



Ref. No. AA/TL/0709

Date: 08.01.2021

Subject: Selection of Technology Collaborator for Industry 4.0 business

1) Introduction:

This Expression of Interest (Eoi) seeks responses from Indian IT majors willing to collaborate with Bharat Heavy Electricals Limited (BHEL) through a long-term Technology Collaboration Agreement (TCA) to enable BHEL to carry out the design, development, customization, testing and implementation of Industry 4.0 solutions for various business segments viz. power plants, process plants, transmission & distribution systems, defence, mobility and other applications like factory automation etc.

BHEL is a leading state-owned company wherein Government of India is holding 63.17% of its equity. BHEL is an integrated power plant equipment manufacturer and India's largest engineering and manufacturing enterprise of its kind, catering to the core infrastructure sectors of Indian economy viz. energy, transportation, heavy engineering industry, renewable & non-conventional energy and Defence. BHEL has been in the business for more than 55 years and BHEL supplied power equipment account for more than 57% of the total thermal generating capacity in India. BHEL is also listed in stock exchanges of India. The company has 16 manufacturing units, 4 power sector regions, 8 service centers, 1 overseas office and 15 regional offices besides a host of project sites spread all over India and abroad. The annual turnover of BHEL for the year 2019-20 was around US \$ 3 Billion*. BHEL's highly skilled and committed manpower of around 33000 employees, the state-of-art manufacturing facilities and practices together with the latest technologies, have helped BHEL to deliver a consistent track record of performance. To position leading state-owned company as Global Industrial giant for their exemplary performance, Government of India categorized BHEL as "Maharatna Company" in 2013, empowering the company with enhanced autonomy in decision making. With the current order book exceeding US \$ 14 Billion*, BHEL is poised for an excellent future growth. Our ongoing major technology tie-ups include agreements with Siemens, Germany (for steam turbines, generators and condensers); MHI, Japan (for Pumps); MPL, Japan (for Flue Gas Desulfurization Systems); Vogt Power International, USA (for HRSG); Indian Space Research Organization (ISRO) (for Space Grade Lithium-Ion Cells); NANO Company Ltd., Korea (for SCR Catalysts); HLB Power Company Ltd., Korea (for Gates and Dampers); Kawasaki Heavy Industries, Japan (for Stainless Steel Coaches for Metros); Valmet Automation Oy, Finland (for DCS System) and Babcock Power Environmental Inc., USA (for Selective Catalytic Reduction Systems). More details about the entire range of BHEL's products and operations can be obtained by visiting our website <http://www.bhel.com>.

BHEL's vision is to become a global engineering enterprise providing solutions for a better tomorrow. The company is striving to give shape to its aspirations and fulfill the expectations of the country by becoming a global player in realizing Gol's vision of "Aatma Nirbhar Bharat" through its flagship initiative of 'Make in India'.

"Digitalisation" has become the most significant trend that is driving the industry thought process today. In each of the earlier Industrial revolutions, upon hitting the prevalent limits of productivity and efficiency with existing technologies and processes, it led to invention of new technologies and processes. This is evident in the transitions from Steam and Rail in Industrial revolution-1 (1750s) to Electricity & Telephone in Industrial revolution-2 (1870s) to Computer & Automation in Industrial revolution-3 (1970s). Presently, digital technologies using Artificial Intelligence, Machine Learning and Analytical Capabilities are promising to provide the new source of productivity and efficiency improvement with better reliability and safety, thus initiating the new industrial revolution which is also being referred to as fourth Industrial Revolution (Industry 4.0).

Foreseeing the Industry 4.0 revolution, BHEL has been developing its own solution space to help

[*Note: Currency conversion rate considered: 1 US \$=Rs 75.33 as on 31st March 2020]

Expression of Interest (EoI) for Selection of Technology Collaborator for Industry 4.0 business

the Indian Power industry move towards the adoption of Industry 4.0. Apart from other solutions, BHEL has developed and successfully implemented its own solution for remote monitoring of fleet of power plants, known as Remote Monitoring & Diagnostic Services system (RMDS) to facilitate remote monitoring, diagnostics and predictive/prescriptive maintenance of Thermal Power Plant assets, employing plant level digital twin capabilities. Besides this, BHEL is strategically positioned in offering Industry 4.0 solution to its customers, based on its already proven comprehensive capabilities in the plant Instrumentation and Control area, namely DCS and HMI Equipment & Systems. BHEL has also got capabilities of making Intelligent P&IDs, 3D models and experience on documentation management system for power plant assets.

