“Industry 4.0 has enabled the entire manufacturing industry to shift from a solely mechanical engineering-oriented approach to a more holistic, dynamic, and intelligent software-defined journey. Enterprises are extending the scope of Industry 4.0 across the value chain and connecting different stakeholders and processes to reap the full benefit of Industry 4.0 solutions and services. In this context, the service providers have an important role to play, not only as technology enablers for manufacturers but also as important contributors to the supplier and customer ecosystems.”

—Tapati Bandopadhyay, Research Vice President
## What you’ll read

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Introduction, methodology, and definitions
Introduction

● “Industry 4.0” refers to the emerging impact of automation and data exchange in manufacturing technologies. It includes cyber-physical systems, the internet of things, cloud computing, and artificial intelligence. Industry 4.0 is commonly referred to as the fourth industrial revolution. Industry 4.0, when adopted effectively, increases manufacturing productivity, reduces costs, accelerates the go-to-market timeline, and facilitates mass personalization.

● The HFS Top 10 Industry 4.0 Service Providers 2019 report examines the role that the service providers play in the evolving Industry 4.0 landscape. We assessed and rated the Industry 4.0 service capabilities of 21 service providers across a defined series of innovation, execution, and voice of the customer criteria. The report highlights the overall ratings for all 21 participants and the top five leaders for each sub-category.

● This report also includes detailed profiles of each service provider, outlining their overall and sub-category rankings, provider facts, and detailed strengths and development opportunities.

● The report focuses on Industry 4.0 specific capabilities across industries, as defined in our Industry 4.0 value chain. It does not include horizontal IT and BPS services, PLM services, and enterprise services such as ERP implementation that may be delivered to Industry 4.0 clients.
Service providers covered in this report

*Altran and Mindtree have been evaluated independent of their acquisition by Capgemini and L&T Group respectively
Research methodology

The HFS Top 10 Industry 4.0 Service Providers 2019 report assessed and scored service provider participants across execution, innovation, and voice of the customer criteria. The inputs to this process were detailed RFIs we conducted with 21 service providers, 120 reference checks, briefings with leaders of Industry 4.0 services practices within service providers, and publicly available information sources. Specific assessment criteria and weighting include:

Ability to execute
- Geographic spread and scale—Includes Industry 4.0 revenue and growth (YoY), global delivery footprint, and delivery spread
- Relationship management—Single face to the customer, formal relationship and governance structure, and client portfolio and centrality
- Depth and breadth of industry-specific offerings and expertise—including capabilities and revenue across the Industry 4.0 value chain, depth of industry knowledge, and level of sector experience
- Depth of expertise across value chain—Includes solutions coverage and maturity, integration among digital, business consulting, and Industry 4.0 practices

Innovation capability
- Vision—including an integrated vision and credibility of strategy, proof-points of strong understanding of industry trends, refinement of capabilities to address industry-specific challenges
- Ecosystem and investments—Partnerships, thought leadership, acquisitions, R&D investments, and talent management
- Tools and technology—In-house tools, patents, lab infrastructure, process integration, and R&D outcomes
- Pricing—Co-development with clients, creative commercial models
- Weaving with emerging technologies—Deployment of intelligent automation, IT-OT convergence, 5G, and other emerging technologies

Voice of the customer
- Direct feedback from enterprise clients—Via reference checks, surveys, and case studies critiquing provider performance and capabilities
The Industry 4.0 value chain defined (1 of 2)

- The Industry 4.0 value chain demarcates the boundary of the people, processes, and technology to form the backbone of successful Industry 4.0 implementations for manufacturers. The HFS Industry 4.0 value chain describes interplays between the processes and functions in which manufacturing organizations engage. The Industry 4.0 value chain provides a comprehensive overview of services for both types of manufacturing activities across differences in business processes and landscapes of discrete and flow manufacturing.

