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Analysing fourteen graphical representations of corporate real estate alignment models

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Abstract

Purpose – This paper aims to report an analysis of the graphical representations of 14 corporate real estate (CRE) models. It does this to establish the systematic, metatheoretical requirements for modelling CRE alignment which to date have been disguised in a multitude of models.

Design/methodology/approach – This meta study of CRE alignment models used a qualitative hermeneutic method to inductively develop understanding of the models' constituent parts. Several iterations of graphical and textual analysis were required to do this. Further deductive analysis sought to understand the individual models relative to this new understanding.

Findings – The analysis showed that a total of 12 components have been used to model CRE alignment. These are divided into four Building Blocks: understanding corporate strategy; understanding real estate performance; making real estate strategy; and implementing real estate strategy. While every model's representation contained the four Building Blocks, few models contained all 12 components, though all contained at least seven. Completeness of representation in this study should not be inferred as equating to effectiveness as an alignment process. Various feedback mechanisms were also evident between the components.

Originality/value – The analysis provides the most complete map of the modelling requirements for CRE alignment. It differs from previous theoretical work on alignment by synthesising a metatheory of alignment representation. By providing a more coherent theory by which to model CRE alignment the metatheory provides a consistent basis on which to investigate and theorise aspects of CRE alignment.

Keywords Corporate real estate, Alignment, Models, Theory, Hermeneutic analysis, Building blocks

Paper type Research paper

Introduction

Aligning corporate real estate (CRE) and corporate strategies for organisational value is a longstanding issue in the field. Authors have addressed this in different ways of theorising and modelling. An indicative sample is [Veale \(1989\)](#), [Nourse and Roulac \(1993\)](#), [de Jonge \(1994\)](#),

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Both authors note that they have contributed equally to its development.



Osgood (2004) and recently Beckers *et al.* (2015). Arguably, CRE alignment is a core technique and a key part of CRE executives' work (Osgood, 2009) and continues to be challenging (Cushman and Wakefield, 2017).

In theorising, there have been multiple modelling attempts – as a process and as an indicator of aligned states for individual properties or portfolios. This suggests the creation of substantive, instrumental and normative theory, as in “You (CREM practitioners) should do alignment this way”. Many alignment papers contain diagrammatic representations of processes or frameworks consistent with similar modelling in strategic management theory, for example, David's (2013) Comprehensive Strategic-Management Model (Figure 1).

Reviewing extant CRE alignment models reveals several things:

- Newer models rarely identify previous modelling efforts. Authors tend to advance their own model in isolation rarely comparing them with past models. Consequently, how models compare is not widely known in the field.
- Models are not always validated. A recent study (Heywood and Arkesteijn, 2017) showed that approximately half of the models they studied were validated.
- Even cursory examination of the models shows variable completeness by way of structure and content. Several possible explanations for this exist, but a relevant one is that models represent incomplete, imperfect views of a phenomenon. Therefore, a collective review of the models should produce a more complete representation.
- Thorough examination of the collective models is rare with five identifiable examples – de Jonge *et al.* (2008, 2009), Appel-Meulenbroek *et al.* (2010), Heywood (2011), Arkesteijn *et al.* (2015) and Heywood and Arkesteijn (2017).

Collectively, this suggests that CRE does not yet have a complete picture of what it takes to model CRE alignment. Also, inadequacies in the field's theorisation are evident by not referencing prior modelling and in the models' variability.

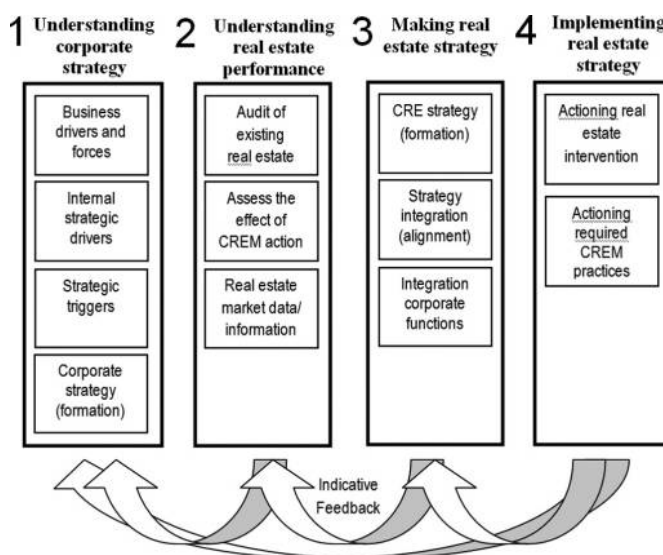


Figure 1.
CRE Alignment, the
building blocks and
components

Having posed this problem, several possible avenues towards more complete theorisation exist. Previous metatheoretical work examined CRE alignment as a phenomenon (Heywood and Arkesteijn, 2017). A study of 20 models[1] showed that only two articles defined alignment. Instead, the models relied on dictionary definitions or understandings available in the field: meanings like harmony, agreement or consistency (*Shorter Oxford Dictionary*). However, models' use various synonyms denoting the relationship lead that study to conclude, based on the synonyms' semantic quality, that alignment was a multi-valent (value) relationship. At one end is "just" having a relationship with two derivation-related links where corporate strategy "informs" CRE strategy allowing the latter to be "derived" from the former. Of higher value utility is a relationship where CRE strategy is "useful" to, and better still "strengthens", corporate strategy. Further, when the examined articles referred to alignment, different things were meant. Therefore, the study concluded that there were multiple alignment forms, multiple cognitive objects to align and multiple alignment directions. This lead to conclusions that alignment is more complex and pluralistic than individual models portray. Consequently, the dictionary definitions were augmented by including the study's four aspects in any understanding of CRE alignment. To omit any aspect in a pithy definition risked overlooking important aspects. The same work identified CRE alignment existing at the intersection of strategic management and CREM theorisations. Both academics and practitioners had contributed to the theory and which of these theorised varied over time. Approximately half the models were validated. Mixed scientific quality was evident, as they originated in reflective practice, empirical studies and normative statements (Heywood and Arkesteijn, 2017). The previous metatheoretical work suggested avenues for future research that could contribute to a more complete picture including: examining the modes of strategising inherent in the models, combining the models into a synthesised whole and modes of decision-making in alignment.

This paper's avenue is to examine the models' representations. Three questions follow:

- Q1. How is CRE alignment graphically represented in the alignment models?
- Q2. What is needed to describe a complete representation?
- Q3. What is the degree of completeness of the existing models' representation?

In doing this, the paper develops and partially supersedes previous comparative work by de Jonge *et al.* (2008, 2009) and Heywood (2011).

The paper outlines the interpretive methods used before the models are précised as a basis for what follows. The analysis' results are presented from a graphical analysis and a metatheoretical synthesis. The Discussion considers the metatheoretical consequences of this work before the Conclusion presents the paper's contribution.

