22ND ANNUAL PACIFIC-RIM REAL ESTATE SOCIETY CONFERENCE

SUNSHINE COAST, QUEENSLAND, AUSTRALIA 17-20 JANUARY 2016

WORK-ARCHITECTURE, A NEW SPACE FOR REAL ESTATE

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Keywords: Supply Chain Networks, Bundled Offerings, Real Estate, Information Age, Transaction Costs

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This research is funded by the CRC for Low Carbon Living Ltd supported by the Cooperative Research Centres program, an Australian Government initiative. The author would also like to acknowledge the support of Brookfield Global Integrated Solutions Ltd. and the insightful comments of Dr Christopher Heywood.

Introduction

Corporate Real Estate is broadly understood to be real estate in use by a firm, its possessive noun "corporate," the legacy of a time when most firms, both owned and operated their real property. Corporate Real Estate has been defined as "*…a major part of the real estate economy's demand-side and houses the productive or business activities of an organisation that owns or leases real estate incidental to its business objectives, where the primary business is not real estate".*(Kenley, Brackertz, Fox, Heywood, Pham, Pontikis, 2000)

In Porters (1985) prevailing Value Chain model of the activities within the firm real estate is described as infrastructure. Infrastructure by definition supports or underpins but does not form part of. For Porter infrastructure is a secondary activity distinct both from the other secondary activities of human resources and information technology and also from the primary activities of the core business of the firm it supports.

In the information age the relationships between those functional groupings within the firm which organize its activities, resources and capabilities, that is a firm's organizational architecture, have become more complex. The resource of real estate may act as supporting infrastructure or be procured through an outsourced commercial real estate, property or facilities management services firm. It may be procured whole or in part, outright or leased, and separately or bundled together with a range of other products, services and information goods such as strategic planning, information and communications technology, or concierge services. It may act as a secondary resource supportive of a firm's core business but it may also form part of the core capability, a primary activity, and be procured in the same manner as the firm's primary inputs. A commercial real estate firm, whose primary business *is* real estate, might name these real estate resources and capabilities, whether in-house or external to the firm, in either its own organizational architecture or that of the outsourcer, "Corporate Real Estate" or "facilities", "infrastructure" or an "integrated solution." In the information age there is a need for a new model of the real estate space which simplifies this new complexity.

Adopting the Resource Based View of the firm and using an overview of the Information Economics and business literature on Transaction Cost Theory this paper describes two information age characteristics which are essential to the transformation of the way real estate is used by firms: 1. Recombinant Real-estate Supply-chain networks and 2. Bundled, material, human and informational, resources and capabilities. This literature is then used to support the Work-architecture model which appends Porters (1985) Value Chain. Finally the Work-architecture model is applied across examples of traditional and innovative offerings in which real estate plays a part. These include: Airbnb, an offering

which bundles residential real estate with the information technology of an app and dis-intermediates hotel companies completely out of their supply chain networks; Plug 'n' Play or serviced offices which can be leased on very short minute or hourly leases and which bundle a commercial real estate space booking app with utilities, furniture, and concierge services and which sit on a supply chain network which intermediates between sub-tenant and end user whether firm or individual; and Cross Docking, developed by Walmart and as recently announced by Amazon for its China operations, in which warehousing real estate - an erstwhile secondary activity frequently outsourced, is brought back within the firm, acknowledged to be a primary activity just long enough for it to be completely dis-intermediated from its supply chain network by an app which enables the tracking of incoming goods to be transferred from transport mode to transport mode across the dock, avoiding the warehouse real estate altogether.

The significance of the Work-architecture model for the real estate professional is that it involves skills which cross between material, human and information resources and capabilities but does not necessarily exclude the need for specialist expertise in any one category. So long as humans continue to have corporality, have not been replaced by cyborgs or robots, and continue to have the need for shelter, real estate is not going to suddenly dematerialize. However real estate professionals require a better understanding of the new space for real estate in order to anticipate, adapt to, create value through, or even be the innovator of new Work-architecture offerings.