Similar to the major contributions that were made in the Industry 3.0 era, BHEL once again poises itself to play a major role in the Industry 4.0 arena in a significant way. In this pursuit, in addition to RMDS, BHEL is also foraying into other contemporary Industry 4.0 solutions including (i) Reliability Centric Maintenance (RCM) (ii) Application of IIoT (AII) (iii) Digital Worker (DW) comprising of wearable devices for implementing Augmented Reality (AR) / Virtual Reality (VR) based solutions & Real Time Location Tracking (iv) Asset Information Management (AIM) which includes Intelligent P&IDs & Document Management System etc. Towards this objective, BHEL has decided to establish a dedicated Centre of Excellence (CoE) on Industry 4.0 at BHEL premises with a vision of making it the indigenous hub for developing, piloting and commercializing cutting-edge digital solutions for industries.

2) Broad Scope of cooperation:

Towards addressing the emerging and futuristic needs of Industry 4.0 in synergistic way, BHEL is seeking Expression of Interest from Indian IT majors for a long term (preferably 7 to 10 years or as mutually agreed) Technology Collaboration Agreement (TCA) with regard to Industry 4.0 solutions for various business segments viz. power plants, process plants, transmission & distribution systems, defence, mobility and other applications like factory automation etc.

The objective of this EoI is to select a suitable Technology Collaborator who can provide Industry 4.0 tools and solutions to enable BHEL to address Industry 4.0 business opportunities in India and abroad. During the validity of TCA, the selected collaborator shall share complete technical know-how & know-why of Industry 4.0 business with BHEL to enable it to address different segments of the industry 4.0 business opportunities. Prospective collaborator shall also grant BHEL right to reuse and modify/enhance all the design, features and functionalities of software platform etc. after expiry of TCA. Selected Collaborator shall also support BHEL in augmenting Centre of Excellence (CoE) for Industry 4.0 at BHEL premises.

The TCA will provide an opportunity to the collaborator(s) to work with BHEL which is India's one of the largest engineering and manufacturing enterprise, who has got an installed base of more than 190 GW of various types of power plants worldwide and who has proved its mettle as a strong and reliable supplier of various products and systems for core sectors of economy viz. power, industry, transportation, defence and oil & gas etc.

Interested reputed Indian IT majors with proven Industry 4.0 solutions are invited to submit their offer in response to this EoI, as per indicative scope of TCA given in **Annexure-1**.

Upon receipt of responses against this EoI, BHEL will review the responses to ascertain suitability of the offer and shortlist prospective collaborators for further discussions. Detailed discussions on techno-commercial and other terms and conditions to finalize the TCA shall be held with the shortlisted prospective collaborators. The detailed terms and conditions for such agreement shall be mutually agreed upon.

3) Desired Technological Capabilities:

The Indian IT major shall have proven track record of deliveries and capabilities, in the following areas, but not limited to:

- Big Data and Analytics.



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- Artificial Intelligence & Machine Learning (AI/ML)
 - Cloud based Technologies
 - Industrial Internet of Things (IIOT)
 - 3D and Asset Integration Management
 - Augmented and Virtual Reality
 - Real-Time Tracking Systems
 - Cyber Security
 - Industrial Wireless Networking
 - Robotics

Coupled with the above technological capabilities in a dedicated setup, the Indian IT major shall have been equipped with experienced and dedicated teams with skillset in the areas of Software Development/ Embedded Systems Development/ Modelling & Data science, Data Communication protocols, etc.

The Indian IT major shall have been equipped with relevant partner / OEM Eco-system which is readily brought forth for BHEL's solution delivery without any limitations.

4) Prequalification requirements (PQR):

The prospective collaborator(s) shall meet following qualification requirements as on the date of publishing of BHEL's EoI:

- (a) The prospective collaborator should be a company incorporated under the Companies Act 1956/2013 of India and subsequent amendments thereto and shall have a valid Capability Maturity Model Integration (CMMi) Level 5 certification for software development.

AND

- (b) The prospective collaborator should be a System Integrator / Owner (OEM) / Developer of Proprietary IT Framework/Platform for providing remote monitoring, analytics, diagnostics, process optimization and predictive maintenance solution (Remote Monitoring & Diagnostic Services i.e. RMDS) to Industry and should have successfully executed at least one (1) order for implementation of the above solution in a large industrial setup. The referred solution should have been in successful operation in a large industrial setup for a period of not less than one (1) year as on date of publishing of BHEL's EoI.