Methods

This paper's meta study approach used the literature, and particularly the qualitative CRE alignment models therein, as "data". This differs from conventional literature reviews which usually establish an empirical study's theoretical basis, and differs also from quantitative meta-analyses aggregating multiple studies' results to produce more reliable findings. We too seek greater reliability but in regard to alignment and its representation. Besides, the articles analysed here usually do not have results that could be aggregated for analysis. Instead, they largely focus on capturing practice and presenting models as an aid to practice.

This paper draws from a larger study where a single set of methods produces multiple papers on different aspects of the research. Therefore, this section has similarities with other papers from the same research.

The study used a qualitative, hermeneutic method as most appropriate where interpreting and understanding a “text” (*verstehen*) is central (Patton, 1990; Bleicher, 1980). Subjective interpretation is possible but is addressed by using methodological metatheoretical rules provided by Bleicher (1980, p. 33-4). Key rules include:

- An intellectual interest in understanding its own value drives engagement, making understanding the interpretation’s highest motivator.
- Recognising that interpreting “meaning-full” objects (Bleicher, 1980) such as texts, images and social practices requires understanding the creation context to understand their meaning and the creators’ intentions. Pre-understanding is necessary, meaning that creators and interpreters must belong to a common intellectual community – a “universe of discourse”. Here, the authors as experienced CRE academics meet that criterion.
- The whole interpreted object informs the parts which in turn informs the whole (the “hermeneutic circle”) [after Bleicher (1980) and also Patton (1990)].

Mugerauer (1995) identified several interpretive approaches within the hermeneutic methods of which Traditional and Hermeneutic approaches are relevant here. Traditional interpretation uses Platonic understandings of possible ideal forms and Aristotelian understandings of things made by a human agency. This allows interpretation to examine human-created things, like CRE alignment models, in terms of its “origins or creation, its forms, materials, and context, and its ethical and intellectual impulse back to social, natural and perhaps sacred reality” (Mugerauer, 1995). This study addresses a social reality.

Hermeneutic interpretation (a distinct interpretive approach within the general hermeneutics, hence its capitalisation) aims to “clarify how understanding takes place” (Mugerauer, 1995). This may not produce new theory. Rather, its focus is on the familiar and taken-for-granted (like CRE alignment models), tracing them back to their origins aiming to reveal afresh meanings that otherwise have been obscured by time, historical shifts or forgetfulness and in doing so, enrich our understandings of them [after Mugerauer (1995)].

This paper applies both interpretive approaches, predominantly the Traditional interpretation which tries to uncover the alignment modelling reality. A Hermeneutic approach helps see afresh the taken-for-granted models where meaning has become obscured by the multiple representation attempts.

Specific methods in this study

Meaning-full objects for interpretation were identified by searching one author’s Endnote database, accumulated since 1998, containing approximately 1,800 references. Searches used one or more of these terms – business or corporate strategy, CRE strategy and alignment because these were thought to represent the phenomenon being investigated. Since the original search, more recent articles, similarly selected, were added to the database and the interpretation. This produced various (39) potential objects for analysis, though inspection indicated not all were comparable. To be comparable objects, a real estate-based diagrammatic representation was required with associated, explanatory material in an “article” [2]. There were three reasons why diagrams were used in this way. One, they were the model’s most concise representation. Two, strategic management theory also uses diagrams to represent strategic processes. Three, many of the models were processes, so diagrammatic representation may be expected. The objects excluded from analysis were:

- models for aligning CREM to improve CREM performance where CREM performance relates to CREM practices and services, and CRE relates to the real estate objects such as properties and their leases;
- similar facilities management (FM) service-focussed models. FM branded models were included that contained significant real estate elements; and
- articles on aligning single CRE or CREM factors, like location or workplace. While real estate-related, they did not have the multi-dimensionality evident in the models.

This filtering produced 14 models for interpretation. Some were explicitly called alignment models or in articles labelled as such. Others used alignment synonyms [Heywood and Arkesteijn (2017) who analysed these synonyms]. Some objects did not specifically refer to alignment, but inspecting them indicated their usefulness for more aligned CRE; therefore, they were also included. Some models in several articles by the same author(s) were treated as one model. Generally, we cite the sequences first and note the others in Table I. Some models used by more than one author were treated as one model. Here, we cite the originating author. One author presented two models sufficiently different to be considered separately.

Fully eliciting the models' meaning in their representation required multiple inductive passes through the articles. First, memos précised the articles and included the models' diagrams (Miles and Huberman, 1994). Further, iterations focussed on thematic and textual analyses useful for parts of the study published elsewhere. Here, graphical analysis was used as a form of thematic content analysis of the diagrammatic "meaning-full" objects (Miles and Huberman, 1994; Carney, 1972) to identify structures, components and feedback mechanisms. Two approaches were used. First, the authors' pre-figuring knowledge of strategic management theory, the relationships between corporate strategy and functional strategy (like CRE strategy) and the types of representations of processes evident in strategic management theory was useful. Second, because this was an interpretation, the models were also allowed to "speak" for themselves like grounded theory (Strauss and Corbin, 1990) and to suggest wholes, parts and relationships. Several iterations were

Building Blocks				
	1: Understanding corporate strategy	2: Understanding real estate performance	3: Making real estate strategy	4: Implementing real estate strategy
Components	Business drivers and forces	Audit of existing real estate	CRE strategy (formation)	Actioning the real estate intervention
	Internal strategic drivers	Assess the effect of CREM actions	Strategy integration (alignment)	Actioning the required CREM practices
	Strategic triggers	Real estate market data/information	Integration with other corporate functions (CIR/IRIS)	
	Corporate strategy (formation)			

Table I.
Summary of the building blocks and their components

Notes: NB. This categorisation differs slightly from previous publication in a conference paper as subsequent work has tested and refined the original work resulting in different components and names

required to establish these. One author leads the analysis and this was check-analysed by the others following which the findings were tested and agreed in discussions. This provided the analysis' inter-coder reliability. The final components were grouped with conceptually similar elements as "Building Blocks" as a "cognitive structure" (Ritzer, 1988) which is a mental ordering device for the abstract concepts derived from the analysis. This structure was then used deductively to examine the individual models for what they contained by way of Building Blocks, components and feedback mechanisms. The analysis was summarised in an Excel spreadsheet with cells containing the evidence for the Building Blocks', component and feedback categorisations. [Appendix](#) has a graphical analysis example. Neither images nor their graphical analyses are included because of extensive copyright permission requirements. Instead, we rely on the models' description and refer readers to the original source material.

The models

This next section précised the 14 models, their graphical representation, their constituent parts and features. Their individuality means that the descriptions vary. They are presented chronologically.

[Nourse and Roulac's \(1993\)](#) triangular model, has [Tregoe and Zimmerman's \(1980\)](#) corporate strategy drivers, (C)RE strategy and (C)RE operating decisions as the model's three vertices. Corporate strategy is based on nine driving forces, eight (C)RE strategies are provided, together with 14 operating decisions. One or more real estate strategy may apply to a driving force, but all 14 operating decisions must be addressed in each real estate strategy, though some are more important than others for any given strategy. Four questions provide crucial tests of consistency (alignment). Feedback was based on double-headed arrows between the elements at the vertices of the triangle.

