

Digital outsourcing in architecture: Sifting through promises, problems and myths

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1. Introduction

The developments in telecommunications infrastructure and digital technologies and their global diffusion have changed the modes of operation of the design professions, and drastically extended their territorial reach. Computer-assisted drafting equipment (CAD) is now used by the overwhelming majority of the design professions around the globe, and drawings are moved between offices for the most part electronically. This operative climate has fostered the growth of digital outsourcing opportunities. The motto of one Delhi-based design and documentation service bureau reflects the spirit of this new development: "... we are your extended global studio, managed by our professional staff, directed by your in-house team, and secured by close relationships that form the very foundation of our enterprise". It goes on to claim "... our production staff, compared head-to-head with ... firm's in-house production staff, were 30% more efficient, 25% more accurate, and 75% less expensive."

The unprecedented opening of international markets, complemented with developments in digital technologies, offers architectural firms the chance to organise their geographic structure according to relative employment and production advantages for services they seek or can deliver. In the architecture profession where internal competition is high, fee levels are either shrinking or dramatically inadequate, and returns are diminishing, digital outsourcing is a highly attractive option. Despite their promises, distant design collaborations are not homogenous or uniform in structure and returns. Instead, they assume increasingly different forms, involve people with varying skills, experiences and backgrounds, and present different associated risks. Amid this variety, it is difficult to say whether the international division of labour in design is going to work on the whole, and whether or not we are entering a new phase in the delivery of professional services. To answer these questions, detailed research on the empirical experience and the lessons of global outsourcing is needed.

Our research examines the industrial restructuring potential of ICT-enabled transnational architectural services by focusing on socio-economic and cultural variables rather than concentrating only on technological infrastructure aspects and technical modalities. Specifically, our research aims to provide answers to three sets of questions: (1) What are the quantifiable advantages and drawbacks of offshore collaborations and do they change according to socio-technical characteristics of collaborating offices? (2) To what degree do such elements as technical specialisation, professional preparation, access to information technology, educational background, cultural cohesion and previous job experience affect the performance of firms engaged in the digital supply of architecture-related services? (3) Is there a way to quantify the cost of the transactions involved in distant collaborations, and use these costs as indicators of future geographic shifts in the procurement of design services? This paper reports results from the initial stage of our research experiments, data collection, analyses and findings.

2. Professional and technological context

The outsourcing of services – whether on-shore or off-shore – has in recent times become one of the central issues of discussion in media, business and policy studies across the globe. While the industries such as software engineering, accounting, call centres, and more recently telemedicine feature prominently in both popular and academic literature on outsourcing phenomenon, it is only recently that the architectural profession started appearing in this discussion. However, the history of architectural profession illustrates a long-standing tradition of itinerant designers, distributed and flexible organization of design services, long before invention, diffusion and adoption of information and communication technologies (ICT). For example, the design and

construction of the Sydney Opera House, from the time it was awarded to Utzon in 1957 to its completion in 1973, involved teams of people working in Australia, UK, France, Germany and Denmark. The transfer of information and materials between distant collaborators relied upon telegram as the most reliable and fastest communication medium and round-the-world flights that took nearly a week. In addition to such established traditions in architecture of working across geographic and temporal zones, the design profession is also faced with two contextual changes: (1) advances in digital communication technologies (ICT), and (2) the expanding pool of building environment professionals in regions around the world that face rapid urbanization, increasing population, low wages, coupled with prospects of significant industrial and economic development.