- HFS has identified the necessary manufacturing business processes and major technologies shaping the Industry 4.0 landscape. As per our industry 4.0 definition, manufacturing leaders must focus on end-to-end processes starting from research and development (R&D) to product design, operations, and support services:
  - **Research and development**—New product development research including market needs, competitive landscape, and technology feasibility.
  - **Design**—Product design focused on physical product development; testing, cost, and quality measures; and regulatory compliance.
  - **Operations**—Focused on inbound and outbound logistics management and production processes. Operations functions include production planning, inventory management, transportation management, order processing, supply chain management, and aftermarket services.
  - **Support services**—Services designed to manage manufacturing organizations such as finance, resource management, and marketing.
The Industry 4.0 value chain defined (2 of 2)

- Industry 4.0 is not a ready-made software suite like ERP; it includes a combination of complex manufacturing processes enabled by emerging technologies. We have identified smart manufacturing and other digital technologies that Industry 4.0 applications leverage. Some of these technologies are specific to Industry 4.0 applications, and others can be leveraged in this space.

- **Industry 4.0 components**—These technologies are limited to manufacturing applications such as 3D printing, robotics, manufacturing automation, and small batch manufacturing.

- **Generic technology components**—This group includes emerging digital technologies such as IoT, digital twin, AR/VR, and others that Industry 4.0 applications can use without too much customization for manufacturing applications.

- The necessity of a workforce with digital mindsets is crucial for the successful deployment of Industry 4.0 tenets. As the number of emerging technology components and their usage are increasing in manufacturing, enterprise must focus on building a smart workforce. Given the newness of Industry 4.0, the training and skill development of the existing workforce is a crucial aspect.
## Industry 4.0 value chain

### Industry 4.0 Value Chain

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<tr>
<th>Activities value chain</th>
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<th>Operations</th>
<th>Support services</th>
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### Industry 4.0 components

- Robotics
- Manufacturing Automation, IT support systems (SCADA, PLC, MES HMI, ERP)
- 3D printing
- Small batch manufacturing

### Generic technology components

- Big data
- Predictive analytics and AI applications (visual analytics, machine learning, computer vision, etc.)
- Internet of things (IoT)
- Digital twin or simulation
- Microservices, as-a-service model
- Cybersecurity
- Augmented reality (AR)
- Virtual reality (VR)
- Blockchain
- Drone

### Workforce

Digital-ready workforce to enable and drive new operating models, innovative business models, and applications of new age technologies
Executive summary
Executive summary (1 of 2)

- **Comprehensive study of 21 service providers serving the Industry 4.0 landscape:** The HFS Top 10 Industry 4.0 Service Providers 2019 report is a study in which we rate 21 service providers across elements of service execution, innovation, and voice of the customer.

- **Data-based business insight is the need of the hour:** Industry 4.0 enables real-time data collection of manufacturing assets and processes. The analysis of this data is used for predictive maintenance, digital simulation, and other purposes. Though edge processing is deployed in some of the factory floor (mainly for dashboard monitoring), most of the data is pushed to the cloud for further analysis. This has helped enterprises in cost optimization, faster time-to-market, and manufacturing efficiency increments, etc. Enterprises are also trying to unlock valuable customer insights from connected customer data, enabling the launch of new business models in the future.

- **The Top 10 leaders in Industry 4.0 services are:** Accenture, IBM, KPMG, Atos, Capgemini, HCL, EY, Infosys, Tech Mahindra, and Wipro. These firms exhibited a strong mix of service execution excellence, applied innovation and vision, and verified customer satisfaction to rise to the top of our Industry 4.0 study.

- **Service providers are following advisory-led and consulting-focused delivery approach for Industry 4.0 services:** Since Industry 4.0 is a very new concept, clients are often confused about its deployments. Some of the common concerns from the enterprises are: What is the technology boundary of Industry 4.0? What are the business cases we can start the experiments with? What are the business outcomes of the Industry 4.0 initiatives in the near, middle, and long term? Service providers are guiding clients to assess the business landscape and identifying opportunities with the maximum business benefits. They are also playing a vital role in selecting the necessary technology stacks (platforms, cloud, connectivity, etc.) for clients.
Executive summary (2 of 2)

- **Industry 4.0 customers are very happy with their providers’ flexibility**: Reference clients interviewed for this study rated flexibility as the area in which they are most satisfied with their service providers. Flexible headcount, pricing models, and good relationships with stakeholders are the key factors for this.

