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DESIGNED FUTURES

Design educators interrogating the future of design knowledge, research and education.

Writing-up Research Through Design: An approach to research report writing in early level postgraduate education

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Abstract

In Christopher's Frayling's seminal account of design-orientated research, he lists research for design, research through design and research about design as the primary modes of research in the field of design. At least since Frayling termed these concepts in 1993, design educators globally have grappled with supervising research through design. While there are many accounts of research through design, few provide clear theory as to how the approach may be applied, least of all in design education. In the field of human-computer interaction, Zimmerman et al. provide multiple methodological suggestions for practising research through design, however, with a focus on HCI practitioners and the core concepts dispersed over a range of publications, their method can be difficult to grasp.

In response to this concern, this paper provides an outline of a novel adaption of Zimmerman et al.'s research through design method. In support of this amended method, fundamental principles of research through design are introduced and discussed, as well as an in-depth description of the research through design. Through these activities, this paper addresses the lack of a clear method for research through design practice in general and particularly, how to apply research through design in early level postgraduate education.

Keywords: Design research, research through design, research methodology and methods, design education

Introduction

This paper is concerned with providing design students at a fourth-year, honours level of study and their academic supervisors, guidance for conceptually planning and conducting a research report applying a *research-through-design* (RtD) approach.⁶ The principal reason for writing this paper is that, in my own experience of supervising students at this level, they typically

⁶ The term 'research report' is used in a general manner that could include dissertations or thesis' written at this level.

struggle to conceive of academic research practice outside of the boundaries of textual analysis. Concurrently, these same students often present mature analytical and generative research abilities in their own design practice. Students, thus, typically struggle to bridge the gap between their practice-orientated research practices and the requirements of a summative largely written research report. While there are numerous reasons for this occurrence, the problem that this paper addresses is the scarcity of methodological structure to guide RtD practice.⁷

To address this concern, this paper concludes with an outline of a model for RtD practice at honours level (Figure 7). This model emerges in response to a range of concepts articulated in the three preliminary sections of the paper which, in turn, discuss: fundamental concepts of design research with an emphasis on RtD; Zimmerman, Forlizzi and Everson's *Research through Design Method* (RtDM); and a novel adaptation of the RtDM to procedurally and conceptually guide an integration of research and practice at honours level in design. More broadly, the proposed method has been informed, iterated and refined over five years of supervising RtDM projects at honours and master's level.

This method integrates RtDM in relation to the expectations typical of an honours level research report or dissertation. As requirements of honours level research reports can differ across disciplines, institutions and individuals, I provide a detailed narrative of my suggestions, less to present a definitive method, but more so that other design educators may understand the rationale to, adapt if required for their individual research approaches.

Furthermore, due to the breadth of the topic of design research and the limits of this paper, several assumptions and constraints that need to be noted. Foremost, this paper is directed at honours students and their supervisors, and although many of the concepts discussed may be of use for master's and PhD studies, these qualifications have other requirements particularly in terms of rigour and contribution. Secondly, while the disciplinary orientation of this discussion is agnostic, to a certain extent, it is more relevant to those concerned with the design of innovative products, services and environments. Thirdly, while the various approaches to RtD are briefly introduced, much of the discussion in terms of application or design process describes methods or conditions that are characteristic of human-centric approaches to design. This is a limitation inherited from the design work I have typically supervised over the past several years.

Nonetheless, the fundamentals of the method should comfortably apply across other methodologies such as critical design or design science. Lastly, this is not a step-by-step guide to writing a research report. This paper suggests how to integrate RtD methodologically conceptually into general research report structure. The expectation is that this paper adds to basic research knowledge. Hence, not every requirement of a research report is detailed.⁸

The theoretical concerns of RtD

This section is primarily concerned with describing the fundamental characteristics of RtD, however, before doing so the concepts of wicked problems and design thinking (DT), which inform much of the subsequent sections, are introduced. While it is assumed that the reader will have some familiarity with both these terms, these brief overviews are important for two reasons. Firstly, RtDs ability to resolve complex design problems is recognised as one of its

⁷ Other reasons could include that design has an immature disciplinary approach to theory generation (Cross 2006), as well as that undergraduates in South African design institutes are frequently taught by theorist with little understanding of design research.

⁸ To better understand other technical requirements of a research report such as 'abstracts', 'problem statement' or 'conclusions', I would suggest other sources such as Muratovski (2016).

strengths (Zimmerman 2007). Thus, the discussion of wicked problems speaks to this notion of complexity. Secondly, design thinking can be interpreted and is applied in multiple ways in design. This introduction concisely unpacks a range of these variations and describes how the concept is applied in this paper.