Telecommunications infrastructure and digital technologies have converged to become cheaper and more widely available around the world, defining an operative environment with relatively low entry barriers in terms of capital investment. International telephone costs and satellite utilization charges have fallen tenfold between 1970 and 1990 - year by which the price of fax machines had dropped to 25% of what it was in 1980 (World Bank 1995). The increases in global connectivity of telecommunication networks, in their capacity to carry data, and in the speed at which data are carried, have started to affect, perhaps structurally, the way architectural practices work. While professional offices had embraced such technologies for linking and sharing documents between their distributed offices by mid-1980, the push for global connectivity came of age with the introduction of World Wide Web. By mid-1990, a number of the so-called virtual design studio experiments began to be reported from educational institutions (Dave 1995; Dave and Danahy 2000). According to *AIArchitect*, the online publication of the American Institute of Architects, 83% of US architectural firms transferred drawings electronically in 1999, compared to just 35% in 1996 (Dalal, 2000). These data are consistent with the information recently collected by other design professional research agencies in North America, which stress diffusion in use and competitive advantage of digital technologies whilst noting offices' interest in setting up remote links (PMA 2001; ZweigWhite 2001).

The combined impact of the push to open up services sector in international agreements such as GATS (see for example, IIA 2003) and the diffusion of globally connected ICT infrastructure offer architectural practices an opportunity to reorganize their services by taking advantage of relative differences in globally available skills and costs. These can be substantial when considering that labour costs reach on average 50% of office budgets in the architectural profession. Tombesi (2004) noted an architect in the United States would cost twice as much as the same architect in Australia, and ten to fifteen times as much as the same architect in the Indian subcontinent. Our earlier research (Tombesi, Dave and Scriver, 2003) noted that the starting monthly salary for an architect in India was equivalent of 185 Australian dollars. In 2000, an experienced Indonesian architect working in a large firm in Jakarta was expected to earn 3 Australian dollars per hour. This could go up to 5 dollars per hour in Colombo, Sri Lanka (where, however, a very experienced draftsman in practice for many years was not going to earn more than 40% of that amount) (Tombesi 2001). By comparison, the official minimum pay for architectural graduates and newly registered architects in the state of Victoria in Australia in 1999 was, respectively, 12 dollars and 15 dollars an hour (APESMA 1998). In the same year, similar positions in the United States commanded, on average, hourly wages of 29 and 33 Australian dollars (AIA 1999). If the relocation of architectural services to lower-wage areas were possible, Australian firms could produce drawings at a fraction of their current cost and obtain multifold gains in net revenues. This would be a difficult opportunity to pass up in an industry where, as Tilley (1997, 1999) and Gardiner (2001) have pointed out, internal professional competition is high, fee levels are either shrinking or dramatically inadequate, and returns are diminishing: strategic remote outsourcing could enhance competitiveness or profitability by capturing productivity increases through rent discounts.

3. From anecdotes to analytical studies

Against the cumulative background of (1) a profession that routinely embraces distributed design services, (2) socio-economic transformations and pressures faced by various regions of the world and capacity of professions to respond to such transformations, and (3) ICT developments that make possible increasing services at falling prices, one may anticipate that the architectural profession would be more than ready and receptive to overcoming the constraints of geography and time and openly embrace outsourcing phenomenon. The real story, however, appears to be more complex. Indeed a handful of 'case studies' embracing these changes have appeared in the professional engineering and architectural publications (Housley Carr Krizan 1988; Korman 1995; Klein 2003; AIA 2003; Lyall 2004; Rubin et al 2004; Solomon and Lin 2005). The professional climate appears to be shedding perceived or real stigmas associated with digital outsourcing. A recent survey conducted for the Boston Society of Architects in 2004 revealed that 20 percent of architects surveyed used offshore services and half the respondents were considering use of these services (Hillman 2005). Some of the most visible outsourcing contractors frequent and lead sessions at the annual conventions of professional societies. Many of these outsourcing service firms are led by graduates of eminent universities and staff who were formerly employed by well-known architectural practices.

While there is plenty of evidence that off-shore collaborations are well underway, not all of this evidence can be put to effective use from a professional research point of view because it tends to remain partial. Given the organisational heterogeneity of architectural practice, anecdotal information about firm-specific experiences or arrangements is not necessarily transferable to the entire sector. General surveys, on the other hand, do not provide descriptive or qualitative data about type of work, firm characteristics, and degree of technical or economic success of the collaboration.

