For your reference, in the tables below the letters in brackets indicate whether the question tests your agreement with the ontological, epistemological, axiological, purpose of research, meaningfulness of data and structure and agency aspects of research philosophy.)

Each answer you gave is given a number of points as shown in the table below:

Strongly agree	Agree	Slightly agree	Slightly disagree	Disagree	Strongly disagree
3	2	1	-1	-2	-3





Progressing your research project (continued)

Heightening your Awareness of your Research Philosophy (HARP)

Positivism: Questions 1, 6, 11, 16, 21, 26

Question	1 (ontology)	6 (epistemology)	11 (axiology)	16 (purpose)	21 (data)	26 (structure/agency)	Total
Answer score		5					

Critical Realism: Questions 2, 7, 12, 17, 22, 27

Question	2 (ontology)	7 (epistemology)	12 (axiology)	17 (purpose)	22 (data)	27 (structure/agency)	Total
Answer score	2						

Interpretivism: Questions 3, 8, 13, 18, 23, 28

Question	3 (ontology)	8 (epistemology)	13 (axiology)	18 (purpose)	23 (data)	28 (structure/agency)	Total
Answer score		13					

Poststructuralism/postmodernism:

Questions 4, 9, 14, 19, 24, 29

Question	4 (ontology)	9 (epistemology)	14 (axiology)	19 (purpose)	24 (data)	29 (structure/agency)	Total
Answer score		10					

Pragmatism: Questions 5, 10, 15, 20, 25, 30

Question	5 (ontology)	10 (epistemology)	15 (axiology)	20 (purpose)	25 (data)	30 (structure/agency)	Total
Answer score		15					

Reflection

Now, for the first of what will almost certainly be many philosophical reflections, consider the following questions regarding how you scored yourself.

- 1 Do you have an outright philosophical winner? Or do you have a close contention between two or more philosophies?
- 2 Why do you think this is?
- 3 Which philosophy do you disagree with the most?
- 4 Why do you think this is?

Appendix H: Instructions for feedback on 1.0

Frugal Design Thinking for Humanitarian Innovation

This research project is developing a design thinking process for the humanitarian sector based on the principles of frugal innovation. The aim is to allow a dispersed group of experts and frontline staff to deliver solutions to complex problems that are field-ready, appropriate and scalable.

- **Design thinking:** “a methodology for innovating routinely” (Kelley and Kelley, 2013)
- **Frugal innovation:** a theory of innovation that “can be considered the pinnacle of innovation capabilities in resource-constrained environments” (Zeschky et al, 2014)
- **Humanitarian innovation:** “...improvements in efficiency, effectiveness, quality or social outcomes/impact” in humanitarian work (Humanitarian Innovation Fund, 2017).

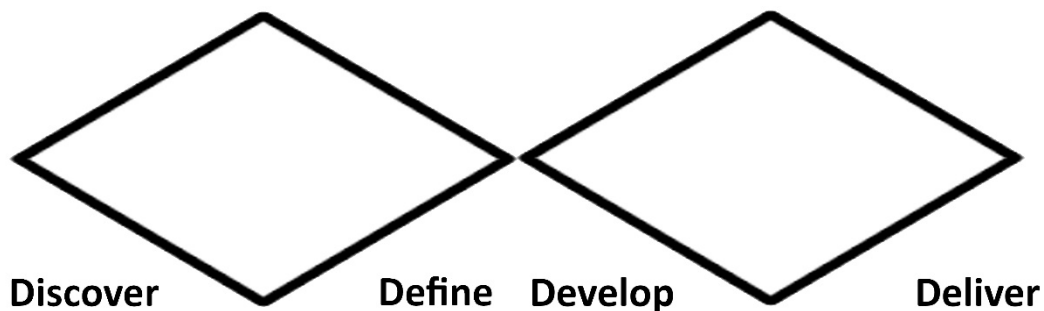
Below is the prototype framework. This is a way to explain the new process, which would be used to take a problem and turn it in to an innovative solution. Once the framework is finalised, a set of design thinking tools, or exercises, will be drafted to complement it.

Your input would be greatly appreciated. Please read through the explanation and then complete this [three-minute survey](#) to share your feedback.

Many thanks,

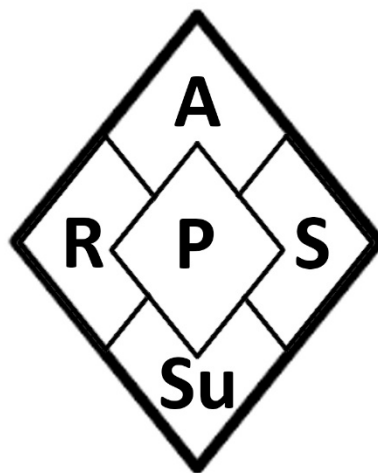
Ben

1. An established approach to creative problem solving is the *double diamond*. There are two periods of idea generation and focusing. The first (discover-define) leads to a brief; the second (develop-deliver) to a potential solution.