The Boundary of the Firm

Ashkenas et al (1992) in writing in the business literature describes the information age firm as a "Boundaryless Organization" with vertical, horizontal, and geographic boundaries having been "crossed" and their being free movement of goods through and out of the firm and into the supply chains. An overview of Transaction Cost Theory of the firm from Economics literature reveals a more nuanced picture. While some boundaries have been crossed, other boundaries have been reinforced or created. While the boundary of the firm may shift it does not disappear. The boundary of the firm remains and is reinforced by corporate law and the transaction costs on either side of it which serve to define the firm itself.

Ronald Coase (1937) bases the very existence of the firm upon "marketing costs." He asks if, as Adam Smith had famously observed, markets were the most efficient way to undertake transactions - why do some transactions take place inside the firm? Coase(1937) reasons that this is because those transactions which took place inside the firm avoid the "marketing costs" which occur if those

transactions take place beyond the boundary of the firm in the unassisted market place. These marketing costs involve the cost of price discovery, negotiation costs and the ex-post haggling over price and the division of surpluses. Coase's theorem (1937) states that in the absence of marketing costs all transactions flow to where the economy would use them most efficiently.

Coase's (1937) marketing costs have since become known as "transaction costs" and become the foundation of the Transaction Cost Theory of the Firm. A major contributor to this theory is Oliver Williamson (1975, 1979, 1985) who adds ex-ante costs to Coase's ex-post costs and further differentiates between those transactions undertaken inside the firm, those undertaken in the external market, and those undertaken in some hybrid of the two. He describes how transactions require ex-ante investment in physical or human assets which are in their highest and best use when specific to that asset. The specificity of these "dedicated assets" is drawn from their customized characteristics such as, in the case of physical assets, the location of buildings and facilities, or in the case of human assets, specialist training. The greater the need for investment in the specificity of these physical and human assets the more efficient it is for that transaction to occur within the firm than for it to occur in the unassisted marketplace (Williamson 1975, 1979).

Williamson (1975, 1985) also describes the difference between the risk and incentives involved in those transactions which take place within the firm and those that take place in the external market. Accepting the bounded rationality, guile and opportunism of all parties, ex-ante investments in assets dedicated to market place transactions could expose the party who had made the greater investment in these customized assets to "lock-in." This may occur when an opportunistic buyer, in the absence of a significant number of alternative buyers, renegotiates ex-post to the transaction, exposing the seller who has made the larger ex-ante investment in those specific, customized, dedicated assets to become locked into the transaction and not be able to cancel or get out without significant cost. This Williamson (1985) describes a "hold-up" – of the party with the greater investment in the transaction but the weaker ex-ante negotiating position, by the party with the lesser investment but the stronger ex-ante negotiating position who could therefore threaten or walk away from the transaction with the lesser costs. Furthermore the prospect of a hold-up may discourage the party with the greater investment from undertaking the transaction in the first place which is good for neither party as both would miss out from the benefit of the transaction. Consequently both parties stand to benefit if they developing structures of market governance and safeguards which instill confidence and prevent opportunism (Williamson 1975, 1985).

Grossman and Hart (1986) and Hart and Moore (1990) describe how contracts can be used to solve the hold-up problem. Contracts are written or spoken agreements which are enforceable by law but

are necessarily incomplete in that they cannot anticipate all contingencies. In order to prevent opportunism, instill confidence, and safeguard the party with the greater investment in a transaction, Grossman and Hart (1986) and Hart and Moore (1990) describe a contract which can award all residual claims, the greater surplus, and the right to walk away, to that party. The contract can also stipulate that the other party with the lesser investment in specific, customized and dedicated assets, be committed to the transaction and so cannot threaten to or walk away. This removes the threat of hold-up by the party with lesser investment, usually the buyer, of the party with the greater investment in dedicated assets, usually the seller.

