# Globalization of Engineering through the OEDC

## (Offshore Engineering Development Center) Model – A Modular Global Sourcing Approach

Viewpoint on **"Engineering services right-sourcing"**
Business Consulting Group – ITC Infotech

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# Executive Summary

Engineering companies are today being challenged by the twin challenges of reducing cost of engineering operations while delivering higher output to meet demands of product proliferation, product localization, product extensions etc. In this context, we find many of these engineering companies facing multiple supply side constraints such as reduced time to market, pressures to reduce costs, dearth of quality engineering talent (issues of availability of skill, skills at the right costs, etc) in the European nations and the United States. Moreover, for high capital intensive industries such as Telecom, Oil and Gas (upstream and midstream), the economy pressures cause variability in investment decisions and thus cyclicity in EPC (Engineering, Procurement and Construction) contracts.

This paper discusses various global sourcing options that a company may consider and further delves into providing a way to "right-source" to meet the engineering objectives and the goals set. Furthermore, the paper examines the evolution and key success factors of OEDC (Offshore Engineering Development Center) model using a risk-reward methodology that can help identify the right engineering work packages (why source, what to source, when to source) that can be put in a "Right-Sourcing" model that optimizes the value-cost-risk parameters.

We believe that, as long as, companies get their engineering sourcing strategy right and also aligned it to their corporate strategy and goals; while keeping track of the service quality; schedule & cost, they are certain to reap huge benefits over a long run horizon and emerge as clear winners. The key lies in conceptualizing and implementing a robust global model capable of delivering competent technical expertise, services and solutions in a flexible and efficient manner.

# The current situation

Most companies in the engineering services space started with and still widely use staff augmentation (also known as the time and material model) to remain flexible and agile to clients' requirements. This allows organizations to retain the ability to control the vendor and resources in-house. The model is simple, cost-effective and relatively low-risk.

Some of the other benefits of the staff augmentation model are:

- Quick access to missing capabilities and skills.
- Ability to accommodate temporary staff shortages.
- Minimal contracting efforts required.
- Reduced time-consuming hiring processes.
- No impact on operating model & organizational structure.

In the next phase of services globalization, engineering design and services companies, for the fear of losing control over their IP (Intellectual property), followed the route of setting up captive centers. Most of the companies felt that it would be impossible to design and implement, in true practice, the stringent data confidentiality and IP security clauses, which were essential to outsource the work to a third party service provider. As a result, companies from an array of industries-: Hi-tech, telecom, semiconductor and automotive, set up their captive sectors in India and other countries. These captive centers have also served the two-pronged agenda of these companies: to benefit from the cost and talent arbitrage of shifting work to low-cost countries and to enter into new markets & geographies.

Some of the other benefits of the captive centre model are:

- Attracting local expertise for industry-specific skills.
- Retain complex and IP-related tasks in house than transfer to a third-party, to mitigate misappropriation and infringement risks.
- Direct control over the operations and ability to implement similar corporate culture.
- Potential spin-off and other asset value-realization options.

Of late, a newer trend is emerging wherein companies are looking at the possibility of setting up OEDCs along with service providers. These are stand-alone; optimized by skills and product design needs; customer centric, engineering service provider managed operating models that span a range of services and technology areas.

Some organizations are also looking at the Engineering Shared Services (ESS) model in which a shared-service center, supported by dedicated people, processes and technologies, acts as a centralized provider of a defined business functions or activities for use by multiple customers/clients. Sharing of resources and infrastructure facilities result in significant cost savings for the clients.

Although, both the approaches of OEDC and ESS are not widespread, there has been a general positive sentiment about the long-term benefits of these models. We have tried to explore the former approach in this paper and the way to go forward.