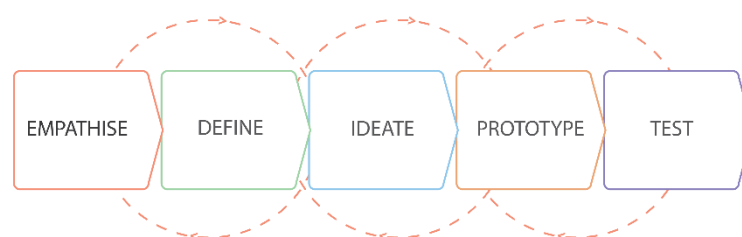
Wicked problems

'Wicked problems' are problems that are difficult to resolve because the relational context of the problem is both difficult to comprehend and yet requires understanding before any approach to resolving the problem can even be considered (Glaver 2012, p. 940). The situated problem is often ill-defined and illusive, muddled in the complexity of social reality and subjective opinion (Buchanan 1992). The wicked problem, thus, first requires being 'framed' by the designer (Dorst 2015). This framing is an interpretive act during which the designer firstly, selects what they believe to be the most important aspects of the situated problem that may be resolved, in terms of impact, and secondly, in terms of their design abilities. The situated complexity of wicked problems typically requires unique framings where the resultant design solution/s are correspondingly indeterminate. Thus, there is seldom an obvious pre-existing category of 'correct' solution to any given wicked problem. As the wicked problem is framed subjectively by the designer, there is opportunity for it to be framed and resolved in numerous different but appropriate ways, by others.

Design thinking

Design thinking (DT) refers to two interrelated concepts. Firstly, design thinking can refer to cognitive aspects, often aligned with abductive reasoning that guide and explain creativity (Wendt 2015, p. 62). This design cognition can be compared with what Schön (1983, p. 92) refers to as 'knowing-in-action', a practice in which the designer reflectively acts in a continuous dialogue with the technology, materials and larger worldly contexts.

Design cognition is often optimised in the form of process models such as Stanford University d.school's design thinking process (Figure 1). In these design-thinking models, the design process is represented as a range of iterative phases that suggest particular concerns. To exemplify this concisely the 'empathise' phase of Figure 1, would imply understanding the design problem, by researching it from the perspective of the people affected. 'Define' would imply defining a design opportunity or strategy based on the 'empathise' research, 'ideate' refers to responding creatively and imaginatively to the defined opportunity, 'prototype' envisions exploring strong ideation concepts further through making, and lastly, 'test' describes ongoing and summative evaluation of prototypes to determine advancements or required amendments. While the design thinking models suggest phases that build towards a completed design product, description of design thinking models typically suggest that design is an iterative, reflective process that often requires rethinking prior decisions and actions. Rather than the cognitions they model, these process models are arguably the mainstream understanding of what design thinking is.



**Figure 1: The Stanford d:school's design thinking process
(adapted from Doorley et al. n.d., p. 2)**

Sheppard et al. (2018) articulate the commercial value of design thinking to business, in terms of strategic alignment, organisation management, and communication across multi-disciplinary teams and stakeholders, where the value for applying an explicit framework for practice, particularly when resolving wicked problems. However, in design education beyond the management and structure required to resolve complexity, I would suggest, that design thinking process models can enable students to be more aware and reflective of their design cognition and capable of communicating these reflective moments to others.

Research through design

While there have been numerous attempts to classify design research that relate to and are informed by what designers do (Wright & McCarthy 2010, p. 87), Frayling's (1993) framework of design research remains relevant for its insights and their importance (Zimmerman & Forlizzi 2014, p. 169). In this framework, design research is organised into three categories, namely, research for design, research through design, research into design (Frayling 1993, p. 5).

Research for design is concerned with improving the practice of design (Zimmerman & Forlizzi 2014, p. 169) and is comprised of two primary concerns. First, research for design includes all the various modes of research that designers undertake before or during a design process such as desktop research, user-interviews, competitor analysis, among others (Wright & McCarthy 2010, p. 88). These research activities predominantly inspire or suggest to the designers the requirements for and amendments in design action. The second concern relates to research that advances the practice of design (Zimmerman & Forlizzi 2014, p. 169). This type of research is concerned with "new methods, tools, or approaches; or any work that uses exemplars, design implications, or problem-framings to discuss improving the practice of design".

Research into design has as its core focus on the human activity of design (Zimmerman & Forlizzi 2014, p. 169). As such, it considers aspects of research as diverse as aesthetics, perception, experience, design critique, design history and artistic practice, as well as theoretical concerns, including, but not limited to, cultural, social, economic, ethical, political research and technical aspects (Wright & McCarthy 2010, p. 93). Research into design typically interprets or critiques designerly artefacts, such as products, texts and artifacts.

Research through design refers to research that is carried out through the medium of design activity (Wright & McCarthy 2010, p. 91). The emphasis of RtD is on 'novel integrations' of research in "an attempt to make the right thing, a product that disrupts, complicates or transforms the world from its current state to a preferred state" (Zimmerman & Forlizzi 2014, p. 169) (Zimmerman 2007, p. 493).

In RtD, all research outcomes result from design practice-orientated towards product generation. However, research outcomes are not always directly focused on the product and can include novel contributions generated during the design process such as methods, framings, practices or theory application. While RtD can appear to resemble design practice, RtD is concerned with how design actions produce novel and useful **knowledge** rather than focussing on a commercially successful solution (Zimmerman & Forlizzi 2014, p. 168). In this sense, RtD aims to explore, through reflecting on processes and outcomes, designer's decision-making, actions and intentions through the creation and deployment of design solutions, be they products, systems, spaces, or media (Wright & McCarthy 2010, p. 92). Product 'solutions' generated during RtD are what Zimmerman et al. (2007, p. 493) refer to as 'design exemplars' capable of embodying, communicating and transferring research findings to the research and

practice communities and can refer to artefacts, prototypes, scenarios, or even detailed concepts (Koskinen 2011, pp. 5–6). Lastly, RtD projects can de-emphasise or alternatively highlight aspects of the design problem (Zimmerman 2007, p. 493). For example, in research concerned with user-experience, aspects such as economic viability, and may be given little attention.

