

sourcing engineering services through dedicated centers of excellence

The engineering services industry has reaped success from outsourcing and globalization in recent years.



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Abstract

The engineering services industry has reaped success from outsourcing and globalization in recent years. One of the critical factors for achieving outsourcing success is identifying and assessing an engineering services partner who can meet an original equipment manufacturer's (OEM's) needs in all the markets it serves. Another important factor is the supplier's capability to continuously innovate and deliver new solutions that address the changing market dynamics. Evaluations based on qualities such as an outsourcing

partner's technology expertise, control mechanisms, engagement models and protection of intellectual property can guide an OEM to success.

This white paper discusses the best practices for establishing an engineering services Center of Excellence (CoE) that can meet the needs of the OEMs today. It will provide the essential elements for evolving the CoE over time, to transform the partnership with the OEMs into a long-term competitive advantage.

Finding the Right Outsourcing Partner – Key Factors

An engineering services organization that has the depth of service offerings and domain expertise is necessarily the starting point to deliver engineering solutions. Further, a provider that has operational flexibility, from the standpoint of delivery models and geographic presence, gives the customer more options in finding the

best sourcing solutions. The ability to find, hire, and train engineering talent is the key. Creativity and willingness to invest in the collaboration adds to the value of the engineering services provider. Finally, process orientation and a quality mindset are the critical factors in ensuring success.

Strategic Collaboration with Dedicated Engineering Centers of Excellence – A Fresh Approach

A precondition for developing a successful, dedicated engineering center is a firm commitment from the customer to build a strategic long-term partnership and view the engagement not just as a sporadic staff augmentation or low-cost / low-complexity support. The capabilities of the center are optimized and strategic decisions are taken to grow the center only when the engagement is viewed as meeting the OEM's long-term objectives.

Planning for Yearly Success

One of the areas where engineering services firms can provide great value is through a true partnering spirit, wherein the provider is an integral part of the customer's engineering team and participates in the planning and reviews at the senior management level. The visibility into a yearly roadmap that spells out the service

requirements from the customer can help propel plans to optimize the product ideas and talent base.

By developing yearly plans for services and work streams and projecting the human resources required, delivery execution by the teams will then appropriately align with the customer's vision and goals. In addition, firms with excellent project management capabilities, and the expertise to update and report progress in real-time during the entire service period, can provide a distinct advantage to both the customer and partner.

The other success parameter that helps in relationship building and provides greater visibility is by agreeing upon and leveraging Key Result Areas (KRAs) that identify the key metrics and stakeholders, and details the delegation of authority to ensure proper accountability.

Dedicated Engineering Centers of Excellence – Best Practices

Engagement Process

The key to a successful partnership starts with a strong commitment and active support from all key stakeholders - including the customer. Consistent engagement throughout the relationship minimizes startup problems, ensures that the right activities are outsourced, maintains acceptable levels of performance and provides an avenue for growth.

