

Applied Photogrammetry and GIS in Large Production Environments - Challenges and Advantages

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Key words: Cost Management, Human Resources, Production, Economic Development

SUMMARY

The GIS and Photogrammetry markets all over the world are highly competitive. Process automation and work flow management is widely used and the technical solutions are mainly optimized. Parallel to the technical side an economic improvement has taken place by using the instrument of outsourcing in off-shore entities to reduce the production cost. In this paper the basic ideas of outsourcing are given together with a synopsis of third party contracting and transfer of the production of an enterprise into low cost areas. The necessary requirements for production outsourcing are explained with a focus on human resources. A case study of a large European production site demonstrates these developments.

ZUSAMMENFASSUNG

Die weltweiten Märkte für Geoinformation und Photogrammetrie stehen unter sehr starkem Konkurrenzdruck. Automatisierte Prozesse und Management der Arbeitsabläufe sind weit verbreitet und weitestgehende optimiert. Parallel zum technischen Teil der wirtschaftlichen Optimierung fand zur Reduktion der Produktionskosten die Auslagerung in kostengünstige Regionen statt. Hier sollen nun neben den Grundlagen der Produktionsauslagerung ein Vergleich zwischen Vergaben an Dritte und einer Verlagerung der eigenen Produktion in kostengünstige Regionen erläutert werden. Es werden die notwendigen Voraussetzungen für eine Produktionsverlagerung beschrieben, wobei die menschliche Arbeitskraft im Mittelpunkt steht. An Hand eines Fallbeispiels einer größeren europäischen Produktionsstätte werden diese Entwicklungen aufgezeigt.

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1. INTRODUCTION

In the industrial environment there is a permanent interest in optimizing procedures, work flows and efficiency. This is strongly related to optimize cost, quality and time lines in addition to health, safety and environmental effects. Also the GIS business is not exempted from these influences. With the conversion from analogue to digital products the location of the production was more and more of less interest. GIS organisations were shifting their production partially or even completely to low cost areas e.g. in Europe to the southern parts like Sicily, Portugal, parts of Spain or to other public subsidized locations with the intention to improve the local economies. Later on the off-shore production facilities in India and Southeast Asia with their tremendous capacities were coming into the Western markets.

So in this article the main reasons for the outsourcing of any GIS production will be demonstrated, but also the synopsis of enterprise integrated production facilities and external ones will be made. The necessary requirements for an off-shore production are summarized and a case of an integrated off-shore production is shown.

The standard enterprise model (see figure 1) is based on 3 columns, i.e. Production, Sales and Finances & Administration. In this article the focus will be on the Production part only.

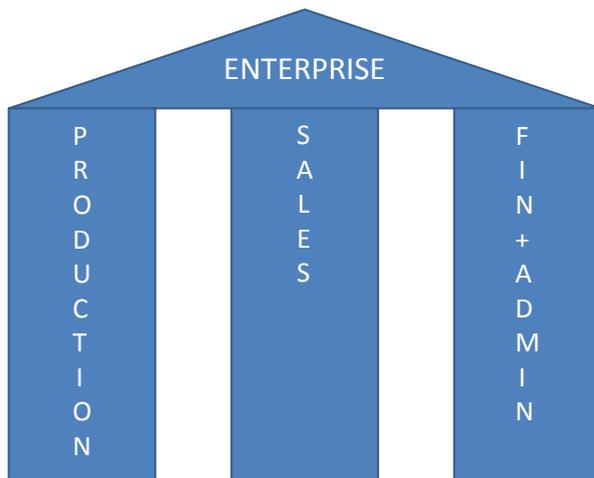


Figure 1: Typical enterprise structure

2. REASONS FOR OUTSOURCING OF PRODUCTION

In the following the major reasons will be shown and explained why enterprises are choosing the opportunity to outsource their production facilities.

2.1 Cost Reduction

The idea of cost reduction is the main and most obvious reason why production facilities will be transferred to low cost or off-shore areas. Especially in mature market segments this is a common management instrument. The work flows are already established and optimized (Schroth, 2008), just the cost for labour, living, taxes, etc is left for optimisation.

2.2 Extension of Own Capacities

The next most common reason is the extension of own capacities. Market requests or single projects are demanding temporary higher capacities than available in the enterprise on short note. Also when the own capacities are fully booked and there are risks in the midterm market requests outsourcing can be an option.

Both of these reasons mentioned are known to the economics as the "Make or Buy Principle".

2.3 Lack of Competence and Experience

Another reason for outsourcing is coming from the available human resources in an production environment. Often there is a demand for special knowledge of hard- or software, like operating specialized sensors or data bases, and the enterprise has to search for assistance. This leads up to the impossibility to make a reliable cost estimation for the different work flows in a tendering phase due to the lack of experience in the own production team and an offer from an outside supplier has to be requested including the following outsourcing of the production parts in case of contract award.