There is a need to go beyond the technicalities of the tools involved, anecdotal views of the impact of IT or simple measures of the back office/front office approach as is evident in many existing reports. In response, our research aims to study and analyse digital outsourcing in architecture by focusing on the tacit practices of collaborating professional sub-cultures while recognising and valuing the subtle distinctions between them. The methodology employed in the research project revolves around an ‘industrial laboratory’ to examine qualitative differences in the performance of distant actors, and determine whether these differences can be related to specific operative attributes of the firms involved. A series of controlled documentation projects involving collaborations between firms of different categories will be run, with specific indicators to measure the levels of technical proficiency required and the results obtained in digital outsourcing transactions.

Specifically, our research involves selections of specific projects and information about costs associated with their documentation in seven Melbourne-based architectural firms. The seven Melbourne-based firms were selected with a view to capture the spectrum of Australian professional markets, building types and office sizes. Four types of outsourcing service providers are then provided the documents pertaining to the design intent of these projects (in the form of schematic drawings and related information though not including the final detailed documentation produced by the Melbourne-based firms). By comparing the work returned by outsourcing service providers and associated costs with the original detailed documents produced by the Melbourne-based offices and associated costs, we can compare and analyse characteristics of knowledge and performance involved in successful (or otherwise) of digital outsourcing arrangements. The specific characteristics of the seven Melbourne-based firms and four types of documentation service providers are illustrated in Figure 1. The reasons to select professional and web-based firms operating mostly in India for outsourcing service delivery are manifold. The professional context in India presents us with the same situation other countries may find themselves in the near future- a sizeable profession (two and half times larger than Australia’s), similar language and tradition, and very cheap wages.

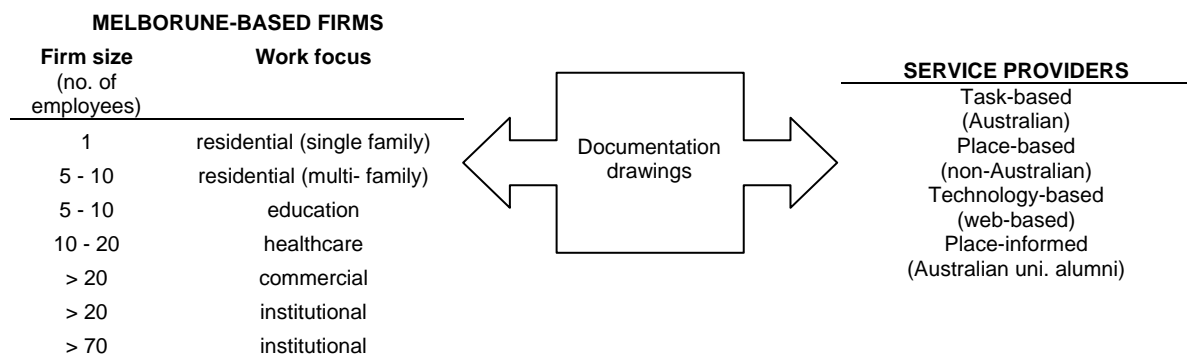


Figure 1. Pairing of Melbourne-based and documentation service provider firms.

The experiments are designed so that each documentation study reflects knowledge required to accurately document a project at different scales, involving information about location, assembly and components, within specific documentation strategies. Since documentation drawings invariably follow and reflect a firm’s own style of documentation, knowledge of local conventions and codes, the degree to which an outsourcing firm can capture, follow and deliver the same level of understanding in their work will determine the success (or failure) of digital outsourcing collaborations.

4. Outsourcing design documentation: preliminary studies

Following the above experimental scheme, we have identified seven specific Melbourne-based firms, projects we wish to employ in the experiments and collated specific information about each project. At the same time, in order to understand the complexities we may encounter in the detailed studies, we decided to undertake (1) an information gathering exercise of the Indian outsourcing service providers, and (2) a pilot study of limited scope involving online outsourcing service providers.