Information Goods and Recombinant Supply Chain Networks

Keith Oliver (1982) describes a "supply chain" of moving and storing materials and inventory from the point of origin to the point of consumption. This term is now widely used and describes a large field of work in the disciplines of operations, economics and management. More recently supply chain has become interchangeable with the term "supply chain network" which is used henceforth in this paper in recognition of the multi-nodal, multi-modal, shifting path of the flow of products and services within and between firms.

A supply chain network is connected by nodes. At each node is a transaction and a contract or agreement which describes and binds the relationship between the firms on either side. In the real-estate supply chain network, down-stream from those firms which have procured the land, developed, designed and constructed the buildings facilities, are nodes with transactions and contracts for real estate sales, leasing, facilities management and other bundled operational services. These contracts may be purchase agreements, leases, competitive tenders, outsourcing contracts, strategic alliances, and require going to the market or renewing and continuing a long standing agreement. At each market based contract real estate demand meets real estate supply.

The preparation and administration of any contract involves some combination of human labor and knowledge. It involves physical materials - the buildings and facilities required to house the human resources preparing the contract and also the information depicted in these contracts. This information can be further divided into the message, the content of the contract, and the medium, the presentation, production, reproduction communication and telecommunication of that information. In the information age these information goods, and the technology to which they are intrinsic, are transformative.

Information goods have long been recognized as having different characteristics from material goods and from human services. In the discipline of Economics the marginal cost of any good, whether

material or informational, is understood to be the fixed cost of producing the first unit of that good plus the variable cost of producing each subsequent unit. Thompson (1982), writing at the advent of the information age, describes information goods as being comprised of high fixed costs but variable costs which, unlike those of material goods, are effectively zero. There are fixed costs associated with an information good and the medium which presents, reproduces and communicates it, but the variable costs of each message are effectively negligible because they require the consumption of almost no additional resources in its production. Thompson (1982) describes the marginal cost of producing the next information good as being effectively nonexistent.

For information goods the hardware and software entail fixed costs and the increment of electric power the variable cost. In aggregate the electric power required for the information goods of today's profligate social media usage and the internet-of-everything, including Building Automation Systems which usefully open a roof top economizer or lower a solar sunshade, or less usefully tell you what is in the fridge, is not nonexistent but existent, and possibly existential when accounting for the externalities of climate change. Thompson (1982) however is not describing aggregate costs but marginal costs and his view of the marginal cost of an information good represents the prevailing view of economists today. It is also demonstrated in the profitability of high technology businesses where content is user generated and the marginal cost of reproducing the information good is a small fraction of the costs charged to advertisers per view.

Shapiro and Varian (2003), also working with Transaction Cost Theory of the Firm characterize information goods in more detail. Information goods must be experienced to have value. They are costly to produce but cheap to reproduce and so can be copied cheaply but are, however, notoriously subject to "switching-costs" (such as switching from one hardware platform to another), and lock-in due to the standardization of hardware and software which requires that employees accumulate knowledge as to how to use them. (Shapiro and Varian 2003)

Contracts can be viewed as information goods the marginal cost of whose administration, reproduction and communication of has been reduced in the information age. As a result the cost of undertaking a contract based transaction in the market has approached that of undertaking the transaction within the firm. Furthermore information and communications technologies have brought the cost of undertaking a transaction nearby to approach the cost of undertaking a transaction at distance. This, along with some herd mentality, has resulted in a continuing shift from owning to leasing real estate and the outsourcing of real estate operations.

In Godfrey (2007) hoping to give pause to the decision to outsource Facilities Management services I asked whether a) It is possible to separate a core from a non-core Facilities Management activity, b)The operational data generated by outsourced service provider can be aggregated, turned into an information good with value, fed back to the owner of the building who then owns this valuable information asset, to support operations and be sold along with the physical building it represents, c) That it is efficient or even possible for Facilities Management activities to be described and controlled by performance criteria written into a contract d) There are enough alternative service providers outside the firm to create a "market" in which they must compete to avoid an uncompetitive in-house provider being replaced by the monopoly of an uncompetitive outsourced provider, e) Outsourcing is suited to the firms culture, f) The demand for goods is too variable or short term to justify the investment in dedicated material human and informational assets within the firm. As cost differentials decrease the relative importance of factors other than cost may increase.

