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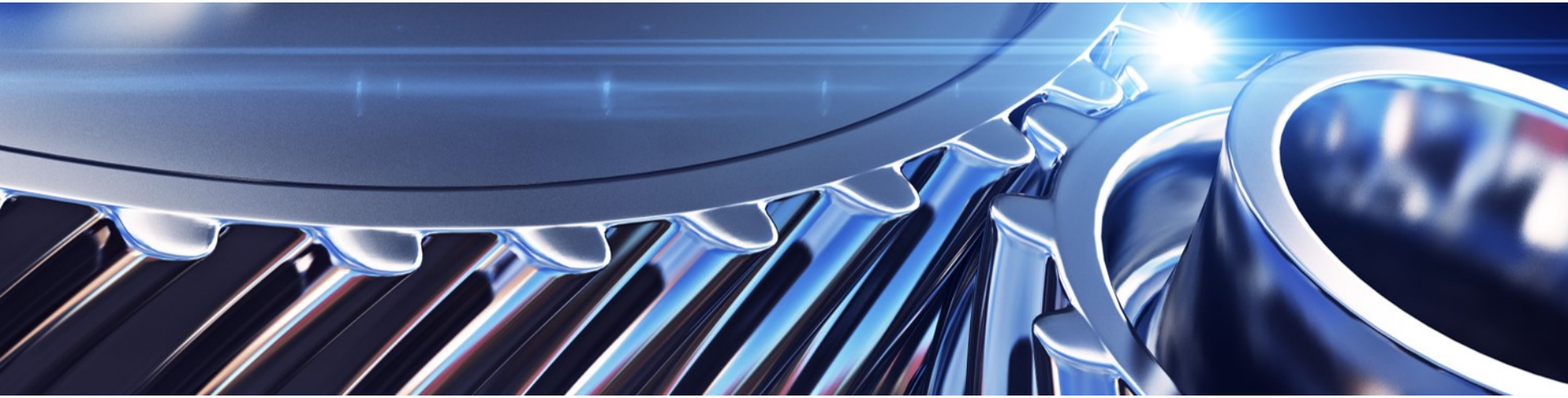

Embedded System Engineering Services PEAK Matrix™ Assessment: Enabling the Era of Connected and Intelligent Products

Engineering Services (ES)

Market Report – August 2018: Complimentary Abstract / Table of Contents

Everest Group®
PEAK MATRIX™

EGR-2018-40-CA-2742

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- Benchmarking | Pricing, delivery model, skill portfolio
- Peer analysis | Scope, sourcing models, locations
- Locations | Cost, skills, sustainability, portfolio – plus a tracking tool
- Tracking services | Service providers, locations, risk
- Other | Market intelligence, service provider capabilities, technologies, contract assessment

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Background, scope, and methodology of the research

Background of the research

As connected ecosystems gain precedence, embedded system engineering is assuming center stage in the development of smart products and services. It forms the backbone of numerous emerging themes including Internet of Things (IoT), Machine-To-Machine (M2M) communication, computer vision, telematics, robotics, and Augmented Reality (AR).

Enterprises across verticals are looking to leverage these themes to steer the next wave of innovative offerings and efficient operations. However, as they embark on the path of redefining their products and operations, they are faced with challenges ranging from unavailability of requisite product design and technology skills to high capital requirements and short time-to-market.

To overcome these challenges, enterprises are increasingly looking toward service provider engagements. They expect service providers to not only provide the engineering headcounts, but to also offer superior domain expertise, reusable frameworks/accelerators, and embedded system engineering infrastructure that enable a smooth and accelerated product development journey.

In this report, we analyze the capabilities of 14 embedded system engineering service providers. These service providers are mapped on the Everest Group PEAK Matrix, which is a composite index of a range of distinct metrics related to a service provider's vision & capability and market impact.

We focus on:

- Embedded system engineering services market trends
- Service provider landscape for embedded system engineering services
- Assessment of service providers on a number of capability-related dimensions

Scope of this report

- **Services:** Embedded system engineering services
- **Geography:** Global
- **Service providers:** 14 leading embedded system engineering service providers

Methodology: The assessment is based on Everest Group's annual RFI process concluded over Q1 and Q2 2018, interactions with leading embedded system engineering service providers, and analysis of the marketplace.

Overview and abbreviated summary of key messages (page 1 of 2)

This report provides a comprehensive assessment of the embedded system engineering services market and maps the leading service providers on Everest Group's PEAK Matrix. It also includes detailed profiles of featured service providers.