# The need to right-source in a right way

In the past, most of the companies considered outsourcing of non-core activities primarily due to cost-arbitrage benefits. While the staff augmentation approach is safer, clients cannot achieve large scale benefits as the approach is fundamentally reactive and short-term. The staff augmentation model may not provide lasting benefits to the clients as there can be issues related to lower productivity, lack of proper capability building and training, higher employee turnover, limits on control and difficulties in corporate culture assimilation. Additionally, the lessons learnt by these companies over a period of time and the costs of delays in schedule and (or) quality have forced the outsourcing decision-makers to think beyond the obvious short-term benefits. Moreover, enterprises can't achieve geographical and market diversification.

Although, the captive route provided a control over the IP and the core engineering design skills residing with the parent companies, but the issues related to long lead times for setup and achieving the RoI target forced many companies to move beyond this model. There were other challenges associated with setting up captives such as:

- Political and geographical issues.
- Local government policies and bureaucratic lobbying.
- High infrastructure investments.
- Challenges in implementing stringent SLAs with a subsidiary.
- Stagnation after initial growth phase leading to attrition.
- Hidden costs such as management time commitment, travel costs and knowledge transfer costs.
- Whole risk remaining with the parent company

At the same time, companies had successfully implemented complex OEDC models wherein they were not required to make huge initial infrastructure investments, deal with the government bodies and ambiguity in the alien countries. Setting up an OEDC over a captive center mitigates above mentioned risks and generates value from day one. Over-time, organizations have also drawn fairly elaborate SLAs which made data security and IP protection mandatory thus leading to a new wave of OEDCs.

Through our interactions with a number of outsourcing decision-makers in the engineering services space, we have found them mired in questions such as:

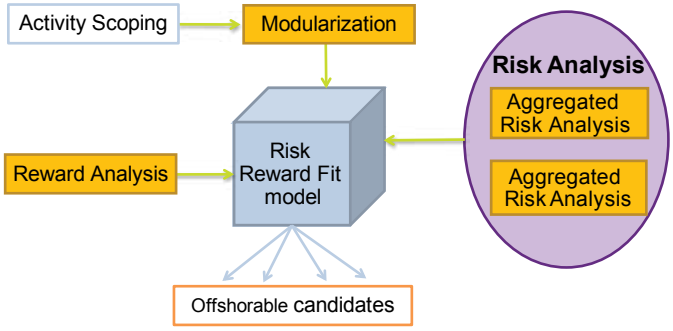
- Are we facing challenges with our current model?
- What is the right way to outsource?
- What should we outsource and to whom?
- What should our expectations be in terms of:
  - Execution
  - Quality
  - Delivery
- What "fair-price" shall be paid to the service providers?

To answer these questions, we have developed a comprehensive model which breaks down the engineering ecosystem into distinct modules and uses the risk-reward analysis to arrive at the decision on the modules to be outsourced and the best-fit approach to right-sourcing model.

# A way to move

Our *Risk – Reward: Fit (RRF) model* will help organization's identify candidates for right-sourcing based on reward, risk and fit analyses of discrete modules or work packages in the Engineering Services domain and enable them to identify the modules which shall be worked in-house or outsourced to third-party vendors

**Risk – Reward *Fit (RRF) model for outsourcing***




Activity scoping and modularization will help us segregate activities / processes into discrete modules of engineering which can be analysed further on risk-reward: fit analyses. To bring clarity on the Risk - Reward: Fit framework, it is important to define what these terms mean individually as well as collectively.

**Reward:**The potential rewards that can be realized by outsourcing a particular module. The rewards are in the form of cost savings, reduction in time to market, access to specialized skills not available locally, SLA based delivery performance, etc.

**Risk:** The risks associated with the outsourcing of modules such as risks due to IP leakage, delivery performance risks, core competency attrition, process breakdown due to cultural mismatch etc.

**Offshorability fit:** Examination of the offshorability of various engineering work packages based on risk- reward analysis.