4.1 Overview of Indian documentation service providers

Based on the publicly available data such as journals, professional publications, and web-based searches, we identified a list of documentation service providers in India. While we encountered a number of firms readily advertising their services on the web and especially brokerage portals, only a smaller number of these firms offer information in some depth including specific services, portfolio of past projects and overview of the way projects are managed by each firm. After sifting through such data, we ended up with a list of outsourcing firms that is certainly not exhaustive or comprehensive. However, we think it is representative of the kind of information someone based in Australia and interested in locating India-based documentation service providers is most likely to find.

The empirical we have collected reveal some interesting characteristics about firms currently operating in India and engaged in digital outsourcing projects. While most firms are reticent about actual identity of their clients or the scale of services they are engaged in, they appear to fall into one of a small number of types. On one end of the scale are firms who openly and exclusively provide outsourcing services employing anywhere up to 250+ staff. On the other end are boutique or start-up operations with 2-5 employees. Many firms have overseas 'front' offices with actual work being carried out in 'back' offices based in India. Another variant depends on free-agents operating overseas who broker connections between those seeking services in overseas markets and providers in India. Most firms provide their services on 'project' basis, 'studio-mode' (dedicated staff working as long-term satellite staff of another office) or even 'person nodes' (in which one or staff are 'attached' to overseas offices). The locations of these offices do not indicate any overarching patterns. They can be found in central city to suburban offices ranging from the most swish environments to the cramped surrounds. While cities such as New Delhi, Mumbai, Kolkata, Pune, Chennai, Bangalore, and other major urban cities appear to be primary bases for these service provider firms, it is not unusual to also find them located in medium to smaller cities as well. The anecdotal data suggest a degree of mobility among mostly young staff. It is not unusual for some firms to also invest time and resources in professional development of staff (usually on Saturday mornings). Many firms are operate three shifts a day to respond to the volume of work as well to align office hours with three different time zones across the globe.

4.2 Web-based documentation experiment

In this phase of the research, our objective was to understand and test technical information and networked services and other infrastructure required to simulate conditions that are faced by firms requesting outsourcing services and those that provide such services using only the Internet-based means of communication. For this preliminary experiment, we decided to use one of the most common project types of Australian architectural practice – the single family house. The design project (Figure 2) is a high modernist design unit, placed at the high-end of the domestic market incorporating quasi-industrial materials and construction systems (e.g. concrete and commercial aluminium window sections). The project incorporates specific design intentions and their resolutions through careful use of materials and construction systems. The architectural practice had generated a substantial amount of highly resolved construction documents, many of which were relational in nature to fully explain the integration of services, finishes and joinery units. Location drawings were set up as a series of layers that effectively reflected the sequence in which different trades, services and finishes came together in the final assembly of the building in order to minimize the potential for positional errors. In addition, resolution of structural engineering, regulatory controls, services incorporation and building performance issues necessitated careful detailing in order to ensure the fine tolerances of finish demanded by a building design of deceptively simple but precise lines. In fact, this was where the architectural practice invested most of its skilled-labour during the design documentation process and was therefore interested in testing the ability of a collaborative documentation partner to coalesce with this working method.



Figure 2. The reference images of the project used in the preliminary study.

To investigate these issues, the proposed documentation test was composed of (1) an information package provided to the service provider, (2) specification of information required to be produced and delivered by the service provider. The former information package consisted of the following:

1. a series of preliminary design sketches for the project;
2. a series of images that were used as reference sources for the design intent;
3. an Autocad file of site survey drawing, defining property boundaries and site levels;
4. a set of regulatory approved town planning drawings in PDF format;
5. a set of Autocad design development drawings to be used as a base for the required documentation set;
6. a series of construction detail sketches to communicate the key assembly components;
7. a description of the principal construction elements and a list of proprietary systems with limited accompanying trade literature;
8. a cad file of the architectural practice's documentation protocols (layer and line types, title sheet set-up);
9. a complete set of construction documentation cad drawings from another project to be used as an exemplar of the architectural practice's documentation communication strategies;
10. a set of instructions on the set of seven required sample drawings to be produced with a specific requirement for a proposal for a roof drainage design in accordance with a particular Australian code of practice and
11. a list of the proposed total construction drawing set for the project numbering seventy-one drawings.