[Weatherhead's \(1997, Chapter 4\)](#) linear, flowchart model sees alignment as corporate strategy that incorporates (C)RE strategy in a three-step process:

- (1) understanding real estate's role in the business;
- (2) creating CRE strategy; and
- (3) corporate strategy inclusive of real estate.

A change in the business triggers a detailed, two-figure multi-element process guiding the user through the requisite steps. Both real estate and business factors are attended to at portfolio and property object level. Feedback is implied through emphasising (as seen in the book's title) corporate strategy that includes real estate.

[White \(1998\)](#), is ostensibly about alignment because the term is used in the title, focuses on optimising CREM service delivery to raise CREM's profile. The linear model's five elements could be used to optimise delivering CRE and associated CREM services – identify key decision drivers, annual business planning process, real estate needs analysis, analyse and match to current portfolio and identify and evaluate options and agree strategic real estate plans. Feedback comes via a continuous reappraisal arrow between implementation and annual business planning process.

[O'Mara \(1999\)](#) connects (business) strategy with CRE through CRE decisions made. Two representations were used. First is a matrix to analyse environmental dynamism based on "Theories of decision-making criteria" and "Uncertainty in the strategic environment" from which three CRE strategies arise – Incremental, Standardisation and Value-based. Second, a linear structuring process model represents a decision-making process applying the three strategies. Feedback is external in an additional figure ([Figure A1](#)) through double-headed

arrows that interconnect various sources of change including real estate, corporate changes and demographics.

Englert's (2001) book provides a rectangular, four-quadrant model based on Henderson and Venkataraman's (1991, 1993) information technology alignment model. The four vertices provide different strategy points or drivers for the alignment process. Four different alignment types follow:

- (1) corporate strategy;
- (2) competitive potential;
- (3) service level; and
- (4) corporate resource infrastructure (CIR) integrated driven – now Integrated Resource Infrastructure Solutions (IRIS) (Dunn *et al.*, 2004; Materna and Parker, 1998).

Subsequently, an eight-step process is specified (nine-steps elsewhere though the difference is slight and in detail rather than intent). The text includes supporting strategic management process models and their input into strategic implementation through CRE and CREM strategies. Feedback is included through double-headed arrows between the elements in the model's vertices.

Edwards and Ellison's (2003) whole book is arguably on alignment given its subtitle but Chapters 2 and 10 are most relevant. Chapter 2's linear model (an "analytical framework") has eight steps with two feedback loops. Rather than modelling "how to do alignment", the framework is intended, with prompting questions, as a conceptual and diagnostic tool applicable to any alignment. Feedback arrows occur between formulate (CRE) strategies and the property characteristics and between performance evaluation and formulate (CRE) strategies.

Osgood (2004, 2009) maps alignment at the intersection of two circular sets of organisation and real estate parameters based on five organisational elements. Corresponding measures as well as six real estate parameters require interpretation to actualise alignment. Organisational parameters are: mission (today) & vision (future), customers and markets, products and services, distinctive competencies and values and cultures (foundation of the organisation). The real estate parameters are: space quality, costs, quantity, location, technology and space providing practices.

This real estate response is customised from a matrix identifying 80 strategic CRE issues (plus others possibly generated by the organisation's strategic managers) into consistent (aligned) real estate strategies and associated measures. The 80 issues are not provided. Feedback occurs through senior management discussions in developing the alignment map and CRE strategy which is integrated into the overall core business strategy.

The 2009 development evolved into two matrices with 40 core business elements, of which 15-25 are combined in any one business for competitive advantage, and 30 CRE enablers of which 15-20 will reinforce the business strategy. Because insufficient detail is provided, the model is highly dependent on Osgood as the analyst.

Wills's (2005) paper reviews the state of the CRE alignment literature at that time. Alignment in his Diagram 3 "refers" back to the core business. Three alignment mechanisms are included – percentage of property on the balance sheet; new, innovative off-balance sheet structuring; and problem areas of current and future values assessed. A linear decision-making process model earlier in the paper guides alignment starting with input from corporate departments and includes portfolio reviews and identifying properties'

strategic-ness. Feedback included through the element of “Always refer back to what is core business”.

Then (2005) provides a real estate and facilities services model as a linear process flowchart. Corporate strategy is the originating input for matching the future real estate and facilities services requirements against current provision. Any mismatch results in changes in:

- strategic facility planning;
- strategic asset management;
- asset maintenance management; and
- facilities services management.

Instruments for matching supply and demand over time are strategic functional briefs and service level briefs for facilities provision and facilities services management, respectively. Feedback arrows occur within the diagram between:

- performance management and strategies for facilities, assets and facilities services;
- strategies for facilities, assets and facilities services and organisational projected needs profile; and
- within the future requirements and current provision element.

Scheffer *et al.*'s (2006) model assesses the alignment state using an “adding value” premise. It uses a rectangular three-part framework linking Nourse and Roulac's (1993) business drivers with de Jonge's (1996, p. 196) seven elements of CRE added value with 25 measurable CRE items. These are scored analysing the CRE situation and assessing the driving forces' relative performance. Using the identified links between adding value elements and driving forces, a “confrontation” identifies the current alignment state. The model does not include feedback, but a form of feedback could be inferred in the article's text that argues for the model's usefulness in CREM in arguing for CREM actions, making employees accountable and in benchmarking.

Lindholm *et al.* (2006) construed alignment as CRE adding value and used two diagrams to show this. The first is a circular model locating CREM within the firm's strategic framework. The second linear model is the main alignment model with (corporate) real estate decisions and operations that support (are consistent with and therefore aligning) two core business performance measures that maximise shareholders' wealth – profitability growth and revenue growth. Subsequent versions alter the performance parameters – profitability becomes productivity in Jensen *et al.* (2012, Figure 4.2), and sustainability is added as an eighth real estate strategy in Gibler and Lindholm (2012). Feedback is via a closed loop in the corporate strategy diagram but not in the main alignment model.

De Jonge *et al.*'s (2009) rectangular model in a university textbook is presented as “designing an accommodation strategy” [that aligns through the CREM definition used from Dewulf *et al.* (2000)]. Four vertices are defined by two pairs of dimensions – current–future and demand–supply. Between the four vertices are four matching or decision points [consisting of eight or nine tasks (added in Den Heijer's (2011) version):

- (1) determine current match (between demand and supply);
- (2) determine future match (between demand and supply);
- (3) weigh and select alternatives (to create future real estate supply for the organisation); and
- (4) create the step-by-step plan (to transition from current supply to future supply).

Multiple triggers for changing the accommodation strategy are identified. Because the model is a “design” process, iterations are expected before the “final” match (strategy). Feedback could be inferred when the article’s text (p. 35) classified it as an iterative process. Later, development does include double-headed arrows between the model’s elements that were not in the original’s version (Den Heijer, 2011).

