

## **TERMS OF REFERENCE FOR THE R&D PROJECT**

**1. Title of the Project:** Repository of Brain Computer Interfaces (BCI) - Use Cases

**2. Background:**

- a. BCI technology is gradually being applied to many real-world application fields, including smart environments, medical and health, education, industrial control, and gaming. In the future, this technology will bring new changes and developments in more fields. Therefore, to ensure that BCI technology can better benefit humans, it is necessary to carry out standardization research work on the technology, which mainly focuses on the standardization of BCI technology, ethics, and safety.
- b. Bureau of Indian Standards (BIS) technical committee, LITD 37 “Brain-computer interfaces sectional committee” is concerned with standardization in the area of Braincomputer Interfaces for information technology to enable communication and interaction between brain and computers that are applicable across application areas.
- c. The R&D project aims to create a collection of representative Use Cases of Brain Computer Interface applications in a variety of domains by performing research on the standardization requirements of BCI, and the outcome document to present the conclusions.

**3. Scope:**

- a. The project would result in a collection of representative use cases of Brain-computer Interface applications in a variety of domains, e.g., medical and health, industrial controls, smart environment, learning/education/training, gaming and any other domain in the template (Annex-A) provided.
- b. The project would include review of the existing standards, reports, documents and whitepapers on reference architecture by organizations like IEC, ISO, IEEE and any other research entity or organization working in these domains.
- c. The deliverable can be used in the development of potential standards, and will be valuable for a better comprehension of BCI.

**4. Expected Deliverables:**

The research activity during the project duration should result into compilation of the following documents:

- a. Repository detailing the Use Cases in the field of Brain Computer Interfaces (BCI) in the format provided by BIS.
- b. Draft document that can be published as Technical Report in India as well as at ISO/IEC level.
- c. Research methodology adopted during the project and details of documents/reports reviewed, experts interviewed, industries reached out to, articles analysed etc.

**5. Objective:** To prepare a repository of Brain Computer Interface Use Cases (Exclusion: human implants) from diverse fields of applications.

**6. Research Methodology:**

- a. Literature review should be done for existing documents, reports, articles, existing published use cases, white papers etc. including but not limited to the list of use cases already incorporated in the Working Draft of standard taken up by ISO/IEC JTC 1/SC 43/WG 2.
- b. Interaction with experts/industries/hospitals/institutes/organizations (at least with 5 such stakeholders) that have wither developed some products/solutions based on BCI or implemented BCI application based solutions/treatments/assistance.
- c. Analysis of data/details available in form of documentaries/use cases/ implementation stories / articles which would help in compilation of use case
- d. Interaction with Committee members for their inputs on various facets of implementation and challenges in the field of BCI application implementation.

**7. Requirement for the CVs:** CVs of the following members to be shared by the organization conducting the research:

- a. Project leader for the R&D project with a min. experience of 5 years in the relevant field.
- b. Team members to be engaged for the project.

**8. Timeline and Method of Progress Review:**

- a. Identification of stakeholders for interaction in consultation with LITD in the first three weeks.
- b. Progress report of the ongoing project, use cases compiled, recommendations- By end of each month from the date of assignment received from BIS.
- c. Final report and repository, recommendation covering all the aspects of the ToR – By end of 5 months from the date of assignment received from BIS.
- d. In case of delay in submission of final draft report, the justification shall be given by the project proposer for consideration by the Sectional Committee.
- e. The proposer shall comply to the provisions given in the BIS guidelines for Research & Development Projects for Formulation and Review of Standards.
- f. The proposer taking up the project shall clear all doubts on provisions of research including ToR and BIS guidelines before acceptance of the project and signing agreement.

**9. Support BIS will provide**

BIS will provide access to latest available editions of Indian standards and/ or international standards relevant to the project, on request.

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**ANNEX-A**  
**Use Case Submission Template**

The application areas of BCI/BMI can include but not limited to Medical Care, Gaming, Smart Environments, Learning/Education/Training, etc.

Use Case Title	<i>Fill the title of your use case.</i>
Application domain	Choose an item.
Contributor (Name and email)	<i>Fill your name and contact point such as email address.</i>
Status	Choose an item.
Source	<i>Fill the title with URLs or references.</i>
Scope <sup>1</sup>	
Objective(s) <sup>2</sup>	
Narrative	Short description (not more than 150 words)
	Complete description
Stakeholders <sup>3,4</sup>	
Scenario Sequence <sup>4</sup>	
Benefits <sup>5</sup>	
Challenges and issues	<i>Describe issues possibly concerned or already raised.</i>
Standardization opportunities/ requirements	<i>Fill the references of originator/organization and links.</i>
Relevant standards or SDOs	
Terms and concepts used	<i>Key terms and concepts that are used.</i>
References <sup>6</sup>	
Notes	<i>Describe notes if it is necessary.</i>

**\*Add 1-3 figures to show/describe the use cases.**

(e.g., productions/principles/framework, etc.)

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<sup>1</sup> The scope defines the intended area of applicability, limits, and audience.

<sup>2</sup> The intention of the system; what is to be accomplished? who/what will benefit?

<sup>3</sup> Stakeholders are those that can affect or be affected by the BCI/BMI system in the scenario; e.g., organizations, customers, 3rd parties, end users, community, environment, negative influencers, bad actors, etc.

<sup>4</sup> Scenario Sequence is a step-by-step description of the scenario. Diagrams are desirable.

<sup>5</sup> Benefits describes economic and social benefits.

<sup>6</sup> References are references to originator/organization and any relevant links.