- **Industry 4.0 customers are least satisfied with their providers’ intelligent automation capabilities**: Clients have mentioned that service providers need to improve their intelligent automation capabilities. Enterprises are looking for intelligent automation systems with seamless integration of manufacturing processes. Because Industry 4.0 facilitates mass personalization, service providers need thorough domain understanding to implement intelligent automation workflow for mass personalization in manufacturing.

- **IoT is the most critical lever for Industry 4.0**: Though previously manufacturing operations were also connected to a centralized location, insufficient data, latency, and lack of intelligent methods made it difficult to derive insights. With the advent of new age sensors, improved connectivity, and increased computing power, manufacturers can gather and analyze more information about their manufacturing activities. Thus IoT is the backbone for most of the other Industry 4.0 technologies applications.

- **The application of digital simulation is steadily increasing**: Digital simulation is becoming very popular as a part of design, development, testing, and validation purposes. As the regulations are becoming stricter (design specification, safety aspects, etc.) and the go-to-market time is decreasing, digital simulation will act as a catalyst for the enterprises.

- **North America remains the largest client base**: Though Europe and Asia Pacific have a significant number of clients in Industry 4.0 services, North America remains the biggest market for the service providers. Most of the Industry 4.0 engagements are in discrete manufacturing domain, and we have also observed several good case studies in the process manufacturing domain.
The HFS Top 10 Industry 4.0 service providers results
HFS top five Industry 4.0 service providers by individual assessment criteria

<table>
<thead>
<tr>
<th>HFS ranking</th>
<th>Ability to execute</th>
<th>Innovation capability</th>
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<td>Geographic spread and scale</td>
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<td>Relationship management</td>
<td>Ecosystem and investments</td>
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<td>Depth of value chain</td>
<td>Pricing</td>
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<td>Weaving with emerging technologies</td>
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<td>#5</td>
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<td>Capgemini &gt; EY &gt; Atos &gt; Atos &gt; Atos</td>
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Source: HFS Research 2019
# HFS Top 10 Industry 4.0 service providers 2019

## Execution
- #1. Accenture: Leading end-to-end Industry 4.0 transformation partner with strong client and patents portfolio
- #2. IBM: Globally scaled Industry 4.0 service provider providing business-centric solutions leveraging internal "Watson" platform
- #3. KPMG: In-depth Industry 4.0 consulting capability, strong talent pool, and uniform visibility across the globe
- #4. Atos: Exhaustive and innovative solutions portfolio enabled by alliance with Siemens and a strong ecosystem presence
- #5. Capgemini: Consulting-driven transformation and significant growth leveraging a robust partner ecosystem
- #6. HCL: Integrated manufacturing approach, highly differentiated IP and non-linear pricing drive client engagements supported by strong engineering DNA
- #7. EY: Strong customer centricity with unified organizational alignment driven by a cluster of co-innovation centers
- #8. Infosys: Mature capabilities across the industry 4.0 value chain and strong thought leadership
- #9. Tech M: Integrating organization-wide cross-functional capabilities, emerging technology expertise, and investment commitment by Wipro Ventures to deliver Industry 4.0 services
- #10. Wipro: Compelling vision, strong talent pool and solutions portfolio, solid presence in manufacturing operations management segment
- #11. TCS: Leveraging L&T Group manufacturing heritage and internal "MOSAIC" platform to deliver Industry 4.0 services
- #12. LTI: Vertical-specific service offerings, strong partnership ecosystem, and collaboration with world-class educational institutions
- #13. DXC: Consulting powerhouse leveraging strong manufacturing and IoT capability to deliver business ROIs
- #14. Deloitte: Strategic vision, consulting, and innovation-driven approach and a good portfolio of smart manufacturing offerings
- #15. Cognizant: Europe-headquartered service provider with production-ready Industry 4.0 engagements and capabilities in automotive and aerospace domains
- #16. Altran: Full services portfolio including end-to-end Industry 4.0 technical capability
- #17. Fujitsu: Strong presence in Europe and APAC, with expertise across emerging Industry 4.0 technology areas
- #18. NTT DATA: Samsung Group company with capability in connectivity technology and expertise in selected technologies
- #19. HARMAN: Leveraging engineering prowess and smart-factory technical expertise for Industry 4.0 services
- #20. LTTS: Focus on innovation and good client engagement portfolio in consumer goods domain