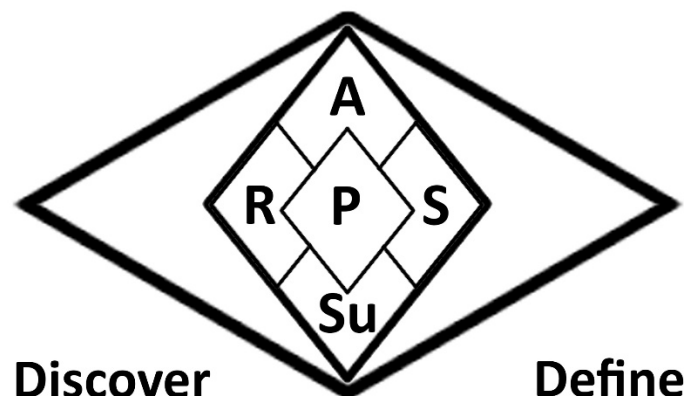


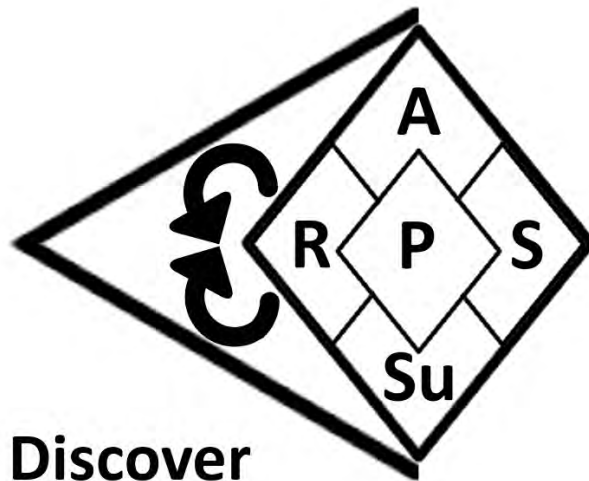
2. Humanitarian innovation has been criticised for failing to deliver many powerful new outputs which have scaled to become useful across the sector, or change working practices. The new model proposes applying a 'frugal innovation lens' to the double diamond process. This lens has been developed through research and experience. Briefly, it ensures innovators consider the following core attributes when designing solutions:

- **Simplicity**
- **Purpose**
- **Affordability**
- **Robustness**
- **Sustainability**



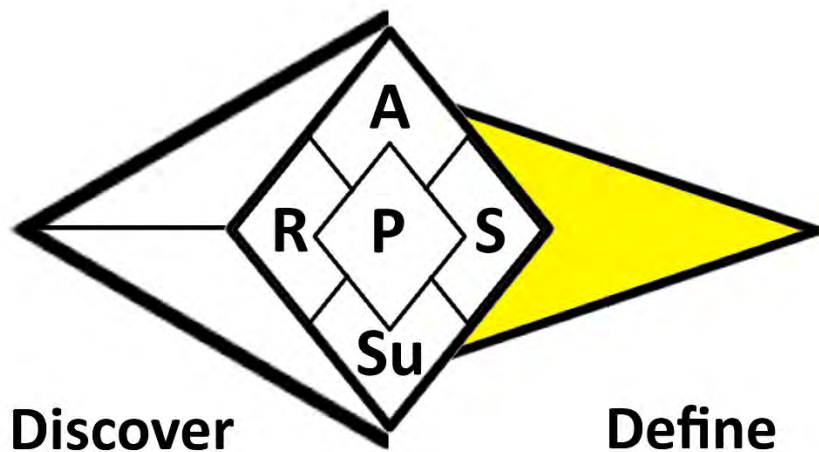
3. The lens is inserted in to each diamond. It is designed to encourage reflection, disciplined exploration and to root thinking in values which the research demonstrates are useful considerations for field-deployment of innovations.