Haynes (2008, 2012) provides a ten element (10 Ps) model in the latest version (2012) with eight concentric, elliptically represented concepts (8 Ps), in a linear stacked form with results in two Ps – performance and productivity. The eight Ps provide dimensions across which alignment can (needs to be) sought to achieve results. The 2012 article adds “procurement” and “planet” to 2008’s 8 Ps. Feedback is not evident in the model or the articles.

Then and Tan (2013, Chapter 13) provide a diamond-shaped model as a “Business-FM Alignment Framework” across four quadrants defined by business-FM domains and capability-capacity. The four vertices of the model are:

- (1) business needs (informed by business strategy) in the business domain and spanning (business’) capability and capacity;
- (2) facility solutions in the capability dimension at the intersection of business and FM domains;
- (3) FM services in the FM domain and spanning FM capability and capacity; and
- (4) FM resources in the capacity dimension at the intersection of the business and FM domains (the internal FM business).

Four alignment variables and alignment forms follow:

- (1) demand for facilities (real estate) and their supply (Supply and demand alignment);
- (2) FM services for the facilities (FM service alignment);
- (3) FM resources to deliver the services (FM resources alignment); and
- (4) FM resources within the business organisation (organisational alignment).

Each alignment variable and form have four to six criteria. Seven alignment propositions are also provided, a key one which says that alignment exists when FM understands business strategy and provides FM solutions that supports customers and stakeholders. Feedback is included in double-headed arrows between the model’s elements.

Results - graphical analysis

Three approaches are evident in graphically representing alignment. The first approach uses simple geometrical structures for representation. Nourse and Roulac (1993) used a triangle with attached, peripheral elements and four structuring questions. De Jonge *et al.* (2009) and Englert (2001) used rectangular diagrams with four main elements, one at each vertex. Rectangular matrices were also evident with Scheffer *et al.* (2006), Osgood (2004, 2009) (primarily) and O’Mara (1999) (partially). Then and Tan’s (2013, Ch 13) was a diamond-shaped model with peripheral elements and guiding questions. Rounded figures were evident in Osgood’s (2004) intersecting circles in part of his representation, while Lindholm *et al.* (2006) used a circular model to locate CREM strategically. Haynes (2008, 2012) used stacked ellipses to represent his eight main elements. A second approach uses a two-part representation with a strategic management diagram followed by the main CRE-specific alignment model as in Lindholm *et al.* (2006), O’Mara (1999) and Englert (2001). The

models' geometrical forms are noted above or below, as appropriate. A third approach provides a structured, linear process. Some have relatively few steps. White (1998) and Edwards and Ellison (2003) have seven and eight steps, respectively. Wills (2005) has a two-part linear process with relatively few steps in each part. O'Mara (1999) has a linear structure decision-making process based on two central elements with peripherally located consequential steps depending on the state of those central elements. Haynes' (2008, 2012) stacked ellipses infer linearity. Two linear models are considerably more complicated. Weatherhead (1997) has three stages with multiple strands of action and many individual steps within both the stages and strands. Then's (2005) flowchart is similar which may explain the re-working and simplification in Then and Tan (2013, Ch 13). These complicated flowcharts while appearing comprehensive could be difficult to follow as instrumental theory.

Different approaches were also evident in the models' degree of prescribing specific methods to follow. One approach provides detailed, prescriptive step-by-step processes (effectively an algorithm to follow), for example, Weatherhead (1997) and Then (2005). A second approach presented loose-fitting, accommodating "frameworks", like Englert (2001), Haynes (2008, 2012) and de Jonge *et al.* (2009).

Framework models suggest more strategic and flexible alignment, theoretically and practically. They are strategic by setting an overall, future-shaping direction with tactical and operational tools and techniques to deliver that. Because different organisations have different strategies, over time, even in the same market, a flexible framework seems more useful theoretically in accommodating those differences. Flexibility also means not locking alignment into a rigid plan or process. A loose-fitting scaffold is provided on which to hang methods at particular junctures. Some frameworks, for example, de Jonge *et al.* (2009) and Haynes [in Appel-Meulenbroek and Haynes (2014)] provide accompanying suites of theoretical tools and techniques. In practice, tools and techniques could be adopted from these theoretical sources or from practitioners' own suites of techniques.

Also, there are framework models, like Osgood (2004), that are analyst-dependent requiring the author to be implementable. Some tools and techniques are illustrated with excerpts of a strategic alignment map (Figure A2) and a map for three potential aligned futures (Figure 4), but there is insufficient detail for someone else to adopt the model. We recognise that proprietary knowledge is involved, but if an intention exists to disseminate models into alignment practice then, without the detail, reverse engineering would be necessary.

Results - introducing the building blocks

The interpretive process yielded 12 components that can be grouped into four conceptual Building Blocks as an organising cognitive structure (Table II). This provides the metatheoretical overview of CRE alignment modelling requirements and this is developed further below. The cognitive structure shows that understanding both corporate strategy and dimensions of CRE performance could be considered the foundation and alignment prerequisites. On those foundations, CRE strategy can be made and implemented. A brief overview of each Building Block is provided below. Their constituent components are discussed in relation to the tables for the individual Building Blocks below.

Building block 1

This Building Block is about understanding the corporate strategy, the factors that give rise to strategies and the strategizing itself. This means that alignment is more than just knowing "What is the business and its strategy (ies)?" or the business "needs"; it is also

Table II.
The models' total
number of
components

Alignment models														
Nurse and Routlac (1993) ^a	Weatherhead (1997, Ch. 4)	White (1998)	O'Mara (1999)	Englert (2001)	Edwards and Ellison (2003)		Osgood (2004, 2009) ^b	Wills (2005)	Then (2005)	Scheffer <i>et al.</i> (2006)	Lindholm <i>et al.</i> (2006) ^c	de Jonge <i>et al.</i> (2009) ^d	Haynes (2012)	Then and Tan (2013, Ch 13) ^f
													Haynes and Nunnington (2010) ^e	
7	12	9	9	10	10	10	11	9	10	10	9	10	10	9

No. of components present ($n = 12$)

NB The count does not include external components because of the focus on the representation in the model

Notes: ^aAppel-Meulenbroek *et al.* (2010), used and validated this model. Routlac (2001) similarly relies on this. ^bOsgood (2009) simplifies the 2004 version somewhat. ^cOther articles with this model include Gibler and Lindholm (2012), Lindholm (2008), Lindholm *et al.* (2006), and Lindholm and Gibler (2006). ^dIncludes de Jonge *et al.* (2008) and Den Heijer (2011). The latter refines the earlier versions. ^eTwo versions exist – the model cited and analysed here and Haynes (2008) with eight components. ^fModel validated in Then *et al.* (2014)

understanding its strategic basis, the dynamics of that basis and the organisational strategy creating process.