## Innovation
- #1. Accenture
- #2. IBM
- #3. KPMG
- #4. Atos
- #5. Capgemini
- #6. HCL
- #7. EY
- #8. Infosys
- #9. Tech M
- #10. Wipro
- #11. TCS
- #12. LTI
- #13. DXC
- #14. Deloitte
- #15. Cognizant
- #16. Altran
- #17. Fujitsu
- #18. NTT DATA
- #19. HARMAN
- #20. LTTS

## Voice of customer
- #1. Accenture
- #2. IBM
- #3. KPMG
- #4. Atos
- #5. Capgemini
- #6. HCL
- #7. EY
- #8. Infosys
- #9. Tech M
- #10. Wipro
- #11. TCS
- #12. LTI
- #13. DXC
- #14. Deloitte
- #15. Cognizant
- #16. Altran
- #17. Fujitsu
- #18. NTT DATA
- #19. HARMAN
- #20. LTTS

• Altran and Mindtree have been evaluated independent of their acquisition by Capgemini and L&T Group respectively
• IBM, Wipro, Deloitte, Fujitsu and DXC have been evaluated as per our own research
## Industry 4.0 services activity value chain heatmap

### Not a focus

<table>
<thead>
<tr>
<th>R&amp;D</th>
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<th>Operations</th>
<th>Support services</th>
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### Emerging

### Mature

- We asked service providers to demonstrate their capabilities across the Industry 4.0 activity value chain.
- We then asked service providers to rate their Industry 4.0-specific offerings on a maturity scale.
- Design and operations are the most mature segments of Industry 4.0 offerings. Design includes feasibility study, prototyping, testing, and regulatory compliance; whereas operations include demand planning, inventory management, production planning and scheduling, sales and distribution, aftermarket services, and transportation and logistics.
- Support services is the least mature segment of offerings. This segment includes services such as finance, human resource management, and marketing.
- Please refer to our [Industry 4.0 value chain](#) for more detail.
Industry 4.0 enabling technology (core Industry 4.0 components) heatmap

<table>
<thead>
<tr>
<th>Robotics</th>
<th>Manufacturing automation, IT support systems (SCADA, PLC, MES, HMI, ERP)</th>
<th>3D printing</th>
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- We asked service providers to demonstrate their capabilities across the Industry 4.0 enabling technologies (core Industry 4.0 components).
- We then asked service providers to rate their Industry 4.0 technology-specific capabilities on a maturity scale.
- Manufacturing automation, IT support systems is the most mature segment among core Industry 4.0 enabling technologies. This segment includes SCADA, PLC, MES, HMI, and ERP. Most of the technology components in this segment have been available for decades, so the segment is considered mature.
- 3D printing is the least mature segment among core Industry 4.0 enabling technologies. 3D printing is used for low volume manufacturing for specific use-cases, thus service providers are developing point solutions in 3D printing. As the adoption of 3D printing will increase, the maturity will also increase in this segment.
- Please refer to our Industry 4.0 value chain for more detail.
Industry 4.0 enabling technology (generic technology components) heatmap