Discover

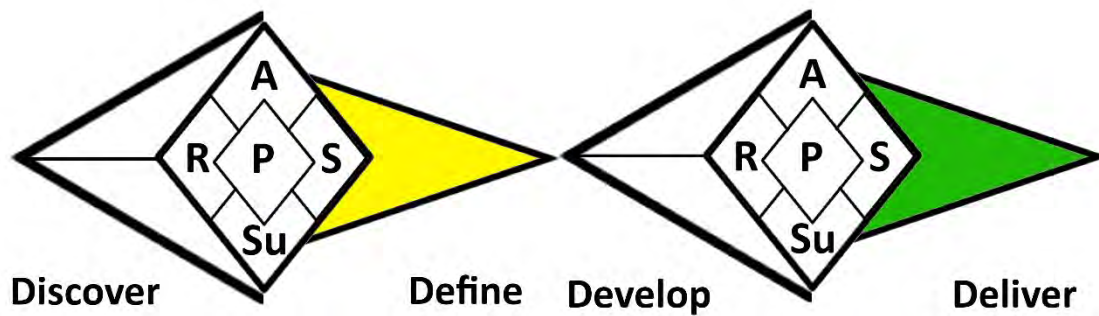
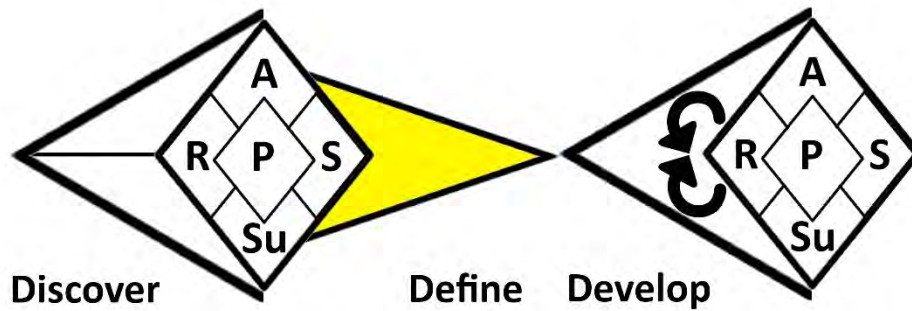
4. The hypothesis is that by applying a lens which has been designed specifically for the humanitarian sector, multi-disciplinary innovation teams, including contributors with no field experience, will be able to develop appropriate and field-ready solutions. This is not a substitute for observation, co-creation, and other methods – indeed the full process under development encourages these practices – but it does apply critical constraints within which creativity can flourish. The outcome should be more sharply focused on the sector’s real needs and context.



Discover

Define

5. The same lens is applied twice in a new-look double diamond, so that both brief and the solution are more appropriate and have a higher chance of sticking, scaling and solving real problems.



6. Once this prototype is tested and iterated, the research will develop recommendations for frugal design thinking tools which will help with each phase of the new process. These will help innovators apply the lens and use frugal principles to develop powerful solutions.

Thank you for your time. If you have any questions, please get in touch.

Please leave your feedback at <https://www.surveymonkey.co.uk/r/6LVTZFS>

Appendix I: 1.0 Feedback Questionnaire and data

The feedback questionnaire was based on Rogers' theory of innovation diffusion (2003), with the reference to the relevant part of the theory preceding the question in square brackets.

Link to final survey: <https://www.surveymonkey.co.uk/r/6LVTZFS>

1. [complexity or difficulty to learn]

The proposed framework is:

- Very easy to understand
- Fairly easy to understand
- Neutral
- Fairly hard to understand
- Very hard to understand

2. [compatibility with the pre-existing system]

The proposed framework:

- Could easily be used alongside my existing innovation process
- Could possibly be used alongside my existing innovation process
- Neutral
- Would be quite difficult to use alongside my existing innovation process
- Could not be used alongside my existing innovation process

3. [relative advantage (the perceived efficiencies gained by the innovation relative to current tools or procedures)]

The proposed framework is:

- A big improvement on existing practice
- An improvement on existing practice
- Neutral
- No improvement on existing practice
- Worse than existing practice

4. [trialability or testability]

The proposed framework:

- Could easily be tested in a real-world setting
- Could possibly be tested in a real-world setting
- Neutral
- Would be quite difficult to test in a real-world setting
- Could not be tested in a real-world setting

5. [potential for reinvention (using the tool for initially unintended purposes)]

The proposed innovation practice appears:

- Very flexible

- Quite flexible
- Neutral
- Quite constrictive
- Very constrictive

6. In your own words, what are the things that you like most about this new frugal design thinking process?

- Free text

7. In your own words, what are the things that you would most like to improve in this new frugal design thinking process

- Free text

8. Which of the following best describes your role in humanitarian innovation?

- Frontline operations staff
- NGO HQ operations staff
- NGO HQ innovation staff
- Consultant
- Academic
- External technical expert
- External supplier
- Enter an answer choice

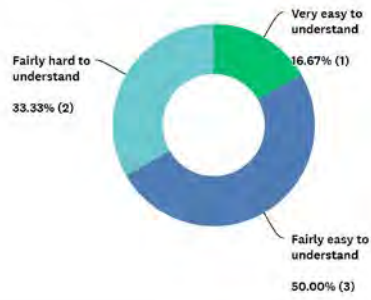
9. Any other thoughts, comments or feedback?