To recap, reward analysis will help us evaluate modules based on the complexity of activities and tasks to understand benefits or rewards from the client's perspective. Risk analysis will help us classify risks of offshoring as aggregated and non-aggregated and analyze them. Finally, the offshorability fit analysis will help us identify the modules to right-source based on outsourcing risk and reward analysis

# Applying the *RRF Model* – An Example

Our *RRF model* is applicable to all engineering companies desiring to outsource their engineering work and help them answer questions such as why to outsource, what to outsource and how to outsource.

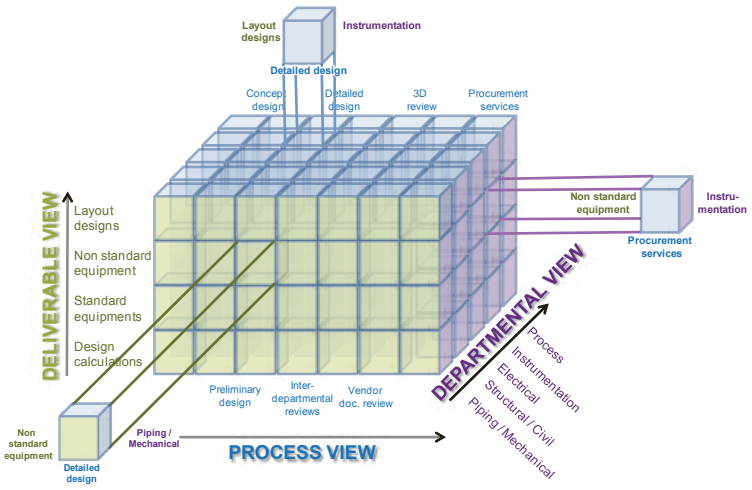
As an example, the *RRF model* as applied to the Oil & Gas mid-stream sector is as follows:

The core hypothesis of this approach is that when engineering companies look for execution on engineering work packages, they assess the same from different dimensions such as:–

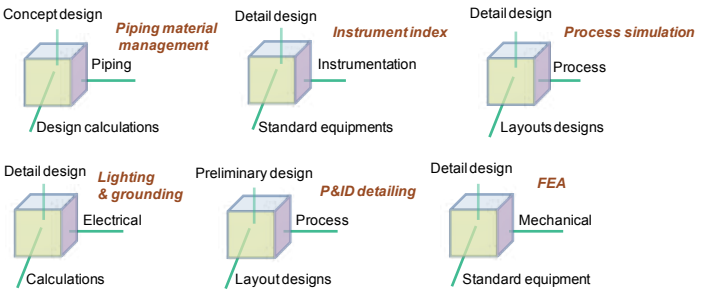
1. Department or functional view of an engi neering organization
2. Deliverable view – such as design calcula tions, standard equipments, layout designs etc.
3. Process view – Concept Design, Detailed Design, 3D review etc.

*Our model is equally applicable on more than three dimensions. As an example, tool view can be added without any loss in the output of the model.*

The activities / processes are identified and classified based on deliverable, process and departmental views as shown:




Some of the modules so identified after modularization are shown in the figure below:




The modules were analyzed on the risk-reward factors to identify the potential right-sourcing opportunities. Following steps were followed:

a. **Reward analysis:** The potential rewards that can be realized by outsourcing a particular module are analyzed based on various factors such as Process complexity, Technology complexity, Resource complexity, Tool / Software complexity and Coordination complexity. Each module is assigned a reward score after the analysis.

b. **Risk analysis:** The risks associated with the outsourcing of modules are classified as aggregate and non-aggregate risks.

   Aggregate risks are the risks impacting the entire model of outsourcing. Some of the aggregate risks identified are Principal/Agent risks, Fiduciary risks, Culture mismatch risk, Transition and transformation risk, Regulatory risks, Legal and Compliance risks, Relationship breakup risk. Risk mitigation strategies were suggested for the aggregate risks.