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<th>Predictive analytics and AI applications</th>
<th>Internet of things (IoT)</th>
<th>Digital twin or simulation</th>
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- We asked service providers to demonstrate their capabilities across the Industry 4.0 enabling technologies (generic technology components).
- We then asked service providers to rate their Industry 4.0 technology-specific capabilities on a maturity scale.
- Predictive analytics and AI applications, big data, and IoT are the most mature segments among generic Industry 4.0-enabling technologies. IoT provides the real-time data flow and data analysis methods used for deriving business insights.
- Drone is the least mature segment among generic Industry 4.0 enabling technologies. We have observed very limited drone applications due to regulatory requirements and some technology limitations. Drone applications are prevalent in asset condition assessments, inventory management, etc.
- Please refer to our Industry 4.0 value chain for more detail.
Industry 4.0 service provider profile
Leading end-to-end Industry 4.0 transformation partner with strong client and patents portfolio

**Strengths**

- **End-to-end smart manufacturing transformation partner.** Accenture positions its Industry X.0 practice as an amalgamation of four areas: Product X.0 (smart products and services), Engineering X.0 (engineering function for innovation), Service Ops X.0 (smart services for Product X.0), and Production and Supply Chain X.0 (multi-plant dynamic production and intelligent supply chain). It leverages strong consulting practice for Industry 4.0 engagements.

- **Scale of Industry 4.0 operations.** Accenture has the highest number of FTEs delivering Industry 4.0 services among the service providers evaluated for this study. It also has one of the largest client portfolios in this domain.

- **Geographic spread of business.** Accenture has a very balanced portfolio of clients in North America and Europe. Also, it earns a significant revenue percentage in the APAC region and has good delivery presence in the APAC countries.

- **Patents and innovation credentials.** Accenture has the highest number of patents among the service providers evaluated for this study. Accenture leverages its innovation centers (Accenture Labs, Accenture Studios) to fuel the innovation.

- **Acquisitions.** Accenture has acquired and successfully integrated several companies in Industry 4.0 domain to increase both industry and technology competency. Some of its notable acquisitions are ESP (life science specific competency) and Mindtribe (connected products).

**Development opportunities**

- **Talent availability and retention.** As Accenture is rapidly expanding its Industry 4.0 practice, talent availability and readiness become the key challenges. Accenture is already strengthening its workforce capability through re-skilling and re-aligning experts.

### Client engagement

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### Relevant acquisitions and partnerships

- **Recent acquisitions:**
  - ESP: A consulting and manufacturing services provider for life sciences (2019)
  - Zieloplus: A technology consultancy specializing in the design of smart products and services for automotive companies (2019)
  - Pillar: Smart embedded software company (2018)
  - Designaffairs: A strategic design consultancy

- **Partnerships:**
  - AWS, Microsoft, Oracle, GE

- **Number of Industry 4.0 clients:** 700+
- **Business lines:**
  - Automotive (9%), aerospace (5%), transportation (4%), industrial (9%), high-tech (3%), chemicals (13%), consumer goods products (4%), medical devices (0.5%), semiconductor (2%), energy, utility, oil and gas (31.5%), pharma, retail (19%)
- **Geographic spread:**
  - America (46%)
  - Europe (36%)
  - Asia Pacific (15%)
  - Middle East and Africa (1%)
  - Latin America (3%)
- **Key clients:**
  - Unilever
  - Magneti Marelli
  - Chevron
  - Faurecia
- **Industry 4.0 headcount:** 10,000
- **Delivery locations:**
  - More than 150 delivery locations, across 43 countries, including locations in India, China, Japan, Philippines, Brazil, Germany, United Kingdom, Turkey, Netherlands, and Spain.
- **Related patents and applications:** IoT (250), 3D printing (20), robotics (75), IoT analytics (170+), manufacturing analytics (70+).
- **Accelerators and solutions:** 40 implementations covering a diverse range of areas including: asset management, asset management for OEMs, mining, construction sites, connected home, smart buildings and campuses, ports, digital agriculture, connected vehicle, fleet management, downstream and midstream oil and gas terminals, vegetation management and autonomous drone inspection (wind turbines, boilers, confined space inspections), digital plants (chem plants, renewables wind farms, upstream oil and gas), plant automation site assessment, connected tire manufacturing, pharma serialization and production, and many more.