Results

Question 1:

The proposed framework is:

Answered: 6 Skipped: 1

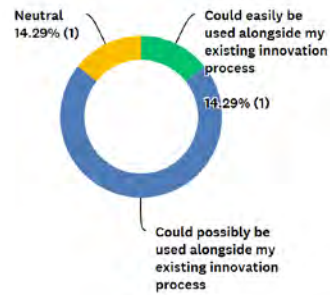


ANSWER CHOICES	RESPONSES	
Very easy to understand	16.67%	1
Fairly easy to understand	50.00%	3
Neutral	0.00%	0
Fairly hard to understand	33.33%	2
Very hard to understand	0.00%	0
TOTAL		6

Question 2:

The proposed framework:

Answered: 7 Skipped: 0

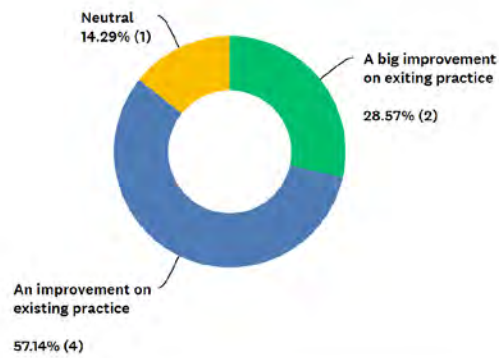


ANSWER CHOICES	RESPONSES	
Could easily be used alongside my existing innovation process	14.29%	1
Could possibly be used alongside my existing innovation process	71.43%	5
Neutral	14.29%	1
Would be quite difficult to use alongside my existing innovation process	0.00%	0
Could not be used alongside my existing innovation process	0.00%	0
TOTAL		7

Question 3

The proposed framework is:

Answered: 7 Skipped: 0

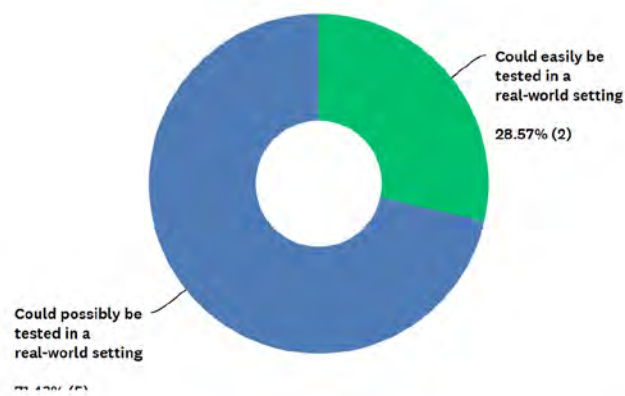


ANSWER CHOICES	RESPONSES	
▼ A big improvement on exiting practice	28.57%	2
▼ An improvement on existing practice	57.14%	4
▼ Neutral	14.29%	1
▼ No improvement on existing practice	0.00%	0
▼ Worse than existing practice	0.00%	0
TOTAL		7

Question 4

The proposed framework:

Answered: 7 Skipped: 0

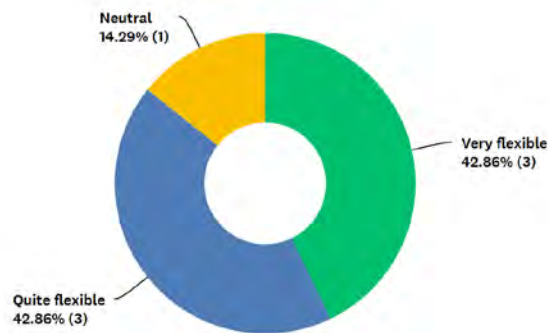


ANSWER CHOICES	RESPONSES	
▼ Could easily be tested in a real-world setting	28.57%	2
▼ Could possibly be tested in a real-world setting	71.43%	5
▼ Neutral	0.00%	0
▼ Would be quite difficult to test in a real-world setting	0.00%	0
▼ Could not be tested in a real-world setting	0.00%	0
TOTAL		7

Question 5

The proposed innovation practice appears:

Answered: 7 Skipped: 0



ANSWER CHOICES	RESPONSES	
Very flexible	42.86%	3
Quite flexible	42.86%	3
Neutral	14.29%	1
Quite constrictive	0.00%	0
Very constrictive	0.00%	0
TOTAL		7