Lastly, it is worth noting that with regards to all three modes of research design, that they are not always distinct from one and other (Zimmerman & Forlizzi 2014, p. 169). For example, research for design may be practised as part of research through design. Additionally, reflections on practice may lead to more general contributions to research. In this case, the RtD study shifts into research into design (Wright & McCarthy 2010, p. 93).

The research through design method

One of the fundamental criticisms of accounts of RtD is that they tend to be theoretically vague, with very little direction on implementation (Koskinen 2011, p. 5). Across *Research through Design in HCI* (2014), *Research Through Design as a Method for Interaction Design Research in HCI* (2007) and *Crafting a Place for Interaction Design Research in HCI* (2008), Zimmerman, Forlizzi and Evenson present detailed theoretical descriptions of their approach to conducting RtD, which I refer to as ‘the research-through-design method’ (RtDM).

Across these three publications, the authors provide several concepts and methods that inform the application of RtD.⁹

While the RtDM publications suggest numerous useful approaches for RtD work, it faces various challenges in these literary contexts. Firstly, the various publications can be conceptually confusing as the methodological suggestions are scattered across the publications. Secondly, the publications are primarily aimed at an HCI audience of professional researchers. Thus, much of the content of RtDM is devoted to arguing for the value of design and design thinking in HCI. Additionally, the emphasis on research professionals also provides scant detail as to the communicative form the research should take outside of ‘design exemplars’ and ‘documentation’.

In terms of the methodological value of RtDM and in response to the limitations of the existing literature, the remainder of this paper will provide a conceptual overview of RtDM synthesising many of the concepts into a more coherent structure. This overview will then be followed by an amended version of RtDM, providing specific clarification and procedural suggestion for honours level application.

An outline of RtDM

To contextualise subsequent discussion, a methodological overview of RtDM will now be presented.

As described in Figure 2, the RtDM authors see the role of (interaction) designers, conducting RtD, as synthesising knowledge problems and methods from the relevant component disciplinary practices of HCI (engineering, anthropology and behavioural science). The purpose of the synthesis is to generate research insights that are of use to researchers operating in these related disciplines and HCI practitioners in general (Zimmerman 2007, p. 493).

In this scenario, ‘engineers’ represent a consideration of technology, ‘behavioural scientists’ represent the theoretical aspects of HCI, while ‘anthropologists’ are concerned with

⁹ I refer ‘the authors’ for practical reasons even though Zimmermann is the only constant author across all three publications.

articulating a human experience of the world and technology. ‘Interaction designers’ represent the pragmatic design approach of HCI that seeks to create the ‘right thing’.

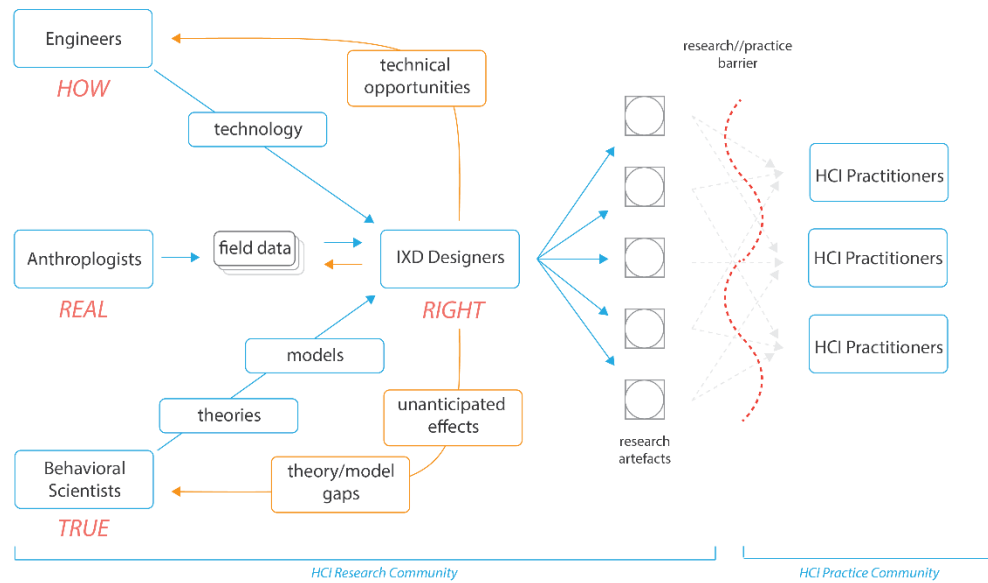


Figure 2: A model of RtD in the HCI community (Zimmerman 2007, p. 493)

Beyond accounting for the disciplinary foci of HCI, the primary value of the RtDM approach is the emphasis on engaging wicked problems (Zimmerman 2007, p. 497). Furthermore, RtD synthesis of technology, theory and human experience allows design researchers to:

[I]deate many possible visions of a preferred future state by imagining new products, services, systems, and environments that address challenges and opportunities and that advance the current state of the world to a preferred state (Zimmerman & Forlizzi 2014, p. 176).