AND

- (c) The prospective collaborator should have successfully executed at least one (1) order for
(i) Reliability Centric Maintenance(RCM) solution

AND

- (ii) All (Application of IIoT in Industry) {i.e. data aggregation software(s) and wireless field sensors}

AND

- (iii) Digital Worker (DW) solution (s)

AND

- (iv) AIM (Asset Information Management) {i.e. supply & installation of 3D Modelling and Smart Documentation System solution}

AND

- (v) IWN (Industrial Wireless Network) solution

for implementation in a large industrial setup. Also, the above referred solutions [from (i) to (v)] should have been in successful operation in a large industrial setup for a period of not less than one (1) year as on date of publishing of BHEL's EoI. Implementation Experience w.r.t. (i) to (v) can be of multiple projects and need not necessarily be for one single project/setup.



In case the prospective collaborator does not meet any requirement from (i) to (v) above on its own, the prospective collaborator can also qualify provided it collaborates/associates with an entity who meets those requirements from (i) to (v) above which prospective collaborator does not meet on its own so that total requirement is met by the prospective collaborator with his associate(s)/partner(s). In such a case, details of scope of work of prospective collaborator and its associate in such an implemented solution to be furnished by the prospective collaborator.

(The prospective collaborator shall submit suitable supporting documents to substantiate the PQR)

Note: Large Industrial setup means power plant or process industries like cement plant, refinery, steel plant, coal mine, fertilizer plant.

5) Evaluation Criteria:

The evaluation criteria to shortlist the prospective collaborator(s) for detailed techno-commercial negotiations is given at **Annexure-2**. The prospective collaborator(s) who secures minimum 60 marks (out of 100 marks) will be eligible for next round of techno-commercial negotiations of TCA. TCA shall be entered into with the prospective collaborator who will meet BHEL's requirement of Transfer of Technology (ToT). The detailed terms and conditions of such TCA shall be mutually agreed upon.

6) Brief Description of Eoi Process:

The interested prospective collaborators shall ensure that their response, along with details requested as per the Annexures of this Eoi, is received by BHEL on or before **29th January, 2021 (Friday)**.

Annexure 1- Indicative Scope of TCA

Annexure-2-Evaluation Criteria

Annexure-3-Broad technical capabilities and indicative technical features of Industry 4.0 solutions

Annexure-4-Prospective Collaborator's Experience

Annexure-5-Solution Matrix

Annexure-6-Reference list

The response(s) shall necessarily be accompanied with details on the following:

- 1) company background
- 2) technical details & system description for industry 4.0
- 3) reference list of customers
- 4) annual audited financial reports for last 3 (three) years including auditor's report

The responding prospective collaborators, on submission of their response, can be called for further discussions at a short notice.

The respondent shall submit their offer through hard copy / soft copy by e-mail with all Annexures duly signed. In case any further information is needed, kindly feel free to contact us.

In case any amendment/ corrigendum issued to this Eoi, it shall be notified only at www.bhel.com.

7) Schedule of Eoi & Contact details:

7.1 Schedule of Eoi:

The schedule of Eoi shall be as follows:

Sl. No.	Description	Date
1.	Issue of Eoi Document	8 th January 2021 (Friday)
2.	Due Date for submission of Eoi response	29 th January 2021 (Friday)



7.2 Contact Details:

The respondent shall submit/send their offer with all annexures duly signed at the following address:

Dy. General Manager
Technology Licensing (TL)
Corporate Technology Management (CTM)
Bharat Heavy Electricals Limited
BHEL House, Siri Fort
New Delhi - 110 049, India
Phone: +91 11 6633-7218
Fax: +91 11 26492974
Email: techeoi@bhel.in

7.3 Language of proposal:

All correspondences and documents related to Eoi submission shall be in English language, provided that any printed literature furnished by the Prospective collaborator(s) may be written in another language, as long as such literature is accompanied by a translation of its pertinent passages in English language in which case, for purposes of interpretation of the proposal the English translation shall govern.

7.4 Clarification on Eoi:

A prospective collaborator (s) requiring any clarification to the Eoi documents may notify the same through e-mail at the email ID indicated herein above. BHEL will respond to any request for clarification received within specified time. Prospective collaborator(s) are also advised to regularly visit website regarding posting of amendment of Eoi if any.

7.5 BHEL at their sole discretion may inspect the Prospective collaborator(s) works / office / reference project sites etc. for the purpose of evaluation, if required.

7.6 Prospective collaborator(s) who have been barred / blacklisted by the Central / State Governments or by any entity controlled by Central / State Governments from participating in any project, as on date of submission of Eoi, shall not be eligible to submit the Eoi.

7.7 Prospective collaborator(s) who has been expelled from any project or contract by any Government / Semi Government entity in last 5 years, prior to date of submission of Eoi, shall not be eligible to submit the Eoi.