Question 6

Respondent	Answer
1	It is designed for humanitarian innovation - there aren't many others like it. It will challenge some ideas!
2	I think the key benefit of this process is as a "reflection tool", meaning that it can help stakeholders to critically reflect on both process and outcomes. I think that sustainability, simplicity and purpose are normally reflected in just about any design process (it is just "good design", really), but I think that affordability and robustness are things that we often miss to take into account. Then again, I'm not at all opposed to including the other three perspectives in the process...I just think that it is very important to keep it fairly "light". It is not a checklist, but rather a tool for reflection. Are we taking these things into account? If not, what are some tools we can use to address these dimensions?
3	Practical steps on feedback loops
4	The concepts are simultaneously incremental and transformative which is brilliant
5	That its simple and visual, making people think about each aspect
6	I like that it applies constraints in a useful way. It is an issue that if you haven't been to the field it is super hard to design for the field, or even just to ideate. I like that it is simple. Being able to effectively explain it in a short amount of time (which this does) is important, even if that means just conveying the concept. I like that if you rearrange SPARSu, you can spell ARS PUs :)
7	Cycles rather than linear processes

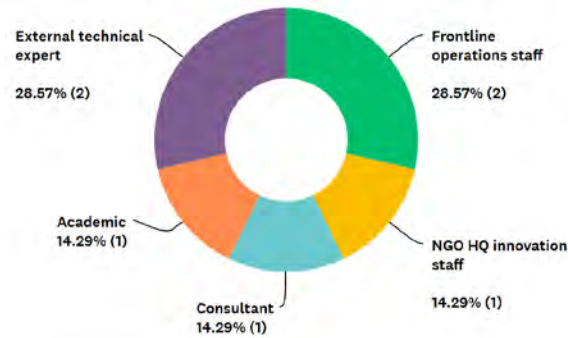
Question 7

Respondent	Answer
1	It could be clearer to remember and explain
2	Quite pragmatically, just add simple explanations of what you mean with the different core attributes (what is simplicity and what would be an example of a solution proposal that takes simplicity into account?) Then also one or two very simple tools that you could use to reflect upon these core attributes and come up with new ideas on how to address these dimensions. I'm pretty sure this is part of your work...but since it wasn't included in the survey explanation I just thought I'd mention it.
3	I'd be interested in field testing it & whether or not it should be applied in the "middle" of the diamond or "between" diamonds. Our experience suggests that the double diamond is a bit simplistic - that it's essentially a start of a series of diamonds (we talk about it as 'experimental culture' i.e. you're constantly coming up w/ and testing hypotheses (see: riskiest assumption test))
4	I found the narrative easy to understand but not the graphics. That appeared more complex to me at first look.
5	I would consider this process better as currently I did not know of one that was being used. However, I think it will be hard to find people who have these expertise and feel confident to carry this process through. I think there needs to be a division of tasks, for example, the expats in the field discover and define and then designers develop and deliver with the constant assistance of the expats.
6	SPARSu is neat, but I feel like it doesn't directly enough communicate 'context'. Several of the bullets are related, but one of the biggest challenges for designers is understanding the context of the challenge they are designing for. For example, designing a solution (or mitigation) to bed sores in MSF wards... Robustness, affordability, sustainability, etc will mean very different things in Chad, Jordan and Uzbekistan. Maybe this will be addressed through the additional tools, though... Also, are these actually stages of the process or just things to bear in mind? That's slightly confusing. Lastly, without the key, the visualisation is quite confusing. Maybe there's a better way to graphically represent it? Constructive criticism only - I think it's looking good...
7	More explicit notion of quick prototyping

Question 8

Which of the following best describes your role in humanitarian innovation?

Answered: 7 Skipped: 0



ANSWER CHOICES	RESPONSES	
Frontline operations staff	28.57%	2
NGO HQ operations staff	0.00%	0
NGO HQ innovation staff	14.29%	1
Consultant	14.29%	1
Academic	14.29%	1
External technical expert	28.57%	2
External supplier	0.00%	0
TOTAL		7

[Comments \(2\)](#)

Question 9

Respondent	Answer
1	Good job! Again, my advice is to "keep it light". There are soooooo many frameworks and toolkits out there and most try to do everything. I'd rather do the small things right than to make everything half-bad. I think you're on to something.
2	I think stepping through very deliberately from the double diamond model to your first picture of the new model would be very worthwhile to the average reader
3	I really think the diamonds currently exist in two separate worlds, the first in the humanitarian world and the second in the design world, they need a link and I think it is that link between the diamonds that is the biggest problem with humanitarian innovation.
4	I am interested in how you plan to test the framework... Always a tricky thing to do... what does success look like and against what benchmark... Looking forward to hearing more.

Appendix J: Interview recordings

All interviews were conducted via Skype in August and September 2017. The full recordings can be accessed on Google Drive via the link below. A full copy on a memory stick has been handed in with the dissertation.