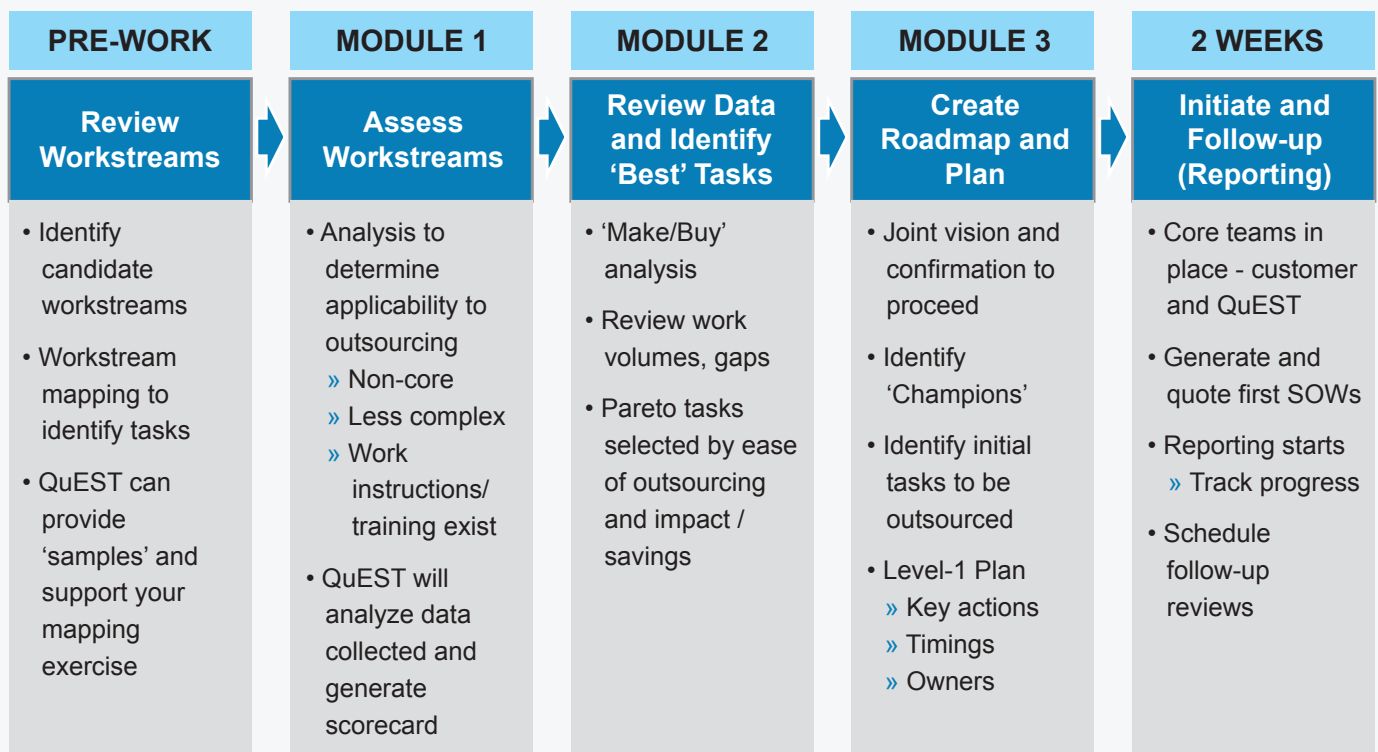
Beginning the Engagement Process

An engagement must begin with a clear and consistent message of intent from the senior executive team. It is also important to incorporate bottom-up planning for the implementation and delivery of the services at an early stage. The engagement process has two steps:

- Nominate managers from each unit of the customer's business – usually it is the strategic sourcing managers

- Organize workshops to help the customer teams identify the best tasks and functions to outsource. These workshops use a data-based process to analyze workstreams, and the output is captured in an Insource/Outsource matrix. This matrix maps the applicability of workstreams for outsourcing to the CoE, and when combined with a cost and needs analysis, provides the direction for the sourcing strategy

It is not a simple task to find a prospective outsourcing partner with a data-based process that identifies optimum outsource workstreams. QuEST believes we are the first global outsourcing firm to introduce such processes and QuEST sourcing workouts.



The diagram above illustrates the steps in QuEST's customer workout that begin the engagement process. A joint sourcing plan is created in the workout and provides

the blueprint and initial steps to start the customer and QuEST relationship.



Resourcing and Work Definition

Staffing and Resource Requirements

The CoE's objective is to provide cost-effective, high-quality support for as per the agreed service engagement. With the yearly plan signed off by the customer and engineering center, a detailed resource-staffing plan that includes details of the skills, experience and timeframe for hiring and training is created. The yearly resource-staffing plan ensures that the right resource is available when needed to support the customer's projects.

The engineering center develops a resource plan with the customer. The plan outlines the minimum staffing level committed, while at the same time provisioning for an up-side in volume or peak staffing by maintaining bench strength in the desired skill areas.

Training Plans

There are two basic options for training. After 'induction' (typically one to two weeks), the engineer will receive on-the-job training at the CoE or training at the

customer's site. Initially, it is useful to deploy a training model where a 'seed team' is trained onsite at the customer location. This team is then responsible for training additional resources at the CoE which minimizes the drag on the customer's manager and staff.

For all individuals in the CoE, it is the responsibility of the CoE managers to provide and establish a training program, which is agreed upon by the customer. This may include skills and competency training, as well as training on customer work processes and required software and systems.