Building block 2

This Building Block's three components are about understanding the real estate objects' performance in relation to alignment. They refer to the state of the portfolio and its individual real estate objects, knowing how CREM actions change alignment states, and grounding CRE alignment decisions within real estate markets. Performance's evaluative basis is unspecified here but various ways are suggested for how to do this for the various roles CRE performs in organisations – as a factor of production, a corporate (balance sheet) asset, a corporate investment, a real estate commodity and in contributing to the public realm (Heywood and Kenley, 2013).

Building block 3

The three components of this Building Block form the actual CRE strategy making. They represent the strategy itself and its formation, an act where the corporate and CRE strategies are actually aligned (ahead of Building Block 4's implementation), and relationships with other corporate functions through the CIR-IRIS concept.

Building block 4

This Building Block is about making the actual changes to reach alignment in two components. These are the operating real estate and management decisions that are core CREM practice.

When considered collectively, the analysis' 14 models, notwithstanding the observed variability, do represent fair though imperfect alignment modelling attempts (Table I).

All models analysed have at least three-quarters of the full set of components and eight (57 per cent) have at least ten, making the models relatively complete representations of alignment. However, only two models were complete or near-complete [Weatherhead (1997) – all 12 – and Osgood (2004, 2009) with 11 of 12] but these have issues, as discussed elsewhere. Not all the identified components were fully evident. Some required interpretation to arrive at an “implied” finding, for example, from the “other function strategies” in Lindholm *et al.*'s (2006) first, circular strategic management diagram integration between these and CRE strategies can be implied, though this was not explicit. Others, where components were evident, for example, White (1998) “Actioning the required CREM practices” had one or two practices (outsourcing in White's case). This is not comprehensive given that Heywood and Kenley (2008) identified 162 practices.

The completeness of representation now evident from this meta study's aggregated components is desirable when representing and understanding alignment. Incompleteness suggests that not all aspects of alignment are captured in the modelling. It should be noted that when we discuss completeness we do not suggest that a model is more useful or better by being complete. Different research is necessary to reveal that which tested the models' working in practice through, for instance, being clearer (Appel-Meulenbroek *et al.*, 2010), easier to use, or produce more aligned corporate and CRE strategies. However, incompleteness does suggest that aspects are missing if such a model was adopted for alignment in practice and be less efficacious as a result.

This understanding is very important in CREM where the real estate objects' service lives exceed business cycles. With shortening business cycles (McGrath, 2013) it is even more important that CREM understands the organisation's deep strategic impulses. Arguably, given real estate's longevity, CREM needs to do this better than those for whom corporate strategising is core. This means that CREM needs a high strategic capacity through deep understanding of the economic, business and demographic factors affecting the organisation. Further, CREM needs strategic capacity as better than other parts of the organisation to enable or add value to the business with real estate durable through changing circumstances. Changing circumstances generate triggers requiring a CREM response. However, not all triggers are strategic and CREM in being responsive (however desirable), it is easy to be reactive rather than strategic. By strategic we mean changing futures or choosing between alternative futures, which is not the same as long-range planning which extends existing circumstances forward (David, 2013). It is to ensure strategic capacity that this building block contains the components it does. The listing appears top-down but could equally have any component as an initiating point, provided all were addressed (Figure 2).

External business drivers and forces. This component identifies the organisation's external impacts that require strategic responses. They are the underlying external operants that affect the business creating something like a “force-field” in which the business operates. We distinguish between external and internal drivers because these are the two perspectives organisations must resolve in making strategy (Heywood and Kenley, 2008). Understanding how these change is also important. Particular changes – so-called disturbances in the force field – become strategic triggers, as discussed below. Several models of drivers and forces have been advanced in the alignment models. Porter's (1980)

Figure 2.
Building Block 1 and
its components

five forces model is a famous one. More CRE focussed, [Nourse and Roulac \(1993\)](#) use nine strategic driving forces from [Tregoe and Zimmerman \(1980\)](#) as driving strategies – Products, Markets, Technology, Production, Resources, Distribution, Sales, Growth and Profit. Few of these operate purely externally, perhaps only Markets; a few operate purely internally (see below), and most appear blended external and internal forces, for example, Technology can be externally generated, or self-developed internally. Nearly all models (13 of 14) included this component.

Internal strategic drivers and forces. This component is the internal equivalent to that above, considered in two ways. One relates to those generated through internal support functions – the CIR-IRIS concept ([Dunn et al., 2004](#); [Materna and Parker, 1998](#)). These functions' forces are focussed on here because responses to drivers and forces on core functions, like Operations, should be evident in corporate strategy itself. Through the CIR-IRIS model these functions provide CREM's internal "force fields" through things like ways of working (originating in Human Resources [HR] and Information Technology [IT]), customer interaction and corporate branding (originating in Marketing) and property accounting methods (Finance originating). Of [Nourse and Roulac's \(1993\)](#) driving forces, probably only Products and Production are purely internal. A second way of understanding internal drivers and forces is the so-called "soft" or "social" management dimensions, for example, leadership styles and methods, entrepreneurship, culture and organisational structures. All the studied models included this component.

Strategic triggers. This component is for understanding what it is in the organisation's operating context that creates organisational change. This includes the business environment's inherent dynamics. This indicates the underlying frequency with which strategic triggers emerge. Specific change in the drivers and forces – changes in magnitude and timing – are clear strategic triggers.

However, not all CREM triggers are strategic. Non-strategic triggers include, lease expiries where occupation continues across the renewal and, in owned CRE, renewal of building components without substantively changing the property's service level. Strategic triggers can originate in the business context or from the portfolio where things like disasters and future property opportunities emerge ([de Jonge et al., 2009](#)). Less than half the models (6 of 14) included this component. It is possible that the models that did not include this component assumed that a strategic trigger has already occurred in the re-alignment need.

Corporate strategy (formation). This component includes the identification of the corporate strategies and how the organisation forms strategy because what is required is more than "just" knowing what the strategy is. This component is particularly informed by [Weatherhead's \(1997\)](#) argument for corporate strategy that includes real estate – the metaphorical "being at the boardroom table". Many possible approaches to strategizing exist that are relevant to understanding strategizing and operating as a corporate strategist ([Idenburg, 1993](#); [Mintzberg et al., 1998/2007](#)). Their detailed consideration is beyond this paper's scope, but the important point for the CRE alignment models' makeup, is that such models include not only corporate strategy as a product of strategizing but also the strategizing itself. All but one models (13 of 14) included this component in their graphic representation.