7.8 Confidential:

Information relating to the examination, clarification, comparison and evaluation of responses submitted against the Eoi and recommendations of BHEL on selection process of collaborator shall not be disclosed to Prospective collaborator(s). Any effort by Prospective collaborator(s) to influence BHEL in this regard may result in the rejection of their proposal.

8) Miscellaneous:

A. Right to accept or reject any or all Applications:

- 1) Notwithstanding anything contained in this Eoi, BHEL reserves the right to accept or reject any Application and to annul the Eoi Process and reject all Applications, at any time without any liability or any obligation for such acceptance, rejection or annulment, and without assigning any reasons therefore. In the event that BHEL rejects or annuls all the



Applications, it may, at its discretion, invite all eligible OEMs/Suppliers to submit fresh Applications.

- 2) Neither BHEL nor its employees and associates will have any liability any loss, expense or damage which may arise from or be incurred or suffered in connection with anything contained in this Eoi document or any matter deemed to form part of this Eoi document, the information and any other information supplied by or on behalf of BHEL.
- 3) BHEL reserves the right to disqualify any Applicant during or after completion of Eoi process, if it is found there was a material misrepresentation by any such Applicant or the Applicant fails to provide, within the specified time, supplemental information sought by BHEL.
- 4) BHEL reserves the right to verify all statements, information and documents submitted by the Applicant in response to the Eoi. Any such verification or lack of such verification by BHEL shall not relieve the Applicant of his obligations or liabilities hereunder nor will it affect any rights of BHEL.

B. Governing Laws & Jurisdiction

The Eoi process shall be governed by, and construed in accordance with, the laws of India and the Courts at New Delhi (India) shall have exclusive jurisdiction over all disputes arising under, pursuant to and/ or in connection with the Eoi process.



Annexure-1

Indicative Scope of Technology Collaboration Agreement

a)	Support BHEL with up-to-date Technical Information along with software tools to enable BHEL to carry out designing, development, customization, testing and implementation/rolling out of up-to-date Industry 4.0 solutions for different business verticals/segments that includes development of required hardware modules, software development and system integration.
b)	Transfer of technology for new, improvements/modifications/developments/up gradations carried out by the Collaborator in its offerings during the currency of TCA to take care of obsolescence and address emerging market requirements.
c)	Transfer of information/specifications to enable BHEL to source/procure items, which the Collaborator sources from third parties/market for use in its Industry 4.0 solutions.
d)	Provide software platform and implementation support and assistance/guidance in planning & setting up the Centre of Excellence (CoE) at BHEL premises
e)	Transfer of Data/Information pertaining to site/customer feedback & troubleshooting information etc.
f)	Transfer of applicable proprietary computer programs including logics/algorithms along with source code
g)	Training of BHEL Engineers at Collaborator's Design Centre/CoE/ Development Centre to enable them assimilate know-how and know-why to address Industry 4.0 solutions for various business verticals/segments.
h)	Deputation of prospective collaborator's experts to BHEL offices/ Units/ Project Sites, upon BHEL's request to assist BHEL in addressing business for different segments/verticals of Industry 4.0.
i)	Support BHEL suitably to address business opportunities where BHEL is not qualified on its own as per tender requirements of customer

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Evaluation Criteria

- 1.0 Response of prospective collaborators who do not meet the Pre-Qualification Requirement as per clause 4 (a) AND (b) AND (c) shall not be considered for evaluation.
- 2.0 Following evaluation methodology shall be adopted for shortlisting of Prospective Collaborator(s) & Prospective Collaborators who score minimum 60 marks out of 100 marks will be shortlisted for techno-commercial negotiations of TCA.

Sl. No.	Parameters	Maximum Marks	Prospective Collaborator's Claim/Response						
1.	Meeting all Prequalification Requirement as per clause 4 (a) AND (b) AND (c)	Must Meet Requirement- No Marks							
2.	Willingness to grant exclusivity to BHEL for Indian Territory Exclusive rights: Selected collaborator or their parent firm/subsidiary shall not directly or indirectly address the business opportunities either individually or in association with other parties in India. During the validity of the TCA, selected prospective collaborator shall be associated exclusively with BHEL and both the parties i.e. BHEL & Collaborator will honour the exclusivity provisions.	<table><tr><td>Exclusive rights for Power & Process plants</td><td>15 Marks</td></tr><tr><td>Exclusive rights for power plants</td><td>10 Marks</td></tr><tr><td>Non-Exclusive rights</td><td>5 Marks</td></tr></table>	Exclusive rights for Power & Process plants	15 Marks	Exclusive rights for power plants	10 Marks	Non-Exclusive rights	5 Marks	
Exclusive rights for Power & Process plants	15 Marks								
Exclusive rights for power plants	10 Marks								
Non-Exclusive rights	5 Marks								
3.	Willingness to grant exclusive rights to BHEL for certain Overseas Territories to be mutually agreed upon	<table><tr><td>Exclusive rights for certain overseas territories</td><td>8 Marks</td></tr><tr><td>Non-Exclusive rights</td><td>5 Marks</td></tr></table>	Exclusive rights for certain overseas territories	8 Marks	Non-Exclusive rights	5 Marks			
Exclusive rights for certain overseas territories	8 Marks								
Non-Exclusive rights	5 Marks								
4.	Industry 4.0 (RMDS / RCM / AII / DW / AIM / IWN) solutions executed for a large industrial setup in last 5 years.	<table><tr><td>Executed 3 or above orders</td><td>10 Marks</td></tr><tr><td>Executed 1 or 2 orders</td><td>5 Marks</td></tr></table>	Executed 3 or above orders	10 Marks	Executed 1 or 2 orders	5 Marks			
Executed 3 or above orders	10 Marks								
Executed 1 or 2 orders	5 Marks								