Some of the findings in this report, among others, are:

Market growth

- Global embedded system engineering services outsourcing market stood at US$11.5-12 billion in 2017
- This market is poised to grow at a Compound Annual Growth Rate (CAGR) of 13-14% during 2018-2021
- Automotive, telecom, industrial, and consumer electronics are the leading sectors for embedded system engineering services
- Embedded software constitutes nearly two-thirds of the embedded system engineering services market

Market trends

- **Connected ecosystems:** Product connectivity is helping enterprises drive superior user experience and enhanced product life for customers, while also enabling new revenue streams
- **Embedded intelligence:** Large volumes of data is making it unfeasible to analyze the data from individual devices in the cloud. This, coupled with the need to act on data in real-time, is driving the adoption of edge computing and embedded Artificial Intelligence (e-AI)
- **Embedded security:** As embedded systems are now a part of connected ecosystems, it is becoming imperative for enterprises to think of product security as an integral part of product design and development
- **Product optimization:** To better serve the emerging use cases, enterprises are laying focus on optimizing the footprint and power consumption of their embedded products and systems

Overview and abbreviated summary of key messages (page 2 of 2)

PEAK Matrix for embedded system engineering services

- Analysis of the service provider landscape for embedded system engineering services, leveraging Everest Group's PEAK Matrix, highlights the following categories of service providers:
  - **Leaders:** Altran, HCL Technologies, L&T Technology Services, and Wipro
  - **Major Contenders:** ALTEN, Capgemini, Cognizant, HARMAN, Infosys, QuEST Global, Tech Mahindra, and TCS
  - **Aspirants:** Innominds and Sasken
- **Leaders** showcase an ability to deliver system-level engagements in this space using their breadth of technology capabilities, strong project management capabilities, and sizable delivery footprint
- **Major Contenders** have demonstrated the ability to challenge Leaders and win large deals on the back of their partnership ecosystem, flexibility, and early-stage client engagement models
- **Aspirants** exhibit strong capabilities in delivering services for specific niches within embedded system engineering

This study offers three distinct chapters providing a deep dive into key aspects of embedded system engineering market; below are four charts to illustrate the depth of the report

Embedded system engineering services definition

	Ideation and design	Product development	Verification & validation	Product sustenance
Embedded software engineering	• Requirements gathering and analysis • Embedded software architecture • UI/UX ideation • Customer experience design	• Firmware development • Human Machine Interface (HMI) development • Middleware, stacks, and adoption layer • Release management	• Test plan design • Test automation and scripting • Testing based on requirements and safety criticality levels	• Feature enhancements • Defect tracking and fixing • Maintenance releases • Lifecycle enhancements • OS porting including Real Time Operating System (RTOS) & open source • Embedded analytics • Remote device management services • Power and footprint optimization • New processor platform adoption • Technical publications • Low volume manufacturing • Customer field support
Hardware engineering	• Hardware architecture • Component layout • Sensor design • Printed Circuit Board (PCB) layout • Processor/controller selection • Hardware simulation	• Fabrication and PCB assembly • Device drivers and control systems • Modem & sensor integration (for IoT/M2M) • Packaging engineering	• Board bring-up and diagnostics • Isolation checks • Design verification tests • Functional verification tests • Compliance certifications	
Silicon engineering	• Application-Specific Integrated Circuit (ASIC), Field Programmable Gate Array (FPGA), and System on Chip (SoC) design • ASIC to FPGA and FPGA to ASIC conversion • Design For Testability (DFT)	• EMI/EMC testing • IP verification • Functional verification • Protocol monitors and checkers • Code coverage analysis		

Project management

Product lifecycle management

Process improvement

Revenue breakdown by value chain elements and service functions

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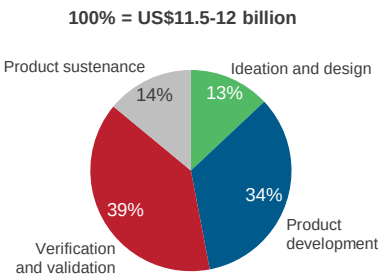
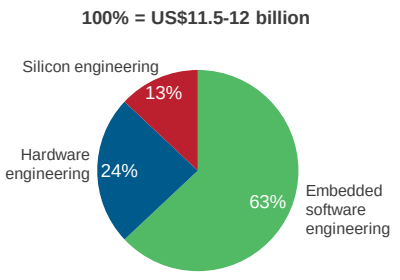
Embedded system engineering services outsourcing market – by value chain element
2017, %