<http://bit.ly/2Bp0d6W>

Files on the USB stick (duplicates of those accessed via link above):

- David K 1.mp3
- David K 2.mp3
- David V interview.mp3
- Eric P interview.mp3
- Glen Mehn interview - 23 August 2017.mp3
- Ivan interview.mp3
- Josie interview.mp3
- Karline interview.mp3
- Nils interview.mp3
- Pete interview.mp3

Appendix K: Logline development

Concise 'loglines' were drafted and refined to facilitate the move from version 1.0 of the framework to the final *Surpas* model. Loglines are a technique used in film production and are described as the 'DNA' of an idea – if you can't make the logline work then the idea itself is probably flawed. The aim was to focus thinking on core attributes and essential elements for the emerging solution. The various iterations are presented here.

A humanitarian innovator must overcome constraints to deliver ingenious solutions that make the world a better place

A humanitarian innovator must not compromise their values as they turn resource constraints into world-improving ideas

An inspired problem-solver places values at the heart of his fight to deliver ingenious ideas that make the world a better place

An inspired problem-solver places values at the heart of his fight to help humanity with ingenious ideas

An inspired problem-solver overcomes constraints by placing values at the heart of his process

An inspired problem-solver challenges his assumptions by placing values at the heart of his innovations

An inspired problem-solver places values at the heart of his innovations

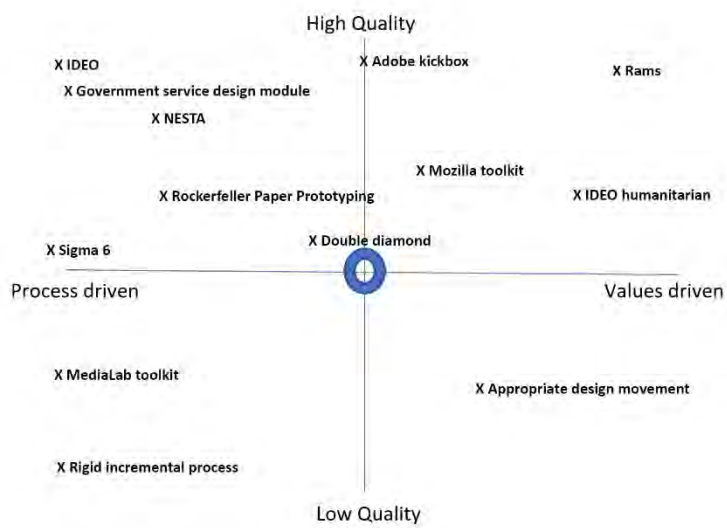
An inspired problem-solver embodies frugal values in his world-improving innovations

Appendix L: Conceptual space maps (illustrative)

Low-resource Innovation



Design thinking



Humanitarian innovation



Appendix M: Consent forms



CONSENT FORM

Title of Study: *“Doing better with less; can a frugal approach to design thinking improve humanitarian innovation?”*

Please initial box

1.	<p>I agree to take part in the above City University London research project. I have had the project explained to me, and I have read the participant information sheet, which I may keep for my records.</p> <p>I understand this will involve</p> <ul style="list-style-type: none"> • be interviewed by the researcher • allow the interview to be audiotaped • complete questionnaires asking me about innovation practice and deployment of new products • make myself available for a further interview should that be required • Participate in a moderated workshop if feasible 	pm
2.	<p>This information will be held and processed for the following purpose(s):</p> <ul style="list-style-type: none"> • Production of a Masters Dissertation <p>I understand that I have given approval for my name and/or the name of my workplace to be used in the final report of the project, and future publications.</p>	pm
3.	<p>I understand that my participation is voluntary, that I can choose not to participate in part or all of the project, and that I can withdraw at any stage of the project without being penalized or disadvantaged in anyway.</p>	pm
4.	<p>I agree to City University London recording and processing this information about me. I understand that this information will be used only for the purpose(s) set out in this statement and my consent is conditional on the University complying with its duties and obligations under the Data Protection Act 1998.</p>	pm
5.	<p>I agree to take part in the above study.</p>	pm



A handwritten signature in black ink, appearing to be "Pete Masters", written over a horizontal line.

Pete Masters

16 September 2017

Name of Participant

Signature

Date

Ben Holt

Name of Researcher

Ben Holt
Signature

17/09/2017
Date

When completed, 1 copy for participant; 1 copy for researcher file.



CONSENT FORM

Title of Study: "Doing better with less; can a frugal approach to design thinking improve humanitarian innovation?"