2.4 Risk Share or Transfer

When a GIS project includes risky elements like significant penalties in the contractual conditions or imprecise or challenging technical specifications outsourcing to other companies with back to back contracts is a common tool. Of course the prime contractor is always liable for his activities. But at least after a risk realization he can recover some of his losses or damages. Procedures of risk management can be seen at FRENKEL et al., 2013.

2.5 Reduction of Working Capital

GIS projects in general need some relevant working capital as the payment conditions are not in line with the project flow and production cost. Pre-financing is a standard situation. As rule of thumb a working capital of about 3 times the monthly revenue is necessary. But working capital is the most expensive cash as it is borrowed from the shareholders of an enterprise. So outsourcing with, in best case, back to back payment plans is becoming a more and more common instrument. As the competition between the suppliers is quite high they are often neglecting this kind of risk and acting as a financing institute when they are economically strong enough. If not this financing model collapses.

3. INTERNAL VS. EXTERNAL PRODUCTION

There are several options of outsourcing the production. One can fully rely on third party suppliers (external production) or a production subsidiary is established in a low cost environment (internal production). The internal production is quite similar to an enterprise integrated production. The main difference is that it is an own entity with some independences like its own legal status. The shares of this entity are mainly belonging to the enterprise. The advantages of the internal production are clearly to avoid loss of competence, knowledge and experiences. There is less risk of dependency on a third party supplier like weak finances, not keeping schedules, capacity and quality problems, etc. The enterprise will also keep its strong market position with all the competences in the backhand and is not downgraded just to a point of sales. Also with the use of third party suppliers it is still possible to cover production peaks.

With the internal off-shore production an enterprise can take most of the advantages of outsourcing without creating new competitors in its own market coming from the third party side. In chapter 5 a case of this model will be demonstrated.

4. REQUIRMENTS FOR OUTSOURCING

For the establishment of an own entity for outsourcing, the internal model, some prerequisites are absolutely necessary:

4.1 Investment Capital

Capital is necessary for building up the IT environment, office spaces, training of staff, working capital, etc. Normally it should come from the enterprise establishing the entity. The volume depends on the production capacities to be build up. A stepwise procedure is recommendable.

4.2 Human Resources

The human resources are the most important item in the establishment of an GIS production entity. There must be a good educational system available in the vicinity of the entity to cover all basic trainings in IT, geography, mathematics or automation. The capacity of the labor force must be sufficient or even better, redundant available. The selection of the staff with the right base of knowledge and skills is the major factor of success. Assessment centers are recommendable. In the beginning there will be an investment in intensive training of the staff necessary to teach the production processes and work flows established by the enterprise.

4.3 Infrastructure

The infrastructure means of course good access to the location by general traffic (air, train, cars). The distance in between the enterprise and its production facility should be in a range of several hours. Besides traffic the IT infrastructure is a basic requirement, high band width for data traffic is a must. But even standard utilities like water, electricity and gas have to be guaranteed by a sufficient infrastructure, if necessary by backup systems.

4.4 Hard-and Software

The GIS production is more and more based on a huge amount of source data to be processed. So the onsite IT infrastructure is of relevance. Data servers with high capacities, fast LAN, and scalable systems, data security, etc have to be established. But the major impact is the specialized software which will be in use. The software is the crucial point of the investment and has to be selected carefully. Open source software and other options are not always recommendable.

5. CASE BLOM INTERNATIONAL OPERATIONS

The former Norwegian Blom Group, nowadays NRC Group, Geo Division, has established two production centres, one in Indonesia (1999) and one in Romania (2012). In general both are acting as internal production units. The focus here will be on the Romanian production site, called Blom International Operations SRL, as there are some specialities.

This entity is based in Targoviste, greater Bucharest area with about 3 million inhabitants, Romania (figure 2). It is within about 4 hours of travel distance to Central and Northern Europe where the other Blom subsidiaries are located. As Romania is a member of the European Union the legal conditions are similar to Western standards. The NATO membership guarantees a high security class. A local technical university is the main education resource besides the variety of Bucharest universities.

This production centre was a spin-off from the former Blom Romania subsidiary, focusing mainly for GIS production for the Blom Group. Nowadays there are 150 highly skilled employees providing competences in geo-referencing, surveying, sensor operations (LiDAR, cameras, etc.), Photogrammetry, GIS (interpretation, capturing, analysis, cartography), 3D city models and landmarks, software engineering and database development. Figure 3 shows the organisation of the entity.

As the production is mainly focused on European clients different language skills besides the standard English in-house communication are necessary and available in German, French, Spanish and others.