Embedded system engineering services outsourcing market – by service function
2017, %



Demand drivers for embedded system engineering services

Low — High

Demand driver for embedded system engineering services	Assessment	Comments
Cost containment		• Cost containment by means of offshoring is a low-order priority for enterprises to engage with service providers • While embedded software is still offshored, hardware and semiconductor components limit the level of offshoring for activities such as testing of physical components and entire systems
Innovation and adoption of new technologies		• While enterprises look to constantly leverage emerging technologies to offer innovative products to the market, they often struggle with articulating the business impact and return on investments at the outset • In these situations, they seek help from service providers who can take a consultative approach to educate enterprises on prioritizing investments and also showcase Proofs of Concept (POCs) to qualify the business case for investment in new technologies
Time-to-market		• Time-to-market has become an extremely crucial factor for embedded systems in today's world of constantly evolving technology landscape • Enterprises seek support from service providers for development of net-new products with emerging technologies as well as for upgradation of existing products • A solution-led approach from service providers, thus, resonates well with enterprises
Talent access		• Talent and relevant skill acquisition is imperative in the connected ecosystem with the emergence of new technologies • By means of service provider engagements, enterprises look to acquire talent with skills in new technologies, who can work as an extension of their own innovation teams for executing work packages at scale

Embedded intelligence – key use cases and ecosystem players

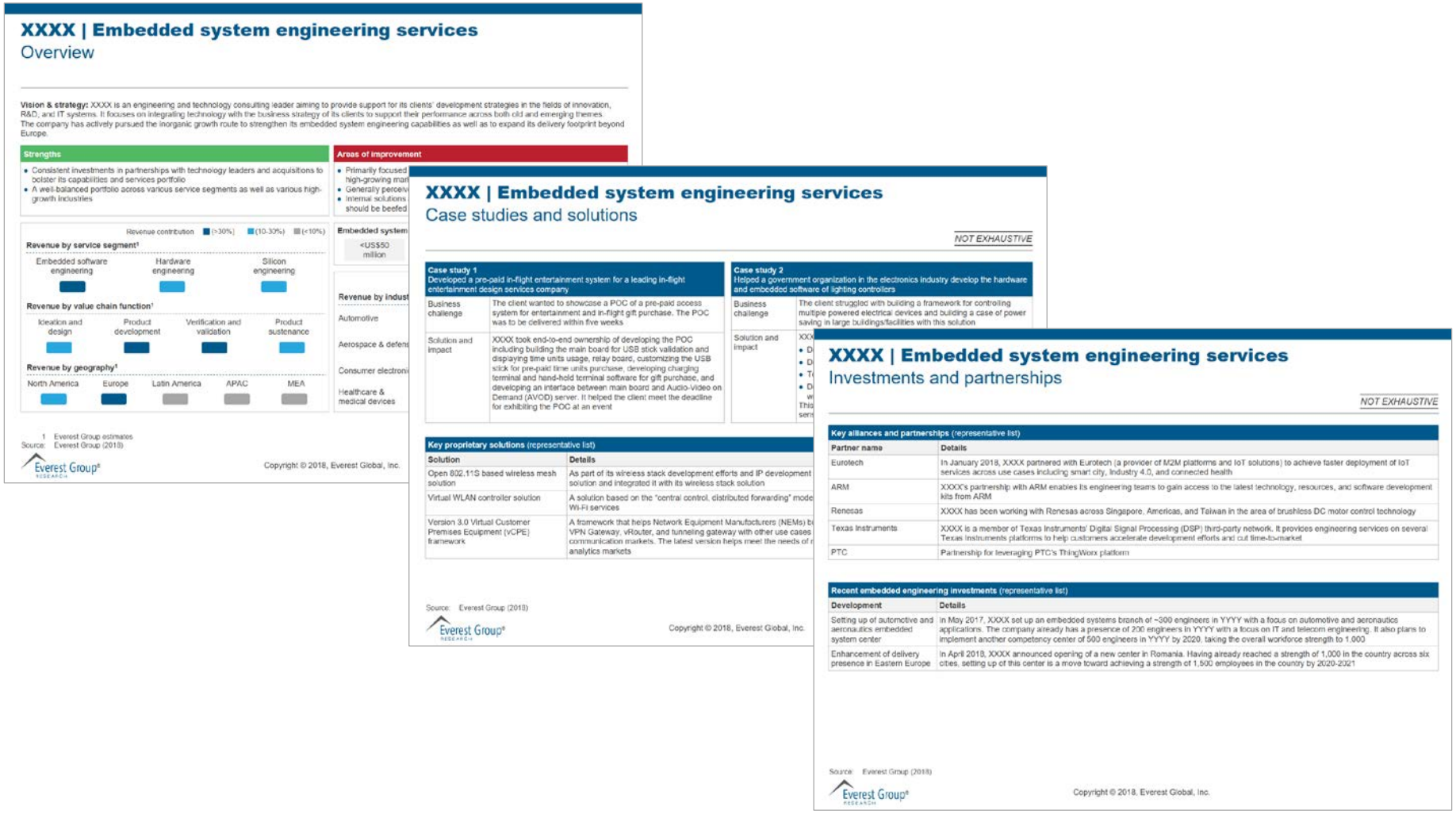
e-AI and edge analytics – industry use cases (representative list):