   Non-aggregate risks are module specific risks and have varying degree of impact on offshorability of the modules. Some of the non-aggregate risks identified are IP mis-

appropriation risks, Service Provider knowledge retention / Infringement risks, Quality; Schedule and Cost overshoot risks. Overall financial risk is a sum of the above mentioned non-aggregate risks along with the risks arising from volatility in currency and capital markets. Each module is assigned a risk score after analysing the non-aggregate risks.

c. **Offshorability fit:** The modules were classified along the risk and reward parameters on the Risk - Reward matrix as shown below for recommending the offshorability potential. The output is then categorized and plotted into 4 quadrants as shown below. In the Oil & Gas example, a *sample representative* analysis was done and the same is shown below.

## Risk – Reward matrix


**High reward, Low risk:** Work packages in this quadrant are the immediate candidates for outsourcing.

**Low reward, Low risk:** Work packages in this quadrant are potential outsourcing candidates. Engineering work-processes associated with these modules shall be re-engineered to make these modules more suitable for outsourcing.

**High reward, High risk:** Work packages in this quadrant present high rewards for high risks undertaken. Processes shall be standardized so as to reduce the associated risks of outsourcing.

**Low reward, High risk:** Work packages in this quadrant present high outsourcing risks for low rewards and thus shall be worked "In-House".

## Color coding

| Process | Instrumentation | Electrical | Civil/ Structural | Mechanical | Plant design & Piping | All |
|---|---|---|---|---|---|---|

## Legend

| | | | | | |
|---|---|---|---|---|---|
| P&ID detailing | P_P&ID | Instrumentation index | I_II | Cable tray routing, sizing and scheduling | E_CTR |
| Process simulation | P_PS | Cable tray routing, sizing and scheduling | I_CTR | Load analysis | E_LA |
| Heat & Material balance equations | P_H&MB | Wiring diagrams | I_WD | Lighting and ground design | E_LGD |
| Line & relief sizing | P_LRS | Instruments datasheets & selection | I_IDS | Power distribution system design | E_PDSD |
| HAZOP review | P_HAZOP | Valve noise, TC vake frequency calculations | I_VNC | MCC and substation design | E_MCC |
| PFD development | P_PFDD | Control valves design | I_CVD | System architecture design | E_SAD |
| General designing & drawings | CS_GDD | FEA(Finite element analysis) | M_FEA | General designing & drawings | P_GDD |
| Concrete analysis and design | CS_CAD | General designing & drawings | M_GDD | Piping modelling | P_PM |
| Cut and fill design | CS_CFD | Fabrication drawings | M_FD | Static and dynamic piping stress analysis | P_SDPSA |
| Site drainage and road design | CS_SDRD | Material handling equipment design (Conveyers etc.) | M_MHED | Isometric developments | P_ID |
| Structural analysis | CS_SA | Heat exchanger settling plan | M_HESP | Reference database development & maintenance | P_RDDM |
| Structured steel connections and detailing | CS_SSCD | Compressors/boiler/pumps /reactors | M_CBPR | Piping material management | P_PMM |
| Milestone check & review | COR_MCR | Staged reviews | COR_SR | Knowledge database management | COR_KDD |
| AS-built services | COR_ABS | Clash checking | COR_CC | 3D plant design | COR_3DPD |

## Conclusion

Maximizing the value of right-sourcing and minimizing the associated risks entail getting a clear view of the benefits that an organization seeks through outsourcing. The motivations for organizations can be multi-dimensional, ranging from cost & talent arbitrage, reduced time to market, entering newer markets; to tapping into newer streams of revenue. Based on the intended benefits and outcomes, an organization must weigh the rewards and the associated risks in right-sourcing to arrive at the best fit outsourcing candidates and the right outsourcing strategy.

## About the Author

Vikas Jandial is a Lead Consultant with the SCM practice at ITC Infotech, Business Consulting Group. He holds an MBA in Finance and Marketing from the Indian School of Business (ISB), Hyderabad with a B.Tech in Instrumentation Engineering from NIT, Trichy. He has over 5 years of experience in Energy consulting and Engineering, Procurement and Construction (EPC) sector in Business development, Change management, Project management and Business Process Re-engineering.

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