In the information age the difference between the cost of transacting within the firm and transacting in the market has been reduced as has the cost of transacting nearby and transacting at distance. The firm, however, is not "boundaryless" but remains defined by transaction costs and factors including the incomplete nature of contracts which can never account for all contingencies, asset specificity and switching costs. These boundaries may shift more readily as do the nodes on the real estate supply chain network. In the information age the real estate supply chain network has become recombinant.

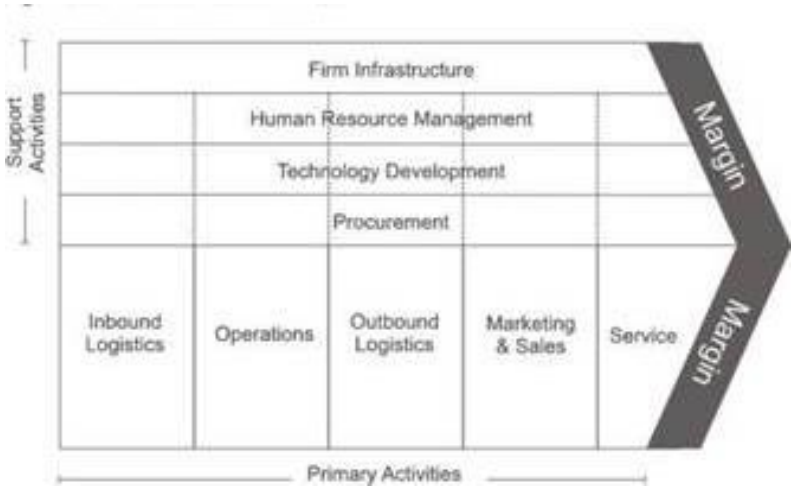
Bundling, Information Goods and the Functional Boundaries within the firm

The organizational architecture of a firm can be defined as the configuration of the functions or departments which manage its activities. For Porter (1985) this architecture is depicted in his influential Value Chain model which has endured these past thirty years relatively intact. Porter, a management theorist, like the economists Coase (1937) and Williamson (1975, 1985) works within what has since broadly become known as the Resource-Based View of the Firm. The Resource-Based View sees the firm as a collection of heterogeneous and relatively immobile resources which the firm turns to its competitive advantage (Barney 1991). Amit & Schoemaker (1993) made a further distinction between a firm's capabilities which are specific to the firm and resources which are not.

For Porter the Value Chain is *"the set of activities an organization carries out to create value for its customers*" (Porter 1985) In it there are nine interdependent value activities, five of which he describes as primary activities and four as secondary. Primary activities are Inbound Logistics, Operations,

Outbound Logistics, Marketing and Sales and Service and these occur sequentially, as in a chain. These primary activities are supported by secondary activities: Procurement, Technology Development, Human Resource Management and Firm Infrastructure - the latter being Porters' space for real estate. Three of these secondary activities: Procurement, Technology Development and Human Resource activities occur across all primary activities and also in sequence with the primary activities. Infrastructure alone out of the secondary activities, does not relate to the sequential primary activities. The horizontal chain of primary activities within the firm links to activities outside the firm in a value system (Porter 1985).

Fig. 1. The Generic Value Chain (Porter 1985 Fig. 3.2 pg. 37)



The division between primary and secondary activities continues to be a reflection of the different tax treatment of associated costs. Under accounting convention direct costs are those incurred by primary activities and include raw materials and freight, storage, direct labor etc. while indirect costs are operating expenses incurred by secondary activities such as repairs and maintenance which unlike primary activities receive tax deductions. The hard line between primary and secondary activities does not however represent those activities which require the recombination of those functions resources and capabilities across these internal boundaries.

The linkages between Porter's activities are "*relationships between the way one value activity is performed and the cost or performance of another.*" (Porter 1985 Pg. 48). These relationships involve agreements, if not actually legally binding contracts, information goods whose marginal cost has become negligible.