Sl. No.	Parameters	Maximum Marks		Prospective Collaborator's Claim/Response
5.	Comprehensiveness/Diversity of solutions provided (Supply reference in diverse areas / large Industrial set-ups in last 5 years) Areas covered: 1. Power Plant 2. Process Industry 3. Factory Automation	All 3 areas	15 Marks	
		Any 2 areas	10 Marks	
		Single area	5 Marks	
6.	Transfer of Complete Know-How of Proprietary Software Platform (RMDS/RCM Software Platform)	Transfer of Complete Know-How with Source Code	10 Marks	
		Transfer of Know-how to use/ customize Prop. S/w Platform	5 Marks	
		No Prop. S/w Platform available	3 Marks	
7.	Willingness to offer long term support on maintenance and update of the Prop. S/w platform through suitable mechanism viz. ATS/AMC etc. and Right to use Prop. S/w platform after expiry of TCA	Willingness to offer long term support on maintenance and update of the Prop. S/w platform through suitable mechanism viz. ATS/AMC etc., after expiry of TCA + Grant of Right to use Prop. S/w Platform after expiry of TCA	15 Marks	
		Only Grant of Right to use Prop. S/w Platform after expiry of TCA but no commitment on long term support	10 Marks	
		No Rights to use the Prop. S/w Platform after expiry of TCA	0 Marks	



Sl. No.	Parameters	Maximum Marks		Prospective Collaborator's Claim/Response
8.	OEM Status of Prospective Collaborator	OEM for RCM and RMDS Prop. S/w	10 Marks	
		OEM for RCM or RMDS Prop. S/w	8 Marks	
		System Integrator only	5 Marks	
9.	Supply & Execution of RMDS in Power Plants in last 5 years	For Complete Power Plant	10 Marks	
		For Boiler, Turbine, Generator Package	8 Marks	
		For Balance of Plant (BoP) package / certain standalone equipment	5 Marks	
10.	Prospective Collaborator's Dedicated Centre of Excellence/Development Center for Industry 4.0 & Its team strength	Team of 25 or more professionals	7 Marks	
		Team of 10 to 24 professionals	5 Marks	

(The prospective collaborator shall submit suitable supporting documents, wherever applicable)

Note:

- Prospective Collaborator must opt for a single option out of given ones**
- Last 5 years means FY2019-2020, FY 2018-2019, FY 2017-2018, FY 2016-2017, FY 2015-2016**

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**Broad technical capabilities of Prospective Collaborator and indicative technical features of
Different segment of Industry 4.0 solutions proposed under TCA**

Sl. No.	Description	Key Requirements	Prospective Collaborator Response
1.	RMDS Solutions	▪ Total Number and type of power plants (Thermal, Hydro, Gas, solar) with individual unit rating where RMDS is implement and in service for last 3 years.	
		▪ Total number of power plant units where RMDS solution provided for complete system and equipment including BOP.	
		▪ Maximum and minimum rating of single units, where RMDS implemented and in service in last 3 years.	
		▪ Nature of solution provided to customer (In-premises or Cloud bases).	
		▪ Total number of input signals used in single units of highest rating of power plants in RMDS.	
		▪ Total no of process plants where the system is implemented	
		▪ Maximum no of assets implemented in a plant	
2.	Reliability Centric Maintenance(RCM) ▪ RCM software ▪ RCM Implementation	▪ Number of plants where RCM Software including implementation of RCM functionalities and RCM/ FMEA Analysis for plant Assets successfully installed.	
		▪ Name of client (end user) where RCM implimented with full Address, Fax No, Telephone No. and E-mail address.	
		▪ The year the prospective collaborator entered its first commercial contract with any company for RCM.	
		▪ The number of customers currently and actively using the software in industry.	
		▪ Is the RCM solution being cloud based or on premise based or both?	
		▪ Product Details (Name & Version/series/sub-module details as applicable)	