The technical education and the fast and flexible adoptability of the staff (average age about 28 years) guarantees quality and in time delivery which is even certificated by international clients of the Blom Group.



Figure 2: Location of the production centre in Romania

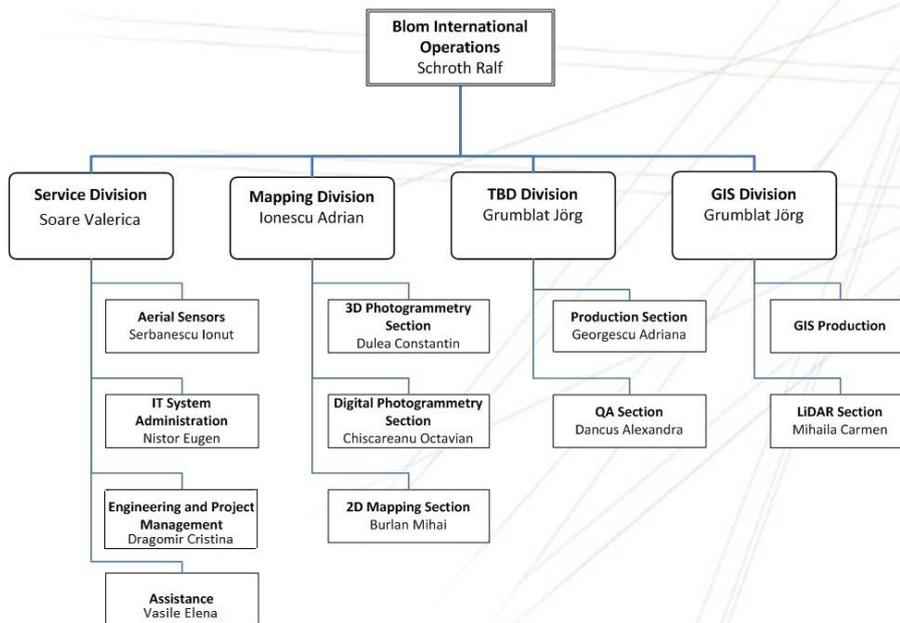


Figure 3: Organisation of the Production Centre

These conditions are the key for a technical and economical success in a very competitive GIS market. That is why Blom International Operations is offering its service also to third parties like partners outside of the Blom Group. This hybrid model gives a sound and stable economic situation with a balanced relation in between group internal and own external revenues.

6. CONCLUSIONS

Optimisation of technical processes, work flows and quality assurance, efficiency in use of the human capital under continuous observation of the ethic, health and safety standards and permanent economic improvements should be a standard in an industrial and production environment. Further concepts like value chain organisation, Internet of Services and Industry 4.0 will influence the future developments of the production.

Besides these production concepts for mature markets one should keep in mind that mainly innovations and the creation of new markets are the driving factors in each business.

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BIOGRAPHICAL NOTES

Dr. Ralf W. Schroth, born in Berlin in the year 1953, studied Geodesy and Surveying from 1972 up to 1977 at the University of Stuttgart. After the probationary period for the national surveying administration in the Land Baden-Wuerttemberg he got his degree as legal surveyor in 1979.

He worked as a scientific assistant at the Institute for Photogrammetry at the University of Stuttgart under the leadership of Prof. Fritz Ackermann till 1984. There he was active in the fields of research and development, giving lectures in Photogrammetry and adjustment theory, software development for aerial triangulation and photo-reproduction. In 1985 obtaining the degree of Doktor-Ingenieur.

From 1984 till 2008 he has been working with the company Hansa Luftbild in Muenster, where he was acting in different managing positions like as managing director and member of the board of the Hansa Luftbild Group.

Since 2008 Ralf Schroth is working for the Norwegian Blom Group (since 2015 named NRC Group) as managing director in Germany and Romania, business development director for central and eastern Europe and organizing the off-shore production at Blom International Operations SRL, Romania.

Ralf Schroth has many years of experiences in business administration and management, project management, Photogrammetry and Geo-Information systems. Already in 1988 he was announced as a member of the management board at Hansa Luftbild GmbH and co-founded an international group of companies. He was also responsible for general contracting projects on the Arabian Peninsula. He was board member in several affiliated companies in Germany and abroad.

From 1991 till 2015 he has been lecturer at the University of Hanover for business administration and management for surveying engineers. In 1997 he got the appointment as honorary Professor from the University of Hanover. From 2004 till 2008 he was also lecturer at the Institute of Geomatics at the Polytechnic University of Barcelona.

Ralf Schroth is member of DVW - Gesellschaft für Geodäsie, Geoinformation und Landmanagement und Deutscher Gesellschaft für Photogrammetrie, Fernerkundung und Geoinformation (DGPF).

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