Adams and Yellen (1976) appear to have be the first to describe a "bundle" which they said as being comprised of two distinct but complementary goods that can be bundled together and sold for a

single price higher than that of each good alone. This they saw as being particularly well suited to the adding of an information good to a material good, the marginal cost of the information good being almost negligible (Adams and Yellen, 1976).

A bundle of human services and material goods has been called a "Product-Service System" defined as *"a marketable set of products and services capable of jointly fulfilling a user's needs"*. (Goedkoop et al. 1999 cited by Tofell 2008. pg 18.) Toffel finds this an overreaching definition and so prefers the term "servicizing" which he describes those offerings provided by manufacturers who once sold the product alone, but no longer sold the product but only its functionality while supplying maintenance at no additional cost.[1]

In the real estate space there is nothing new or innovative about a contract that gives the right of possession and use, but not ownership – it is a lease. Furthermore the "servicize" concept may be hard to distinguish from a plain old service for the end user who is agnostic to its history and whether the firm upstream on the supply chain network from whom it was procured had once manufactured and sold the product alone, or did, or continues to, procure it from yet another upstream firm in the real estate supply chain network. Product-Service systems are not new either. Neither a product nor a service is, or has ever been, offered entirely separately but exist along what the marketing discipline has long called the product – service continuum. There are products only requiring a little bit of a service at one end and services only requiring a little bit of a product at the other end. What is new in the information age is the negligible marginal cost of adding an information good and it is this change that has given rise to a number of offerings which require activities which cross between the functional boundaries of the firm. Brady Davies and Gann (2005) describe an integrated solution as spanning all or some of the life-cycle of a building, from pre-bid to post implementation through specification, design, deliver, finance, maintenance and operations. Real estate's role is not infrastructure but part of a solution. There is a need for a model which describes this and other offerings and which recombines the functional space for resources and

[1] Much of the literature on Product-Service systems is in the field of sustainability. These authors rest our hopes on at least part of a carbon intensive product being substituted by a less carbon intensive service. Toffel (2008) observed that a Product-Service System does not completely eliminate the need for products but that their combination does change the relationship between manufacturers and customers and align their incentives to reduce total life-cycle costs. While beyond the scope of this paper this is an observation which merits further research including that of my current research project, "Information, Risk, and Retrofit" which examines the implications of the recombinant supply chain networks and bundled work-architecture offerings as described in this paper, for energy efficiency retrofits. That project is also funded by the CRC for Low Carbon Living Ltd and supported by the Cooperative Research Centres program, an Australian Government initiative, and by Brookfield Global Integrated Solutions Ltd.

capabilities and which triangulates the product-service continuum to include information goods and the technologies to which they are intrinsic.

The Work-architecture Model

Max Weber (1946) describes the organizational architecture of a bureaucracy as having "pure technical superiority" because it compared favorably with other forms of organization as does machine with "non-mechanical" modes of production (Weber 1946). For Weber the mechanical machine is the metaphor for the firm. For the management guru Porter (1985) it is the chain. For the Work-architecture model the metaphor is a circuit board, into which material human and informational resources and capabilities can be plugged or unplugged, either in substitution or in combination, in percentages of zero to one hundred, and through which activities and value streams flow like a current in order to enable the work or the firm.

In Godfrey (1998) I describe the work-architecture concept as a representing dynamic "organizational, technological and built architectures" as evident in the 2000 Sydney Olympics. The global consumer of this recombinant offering purchased not only the spectacle of Olympic athlete's performance but also that of the Olympic facilities along with their represented, enhanced, or at least transformed, virtual representation through information and communications technology. All three were recombined as offerings for consumer gratification in the grandstand or on the sitting room TV.