Sl. No.	Description	Key Requirements	Prospective Collaborator Response
		Name of industry set up where RCM supplied and Installed in last three years.	
		Date of start and completion and putting into operation for each set-up.	
		Number of year for which RCM is in successful operation since putting into operation.	
		Whether prospective collaborator is an OEM of product OR with partnership. If it is from prospective collaborator's partner, please provide details of partner.	
		Name of the referred industrial setup (Location and Address).	
		Name of Package/Contract along with Order/LOA No. & Date.	
		Rating of the largest one unit of power plant / Industry where the software has used for monitoring.	
		Name of Systems / equipment of plants captured by the system.	
3.	Application of IIoT in Industry (All) - IIoT in Industry (All) Software - Implementation of IIoT in Industry (All)	Number of plants where All Software including implementation of All functionalities successfully installed.	
		Name of client (end user) where All implemented with full Address, Fax No, Telephone No. and E-mail address.	
		The year the prospective collaborator entered its first commercial contract with any company for All	
		The number of customers currently and actively using the software	
		Is the All solution is cloud based or on premise based or both?1. Product Details (Name & Version/series/sub-module details as applicable) Please attach relevant documents.	

Sl. No.	Description	Key Requirements	Prospective Collaborator Response
		- Are the following type of IIoT devices available with you or through your sub-vendors: (i) Non-Intrusive Wireless Sensors & Transmitters for Vibration Measurement (ii) Non-Intrusive Wireless Sensors & Transmitters for Vibration Measurement (Displacement Type) (iii) Non-Intrusive Wireless Sensors & Transmitters for Temperature Measurement (iv) Hydrogen Leak Detection Wireless Sensors & Transmitters (v) Partial Discharge Monitoring Wireless Sensor & Transmitter (vi) Lux Level Measurement Wireless Sensor & Transmitter (vii) Level Measurement Wireless Sensor & Transmitter (viii) Pressure Wireless Sensors & Transmitter (ix) Air Flow Wireless Sensor & Transmitter (x) Humidity Wireless Measurement Sensor & Transmitter (xi) Wind Speed Wireless Measurement Sensor & Transmitter (xii) Humidity Measurement Wireless Sensor & Transmitter (xiii) Chlorine Concentration Measurement Wireless Sensor & Transmitter (xiv) AC Voltage Measurement Wireless Sensors & Transmitters including suitable potential transformer, Portable DC Voltage Measurement Wireless Sensors & Transmitters (0-50V DC) Portable DC Current Measurement Wireless Sensors & Transmitter including dismountable current	
4.	Digital Worker Solution	Number of plants where Digital Worker Software including implementation of All functionalities successfully installed.	

Sl. No.	Description	Key Requirements	Prospective Collaborator Response
	- Digital Worker Software - Implementation of Digital Worker. Brief system description: Digital Worker: Mobile Apps for use in field for use cases as per requirement for example Operator Rounds Digital Helmet (including the Hardware of Realwear make and configuration / development of features as required) RTLS (Real Time Location Tracking System)	- Name of client (end user) where Digital Worker Software implemented with full Address, Fax No, Telephone No. and E-mail address. - The year the prospective collaborator entered its first commercial contract with any company for Digital Worker Software - The number of customers currently and actively using the software. - Is the Digital Worker Software solution being cloud based or on premise based or both? Product Details (Name & Version/series/sub-module details as applicable) (i) Mobility Applications for applications like Operator Rounds (ii) Real wear based Digital Helmet /Connected Digital Worker-Skill Center (iii) Real time location tracking system (RTLS)	
5.	Asset Information Management (AIM): - Creation of Intelligent 3D modelling - Creation of Intelligent P&ID - Digitalization of plant documents and drawings and interlinking of 3D models with documents, intelligent P&IDs, 2D drawings, documents etc.	- Number of plants where AIM including implementation of AIM functionalities successfully installed. - Name of client (end user) where AIM implemented with full Address, Fax No, Telephone No. and E-mail address. - The year the prospective collaborator entered its first commercial contract with any company for AIM - The number of customers currently and actively using the software. - Is the AIM solution being cloud based or on premise based or both? (i) Product Details (Name & Version/series/sub-module details as applicable) Please attach relevant documents 3D Modelling (i) Product Details (Name & Version/series/sub-module details as applicable) (ii) Please mention 3D modelling technology that shall be used in such a system	