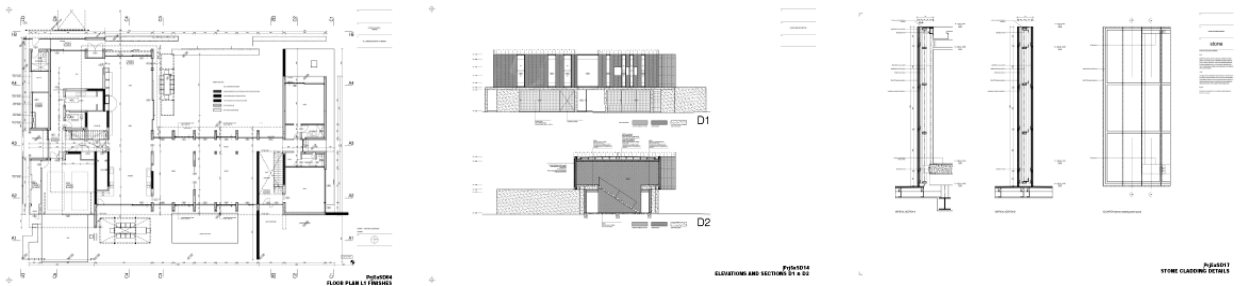


Figure 3. Sample documentation drawings from another project.

Using the above information, the documentation service provider had to produce and deliver

1. four plan drawings, three of which represented the building at different levels with the fourth to include a proposal for roof drainage in compliance with the Australian standards;
2. one critical representational elevation and section drawing;
3. a drawing of vertical construction details linked back to the section, and
4. a drawing of vertical and horizontal window details crucial to achieve the design aesthetic proposed.

The intention behind setting up this documentation challenge was that the production of these drawings required the service provider to understand, interpret and represent subtle variations in the configuration of each system vis-à-vis its position in space in a way that reflected the design intentions of the solution designed by the architectural practice. This set of drawings thus became the primary means to display the professional skills and capacity of the service providers with regard to specific language decisions (i.e. prescriptive technology), interpretation of regulatory requirements (i.e. normative technology) and understanding of local traditions (e.g. conventional technology).

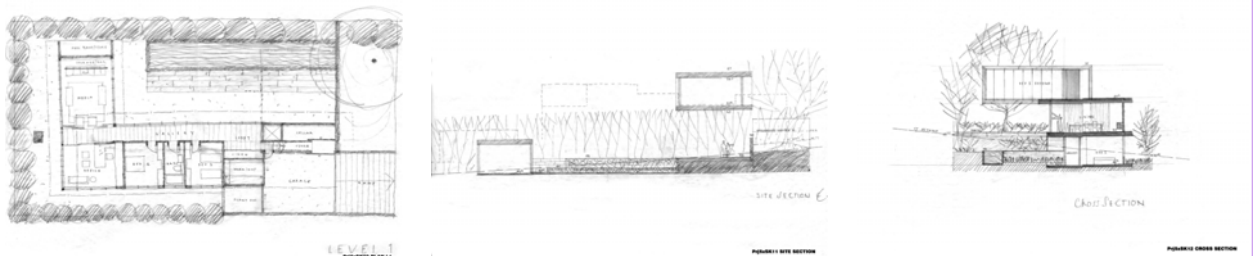


Figure 4. Sample sketch layouts of required drawings.

This pilot project was designed with a view to test the web-based documentation service providers. Based on the list drawn up earlier comprising outsourcing provider firms based mostly in India and a few outside

India, we selected a subset of firms based on the web-site descriptions of their service capabilities, practice capacity, record of experience with off-shore alliances and English language capabilities. Of the eighteen firms identified in this process, ten identified their geographic base as being in India, three were located in the Philippines, two in the United States, with one each from Mexico, Botswana and the United Kingdom.