Please initial box

1.	<p>I agree to take part in the above City University London research project. I have had the project explained to me, and I have read the participant information sheet, which I may keep for my records.</p> <p>I understand this will involve</p> <ul style="list-style-type: none">• be interviewed by the researcher• allow the interview to be audiotaped• complete questionnaires asking me about innovation practice and deployment of new products• make myself available for a further interview should that be required• Participate in a moderated workshop if feasible	
2.	<p>This information will be held and processed for the following purpose(s):</p> <ul style="list-style-type: none">• Production of a Masters Dissertation <p>I understand that I have given approval for my name and/or the name of my workplace to be used in the final report of the project, and future publications.</p>	
3.	<p>I understand that my participation is voluntary, that I can choose not to participate in part or all of the project, and that I can withdraw at any stage of the project without being penalized or disadvantaged in any way.</p>	
4.	<p>I agree to City University London recording and processing this information about me. I understand that this information will be used only for the purpose(s) set out in this statement and my consent is conditional on the University complying with its duties and obligations under the Data Protection Act 1998.</p>	
5.	<p>I agree to take part in the above study.</p>	

David Veldema _____ 22-08-2017
Name of Participant Signature Date

Name of Researcher Signature Date



CONSENT FORM

Title of Study: *"Doing better with less; can a frugal approach to design thinking improve humanitarian innovation?"*

Please initial box

1.	<p>I agree to take part in the above City University London research project. I have had the project explained to me, and I have read the participant information sheet, which I may keep for my records.</p> <p>I understand this will involve</p> <ul style="list-style-type: none">• be interviewed by the researcher• allow the interview to be audiotaped• complete questionnaires asking me about innovation practice and deployment of new products• make myself available for a further interview should that be required• Participate in a moderated workshop if feasible	D.K
2.	<p>This information will be held and processed for the following purpose(s):</p> <ul style="list-style-type: none">• Production of a Masters Dissertation <p>I understand that I have given approval for my name and/or the name of my workplace to be used in the final report of the project, and future publications.</p>	D.K
3.	<p>I understand that my participation is voluntary, that I can choose not to participate in part or all of the project, and that I can withdraw at any stage of the project without being penalized or disadvantaged in anyway.</p>	D.K
4.	<p>I agree to City University London recording and processing this information about me. I understand that this information will be used only for the purpose(s) set out in this statement and my consent is conditional on the University complying with its duties and obligations under the Data Protection Act 1998.</p>	D.K
5.	<p>I agree to take part in the above study.</p>	D.K

D. Kucher

Name of Participant

Signature

Date

Name of Researcher

Signature

Date



CONSENT FORM

Title of Study: *“Doing better with less; can a frugal approach to design thinking improve humanitarian innovation?”*

Please initial box

1.	<p>I agree to take part in the above City University London research project. I have had the project explained to me, and I have read the participant information sheet, which I may keep for my records.</p> <p>I understand this will involve</p> <ul style="list-style-type: none"> • be interviewed by the researcher • allow the interview to be audiotaped • complete questionnaires asking me about innovation practice and deployment of new products • make myself available for a further interview should that be required • Participate in a moderated workshop if feasible 	EDP
2.	<p>This information will be held and processed for the following purpose(s):</p> <ul style="list-style-type: none"> • Production of a Masters Dissertation <p>I understand that I have given approval for my name and/or the name of my workplace to be used in the final report of the project, and future publications.</p>	EDP
3.	<p>I understand that my participation is voluntary, that I can choose not to participate in part or all of the project, and that I can withdraw at any stage of the project without being penalized or disadvantaged in anyway.</p>	EDP
4.	<p>I agree to City University London recording and processing this information about me. I understand that this information will be used only for the purpose(s) set out in this statement and my consent is conditional on the University complying with its duties and obligations under the Data Protection Act 1998.</p>	EDP
5.	<p>I agree to take part in the above study.</p>	EDP

Eric Perakslis
Name of Participant

Eric Perakslis
Signature

6th September 2017
Date

Ben Holt
Name of Researcher

Ben Holt
Signature

8/09/17
Date

When completed, 1 copy for participant; 1 copy for researcher file.



CONSENT FORM

Title of Study: "Doing better with less; can a frugal approach to design thinking improve humanitarian innovation?"

Please initial box

1.	I agree to take part in the above City University London research project. I have had the project explained to me, and I have read the participant information sheet, which I may keep for my records. I understand this will involve <ul style="list-style-type: none">• be interviewed by the researcher• allow the interview to be audiotaped• complete questionnaires asking me about innovation practice and deployment of new products• make myself available for a further interview should that be required• Participate in a moderated workshop if feasible	
2.	This information will be held and processed for the following purpose(s): <ul style="list-style-type: none">• Production of a Masters Dissertation I understand that I have given approval for my name and/or the name of my workplace to be used in the final report of the project, and future publications.	
3.	I understand that my participation is voluntary, that I can choose not to participate in part or all of the project, and that I can withdraw at any stage of the project without being penalized or disadvantaged in any way.	
4.	I agree to City University London recording and processing this information about me. I understand that this information will be used only for the purpose(s) set out in this statement and my consent is conditional on the University complying with its duties and obligations under the Data Protection Act 1998.	
5.	I agree to take part in the above study.	