In this manner, the RtDM invokes a pragmatic intent (Koskinen 2011, p. 27) allowing designers to do what they do best: engage with the world and subsequently *make things* intended to affect positive change.

The RtDM process

This section describes the integration of key concepts articulated in the RtDM evaluation criteria (Zimmerman et al. 2007, p. 499) with the relevant procedural descriptions of RtDM (Zimmerman & Forlizzi 2014, pp. 184-87).

RtDM Phase 1: Select

The first step in the RtDM process is to identify the problem space that the project will address. Typically, the problem would be a wicked-problem problem and include “multiple agendas driven by different stakeholders and entrenched interests” (Zimmerman & Forlizzi 2014, p. 185).¹⁰ Key aspects of the wicked problem that would need to be identified include, among others, the situated context, user communities/stakeholders and both macro and micro social factors and forces. Along with this initial problem-framing, other aspects such as disciplinary

¹⁰ The RtDM publications highlight the ability of design thinking to engage with wicked problem is the key contribution of RtD to HCI practice

concerns, theoretical frames, and technological, as well as personal or team goals, should be identified.

The fundamental objective at this initial stage is to ensure that the identified wicked problem is capable of being resolved firstly, by design generally, and secondly, within the capabilities and competencies of the designer in question (Zimmerman & Forlizzi 2014, p. 185). The problem-framing at this point should be regarded a starting point, likely to be reframed during the design process.

The last aspect of the *Select Phase* is the selection of the particular RtD method to be applied in the study. It is at this juncture that a pragmatist concern for making ‘the right thing’ rather than following a prescriptive theoretical viewpoint (McCarthy & Wright 2004) becomes apparent. In this sense, RtD can follow a variety of RtD methodologies such as critical design (Koskinen et al. 2011), design fiction (Dunne & Raby 2013), participatory design (Koskinen et al. 2011) or design science (Hevner et al. 2004) or even combine different aspects of methods (Zimmerman & Forlizzi 2014, p. 185). Once the particular RtD method has been selected or configured, Zimmermann and Forlizzi suggest undertaking a short literature review describing examples of the selected RtD method to guide the implementation of the method (Zimmerman & Forlizzi 2014, p. 185).

RtDM Phase 2: Design

This phase consists of two steps.

The first step is to conduct a literature review to assess current approaches, concerns and questions evident in the work of other researchers working in similar contexts as the initial problem framed in the select phase (Zimmerman & Forlizzi 2014, p. 185).

The second step of the phase is to conduct the ‘practical’ design project. Zimmerman and Forlizzi provide a very high-level description of the range of activities typical of the design process (2014, p. 185). They do also recommend the value of applying design thinking and suggest a design process, as depicted in Figure 3:

Our model provides a new channel for the power of design thinking, desired by many disciplines, to be unleashed as in a research context. Design researchers can contribute from a position of strength, instead of applying the methods of other disciplines as a means of justifying their research contribution (Zimmerman et al. 2007, p. 499)



Figure 3: Adaption of Zimmerman and Forlizzi’s design process (2014, p. 176)

The value of selecting an explicit and appropriate design thinking process model is useful firstly, in terms of practice method, and, secondly, to assist in the process of structuring, documenting and reflecting on the design process, as will be articulated in later steps.¹¹

RtDM Phase 3: Evaluation

‘Evaluation’ is the continual challenging of the problem-framing through critique and reflection to ensure that the *right thing* is made (Zimmerman & Forlizzi 2014, p. 185). In RtDM,

¹¹ At masterss level, we have also applied other design process methods such Rogers et al. (2014) model of interaction design and Visser et al.’s (2005) contexmapping method.

the evaluation provided by the design researcher takes the form of detailed documentation and a rationale of their methods (Forlizzi et al. 2008, p. 27).

To avoid the rationale taking on a subjective, self-indulgent form, the authors provide four criteria for guiding the evaluation of RtD practice (Figure 4), namely *process*, *relevance*, *invention* and *extensibility* (Zimmerman et al. 2007, p. 499).

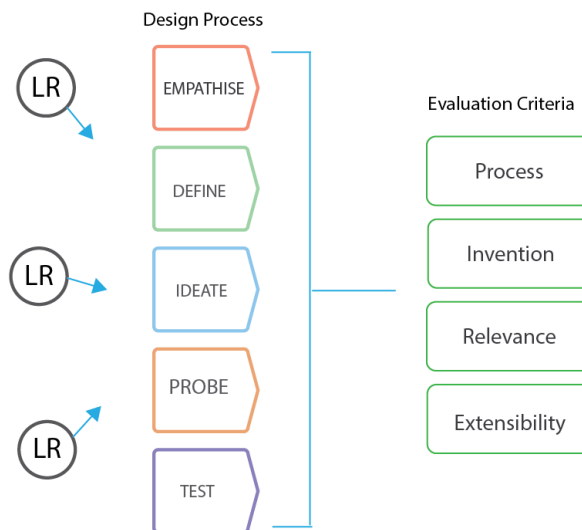


Figure 4: The conceptual flow of RtDM method

Fundamentally, the method suggests an array of secondary research reviews, a design thinking process-orientated towards a summative solution, and, that the process is evaluated in terms of the provided criteria. Note the term ‘probe’ is a specifically RtD term that at this level can be equated with ‘prototype’.