Sl. No.	Description	Key Requirements	Prospective Collaborator Response
		(iii) Will it be possible to interlink 3D model developed here with the intelligent P&IDs and 2-D drawings in a document management system. If yes, then please mention the name of all such document management system which can be interfaced with mentioned 3D modelling software.	
		(iv) Can 2-D drawings be generated from the built 3-D model? Digitization of Plant documents and drawings including creation of Intelligent P&IDs Will it be possible to interlink intelligent P&IDs and digitized 2D documents in the mentioned system to be linked to a 3D modelling software. If yes, then please mention the name of all such 3D modelling software which can be interfaced with mentioned document management system software	
		(v) Whether scanning will be used for capturing upto date as-is/ as-built physical plant for creating 3D models? If yes, then name the scanning technologies and software that will be used.	
		(vi) Whether scanning work will be done by the prospective collaborator or the services will be outsourced from other party. In case scanning work is outsourced to other party, mention the name and work division with the party.	
		(vii) Whether Smart documentation tool will be on the same software platform of 3D modelling & Intelligent P&ID or will it use independent platform with linkage to 3D models and Intelligent P&IDs	
6.	Wireless Infrastructure for providing field connectivity on the above solutions ▪ Wireless Infrastructure solution ▪ Implementation of Wireless Infrastructure solution	▪ Number of plants where Wireless Infrastructure solution including implementation of Wireless Infrastructure solution functionalities successfully installed.	
		▪ Name of client (end user) where Wireless Infrastructure solution implemented with full Address, Fax No, Telephone No. and E-mail address.	
		▪ The year the prospective collaborator entered its first commercial contract with any company for Wireless Infrastructure solution	



Sl. No.	Description	Key Requirements	Prospective Collaborator Response
		▪ The number of customers currently and actively using the software.	
		▪ Is the Wireless Infrastructure solution being cloud based or on premise based or both? (i) Product Details (Name & Version/series/sub-module details as applicable) Please attach relevant documents	
7.	Integration of all system mentioned in Sl. No. 1 to 6 above on common platform.	▪ Name of software platform to integrate the system from Sl. No. 1 through 6.	
		▪ Capacity of software platform to integrate multiple units and plants.	
		▪ API should be made available for third party system (For data acquisition and data provider)	
8.	If implementation of different segment of industry 4.0 is through an associate / partner, the details of partner to be furnished for each associate/ partner.	▪ Registered Office address	
		▪ Brief about company and other businesses	

(SIGNATURE)



Annexure-4

Solution Matrix

Sl. No.	Description	Prospective Collaborator offer for Software part	Prospective Collaborator offer for Hardware part	Prospective Collaborator offer for Implementation part	Prospective Collaborator offer for Warranty	Prospective Collaborator offer for AMC
1.	RMDS solution ▪ Software ▪ Implementation					
2.	Reliability Centric Maintenance (RCM) ▪ RCM software ▪ RCM Implementation					
3.	Application of IIoT in Industry (All) ▪ IIoT in Industry (All) Software ▪ Implementation of IIoT in Industry (All)					
4.	Digital Worker Solution ▪ Digital Worker Software ▪ Implementation of Digital Worker. Brief system description: Digital Worker: Mobile Apps for use in field for use cases as per requirement for example Operator Rounds Digital Helmet (including the Hardware of Real wear make and configuration /development of features as required) RTLS (Real Time Location Tracking System)					
5.	Asset Information Management (AIM): ▪ Creation of					



Sl. No.	Description	Prospective Collaborator offer for Software part	Prospective Collaborator offer for Hardware part	Prospective Collaborator offer for Implementation part	Prospective Collaborator offer for Warranty	Prospective Collaborator offer for AMC
	Intelligent 3D modelling ▪ Creation of Intelligent P&ID ▪ Digitalization of plant documents and drawings and interlinking of 3D models with documents, intelligent P&IDs, 2D drawings, documents etc.					
6.	Wireless Infrastructure for providing field connectivity on the above solutions ▪ Wireless Infrastructure solution ▪ Implementation of Wireless Infrastructure solution					
7.	Integration of all system mentioned in 1 to 6 above on common platform.					