Smart factories	• e-AI capabilities can enable condition monitoring of equipment at the end-point itself, without the need of uploading sensor data to cloud • By sending only evaluation results to the management console, real-time autonomous control of the equipment can be maintained without straining the network resources
Hyper-personalized assistants	• e-AI and edge analytics offer a unique advantage of not having to share one's personal data onto public cloud for availing the services of a smart device-based personal assistant • As a result, individuals will be more comfortable sharing personal information to help the AI offer hyper-personalized suggestions and services
Service robots and drones	• e-AI and edge analytics can enable a level of cognition in service robots and drones (without the need for constant network connectivity). This will open new horizons of applications for these devices. For instance, these devices will be able to function and take autonomous action in real-time, without human supervision, while inspecting a remote mining site

e-AI and edge analytics – key enterprises and startups (representative list):

Leading enterprise participants	Key startups
cisco, DELL, hp, IBM, intel, Qualcomm	FOGHORN, Horizon Robotics, nebbiolo technologies, 商汤, Sentient, snips, westwell lab

This report includes 14 service provider profiles detailing their embedded system engineering services vision, scale and scope of operations, key solutions, and partnerships



XXXX | Embedded system engineering services
Overview

Vision & strategy: XXXX is an engineering and technology consulting leader aiming to provide support for its clients' development strategies in the fields of innovation, R&D, and IT systems. It focuses on integrating technology with the business strategy of its clients to support their performance across both old and emerging themes. The company has actively pursued the inorganic growth route to strengthen its embedded system engineering capabilities as well as to expand its delivery footprint beyond Europe.

Strengths
- Consistent investments in partnerships with technology leaders and acquisitions to bolster its capabilities and services portfolio
- A well-balanced portfolio across various service segments as well as various high-growth industries

Areas of improvement
- Primarily focused
- Generally perceiv
- Internal solutions should be beefed

Revenue contribution (>30%) (10-30%) (<10%)

Revenue by service segment[1]
Embedded software engineering | Hardware engineering | Silicon engineering

Revenue by value chain function[1]
Ideation and design | Product development | Verification and validation | Product sustenance

Revenue by geography[1]
North America | Europe | Latin America | APAC | MEA

Embedded system
<US$50 million

Revenue by indust
Automotive
Aerospace & defen
Consumer electroni
Healthcare & medical devices

1 Everest Group estimates
Source: Everest Group (2018)

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XXXX | Embedded system engineering services
Case studies and solutions

NOT EXHAUSTIVE

Case study 1
Developed a pre-paid in-flight entertainment system for a leading in-flight entertainment design services company

Business challenge	The client wanted to showcase a POC of a pre-paid access system for entertainment and in-flight gift purchase. The POC was to be delivered within five weeks
Solution and impact	XXXX took end-to-end ownership of developing the POC including building the main board for USB stick validation and displaying time units usage, relay board, customizing the USB stick for pre-paid time units purchase, developing charging terminal and hand-held terminal software for gift purchase, and developing an interface between main board and Audio-Video on Demand (AVOD) server. It helped the client meet the deadline for exhibiting the POC at an event

Case study 2
Helped a government organization in the electronics industry develop the hardware and embedded software of lighting controllers

Business challenge	The client struggled with building a framework for controlling multiple powered electrical devices and building a case of power saving in large buildings/facilities with this solution
Solution and impact	XXX • D • D • T • D w This serv

Key proprietary solutions (representative list)

Solution	Details
Open 802.11S based wireless mesh solution	As part of its wireless stack development efforts and IP development solution and integrated it with its wireless stack solution
Virtual WLAN controller solution	A solution based on the "central control, distributed forwarding" mode Wi-Fi services
Version 3.0 Virtual Customer Premises Equipment (VCPE) framework	A framework that helps Network Equipment Manufacturers (NEMs) b VPN Gateway, vRouter, and tunneling gateway with other use cases communication markets. The latest version helps meet the needs of r analytics markets