Building block 2: Understanding real estate performance

This Building Block consists of the components required to understand real estate performance in alignment ([Figure 3](#)). Performance and its measurement have long featured

Building Blocks components	Alignment models														Total (n=14)
	Nourse and Roulac (1993)	Weatherhead (1997, Ch. 4)	White (1998)	O'Mara (1999)	Englert (2001)	Edwards and Ellison (2003)	Osgood Jr (2004& 2009)	Wills (2005)	Then (2005)	Scheffer et al. (2006)	Lindholm et al. (2006)	de Jonge et al. (2009)	Haynes (2012) Haynes and Nunnington (2010)	Then and Tan (2013, Ch 13)	
Building Block 2: Understanding real estate performance															
Audit of existing real estate	■	■				■	■	■	■	■	☒	■		■	9
Assess the effect of CREM actions	■	■	■	■	■	■	■	■	■	■	■	■	■	■	13
Real estate market data/information	☒	■	☒			■	■		■	■	■	■	■		8
NB the count does not include external components															
Legend															
■	Included explicitly in the model														
■	Implied in the model														
☒	External to diagrammatic model but in the text														

Figure 3.
Building Block 2 and
the components

in CREM. Though not considered here, possibly not all CREM performance measures are relevant to alignment.

Audit of existing real estate. This component assesses the current state of portfolios and individual properties prior to alignment actions, thereby benchmarking future assessments. “Audit” is chosen deliberately though it was more associated with CREM before 2000 when audits were used to reveal the portfolio’s state, often for the first time. While knowledge of CRE alignment states has increased since then, “audit” still usefully captures ongoing, periodic assessments (benchmarking) against current strategic objectives. Audit also suggests formal, systematic and rigorous evaluations. The many bases for auditing are not examined here. Approximately, two-thirds of models (9 of 14) included this component. Its absence could be attributable to earlier auditing resulting in a re-alignment need with the modelling, assuming this has occurred before initiating re-alignment using the model.

Assess the effect of CREM actions. This component is for assessments, other than an original audit, of the effect of possible CREM alignment actions. Usually, this is post-alignment but pre-knowing the effects of CREM actions helps decide the CRE strategies in Building Block 3, and Building Block 4’s interventions to use. Various techniques are available such as re-evaluation using original audit criteria, gap analyses and post-occupancy evaluations. Almost all models (13 of 14) included this.

Real estate market data/information. This component captures the information required to evaluate a portfolio and its real estate objects. This data/information provides a foundation for creating CRE strategies that are “commercially viable”. This means that real estate products are available or potentially available in locations and at prices to satisfy alignment requirements. Without recognising market realities, it is possible to overspend on inappropriately located “palaces and Taj Mahals” as previously occurred (Joroff *et al.*, 1993). Where specific real estate objects sit in the real estate market (and aggregated to the whole portfolio) needs to be understood and market information and data provides this. Just more than half of the models (8 of 14) included this component. The absence may be because of a

reliance on CREM's own tacit knowledge of markets, therefore overlooking the need to explicitly include it.

Building block 3: Making CRE strategy

This Building Block represents components in making a CRE strategy (Figure 4). This is more than just “having” or even forming CRE strategies. A point of integration is necessary, and given the degree of inter-functional relationship with other corporate functions, they also require inclusion in making CRE strategy.

Corporate real estate strategy (formation). This component recognises the models' two dimensions related to CRE strategy – listing or documenting various strategies (the models contain CRE strategies) and ways of creating CRE strategy. Nourse and Roulac (1993), de Jonge (1996), O'Mara (1999), Lindholm *et al.* (2006) and Appel-Meulenbroek *et al.* (2010) all list possible CRE strategies. Models like de Jonge *et al.* (2009) and Edwards and Ellison's (2003) develop ways of creating CRE strategies without necessarily predefining them. Others, like Haynes (2008, 2012) suggest where strategies are required. All models included this component which is logical given the modelling's purpose.

Strategy integration. This component recognises that CRE and corporate strategies need bringing to an actual alignment state. Based on dictionary definitions (*Oxford English Dictionary*) either the corporate or the CRE strategies could move. Most usually, this is interpreted as the CRE strategies being chosen or altered for consistency. This assumes a top-down derivation of CRE strategy, which is not a bad thing, though this may not fully capture a bi-directional quality where corporate strategy also alters, as informed by Weatherhead's (1997) “corporate strategy that incorporates real estate”. Just more than three-quarters of models (11 of 14) included this.

Integration with other corporate functions. This component recognises that CRE strategy is rarely enacted alone and often requires other corporate functions, like HR and Finance to achieve desired strategic outcomes. Forms of inter-functional

Building block components	Alignment models														
	Nourse and Roulac (1993)	Weatherhead (1997, Ch. 4)	White (1998)	O'Mara (1999)	Englert (2001)	Edwards and Ellison (2003)	Osgood Jr (2004& 2009)	Wills (2005)	Then (2005)	Scheffer et al. (2006)	Lindholm et al. (2006)	de Jonge et al. (2009)	Haynes (2012) Haynes and Nunnington (2010)	Then and Tan (2013, Ch 13)	Total (n=14)
Building Block 3: Making real estate strategy															
CRE strategy (formation)	■	■	■	■	■	■	■	■	■	■	■	■	■	■	14
Strategy integration (alignment)	■	■	■	■	■	■	■	■	■	■	☒	■	☒	■	11
Integration with other corporate functions (CIR-IRIS)	■	■			■		■	■		■	■		■	☒	8
NB the count does not include external components															
Legend															
■	Included explicitly in the model														
☐	Implied in the model														
☒	External to diagrammatic model but in the text														

Figure 4.
Building Block 3 and
components

coordination are important for enterprise value (Kaplan and Norton, 2006). Shared services models do this, like the CIR-IRIS models (Dunn *et al.*, 2004; Materna and Parker, 1998). Just more than half of the models (8 of 14) included this. This could be explained by the CRE focus in the models' intended audience despite the long existence of the Corporate Infrastructure Resource (CIR) concept. Half of the models that predated CIR's introduction still included this relationship.

Building block 4: Implementing real estate strategy

This Building Block is about changing real estate objects, the portfolio and CREM practices to deliver aligned strategies (Figure 5). In an alignment process, assessing the effects of CREM actions (from Building Block 2) is a necessary test of implementation.

Actioning the real estate intervention. This component involves the portfolio changes to individual real estate objects that are necessary to actualise aligned CRE and organisational strategies. Various authors suggest types of decisions, for instance, Nourse and Roulac (1993) identify 14, Lindholm *et al.* (2006) identify seven [8 in Gibler and Lindholm (2012)] and Scheffer *et al.* (2006) identify 25 measurable CRE items. In addition, de Vries *et al.* (2008) identified five applicable types of real estate interventions. From their implications, these operating decisions may also be called strategic real estate options but essentially they are transaction-based decisions about "acquiring controlling, managing, and disposing of real property interests" (Nourse and Roulac, 1993, p. 486). It is a working assumption that over time, the portfolio's alignment improves from more aligned real estate objects. Business dynamics raise questions as to whether perfect alignment is ever achievable because over time context and requirements change. At best, alignment might be partial in the portfolio, though more complete for any one object.

Actioning the required CREM practices. This component recognises that CREM practices are also required to reach alignment. These are extensive with at least 162 being identified (Heywood and Kenley, 2008).