Building on this work-architecture concept the Work-architecture model replaces three of Porters (1985) secondary activities: Infrastructure, Human resources and Information Technology with three spaces for resources and capabilities: Material (including real estate), Human, and Informational which includes both the message and its information and communications technology medium. The work-architecture model appends Porter's (1985) value chain and sits atop its primary activities of Inbound Logistics, Operations, Outbound Logistics, Sales and Marketing. It adds a new function: the Work-Architecture System which manages the recombination of the resources and capabilities in order to either support the work of that firm or in order to produce a Work-architecture offering for sale in the market to a firm downstream on the supply chain network. This downstream firm may procure the Work-architecture offering through the same function which procures its primary inputs, blurring the boundary between resources and capabilities, the latter as defined by Amit & Schoemaker (1993) being specific to the firm while resources are not. Work-architecture system "recombinant" rather than "integrated" in recognition that these resources and capabilities may be combined and recombined within the life of the firm.

Fig. 1. The Work-Architecture Model within the boundary of the firm of whose work it enables.

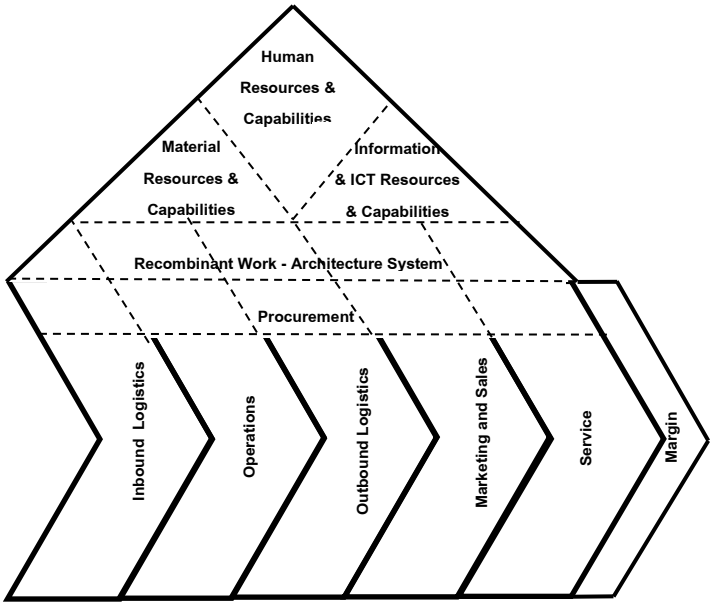
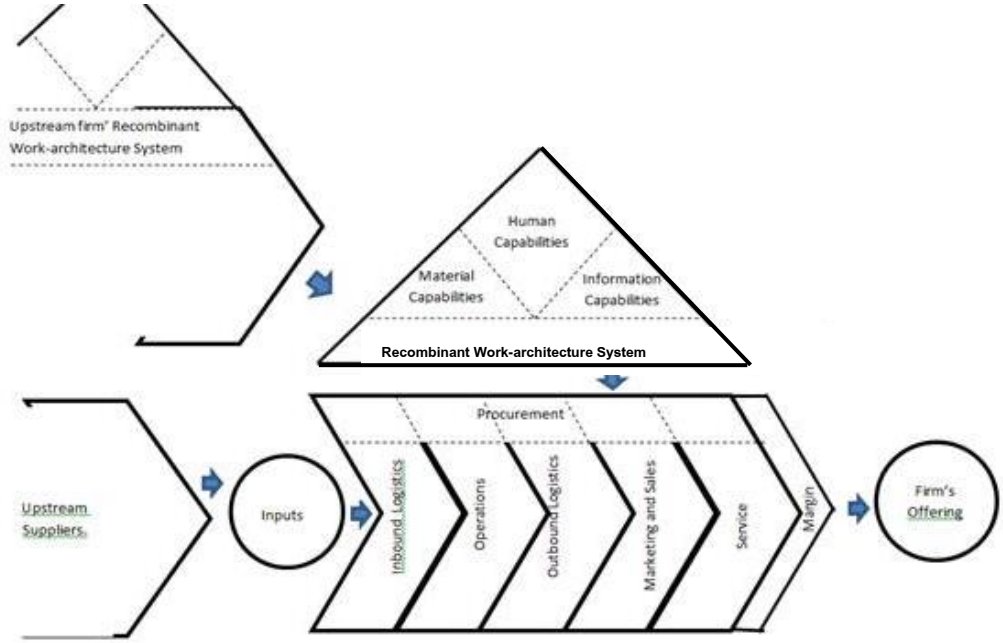