Glen Moran 18/9/2017
Name of Participant Signature Date

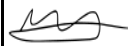
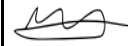
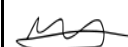


Name of Researcher Signature Date

When completed, 1 copy for participant; 1 copy for researcher file.

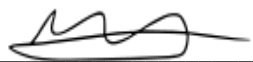
CONSENT FORM

Title of Study: *“Doing better with less; can a frugal approach to design thinking improve humanitarian innovation?”*

Please initial box

1.	<p>I agree to take part in the above City University London research project. I have had the project explained to me, and I have read the participant information sheet, which I may keep for my records.</p> <p>I understand this will involve</p> <ul style="list-style-type: none"> ● be interviewed by the researcher ● allow the interview to be audiotaped ● complete questionnaires asking me about innovation practice and deployment of new products ● make myself available for a further interview should that be required ● Participate in a moderated workshop if feasible 	
2.	<p>This information will be held and processed for the following purpose(s):</p> <ul style="list-style-type: none"> ● Production of a Masters Dissertation <p>I understand that I have given approval for my name and/or the name of my workplace to be used in the final report of the project, and future publications.</p>	
3.	<p>I understand that my participation is voluntary, that I can choose not to participate in part or all of the project, and that I can withdraw at any stage of the project without being penalized or disadvantaged in any way.</p>	
4.	<p>I agree to City University London recording and processing this information about me. I understand that this information will be used only for the purpose(s) set out in this statement and my consent is conditional on the University complying with its duties and obligations under the Data Protection Act 1998.</p>	
5.	<p>I agree to take part in the above study.</p>	

Ivan Gayton
Name of Participant


Signature

2017-09-15

Date

Name of Researcher

Signature

Date

When completed, 1 copy for participant; 1 copy for researcher file.



CONSENT FORM

Title of Study: *“Doing better with less; can a frugal approach to design thinking improve humanitarian innovation?”*

Please initial box

1.	<p>I agree to take part in the above City University London research project. I have had the project explained to me, and I have read the participant information sheet, which I may keep for my records.</p> <p>I understand this will involve</p> <ul style="list-style-type: none"> • be interviewed by the researcher • allow the interview to be audiotaped • complete questionnaires asking me about innovation practice and deployment of new products • make myself available for a further interview should that be required • Participate in a moderated workshop if feasible 	J.G
2.	<p>This information will be held and processed for the following purpose(s):</p> <ul style="list-style-type: none"> • Production of a Masters Dissertation <p>I understand that I have given approval for my name and/or the name of my workplace to be used in the final report of the project, and future publications.</p>	J.G
3.	<p>I understand that my participation is voluntary, that I can choose not to participate in part or all of the project, and that I can withdraw at any stage of the project without being penalized or disadvantaged in anyway.</p>	J.G
4.	<p>I agree to City University London recording and processing this information about me. I understand that this information will be used only for the purpose(s) set out in this statement and my consent is conditional on the University complying with its duties and obligations under the Data Protection Act 1998.</p>	J.G
5.	<p>I agree to take part in the above study.</p>	J.G

Josie Gilday
Name of Participant

Josie Gilday
Signature

11/09/2017
Date

Ben Holt
Name of Researcher

Ben Holt
Signature

11/09/17
Date

When completed, 1 copy for participant; 1 copy for researcher file.



CONSENT FORM

Title of Study: "Doing better with less; can a frugal approach to design thinking improve humanitarian innovation?"

Please initial box

1.	<p>I agree to take part in the above City University London research project. I have had the project explained to me, and I have read the participant information sheet, which I may keep for my records.</p> <p>I understand this will involve</p> <ul style="list-style-type: none">• be interviewed by the researcher• allow the interview to be audiotaped• complete questionnaires asking me about innovation practice and deployment of new products• make myself available for a further interview should that be required• Participate in a moderated workshop if feasible	N.A.
2.	<p>This information will be held and processed for the following purpose(s):</p> <ul style="list-style-type: none">• Production of a Masters Dissertation <p>I understand that I have given approval for my name and/or the name of my workplace to be used in the final report of the project, and future publications.</p>	N.A.
3.	<p>I understand that my participation is voluntary, that I can choose not to participate in part or all of the project, and that I can withdraw at any stage of the project without being penalized or disadvantaged in any way.</p>	N.A.
4.	<p>I agree to City University London recording and processing this information about me. I understand that this information will be used only for the purpose(s) set out in this statement and my consent is conditional on the University complying with its duties and obligations under the Data Protection Act 1998.</p>	N.A.
5.	<p>I agree to take part in the above study.</p>	N.A.

NILS AKSNES
Name of Participant

Signature

30/8/17
Date

Name of Researcher

Signature

Date

When completed, 1 copy for participant; 1 copy for researcher file.