- **Value chain capability**
  - R&D
  - Design
  - Operations
  - Support services
  - Robotics
  - Automation, IT support systems
  - 3D printing
  - Small batch manufacturing

- **Value chain Industry 4.0 components**
  - R&D
  - Design
  - Operations
  - Support services
  - Robotics
  - Automation, IT support systems
  - 3D printing
  - Small batch manufacturing

- **Industries**
  - Industry 4.0 in-house platform and tools
  - Automotive
  - Aerospace
  - Chemicals
  - Consumer goods
  - Energy
  - Public services
  - Retail
  - Technology
  - Utilities
  - Consumer goods
  - Energy
  - Public services
  - Retail
  - Technology
  - Utilities
About the authors
Tapati Bandopadhyay is Vice President, Research at HFS. She has over 20 years of experience in technology strategy, consulting, and advisory on artificial intelligence, analytics, automation, DevOps, and services management. She is based in the HFS India office in Bangalore.

Prior to HFS, Tapati set up the AI and automation practice at Wipro and contributed to the growth and success of the firm’s HOLMES initiative. She began her analyst career with Gartner, where she handled ITScore, ITSM, and AI and automation across all regions for seven years. She received Gartner business awards and was recognized among top-rated analysts globally. She is a Ph.D. in AI, a gold medallist in engineering, and a DFID scholar at Strathclyde.

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Senior Research Analyst, HFS Research

Tanmoy Mondal is a Senior Research Analyst at HFS Research, identifying global trends in engineering services from both industry & technology perspectives, tracking global outsourcing deals & investments including partnership agreements & R&D announcements in the sector and supporting the domain leads in secondary research, data analysis, PoVs and research writing.

Tanmoy has over 5 years of research, pre-sales and market intelligence experience in TCS, HCL and Tracxn. At his TCS and HCL role, he worked on preparing RFP responses including solution construct and commercial proposition. He was responsible for analysing the business scenario for ERP implementation for different industry verticals and participated in several Enterprise Transformation projects across domains to optimize the IT landscape, increasing IT integration among client business verticals, improving productivity and reducing business incidents. At Tracxn, he was part of the emerging technology team that helped finding companies (start-ups) specializing in upcoming technologies (virtual/augmented reality, drone etc.) for acquisition and portfolio investments for PE and VC firms.

Tanmoy holds a Master’s in Business Administration from IIFT (Indian Institute of Foreign Trade), and Bachelor of Engineering from Jadavpur University, Kolkata.

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Mayank Madhur is a Senior Research Analyst at HFS Research, supporting different practice leads in area of Industry Research, IoT and Blockchain by working on secondary research, data analysis, PoVs and research writing.

Mayank has over 4 years of research, pre-sales and software development experience. Prior to HFS he was part of business strategy and pre sales in Altimetrik supporting vertical heads, sales and marketing team. Before it in his HCL Tech role, he worked in the delivery team of a large medical device client for R&D project.

He holds blockchain certification by IIT & IBM on "Blockchain Architecture Design and Use Cases". His other certification include certification on Google analytics, Scrum, Six Sigma, Introduction to IIoT and Industry 4.0 (IIT) etc. to name a few. Mayank holds Master’s in Business Administration from Birla Institute of Technology and Science College, Pilani (BITS, Pilani University) and a Bachelor of Engineering in Electrical and Electronics from Jawaharlal Nehru National College of Engineering (Visvesvaraya Technological University), Karnataka.

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Josh Matthews
Research Analyst, HFS Research

Josh Matthews is an Research Analyst at HFS Research, based in Cambridge following a Master’s programme covering Engineering Management at Cambridge University’s Institute for Manufacturing (IfM). His research tackled operational and environmental improvements in industry, and the implementation and management of sustainable initiatives. On behalf of the university, Josh worked on consulting projects with Unilever, as well as SMEs in the tech and marketing spaces.

Josh had previously graduated from Loughborough University with a first-class master’s in Chemical Engineering; over the course of this degree he spent a year at Total in the oil refining industry, and a semester at UC Santa Barbara, publishing work which is currently being commercialized on low-CO2 hydrogen production.

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