Building Block components	Alignment models														Total (n=14)
	Nourse and Roulac (1993)	Weatherhead(1997, Ch. 4)	White (1998)	O'Mara (1999)	Englert (2001)	Edwards and Ellison (2003)	Osgood Jr (2004& 2009)	Wills (2005)	Then (2005)	Scheffer et al. (2006)	Lindholm et al. (2006)	de Jonge et al. (2009)	Haynes (2012) Haynes and Nunninton (2010)	Then and Tan (2013, Ch 13)	
Building Block 4: Implementing real estate strategy															
Actioning the real estate intervention	■	■	■	■	■	■	■	■	■	■	■	■	■	■	14
Actioning the required CREM practices	☒	■	■	■	■		■	■	■		■			■	9
NB the count does not include external components															
Legend															
■	Included explicitly in the model														
■	Implied in the model														
☒	External to diagrammatic model but in the text														

Figure 5.
Building Block 4 and
components

Feedback in models

The third aspect of graphically representing CRE alignment was the models' treatment of feedback. Ten of the 14 models (71.4 per cent) explicitly included some feedback. Another three (21.4 per cent) included reference to feedback externally to the analysed model, for instance, in the article's text. Various approaches were evident but broadly can be categorised as occurring between components in one Building Block and another:

- (Formulating) CRE strategy (a Building Block 3 component) and the CRE itself (Building Block 4) ([Edwards and Ellison, 2003](#));
- performance evaluation/management (Building Block 2) and (formulating) CRE strategy (Building Block 3) ([Edwards and Ellison, 2003](#));
- aligned CRE and core business (Building Blocks 1 and 3) ([Then, 2005](#); [Wills, 2005](#));
- future requirements and current provision (of CRE) (Building Blocks 2 and 3) ([de Jonge et al., 2009](#); [Then, 2005](#));
- within corporate strategy processes (Building Block 1) (with CRE embedded in that in some way) (Building Blocks 2 and 4) ([Weatherhead, 1997](#); [Lindholm et al., 2006](#); [Osgood, 2004](#); [White, 1998](#));
- double-headed arrows within the diagram between the model's elements were often used indicating action and feedback ([Englert, 2001](#); [Then and Tan, 2013](#); [den Heijer, 2011](#); [Nourse and Roulac, 1993](#)); and
- inferred within management practices as a vehicle for improvement/performance ([Scheffer et al., 2006](#)).

Discussion

This meta study was motivated by a perceived need to reconcile the observed variability in CRE alignment models and to more completely represent CRE alignment. Two main explanations for this variability were offered. First was that individual models offer partial views of a phenomenon. Second, is that often, new models appeared without reference to extant alignment modelling. Both explanations represent inadequacies in theorising and point towards meta theorisation being needed to:

- interpret and aggregate the pre-existing theory to reveal more completely the partially revealed phenomenon as a social reality [after [Mugerauer \(1995\)](#)]; and
- examine the extant modelling in a way that has not been done previously with potential benefits of increasing theoretical self-consciousness in the field ([Ritzer, 1988](#)).

The results above show that representing alignment's "social reality" needs four Building Blocks, their 12 components and feedback between the components and the Building Blocks ([Figure 1](#)).

These graphically represent the CRE alignment phenomenon's underlying cognitive structure, as that social reality. In calling it that we accept that there is a reality, which in this case relates to the social practices of CREM. As a cognitive structure, this provides a more systematic and reliable way of understanding previous CRE alignment modelling. At least four things follow.

First, the cognitive structure is a metatheoretical thing; that is, a higher order, more robust level of theorisation, one step removed from that encountered in the alignment models themselves. That modelling's theorisation develops substantive theory of the

practical, empirical domain which may, or may not, have value as instrumental theory applicable to practice. The latter is seen in some models' normative theory, as in "You should do alignment this way". Instead, this metatheoretical work seeks the phenomenon's fundamental aspects to provide a more robust and reliable basis to any future substantive and instrumental theorisation.

Second, the metatheory is an abstraction that collects related cognitive objects into the Building Blocks. As an abstraction, these are not necessarily hierarchical within the Building Blocks, they are just lists of the Block's identified sub-elements. Having said that, the Building Blocks do contain an implicit sequence through their numbering making them, superficially, appear alignment process-like. Partly, this is a consequence of the metatheoretical work done here that engages with a system that is a process, as one of the evident alignment forms in the alignment phenomenon (Heywood and Arkesteijn, 2017). Therefore, engaging with a process at the substantive theory level almost inevitably yields something that looks process-like as metatheory.

Third, though abstract, the metatheory is more complete by showing all the elements – all the necessary high-level cognitively related components are in Building Blocks, and feedback is indicated between them. Also, the figure above does not show specific feedback relationships because the analysis showed various possible relationships between components and between Building Blocks. However, analysing the CRE alignment representations does not, on its own, produce a complete metatheory. Previous metatheoretical work examined CRE alignment as a phenomenon (Heywood and Arkesteijn, 2017). That work revealed:

- the underlying theories that defined the phenomenon;
- theory's origins, that is who is doing the theorising and how the theory is created;
- theory's scientific basis; and
- how the theory is disseminated.

This has implications for theory's potential take-up in practice.

This work adds to and builds on that metatheory.

Fourth, from that previous meta theorisation, the components organised here into Building Blocks could also be understood as types of cognitive objects (Heywood and Arkesteijn, 2017). They also represent multiple alignment directions. Building Block 1 is composed entirely of cognitive objects of the "Business strategies and context" type. Building Block 2 has "CRE object" type cognitive objects that focus on CRE objects – properties, leases and buildings – and their characteristics. In addition, in Building Block 2 assessment the effect of CREM actions could also be a cognitive object of the "Business performance" type because CRE's effects on the business are a key CREM question. Building Block 3 has components that are all of the "CRE strategy" type but other than CRE strategy itself these components also function as "Business strategy and context" type objects. Building Block 4 is entirely composed of "CRE objects" and "CREM objects".

Hermeneutic interpretive analyses may not produce new substantive theory directly instrumental to the field. Instead, they represent opportunities to look afresh at the familiar and to see it, through the meta theorisation, in a higher order way – for what it is fundamentally. This analysis' resolving the higher order elements into more robust and reliable theory, may allow development of more instrumental CRE alignment theory. That is not done here but this analysis shows what instrumental theory needs to address.

This analysis also suggests that instrumental theory should be based on loose-fitting frameworks or scaffolding to locate the more fine-grained substantive and instrumental

theory already available or created in future, but which currently is not otherwise well organised. Before that instrumental theory is developed, we suggest that alignment-in-practice needs checking using this metatheory. We argue this because while there is evidence of theorisation, and validation of that theory, the literature has little evidence of practice using this theory. This begs the question, despite previous theorisation, of what actually occurs in practice. Checking what actually occurs in practice, based on this metatheory, and would inform the development of future instrumental theory.