(SIGNATURE)

Annexure-5

Prospective Collaborator's Experience in different segment of Industry 4.0 solutions for different business verticals

Sl. No.	Requirement	Prospective Collaborator's response YES/NO and remarks if any.
1.	For how many years, Prospective Collaborator is in business of Industry 4.0	
2.	Whether company background and its product profile along with technical details of industry 4.0 which is being offered to BHEL under this EoI, enclosed	
3.	Whether prospective collaborator's detailed reference list has been enclosed	
4.	Whether prospective collaborator's annual audited financial reports including auditor's report for last 3 years has been enclosed	
5.	Whether prospective collaborator have positive net worth as per latest audited financial statements	
6.	<i>"The prospective collaborator should be a company incorporated under the Companies Act 1956/2013 of India and subsequent amendments thereto and shall have a valid Capability Maturity Model Integration (CMMi) Level 5 certification for software development."</i> Whether prospective collaborator meets above PQR and requisite incorporation certificate & valid CMMI Level 5 certificate submitted to substantiate the above PQR.	
7.	<i>"The prospective collaborator should be a System Integrator / owner (OEM) / Developer of Proprietary IT Framework/Platform for providing remote monitoring, analytics, diagnostics, process optimization and predictive maintenance solution (Remote Monitoring & Diagnostic Services i.e. RMDS) to Industry and should have successfully executed at least one (1) order for implementation of the above solution in a large industrial setup covering minimum 4 equipments in the plant. The referred solution should have been in successful operation in a large industrial setup for a period of not less than one (1) year as on date of publishing of BHEL's EoI."</i> Whether prospective collaborator meets above PQR and requisite documentary proof to substantiate the above PQR has been submitted.	
8.	<i>"The prospective collaborator should have successfully executed at least one (1) order for</i> <i>(i) Reliability Centric Maintenance(RCM) solution and</i>	



Sl. No.	Requirement	Prospective Collaborator's response YES/NO and remarks if any.
	(ii) All (Application of IIoT in Industry) {i.e. data aggregation software(s) and wireless field sensors} and (iii) Digital Worker solution (s) and (iv) AIM (Asset Information Management) {i.e. supply & installation of 3D Modelling and Smart Documentation System solution} and (v) IWN (Industrial Wireless Network) solution for implementation in a large industrial setup. Also, the above referred solutions [from (i) to (v)] should have been in successful operation in a large industrial setup for a period of not less than one (1) year as on date of publishing of BHEL's EoI. Implementation Experience w.r.t. (i) to (v) can be of multiple projects and need not necessarily be for one single project/setup. In case the prospective collaborator does not meet any requirement from (i) to (v) above on its own, the prospective collaborator can also qualify provided it collaborates/associates with an entity who meets those requirements from (i) to (v) above which prospective collaborator does not meet so that total requirement is met by the prospective collaborator with his associate collaborator(s). In such a case, details of scope of work of prospective collaborator and its associate in such an implemented solution to be furnished by the prospective collaborator." Whether prospective collaborator meets above PQR and requisite documentary proof to substantiate the above PQR has been submitted.	
9.	Whether prospective Collaborator is having any implementation experience in providing RMDS solutions to Power Plant Industry? If yes, please specify total MW capacity experience.	
10.	Whether the prospective collaborator owns the Intellectual Property Rights for the different segment of Industry 4.0 technology being proposed under the Technology Collaboration Agreement (TCA). If yes, whether list of such Intellectual Property Rights enclosed.	
11.	Whether the prospective collaborator has any experience in establishing a Centre of Excellence (CoE) facility, if so please specify.	



Sl. No.	Requirement	Prospective Collaborator's response YES/NO and remarks if any.
12.	Whether prospective collaborator has entered into any partnership agreement with any other company in the world (including India) for supply of different segment of Industry 4.0 solutions. If yes, please provide details.	
13.	Whether prospective collaborator is having any operational Development Centre / CoE	
14.	Whether prospective collaborator has any experience in implementation of Industry 4.0 solutions: (i) power plant (ii) process industries like cement, refinery, steel, coal mine, fertilizer (iii) transmission & distribution systems (iv) defence (v) mobility (vi) Smart factories (vii) Smart cities If yes, please furnish the experience details.	
15.	Does the solutions offered by prospective collaborator come with proven security solutions?	
16.	Does the solutions offered by prospective collaborator use OPC UA (OPC Unified Architecture technology) or better communication model?	
17.	Whether Industry 4.0 solutions offered by prospective collaborator to BHEL in a seamless and integrated manner working with unified database, online plant data connectivity and ERP connectivity, as and when required.	
18.	Organization Structure for Industry 4.0 segment to be enclosed.	

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Annexure-6

Reference List: The Prospective collaborator shall furnish a summary of their reference as detailed below for major supplies in last 5 years

Sl. No.	Type of Industry 4.0 solution (RMDS / RCM / AII / DW / AIM / IWN)	Customer / Country	Type of Industry	Capacity of plant	Date of Order	Implementation date	Assets / equipments covered under implementation	Brief Scope of Work	Whether order was directly placed by customer on prospective collaborator
1.									
2.									
3.									
4.									
5.									

(SIGNATURE)