- All the engineers working at the center are assessed by functional experts at the CoE every six months against a capability matrix. The CoE and customer review the matrix – agreeing on skills requirements and identifying skill gaps
- Any skill gaps are addressed through the CoE's employee development process and training. This can lead to additional training at the customer's site

Work Package Creation and Execution

Operations in the CoE should follow a simple process, initiated by the customer's identification of the work to be sourced. This process is described below:

- Once a work package is identified, the customer's work package owner (WPO) should use a standard template to create a statement of work (SoW), and provide specific data that helps in understanding the details of the project
- The CoE reviews the SoW and provides a quote. This includes the effort estimation, the program plan, and key assumptions made, together with a list of data required to execute the project
- Once the customer's WPO accepts the quote, a purchase order (PO) is issued, and work can begin
- During work execution, the CoE will review for schedule and budget adherence, as well as technical accuracy and quality. In many instances, 'in-process' reviews with the customer may also take place. A final review with the customer is required for the submission of the deliverables
- On submission of the deliverables, the CoE provides an invoice for the work completed, according to the terms in the PO. The customer's WPO will then initiate and process the payment

Controls and Protocols

Setting Up the Approval Hierarchy

Before any deliverable is submitted to the customer, the project is reviewed through the CoE's Quality Management System (QMS), which includes a rigorous process of peer review and additional reviews by the assigned technical leaders.

Establishing the Quality Control Processes

Quality is measured across the various workstreams in the center using a DPHH (Defects Per Hundred Hours) measure. It is an industry standard metric for measuring the quality of the service delivered.

DPHH is a Six Sigma tool, which is based on receiving the customer's and internal team's feedback against a holistic list of failure types. It categorizes errors into Critical, Functional and Appearance. Yearly targets are set for the CoE to achieve - performance is measured continuously and failure to meet the targets results in Key Performance Indicator (KPI) failure.

- Completing the DPHH feedback by the customer is merely a request of the WPO to record any defects in the work package deliverables
- The DPHH database is reviewed by the CoE's Quality Board and appropriate corrective actions are then taken to address the root cause using the Problem Resolution process

The performance measurement and reporting processes also incorporate additional relevant performance metrics such as on-time delivery, productivity improvement, capability development, key staff retention and others that are monitored and reported.

Establishing the Governance Framework and Protocols

An agreed upon governance, communication and operating plan for Management Reviews is the key to the success of a CoE.

Frequent, clear, and structured communication is the most effective way to initiate, scale and maintain the strategic relationship, reduce the support burden from the customer, and ensure that the work is delivered on time and to the required standard. An environment that encourages the early identification of issues must be established. A greater investment of time is required in the early stages of engagement to make outsourcing to a CoE a success.

Following an annual planning meeting, an operating plan for communication and reviews is established. Included in this review is 'Rhythm', a monthly Management Review Meeting (MRM) with the customer's senior executive champion and the senior leadership of the CoE, where the strategic direction of the relationship and the CoE are discussed. The meetings outlined below ensure that an operating rhythm is maintained and that continuous improvement and achievement of objectives is reviewed and scrutinized.

Customer Review / Report Rhythm	
Project Team status report (Written for each customer team)	Weekly
Business Unit Review (Resource requirements / fulfillment)	Weekly
QuEST Program Status Report (Status of plans)	Monthly
Technical Reviews (QuEST also performs internal technical reviews as per process)	As required
Senior Management Review Meeting (Alignment, issue resolution, forecast, strategic opportunities)	Monthly (Quarterly when mature)

It is important to encourage face-to-face meetings between the key stakeholders from the customer's side and the CoE. Additionally, visits to the CoE by the customer's key technical personnel should be

encouraged to provide visibility into the capabilities of the CoE, address any challenges, and most importantly build a sense of team between the customer and the CoE.

Case Study

QuEST has significant experience in building engineering Centers of Excellence (CoEs) around the globe. In the US, multiple such CoEs are providing our customers with strategic solutions to the manpower and budget restrictions that are common in the ultra-competitive business climate of today. The following is a description of a large-scale, cost-effective CoE that we operate in the Northeast US.

Project Engineering Centers of Excellence

In 2007, QuEST created a low-cost Project Engineering Centers of Excellence (PECoEs), based out of our offices in East Hartford, Connecticut. This CoE supports the execution of project engineering and manufacturing engineering tasks in a completely QuEST-managed environment. The CoE is connected directly to the customer's IT network with significant infrastructure, hardware, and IT security measures in place.

QuEST PECoE services cover a variety of project and manufacturing engineering tasks, including:

- Engineering Change Execution
- BoM Maintenance
- Configuration Management
- Hardware Tracking and Expediting
- Development Build Support and Hardware Documentation
- Test Planning and Reporting
- Design Documentation (ICD, CICR, and so on)
- Business Management and EVMS
- Cost Reduction
- Technical Writing
- Root Cause Investigation
- Inspection and Stack Up