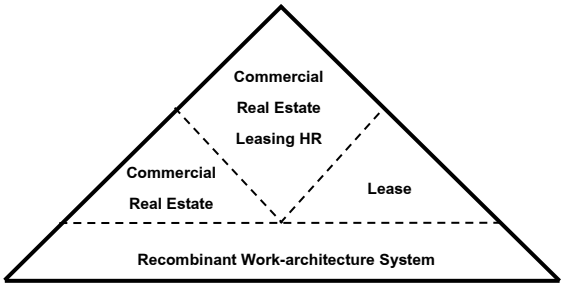
Fig. 2. The Work-architecture offering for transaction in the market.



Eg. 1. Leased Real Estate Work-architecture

Leased real estate Work-architecture is offered either within or external to the firm whose work it enables. It bundles physical real estate with human services of leasing staff and the information goods of advertising and the lease document which may be either hardcopy or digital.

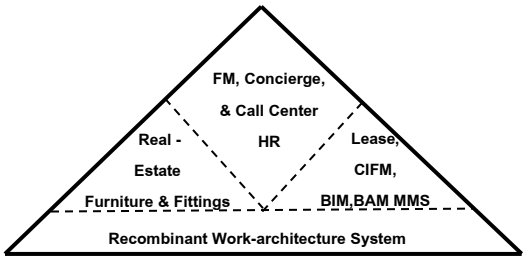
Fig. 3. Leased Real Estate Work-architecture



Eg. 2. Facilities Management Work-architecture

Facilities Management (FM) Work-architecture is offered either within or external to the firm whose work it enables. It recombines all or some of leased or owned commercial real estate, furniture and fittings, facilities management and concierge human resources, the information goods of Facilities Strategic and Operational Plans, sales and lease contracts, and the technology of Computer Integrated Facilities Management (CIFM), Life Cycle Building Information Management (BIM), Building Automation Systems (BAS) also known as Building Management Systems (BMS), Maintenance Management Systems (MMS), Hotelling and online room booking apps. A call center Work-architecture may also intermediate on the supply chain network between the firm and its FM work-architecture recombining the human services of call center staff, with commercial office space of the call center, the information goods of the service requester (which if a complaint may have an atypical marginal cost) and the technology of the MMS and the phone.

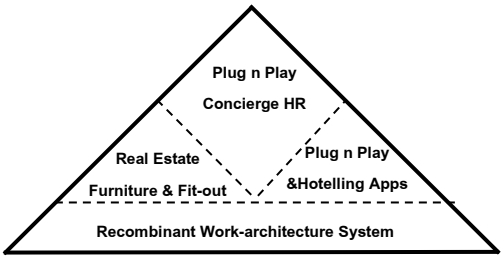
Fig. 4. Facilities Management Work-architecture



Eg. 3. Plug n Play Work-architecture

Plug n Play, also known as serviced offices, Work-architecture intermediates the supply chain network between building owner or tenant and the end user. The Plug n Play Work-architecture offering bundles commercial real estate (frequently sublet office space furniture), furniture and fit-out, with human resources of the Plug n Play firm and concierge services, with the information goods of short leases or subleases of either months, days, hours or minutes duration, along with the information technology of 'hotelling' or space booking apps which can be accessed either locally or remotely.

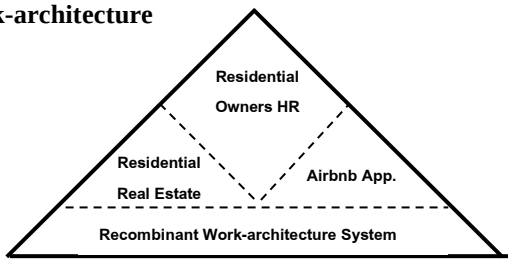
Fig. 5. The Plug n Play Work-architecture Offering



Eg 4. Airbnb Work-architecture

The Airbnb Work-architecture offering disintermediates hotel companies out of the supply chain network altogether. It sits between the residential real estate owner and the residential real estate user and bundles residential real estate, furniture and fittings, with the Human Resources of the Airbnb management and more significantly that of the residence owner who prepares and administering the real estate, with the information resources and capabilities of the Airbnb app and database.

