

# The economic potential of outsourcing through the Internet.

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This paper evaluates the experiences of an industrial partner, EGM architecten bv (holdster company: EGM beheer bv) from the Netherlands, in the Caribcad consortium, as well as the potential economic benefits of the results of the research project.

EGM architecten is one of the larger architectural firms in the Netherlands with a total of approximately 180 employees. The firm is specialised in designing hospitals and other health care related facilities. In the Caribcad project EGM participated in Pilot 1 and was partnered to the Delft University of Technology.

Pilot 1 involved the outsourcing of bulk CAD work through the Internet. Hospitals are facilities that are constantly changing, due to shifting functional requirements and both medical and technological innovations. Consequently, EGM is often involved in refurbishment projects for hospitals. Mostly there are only paper based drawings available of the existing situation. In order to be able to use modern CAD techniques in designing and elaborating the refurbishments, the paper based drawings need to be regenerated in CAD. This is a very labourous and relatively simple job, mostly for which is only a modest budget available. Thus, the regenerating of paper based drawings of hospitals to be refurbished is potentially a suitable subject for outsourcing to countries with relatively low wages. The fact that the work is relatively simple, made it in theory a perfect subject for a pilot in the Caribcad project.

The pilot thought that the success of outsourcing CAD work depends maybe more on social and organisational conditions than on IT related aspects. Some examples of these social and organisational aspects are:

- the language; it's important that a few people in the outsourcing firm (the client) and the firm that does the outsourced work (the supplier) speak or at least understand a common language (English);
- building techniques: it is necessary that the supplier has some basic knowledge of building techniques and practices in the client's country;
- building regulations: some basic knowledge with the supplier of the building regulations in the client's country is indispensable.

These basic conditions were not met in the pilot project. As a result, the project failed as far as effective CAD production is concerned. The project clearly illustrated the paramount importance of good management of these kind of outsourcing projects. In this respect it is very good that the emphasis of research project did not lie on the actual CAD production, but on the development and implementation of workflow management tools.

We learned that the economic potential of outsourcing CAD work highly depends on the strategic choices that an A/E firm makes. It turned out that the outsourcing of e.g. the

regeneration of paper based drawings takes a lot of preparation and management to assure the quality that is required. The supplier has to be briefed and instructed very thoroughly on the subject of e.g. the client's drawing conventions. If this is not done properly and into great detail, there is a fair chance that the client has to put much effort in the adjustment of the results in order to get CAD files that meet with the required functionality. The effort that has to be put into briefing, introduction, quality control and making adjustments makes the potential profit of outsourcing this kind of work almost, if not completely, disappear. EGM architecten concluded, that this kind of outsourcing can only be profitable in a long time relationship between client and suppliers and on the basis of a mutual understanding of building techniques and drawing conventions. It made EGM realise once more that 'bulk CAD work' hardly exists any more in today's architectural practice. CAD systems are no longer merely automated drawing boards; they gradually develop into sophisticated and high tech information systems. It takes well educated and highly trained building technicians to produce CAD files that:

- a. meet with the state of the art in the field of building technique;
- b. meet with the requirements of modern project databases and the exchange and reuse of data;
- c. meet with the national building regulations.

Regarding this, one of EGM's conclusions from Pilot 1 is that CAD work is probably not the right type of work for outsourcing through the Internet. EGM architecten strongly feel that the production of architectural CAD drawings (that is: the building up of a project database) is an essential part of the architectural firm's core business, that consequently can hardly be outsourced, unless:

- a. the workload is outsourced to a specialised (local) service firm with which the architectural firm has a durable relationship;
- b. the WMF tool or template used for open outsourcing through the Internet is so good, that the supplier can 'learn' while performing the job.

This conclusion has to be seen in the background of the strategic choices EGM architecten have made considering their position in the building process. In order to be able to realise it's professional ambitions, the firm strives to be leading in the design process. It wants to be the participant in a desing project that integrates the specialistic contributions of all the participants into one facility concept. The management feels that this can only be achieved, when the firm is very good in it's own core business. More than ever the production of CAD files is considered an indisposable part of that core business, as the ability to control the digital information flow in projects is of great strategic importance.