Evaluation Criterion 1: Process

The purpose of the *process* criterion is to provide clarity on the selection of design methods, theories, practices and decision-making, and the subsequent effect of these activities in practice. In RtDM, there is no expectation that reproducing a design process will produce the same results. However, the design researcher must provide in their documentation and explanation enough detail so that the processes employed can be reproduced (Zimmerman et al. 2007, p. 499). The rationale should not be purely procedural but also seek to provide reasons for decisions and explanations through a reflection of the approaches that worked or did not work (Zimmerman & Forlizzi 2014, p. 185). The value of a thorough explanation of the design process is centred on attesting to the rigour of the applied methods and the subsequent rationale for the selection of the methods (Zimmerman et al. 2007, p. 499).

Evaluation Criteria 2: Relevance

Relevance refers to the extent to which the design solution is considered to be of value in the broader societal world (Zimmerman et al. 2007, p. 499). The requirement of the *relevance* criterion is threefold (ibid). Firstly, the design process must be framed within the *real* world. Fundamentally, this would require an in-depth explanation and analysis of the wicked problem. Secondly, the strategy for resolving the wicked problem should be articulated. In this sense, the “preferred state their design attempts to achieve” should be described and argued for (ibid). Lastly, the final obligation of the *relevance* criterion lies in providing the reasons for why the envisioned state can be regarded as to be preferred.

Evaluation Criteria 3: Invention

Invention refers to the novelty of the research contribution, as evident in the embodied design product. The contribution should be ‘significant’ demonstrating a “novel integration of various subject matters” that address the particular framing of the problem (Zimmerman et al. 2007, p. 499). To demonstrate the novelty of the invention an extensive literature review should be carried out that firstly, situates the work in relation to other relevant examples, and, secondly, identifies and describes the aspects that demonstrate how their contribution “advances the current state of the art in the research community” (ibid).

Evaluation Criteria 4: Extensibility

The authors define ‘extensibility’ as the ability to build on the resulting outcomes of the design research. As such, the *extensibility* criterion identifies research insights gained from the previous three criteria that are scalable to other problem situations and/or product designs.

RtDM Phase 4: Reflect and disseminate

In the fourth phase of RtDM (ibid), the emphasis is placed on reflecting on what has been learned and the dissemination of the research. Dissemination can take the form of ‘product exemplars’ that embody research concepts in the design ‘product’, as well as research publications, research posters, videos, presentation and demonstrations (ibid). In terms of reflection, the authors do not make any prescriptive suggestions. However, Muratovski (2016, p. 197) does suggest the value of the research report format to achieve credibility and external validation when undertaking applied research such as RtD.

The research-through-design-thinking method

To reconcile a research report with RtDM, this section provides an amended model referred to as the research-through-design-thinking method (RtDTM). This model is also oriented around four phases, namely: select, literature review, design process and the reflective evaluation.

Table 1: An overview of the shared and differing phases of the two methods

Research-through-design method '		Research-through-design-thinking method (RtDM)
Phase 1: Select (shared)		
		Phase 2: Literature
Phase 2: Design		Phase 3: The design process
Phase 3: Evaluation		Phase 4: Evaluation

RtDTM Phase 1: Select

This phase remains fundamentally the same as described for the *RtDM Phase 1: Select*. The priority in this phase is to frame the design opportunity through a range of the following:

- Initial descriptions of the wicked problem;
- The design discipline (IXD, industrial design, architecture, etc.) and/or design approach (HCD, speculative design or critical design, etc.);
- Theoretical frames;

- The technological or channel focus (product design, mobile, smart technology, brand campaign, etc.); and
- The relevant research interests.

At an honours level, all design solutions are regarded as RtD design exemplars as they are seldom completed commercial products.

Additionally, research objectives are typically directly related to how the design process results in a creative or innovative solution. For example, in a broadly HCD study, the primary research objective could be along the lines of ‘how can [x design] improve [the current experience] of [y user] performing [z activity]’. Alternatively, ‘How can issues of [gender inequality] be exposed through a critical design approach’ or ‘what is the future of [garbage collection]’ would frame respective critical design or design fiction approaches to RtD.

Depending on the level of experience of the design-researcher, the disciplinary concerns can be more or less open. For example, at a fourth-year level, it can be helpful (and sometimes a curriculum requirement) to constrain the disciplinary focus, theoretical frameworks and technological focus. Alternatively, defining a type of technology as part of the enquiry is also a viable option, for example, exploring the opportunities that smart technology could bring to the future of urban parks.

RtDTM Phase 2: Literature

In the RtDTM, the various literature requirements suggested in the RtDM are consolidated in a single phase. In a research report, this would account for the ‘background of/introduction to the research’, ‘theoretical framework’ and ‘literature review’ sections, as well as aspects of the ‘research method’. This phase adds to the RtDM literature requirements but also addresses several conceptual and structural gaps.