QuEST's CoE is completely responsible for the

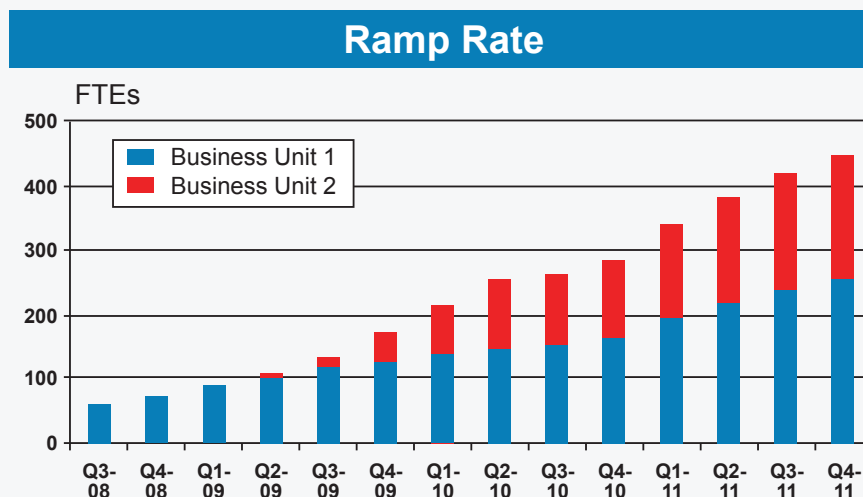
successful execution of these tasks as well as managing our team members. To achieve this, QuEST provides the daily direction and management of personnel, with QuEST offices as a base of operations for the team. This ensures technical proficiency development and team management processes, and a quality system and metrics tracking to measure performance.

Ramp Up

At the initiation of the CoE, we worked closely with the customer's senior management and identified long-term resource requirements. Then we developed a ramp plan based on our experience in building Centers of Excellence and understanding the skills mix required. Using the agreed ramp plan, QuEST developed a recruitment and hiring process flow required to support this ramp. QuEST used its team of full-time recruiters in the US to find and present appropriate candidates who were individually interviewed using a panel interview process to ensure consensus prior to hiring. Over time, we made improvements to the recruiting process and to the profile of candidates we were seeking to align with our best practices in PECoE hiring. The result was a ramp rate of approximately 10 project engineers per month during the initial growth period. During this time, the PECoE team maintained performance at customer's 'Gold Level' throughout.

Sustained Growth

After the initial ramp phase, the CoE has continued to grow steadily - adding new tasks and supporting additional business units and new departments in the customer's organization. The PECoE team in Connecticut is now at over 450 FTEs. The growth path is illustrated below.



Benefits: Performance and Cost Savings

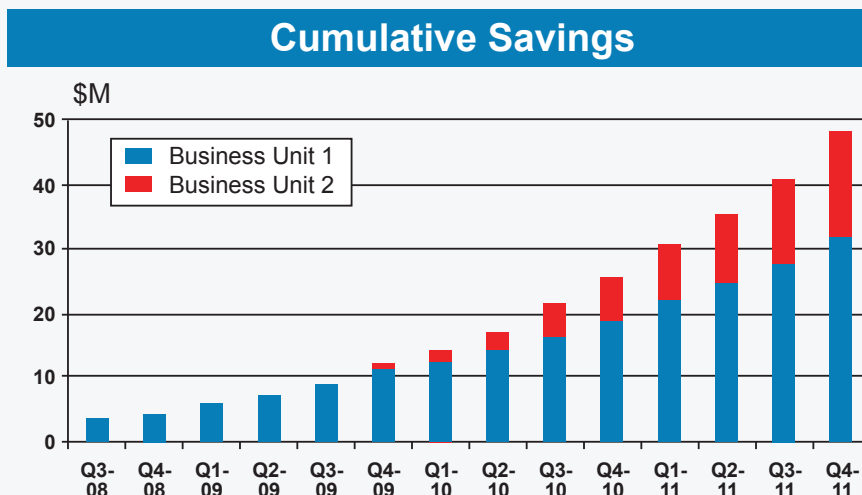
Our PECoE Center has achieved consistent and excellent performance in work quality, delivery, customer satisfaction and cost savings. We have maintained the

customer's 'Gold Level' since inception, and in 2011 was recognized as their #1 quality supplier. A standard performance scorecard for the CoE is illustrated below.