Similar to many of the web-based firms, we established an electronic offshore website. The virtual front office was used to invite, communicate with and exchange information with each firm. Initially, an electronic mail was sent out to all the eighteen firms inviting them to participate in a pilot test to investigate the suitability of remote documentation services to a selection of Australian architectural practices.

The firms were asked to express their interest in providing such services with information on firm profile, contact details, references, payment conditions, quality assurance procedures and confidentiality arrangements. The invitation outlined that through a secure server the project information package was available with a request to translate the information into construction documents in Autocad drawing format and to price, on the basis of the scope of work identified, the production of the limited set of drawings as well as the entire documentation package and to indicate the turnover time anticipated for both the test and the complete documentation package.

Of the eighteen firms five responded immediately and downloaded the information package, three were based in India, with the others being one each from Botswana and the Philippines. Of the five, one of the Indian firms proposed working on the project on the basis of hourly rates that were approximately 26% of the Melbourne practice; however, they did not proceed beyond this communication. Another Indian based firm (Firm 1) and the Philippines firm (Firm 2) proceeded further by providing the requested service provider information and followed with engagement terms. Firm 2 provided a fee for the same scope of works that was 47% of Firm 1. Although initially both firms noted their usual practice of requiring an advanced payment, only the Firm 1 required 50% of the fee up-front prior to proceeding. Both firms were engaged and proceeded to participate in the pilot exercise.

Both firms responded with the complete set of drawings within twelve days. Within this period Firm 1 issued an intermediary set for review with minimal queries and Firm 2 issued two intermediary sets with a number of queries which were not extensive but were quite specific in their content. Firm 1 also issued a request for payment to cover the costs of purchasing the Australian code that the project instructions required.

The drawing sets indicated that neither firm had difficulty in setting up the required CAD standards and that layering protocols and electronic transfer of documents were not problematic for either firm. However, neither firm established clear and well defined project management protocols and the process of managing project communication. The requests for information were loose and necessitated the implementation of a system to control these aspects of project delivery.

Neither firm proposed the development of the documentation beyond the minimal requirements of the tasks set. The detailed resolution of important design and construction aspects were cursory and unresolved. Significantly, there were important construction details dictated by the design were not picked up. These included issues dealing with waterproofing, provision for movement and the treatment of finishes. Neither firm outlined how it incorporated the stipulated code requirements for roof drainage with one firm proposing a scheme that did not account for the construction system or important design imperatives. Instead, it issued drawings that indicated exposed down pipes without any suggested treatment along a fully glazed modernist façade. The other firm resolved the drainage system well and provided additional explanatory relational drawings to indicate how the system was placed vertically through the building. The process also suggested that the design development drawings were in fact already highly resolved and therefore significant errors and discrepancies were not overt.

4.3 Discussion

Although the pilot study involved only a very limited sample of documentation service providers, it already highlighted a number of issues that will inform the second stage of the investigation.

One may speculate as to why the take-up rate was so low with only 28% of invitees responding and only 11% continuing to proceed to participate in the test project. A number of reasons may be proposed. The cost of establishing a web-based profile is relatively low. With costs as low as \$4 per month, it is possible to set up a digital front office with unlimited storage and data transfer. The overheads in establishing a web profile and using it to gauge market interest and potential commercial activity are very low. However, not all the firms may have true capacity to actually deliver the services being advertised, may not be committed to such offshore transactions, may be only testing the waters of outsourcing phenomenon and thus may not be geared as yet towards entering into formal offshore arrangement.

The form of approach may also have led to a low acceptance rate, for the offer was presented in terms of a brokerage arrangement. The positioning of an intermediary removed the opportunity to enter into a direct commercial relationship with the potential actual client (i.e. a design practice) and may have lessened interest in

proceeding to engage with the pilot test as proposed. The firms may already have established markets and may be less interested to go through an intermediary for garnering additional business.