The first consideration requires a brief procedural jump. As will be described in the following phase, *evaluation*, there are three criteria (the process, relevance, invention) against which the RtDM project can be evaluated to determine knowledge advancement. To identify any ‘new’ knowledge, the existing knowledge in the field must be articulated. In reference to this concept, RtDMs three evaluation criteria provide a guide as to what existing content, relevant to the scope of the study, should be included in the various reviews that address the current ‘state of the art’.¹²

Applying this strategy, the following content would be the minimum required:

- **Process:** Include examples of RtD methods or other relevant design methods.
- **Relevance:** Provide an account of existing research or other sources that assist in framing the wicked problem.
- **Invention:** Include related current research or artefactual exemplars. These would, for example, focus on similar types of wicked problems, resolve the same problem in a different disciplinary or situated context or involve similar types of technology concerns.

These three themes can be complemented by literature that describes the disciplinary approach and method of RtD used in the study as developed in the *select* phase. Lastly, any theoretical approaches would require substantiation.

¹² See Figure 8 for a visualisation of this iteration between literature and evaluation criteria

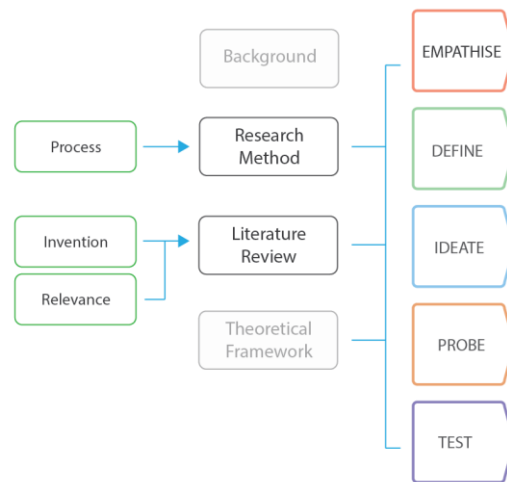


Figure 5: The structure of proposed literature sections in RtDTD research

As described in Figure 5, the structure of the literature themes *can* take the following form in an RtDTD research report.

The background of the study

In the background of the study, the design ‘paradigm’ of the study is discussed. This discussion frames the conceptualisation of the research project and as such, would refer to aspects such as the design discipline, the thematic focus and the particular RtD approach (HCD, critical design, etc.). Conceptual aspects of the RtD approach can be introduced here to suggest how the design process articulated in the ‘research method’ engages with the ‘wicked problem’. The identification of the discipline and themes focus the subsequent selection of content in the literature review and theoretical framework.

The literature review

Literature related to relevance and invention themes form the bulk of the literature review. Typically, the ‘relevance’ focus would frame the (wicked) design problem while ‘invention’ would refer to related solutions from design or other relevant fields. Ideally, the ‘relevance’ discussion would identify, what is generally known about the wicked problem but should also identify knowledge gaps that would typically be explored in the *research for design* activities of the upcoming *design thinking process*. The ‘invention’ discussion should clearly articulate why none of the described exemplars adequately resolve the framed problem. If this gap cannot be articulated, there is no logical reason for the research project!

Theoretical framework

Relevant theoretical concepts are accounted for in the theoretical framework.

Research method

The research method section should include brief descriptions of the RtD approach, as well as the selected RtD method (for example, RtMTD) and design thinking process. These descriptions should also refer to examples of other researcher’s application of RtD methods similar in nature to the one expected to be applied in the student’s study.

The student’s own methodological ‘design’ of these aspects should then be described, preferably making use of annotated diagrams. As illustrated in Figure 7, these diagrams should reflect the *meta*-RtMD research organisational structure, as well as the details of the design thinking process.

RtDTM Phase 3: The design process

The design process consists of two core activities, namely the practical design project and the documentation of the process.

When engaging in RtD research, the practical design process and the research report should be undertaken concurrently as they co-define each other. In this sense, the *select* and *literature review* phases provide an initial problem-framing, conceptual approaches, solution benchmarks and methodology recipes that inform the design process, which in turn is likely to reframe the problem and suggest appropriate practice.¹³

With regards to the documentary account of the practical design process, and while RtDM provides scant details as to how an evaluation should occur in practice, Glaver (2012, p. 944) suggests that RtD could take the form of an annotated portfolio – a detailed visual documentation of the design process accompanied by a narrative description. This narrative, which I suggest should be a first-person account, pragmatically reflects on the design process in a manner that describes and rationalises problem-framing, applied methods, design decision, and the impact of these activities during the design process.¹⁴

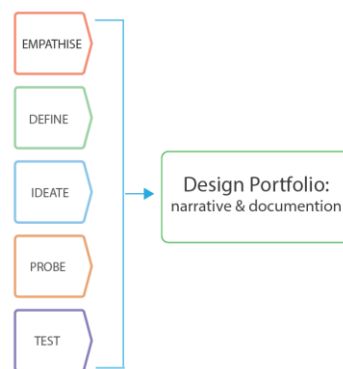


Figure 6: The design portfolio provides a rich visual description of the design thinking process and product solution

Due to the level of detail in situated practise, it is unreasonable to expect the portfolio to describe all aspects of the design thinking phases. Rather the narrative should limit the discussion in terms of the scope of the research focus. For example, an HCD project concerned with the design of an innovative product in response to user needs may only briefly describe the technical aspects of the final product spending considerably more time on design research, strategy and product concept.