Many other architectural firms in the Netherlands make a different choice. They choose to remain small in size, consider 'architectural design' as their core business and outsource all other activities that traditionally belonged to the architect's task (e.g. CAD production, developing the technical specifications, cost engineering). There is an increasing number of architectural service bureaus that supply all architectural services except the actual architectural design. Service bureaus mostly have relationships with a relatively small number of architects, because they have experienced that it is very important to know an architect they work for very well. They have to know how the architect feels, thinks and what he means in order to be able to make the right decisions while elaborating the design. It is evident that the service bureaus have to have a thorough knowledge of the local building regulations, habits

and techniques. Therefore, architects (can) only co-operate with local service bureaus. Moreover, Dutch architectural service bureaus often partner with foreign architects who do projects in the Netherlands. For the same reasons Dutch architects can only do projects abroad if they partner with architects or service bureaus in their client's home country.

The fact that EGM architecten choose not to outsource CAD production work certainly does not mean that the firm rejects co-operation through the Internet. On the contrary: EGM sees great opportunities in the use of the Internet in the co-operation on a project basis between firms with different core competences. This can be clarified as follows.

The organisation of the market for built facilities is quickly changing. Some dominant trends are:

- the end users of buildings are emancipating. They no longer ask for buildings; they demand facilities that enable them to function and perform in an optimum way;
- clients more and more want to do business with one party, that is prepared to take full responsibility and liability for the whole design process or even the whole building process (management contracting, design & build, turnkey, design-build-operate-transfer and so on).

Both trends lead to the necessity of integral, multidisciplinary approaches of the design and building process. To meet the functional requirements of end users, it is necessary to develop a facility simultaneously from different viewpoints, e.g. functional design, structural design, service engineering, cost engineering, sustainability and labour conditions. All these aspects interact and need to be looked at in mutual cohesion. This can only be done in multidisciplinary teams with skilled members. From an architect's point of view there are basically two ways to achieve this:

1. incorporate different specialisms in the architectural firm, such as structural engineering, service engineering, know how in the field of sustainable building, planning and landscape architecture;
2. form networks of different, specialised firms.

EGM used to be an architectural firm that had several design disciplines in house. This model was quite successful during twenty years since the mid seventies. But nowadays it is evident that different projects need different combinations of expertise. In the quest for the best solution to a design problem it often has become necessary to involve specialised 'niche players' that are not always available in the own firm. Like many other firms inside and outside the building industry, EGM's policy is aimed at 'going back to the core business' and in participating in multidisciplinary networks of specialised design and engineering firms.

EGM architecten are convinced that ICT and the Internet will play (and already play) a major supporting role in this process. Up to this moment, multidisciplinary networks are mainly formed on a regional basis, as nearness of all participants in a project is considered important in today's practice in terms of efficiency. The Internet will enable the development of virtual project organisations (in fact, this is already the case today). As a result, distances between participants will no longer be of major importance.

Moreover, the Internet will enable specialised architectural firms like EGM to seek co-operation with highly specialised partners on a national, European and even global level.

One of the major conditions for the success of virtual project organisations and co-operation through the Internet is a faultless workflow management. In this respect the Caribcad project has been very useful and instructive. Caribcad has offered good insight in the state of the art and potential of workflow management tools and has clearly demonstrated where further research and development is required.

Another important condition is that the participants in a project use the same definitions for building objects and their properties. Only this will enable faultless electronic data interchange between different software applications of different participants. EGM is involved in a nationwide initiative to develop a 'Lexicon' of such definitions (the BAS initiative; 'BAS' stands for 'Bouwbreed Afspraken Stelsel', which means so much as 'industry wide standard for building object definitions'). It is expected that the Lexicon will increase the effectiveness of the use of ICT in the building industry enormously. A lot of effort is put into tuning this Dutch initiative with similar international initiatives, with the focus on synergy.

Good workflow management is indispensable for co-operation through the Internet. From an architect's professional point of view, there is a market for both types of WMF tools that are developed in the Caribcad project:

- tools for 'closed partnership with shared collaborative process' (collaboration between architectural firms and architectural service bureaus);
- tools for 'open partnerships with shared outsource template' (collaboration between architects and specialists with additional expertise).