Source: Everest Group (2018)

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XXXX | Embedded system engineering services
Investments and partnerships

NOT EXHAUSTIVE

Key alliances and partnerships (representative list)

Partner name	Details
Eurotech	In January 2018, XXXX partnered with Eurotech (a provider of M2M platforms and IoT solutions) to achieve faster deployment of IoT services across use cases including smart city, Industry 4.0, and connected health
ARM	XXXX's partnership with ARM enables its engineering teams to gain access to the latest technology, resources, and software development kits from ARM
Renesas	XXXX has been working with Renesas across Singapore, Americas, and Taiwan in the area of brushless DC motor control technology
Texas Instruments	XXXX is a member of Texas Instruments' Digital Signal Processing (DSP) third-party network. It provides engineering services on several Texas Instruments platforms to help customers accelerate development efforts and cut time-to-market
PTC	Partnership for leveraging PTC's ThingWorx platform

Recent embedded engineering investments (representative list)

Development	Details
Setting up of automotive and aeronautics embedded system center	In May 2017, XXXX set up an embedded systems branch of ~300 engineers in YYYY with a focus on automotive and aeronautics applications. The company already has a presence of 200 engineers in YYYY with a focus on IT and telecom engineering. It also plans to implement another competency center of 500 engineers in YYYY by 2020, taking the overall workforce strength to 1,000
Enhancement of delivery presence in Eastern Europe	In April 2018, XXXX announced opening of a new center in Romania. Having already reached a strength of 1,000 in the country across six cities, setting up of this center is a move toward achieving a strength of 1,500 employees in the country by 2020-2021

Source: Everest Group (2018)

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Research calendar – Engineering Services (ES)

Published | Planned | Current release

Flagship ES reports	Release date
Leading the Pack: Trends for the Top 200 Engineering Research & Development (ER&D) Enterprises	May 2018
Embedded System Engineering Services PEAK Matrix™ Assessment: Enabling the Era of Connected and Intelligent Products	**August 2018**
Verification and Validation (VaV) Services – Service Provider Landscape with PEAK Matrix™ Assessment 2018	Q3 2018
Engineering Services for Medical Devices – Service Provider Landscape with PEAK Matrix™ Assessment 2018	Q4 2018
Manufacturing Engineering Services – Service Provider Landscape with PEAK Matrix™ Assessment 2018	Q4 2018

Thematic ES reports	
Top 20 Software Engineering Trailblazers – The DevOps Enablers	January 2018
Additive Manufacturing – Defining New Frontiers in Digital Manufacturing	March 2018
Supply Chain Excellence – Demystifying the Digitalization Journey	April 2018
A Guide to Industry 4.0 – Industrial Revolution and the Making of Smart Solutions	Q3 2018
Software-Defined "Suite of Things" – Blurring the Boundaries of the Technology Ecosystem	Q3 2018
How to Build a Superior Engineering Services Sourcing Model	Q3 2018
Global Engineering Services Talent Overview	Q3 2018

Note: For a list of all ES reports published by us, please refer to our website page

Additional Engineering Services research references

The following documents are recommended for additional insight on the topic covered in this report. The recommended documents either provide additional details or complementary content that may be of interest

1. **Additive Manufacturing – Defining New Frontiers in Digital Manufacturing** (EGR-2018-40-R-2590); 2018. This report presents an assessment of additive manufacturing in terms of its key enterprise benefits, emerging applications, industry maturity & use cases, and growth potential. It also includes recommendations for both enterprises and service providers to leverage additive manufacturing in order to accelerate growth

2. **Digital Vortex in the Mobility World – Automotive Engineering Services PEAK Matrix™ Assessment 2017 and Profiles Compendium** (EGR-2017-15-R-2446); 2017. This report comprises an analysis of the capabilities of 19 leading engineering service providers in the automotive vertical. These providers are mapped on the Everest Group PEAK Matrix. The report also focuses on key automotive engineering services market trends

3. **Software Product Engineering Services – Market Trends and Services PEAK Matrix™ Assessment: Adapting to the New Normal** (EGR-2017-15-R-2441); 2017. This report presents fact-based trends impacting the software product engineering services market, along with the assessment and detailed profiles of 18 software product engineering service providers featured on the software product engineering services PEAK Matrix

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