RtDTM Phase 4: The reflective evaluation

In senior levels of study, the reflective evaluation is a summative evaluation that addresses the aspect of novelty. While ‘novelty’ is not typically a requirement of honours research, there is an expectation of creative originality in the design process at least in terms of the framing of the wicked problem, the framing of the design opportunity and the strength of the embodied design solution. However, rather than overvaluing novelty, which is typically evaluated in practical modules, I would suggest the value of RtD lies in encouraging honours

13 The practical project would typically have its own evaluative criteria and objectives separate to that of the research report.

14 This could be a stand-alone document or could be included as a chapter in the research report.

students to engage with their work critically within a broader disciplinary context. As such, the evaluative criteria can take the following forms:

Evaluation Criterion 1: Process

At senior levels of study, the *process* criterion would describe any novel contribution to, or amendment of, design method, practice, theory application or theory generation. At an honours level, it is sufficient to describe the design practice emphasising disciplinary appropriateness, creative making and thinking and general methodological coherence. Additionally, I would suggest that at honours level, the *process* criterion is the portfolio narrative as opposed to being delivered as a part of the summative criteria that evaluates the portfolio.

Once more, at senior levels of RtD practice, evaluation criteria 2 and 3 follow the RtDM description, as described earlier, however, at honours level, the summative criteria could be simplified as described below.

Evaluation Criteria 2: Relevance

Relevance refers to the degree to which the design solution is considered to be of value in the broader social world. In this regard, the criterion is concerned with how the needs of people/organisations affected by the wicked problem are met through the design thinking process and as such provides the 'reasons for why the envisioned state can be regarded as preferred'. *Relevance* argues for the value of the design opportunity and solution in reference to the current understanding of the wicked problem as detailed in the literature review, as well as presenting insights gained from the *research for design* methods enacted during the design thinking process.¹⁵

Evaluation Criterion 3: Innovation and creativity

The *innovation and creativity* criterion – being conceptually similar to *invention*, but more appropriately labelled – refers to the novel aspects of the designed solutions. These aspects should be argued for in terms of how they address the gap identified in the *invention* section of the literature review.

Evaluation Criteria 4: Extensibility

At an honours level of study, it is appropriate to think of *extensibility* as the new knowledge gained by the student during the RtD project that they could apply to future design work. The type of discussion expected would take the form of personal reflection.

To provide a final overview of the RtDTM, Figure 7 identifies key processes, conceptual feedback loops and a general suggestion of the design of a research report.

¹⁵ Such as interviews, observations, user-testing, among others.