The Caribcad project shows that the application of today's generation of WMF tools can lead to generic WMF templates that are quite rigid. This causes some concern, as experience with Quality Management in the building industry teaches, that rigid generic QA procedures often work contra productive in project management. Each project has its own specific circumstances and QA-procedures always have to be made project specific. In modern QA systems, e.g. project leaders are being made responsible for turning a generic QA procedure into a project specific procedure. Likewise, it is logical to expect that a generic WMF template has to be turned into a project specific WFM tool, otherwise there is fair chance that the generic template won't fit to most outsourcing jobs. This means that in E

- more R&D has to be put into the building of adjustable generic WMF templates;
- project leaders in architectural firms have to be educated and trained in the use of WMF tools and the adjustment of generic WMF templates to project specific tools.

We are only at the beginning of this process, but Caribcad broadens the insight in this matter and shows the way to further development.

## **Conclusions**

Concluding, for its own use EGM sees the following economic benefits of co-operation through the Internet in combination with workflow management:

- it enables and stimulates the multidisciplinary approach of design projects, that is more or less dictated by the demand side of the market;
- as the distance between project participants is no longer important, it broadens the possibilities for forming the best multidisciplinary team for a specific design project;

- as a consequence, the conditions for achieving ‘quality’, in the sense of meeting with user requirements, will increase;
- moreover it will potentially increase the cost effectiveness of the design process and shorten the pass through time of projects;
- it will give a positive impulse to the professionalism and the competitiveness of architectural firms and other designing and engineering disciplines in the building industry.

Caribcad made clear to EGM architecten that the potential benefits of outsourcing through the Internet do not lie in outsourcing tasks that may be considered parts of the own core business (“no one does that better than the firm itself”), but in the co-operation with firms of high quality with additional expertise, both on a national and an international level. In order to achieve the benefits, the use of workflow management tools and system independent definitions of building objects and their properties is indispensable.

Many architects have a different strategy, they choose to outsource everything but the actual architectural design. For them it is necessary to work in closed partnerships with local partners in the outsourcing of workloads that traditionally belonged to the architect’s task. Open partnership is also a possibility for them in the case of partnering with specialists with additional expertise. However, today’s practice shows that the architectural service bureaus often play a leading role in this.

The following matrix shows the jobs in an architectural firm that can potentially be outsourced, with or without the use of the Internet. The rate of ‘  
-“ or “ - -“. A distinction has been made between outsourcing to local partners and to foreign partners (DC partners)

<b>Category</b>	<b>products</b>	<b>Local partners</b>	<b>Foreign partners</b>
Initiative	Briefing Functional analysis	++ + / -	- -
(CAD) drawings	Design drawings Specification (technical) drawings Detailing / production drawings Regeneration of paper based drawings Building elements (like window frames, prefabricated concrete)	- + + ++ ++	- - - - + +
Visualisations	Animation 3 D-stills Photo montage Artist impression Special products (like sunlight studies) VR-simulations	++ ++ ++ ++ ++	+ ++ ++ + / - +
Mock ups	Physical mock ups	++	- -
Information for users / PR	Bill board User guides	++ +	- -
Special services	Cost engineering Quantity surveying Technical specifications	++ ++ +	- - + -
Engineering	Structural engineering Building science Service engineering	++ ++ ++	+ + +
Building co-ordination	Co-ordination on the building site Quality control on the building site	++ ++	- - - -
Archiving	Information management & knowledge management	+ (consult) - (actual managem.)	+ (consult) - (actual managem.)
Other services	Facility management Maintenance	++ ++	- -
Specific expertise	Accessibility Social safety Sustainable building Energy efficiency Safety & health on the building site	++ ++ ++ ++ ++	++ ++ ++ ++ + / -

The potential economic benefits of co-operation through the Internet with the use of workflow management tools will apply to a major part of the building production, if not the whole building production.

	<b>Percentage</b>	<b>ECU</b>
Annual Dutch building production		20.000.000.000
Cost of design & engineering + design management	Average appr.11 %	2.200.000.000
Architect's fees	Average appr. 5%	1.000.000.000
Of which outsourceable	25 – 75 %	250.000.000 – 750.000.000