The question also arises as to whether there was a mismatch between the advertised capabilities and the proposed task. From the generic descriptions posted on firms' websites, it is not clear if they are equipped to deliver conventional drafting, presentation or design and technical documentation services. Since we had purposely set up the experiment that required a greater level of interpretive expertise and technical sophistication, it may be that many firms do not yet corresponding capacity of the firm and therefore did not pursue the project beyond initial expression of interest. It may even be the case that documentation drawings in our experiment necessitated access to and familiarity with the Australian regulatory frameworks which was both a hurdle and an investment that many firms were not willing to deal with. Finally, as one respondent advised that they were just "too busy" and did not want to explore the offer any further.

Such speculations and questions demonstrate the need for research into outsourcing to also include the operative conditions that prevail from the service provider perspective. It also suggests the difficulty in identifying appropriate service partners and that in order to cultivate particular relationships there is a risk in adopting a generic approach and much greater specificity is required. Further stages of the research will include investigating the performance of web-based service providers where face-to-face contact and preliminary capacity reviews have been undertaken.

The study also made clear that offshore outsourcing requires considerable pre-planning and the identification and formalization of the required processes in advance so that the parties involved do not need to invest significant time and resources in communication flying back and forth. Although many of the web-site descriptions suggested that established communication and project management procedures and protocols were in place, this was not found to be the case once the pilot project with the two firms commenced. One firm enclosed intermediate drawings with email despite explicit instructions to upload drawings to our project server. These required the implementation of document protocols to manage formal communication and responses so that both parties could retrace the decisions if needed.

The pilot also raised the question of the need for up skilling of service providers in local regulatory conditions. The need for a regulatory and trade referencing library or on-line subscriptions to such services where available are an important aspect that requires consideration in how this process is to be managed with a service provider. With web-based services it is difficult to gauge the reality of a firm's capacity in this regard and the progressive costs that may accumulate through the project need to be factored into any agreement. The cost for such information, any up skilling and responsibility for any associated risks need to be explicitly negotiated in advance.

For such collaborations to be effective the pilot has also shown that the quality of service provider output is dependant on the quality of the information provided. The use of a highly resolved design development set of drawings in this study has shown the benefits that arise in lessening miscommunication and misunderstanding of design intent. However, these are not obviated in the detailing aspects of the project. It also suggests that significant portions of the design decisions need to be shifted from the construction documentation stage to the design development stage for the outsourcing arrangements to work most efficiently. The production of drawings with key review and witness points also affords a practice to use the service provider as an important component of their quality assurance system as it forces documentation review which may not occur in-house due to the convenience of over-the-desk communication. It also highlights the diligence requirements that such arrangements produce due to the fact that liability cannot be divested to an offshore agency operating with very different legislative controls and the cost associated in pursuing such partners. However, it also indicates that the potential cost differential allows one to become aware of detailed design issue and spend more time developing and resolving the design or pursuing alternate design options.

What has also been alluded to in the study is that cost is not necessarily an indicator of service quality. In this limited study of the two documentation service providers, the firm that was 45% cheaper than the other one raised more information requests, picked up discrepancies between design development drawings and produced a higher standard of documentation output!

5. Looking forward

We initiated this research with a belief that once we go past the technical or anecdotal accounts of digital outsourcing in architecture, a more complex picture of needs and services will emerge. As indicated even in our preliminary and very limited study, there are real opportunities for digital outsourcing of architectural services. But there are also problems which are not technical in nature. After all, most firms we identified (including our own virtual front office) need only reliable web presence, protocols for transferring digital files, on-demand connection with global networks, and access to necessary CAD and document processing software. The real problems are in acquiring and building on knowledge of conventions and practices grounded in another professional and geographic context. For firms interested in digital outsourcing in architecture, this means a

long-term investment if they wish to step up from presentation, drawing conversion, or pure drafting to tasks that require higher order knowledge. On the other hand, firms that wish to source offshoring services need to establish some performance metric so as to gain the most out of digital outsourcing arrangements. With the extended studies that we intend to complete in the next phase, we hope to provide such benchmarks for parties on both sides of the digital outsourcing phenomena in architecture.

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