It was noted above that benefits of increasing theoretical self-consciousness in the field were available from meta theorising. There is benefit from just observing and reading the documentation of someone else's metatheory. Further benefit can be had from identifying existing theorisation for what it is. Some previous CRE alignment work consciously takes strategic management theory (as arguably a high-level form of CREM theory) and translates it down into real estate language. Two authors that clearly did this are [Nourse and Roulac's \(1993\)](#) use of [Tregoe and Zimmerman \(1980\)](#) and [Appel-Meulenbroek *et al.*'s \(2010\)](#) use of [Swayne *et al.* \(2006\)](#). More broadly, analysis shows that this consistently features in much CRE alignment work ([Heywood and Arkesteijn, 2017](#)), though not all could be called self-conscious. What this metatheory does is to take the existing real estate language found in the 14 models and translates that back up into higher level, more robust theory. This can then be used to consciously develop more robust instrumental theory useful in practice.

Conclusion

This paper used 14 theoretical CRE alignment models to systematically map the underlying phenomenon that individual models partially report and theorise. While various graphical representations and constituent elements were found, a metatheoretical synthesis was possible to inductively arrive at four Building Blocks, 12 components of CRE alignment modelling and feedback between the components and Building Blocks. This mid-level metatheory provided a framework to deductively analyse the existing models. Most models were not complete, as in all 12 components were present, though at least seven were. Some models relied on their article to provide some of the other components. Complete in this study does not mean better which could be investigated further.

Metatheoretical work is useful, in its own right and for what it adds to the field through increased theoretical self-consciousness. The study's resultant metatheory may not be immediately applicable into practice because of its abstraction but it does provide for further alignment theorisation and does point towards other, more practice-focussed theorisation based on this work.

From this meta theorisation two possible research streams are apparent. One stream further orders the theory extending the work here. The second further investigates alignment in practice.

In the theory stream, we identify a need to investigate theoretical modes of strategizing inherent in the models because preliminary work suggests a limited set of modes may be underpinning the models. This may be impeding the development of alignment theory that accommodates dynamic and pluralistic strategy formation. A second theoretical need is research into alignment decision-making and judgement; for instance, how is alignment known to be achieved, or not. A third theory investigation is the possibility of developing a single technology or model. This could integrate the literature's various theoretical tools as a potential basis for alignment practice.

The practice stream needs research into how alignment is actually done. Past surveys show that practitioners know whether and how much of their portfolio is aligned, and previous work by the authors ([Arkesteijn and Heywood, 2013](#)) shows limited knowledge of

theoretical alignment models in practice. So, how are they doing it? That research seems to indicate a more grounded approach than developing a theoretical explanation and testing it empirically. Also, there is a need to investigate, in practice, the alignment forms as a process, alignment states, alignment behaviours and as a plan (Heywood and Arkesteijn, 2017). Multiple studies of each would allow meta studies to identify robust, empirically grounded generalisations of CRE alignment. These are some suggestions but a full outline of an alignment research agenda, perhaps, requires a separate investigation.

Notes

1. Not all had graphical representations so were not included in this study.
2. “Articles” here denote book chapters, reports, conference papers and journal papers. “Texts” were not used because interpretive methods can denote anything subject to interpretation as a “text” – movies, buildings, social practices, as well as documents.

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Illustrating the graphical analysis technique

These two diagrams contain the model's final deductive analysis to illustrate the graphical techniques used. The annotations identify components evident in this particular model's analysis. All other models were similarly treated.

All the models are not illustrated because of the extensive copyright approvals if all were included. The authors are happy to discuss individual models' analysis.

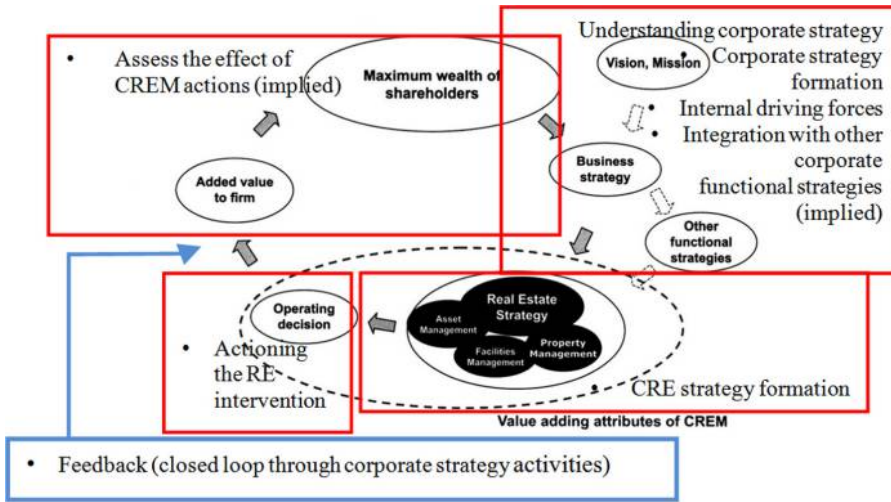


Figure A1.
Analysing the
circular strategic
management model

Notes: After: Lindholm *et al.* (2006) Figure 1

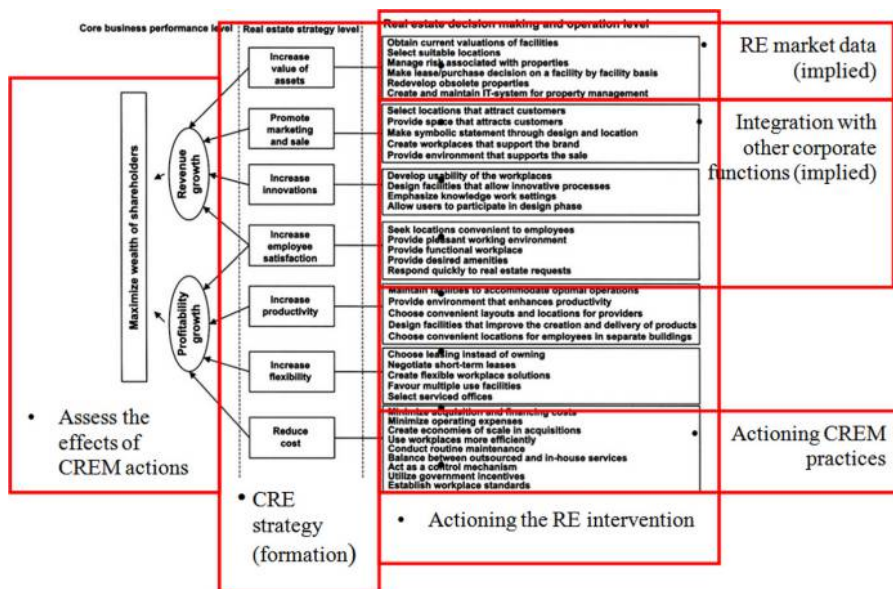


Figure A2.
Analysing the main
alignment model

Notes: After: Lindholm *et al.* (2006) Figure 2

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