Fig. 6. Airbnb Work-architecture

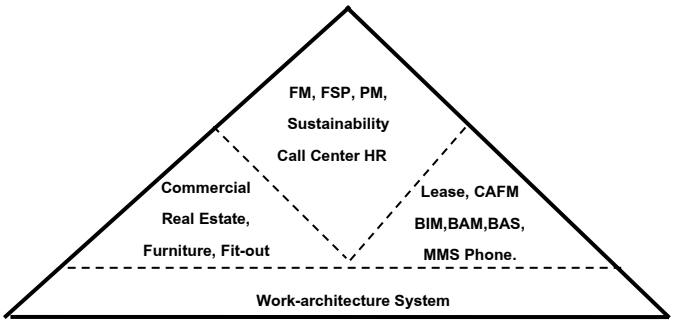


Eg 5. The Integrated Resource Solutions Work-Architecture

Integrated Resource Solutions work-architecture is most commonly offered external to the firm. It bundles all or some of commercial real estate, furniture and fit-out, with the human resources of facilities strategic planning, facilities management, property management, sustainability, supply chain network

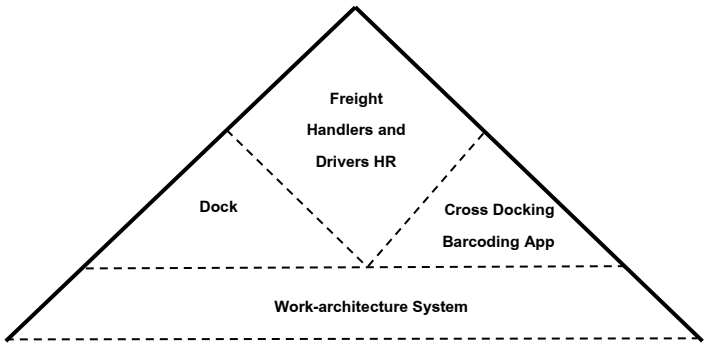
management, and concierge services with the information goods of strategic and operational plans, lease and sales contracts, with the technologies of Life Cycle BIM, BAS, CIFM, and MMS. As with FM work-architecture call center resources and capabilities can be integral to the Intergrated Solutions work-architecture or added at the same node by a firm intermediating on the supply chain network.

Fig. 7 The Integrated Resource Solutions Work-architecture Offering.



Eg 6. Cross Docking Work-Architecture

Cross Docking, long used by Wal-mart and more recently by Amazon.com (Colby, R.C., and Dau, M.T 2005, Streitfeld, D. 2016) is a work-architecture which recombines the material real estate of a dock, the human services of truck drivers, train drivers, or freight handlers and the information goods of logistics within the technology of GPS, barcoding and freight management software to enable the work of tracking of goods from transport mode to transport mode across a dock, avoiding warehousing real estate altogether. Cross docking requires that warehousing real estate be no longer conceived of as supporting infrastructure but as a resource to be brought back inside the firm just long enough for it to be replaced by a dock and completely dis-intermediated from the supply chain network.



Conclusion

An overview of the literature on Transaction Cost theory of the firm and nature of information goods highlighted the inadequacy of the current conception of Corporate Real Estate and its fixed position as infrastructure within the organizational architecture of Porters Value Chain (1985). It also identified two information age characteristics which have transformed the real estate space: recombinant supply chain networks and the bundling of material goods, human services, information goods and the technologies to which those information goods are intrinsic. As an annexure to Porters (1985) Value Chain model the Work-Architecture model was described and then used to depict examples of old and innovative offerings in which real estate plays a part.

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