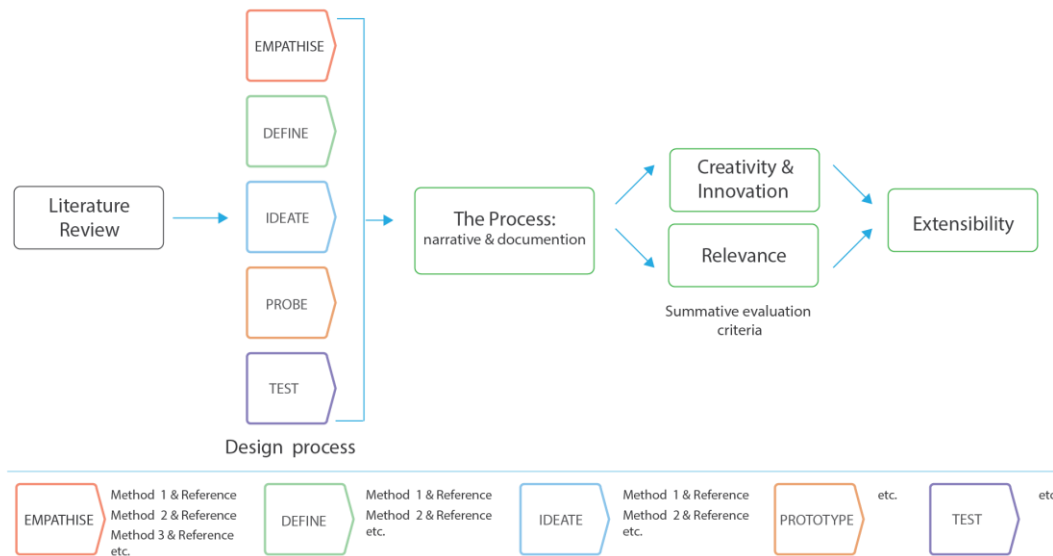


Figure 7: A model for research method diagrams describing RtDTM

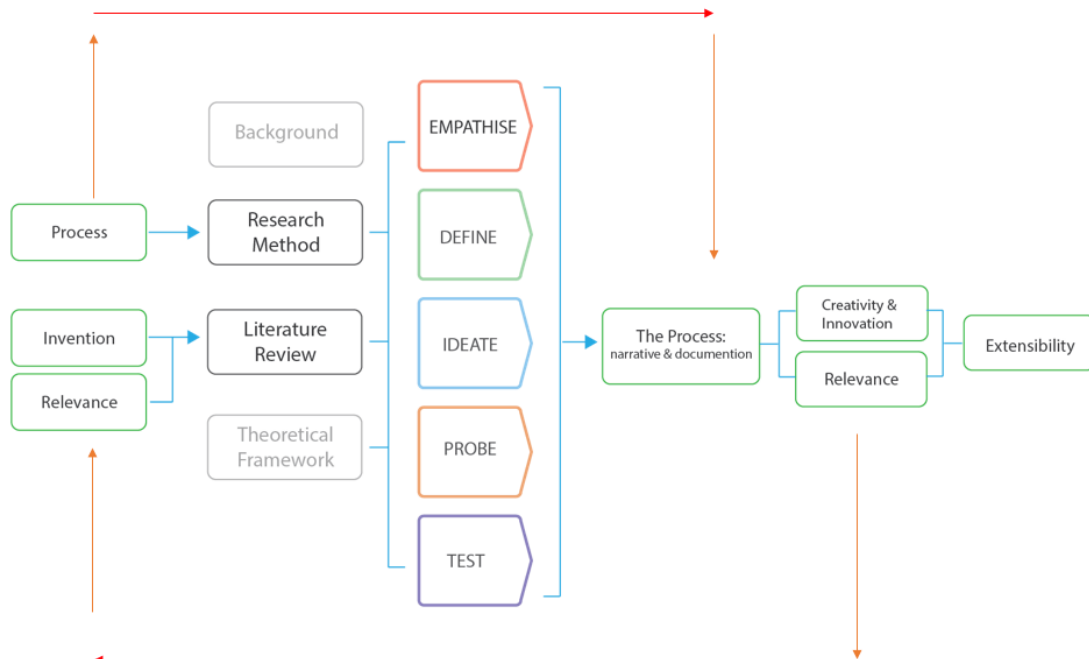


Figure 8: Describes the iterative relationship between the literature review, research method and the evaluation criteria

This specific aspect relates to the earlier discussion on RtDTM Phase 2: Literature. In this sense, the *evaluation* criteria of RtDTM encourage the student to engage with the discipline and other research through the medium of practice critically. For an alternative representation of this model within a generic honours research essay format, see Figure 9.

Conclusion

This paper describes a novel approach to conceptualising and practising RtD that aims to assist honours level students and supervisors, wishing to engage with practice-orientated research. In support of this method, fundamental principles of RtD are introduced and discussed, as well

as an in-depth description of the RtDM, of which this novel method, the RtDTM, may be considered to be an adaptation. In this sense, the paper addresses the lack of clear methodology describing RtD practice in general and how to apply RtD at early level postgraduate education in particular.

Confidence and competency in RtD are worthwhile endeavours for honours design students regardless of whether they continue with their academic studies or opt for the workplace. For those who wish to continue with further studies, this paper introduces a range of design research competencies that can be further developed in RtD master's projects. Equally, for those beginning a career in design, writing up an RtDTM study is good practice for articulating a research-led, end-to-end design process. For supervisors tasked with the ever-increasing volumes of early-stage, postgraduate students, the clarity of method and conceptual direction presented in this paper is hopefully of use.

Lastly, this paper is *an* approach to undertaking RtD. As the growing recognition of RtD in tertiary design research education grows, it is anticipated that other complementary and contrasting frameworks will appear. In this sense, there is space for future work of this type, not only in terms of specific and emerging disciplinary practices but also in terms of developing approaches for both master's and doctoral studies.

0. FRONT MATTER (as required in standard practice)

1. INTRODUCTION TO THE RESEARCH

1.1 Purpose / problem statement (as required in standard practice)

1.2 Aims and objectives of the Research (as required in standard practice)

1.3 Background to the Research/ Context of the Research

Description of:

- Design discipline: eg. Interaction Design, Industrial Design, Urbanism etc.
- The thematic focus: eg. experience design, place-making, activity etc.
- The particular RtD methodology: eg. HCD, Critical Design, Design Fiction etc.
- Briefly, explain how the RtD methodology relates to the selected design process

2. THEORETICAL FRAMEWORK

3. RESEARCH METHODS

Description of:

- RTD
- Procedural outline of selected RTD methodology
- RTD method (RtMTD)
- Recipe of DT process and relevant design methods. (e.g. Empathise, Define Ideate, Prototype, Test)
- Refer to examples of RTD research

4. RESEARCH ETHICS (as required in standard practice)

5. LITERATURE REVIEW

5.1 Relevance (can be referred to as 'The Design Problem')

- Detailed framing of the (wicked) design problem

5.2 Invention (can be referred to as 'Related Work')

- Describe existing design solutions relevant to the design problem or user community
- These design solutions are not necessarily all related to the design field selected in the study.
- The discussion should clearly articulate why none of the described exemplars adequately resolve the framed problem

5.3 Conclude with an outline of key considerations for design practice

6. THE DESIGN PROCESS (Evaluation Criterion 1: Process)

6.1 Documentation and narrative of the practical work

- Use the DT process to structure the portfolio

7. THE EVALUATION CRITERIA

7.1 Evaluation Criteria 2: Relevance.

- Reflects on the the Design Process but substantiates claims by referring back to the literature review

7.2 Evaluation Criteria 3: Innovation and Creativity

- Reflects on the the Design Process but substantiates claims by referring back to the literature review

7.3 Evaluation Criteria 3: Extensability (can be written as

7. THE CONCLUSION)

- Personal reflection on new knowledge during the RtD project that they could apply to future design work.

8. REFERENCES

Figure 9: An outline of RtDTM for honours level projects

This outline specifies the key methodological concerns of the method. The structure of the research report is meant only as a general example and could be amended as per requirements.

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