	Customer Satisfaction		Quality			Delivery / Schedule		
	No.	Customer Satisfaction Scale: 0-7	Hours	Esc.	Normalized Escapes	Items Scheduled	Items Delivered On Time	% On Time
	110	6.3	108,901	0	0.0000%	2961	2961	100%
January	41	6.6	12,892	0	0.0000%	205	205	100%
February	15	6.2	14,582	0	0.0000%	240	240	100%
March	10	6.5	15,317	0	0.0000%	388	388	100%
April	9	6.4	16,959	0	0.0000%	270	270	100%
May	13	6.2	16,489	0	0.0000%	328	328	100%
June	17	6.7	19,127	0	0.0000%	354	354	100%
July	14	6.1	19,649	3	0.0153%	405	405	100%
August	12	6.6	19,317	1	0.0052%	444	442	99.5%
September	24	6.4	22,086	0	0.0000%	390	388	99.5%
October	12	6.2	22,772	0	0.0000%	511	511	100%
November	17	6.6	19,269	2	0.0104%	393	393	100%
December	19	6.3	18,438	0	0.0000%	988	971	98.3%
YTD Total	203	6.4	216,897	0	0.0028%	4,916	4,895	99.6%
Goal		6.1			<0.0063%			99.5%

Finally, the customer was able to achieve over \$45 million in documented and verified cumulative cost savings since the CoE was started, as measured against

the previous cost of supply for these services. These savings are illustrated below.



Author Profile



Kurt Noe

Kurt Noe is responsible for leading the proposal effort across the globe, addressing customer needs, identifying creative solutions, and defining QuEST's value propositions. He has also spearheaded the standardization of QuEST's approach to developing accounts and creating customer-specific collateral.

Prior to this, Kurt was responsible for leading several of QuEST's strategic accounts, globally in North America and in the domain of Aerospace, including the United Technologies business. He has leveraged his 25 years in the industry to develop long-term engineering and manufacturing solutions. He has also made significant contributions in growing this segment of QuEST's business.

Kurt's engineering and program leadership experience at several firms – from small, privately held companies to major multinationals. He was Vice President of Programs for Sermatech International, where he developed a joint venture with Goodrich Aerospace to provide on-site coating capability. Earlier, Kurt made significant contributions – as Hamilton Sundstrand Program Director at United Technologies Research Center (UTC) and Manager of Technology for Pratt &Whitney. Before his tenure at UTC, Kurt has led the development of a new propulsion engine as Program Director at Honeywell Aerospace, where he was Marketing Director and an Engineering Manager. His engineering expertise has been availed of at AlliedSignal, Textron Lycoming, and Douglas Aircraft.

Kurt has a Bachelor's degree and a Master's of Science in Aeronautical Engineering from the University of Illinois. He has also completed the UTC Leadership Program at Darden School of Business and has a Six Sigma Greenbelt, UTC ACE, and extensive Allied-Signal Program Management training.

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Author Profile



James Gallo

James Gallo is currently responsible for the leadership and growth of QuEST's Strategic Customer Relationships, emphasizing on the energy domain.

James joined QuEST in early 1998, and has played a key role in contributing to its impressive growth, ensuring sustainable competitive advantage. His primary focus has been on establishing long-term relationships with strategic customers and developing strong customer-focused engineering teams for the execution of turnkey projects in all QuEST's service areas. He has continuously expanded QuEST's scope of supply - diversifying from high-end analytical support to the design and manufacturing of both mechanical and electrical products from a component level to complete power plant layouts.

Prior to joining QuEST, James had a successful career with General Electric (GE) in their Power Systems and Corporate Research and Development groups, where he was involved in the detailed design and analysis of gas turbines, nuclear and other power generation equipment. He is well versed in Six Sigma, having executed and led many DFSS and DMAIC projects at GE and QuEST.

James holds a Bachelor's degree in Mechanical Engineering from the State University of New York, Stony Brook and a Master's degree in Mechanical Engineering from the University of California, Berkeley.

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About QuEST Global

QuEST Global is a focused global engineering solutions provider with a proven track record of over 17 years serving the product development & production engineering needs of high technology companies. A pioneer in global engineering services, QuEST is a trusted, strategic and long term partner for many Fortune 500 companies in the Aero Engines, Aerospace & Defence, Transportation, Oil & Gas, Power, Healthcare and other high tech industries. The company offers mechanical, electrical, electronics, embedded, engineering software, engineering analytics, manufacturing engineering and supply chain transformative solutions across the complete engineering lifecycle.

QuEST partners with customers to continuously create value through customer-centric culture, continuous improvement mind-set, as well as domain specific engineering capability. Through its local-global model, QuEST provides maximum value engineering interactions locally, along with high quality deliveries at optimal cost from global locations. The company comprises of more than 7,000 passionate engineers of nine different nationalities intent on making a positive impact to the business of world class customers, transforming the way they do engineering.



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