**APPENDIX 01:**

**HANDOVER PRODUCTS, TECHNICAL REQUIREMENTS**

**I. Handover Product**

|  |  |  |
| --- | --- | --- |
| **No** | **Content** | **Output** |
| 1 | Design | Design documents (all design documents, detailed solutions of the System, databases, test scripts, system user manuals, operating and exploitation documents): instructions for installation, operation, and common error handling according to the form specified by Bitel. request form that Bitel sends |
| 2 | Programming | Source Code - Provide all application source code and user library (if any external library is used).  It is necessary to comply with coding convention and sercurity information standards set by Bitel. |
| 3 | Handover + Acceptance | Test Results - test scenario has passed all the cases in the scenario.  Minutes of program acceptance between the two parties.  Source code is handed over according to the versions corresponding to each software |

**II. Technical requirements**

**1.** **Criteria for Product features**

***1.1 Criteria suitable function***

| **No** | **Content** | **Technical requirements** | **Mandatory criteria or not (M- Mandatory, O - Option)** | **Evaluation Criteria** | **Can Modify(Yes/ No)** |
| --- | --- | --- | --- | --- | --- |
| (1) | (2) | (3) | (4) | (5) | (6) |
| ***I. Upgrade software system****:….[Name of system]* | | | | | |
| *1* | List of features and requests sent to partners by Bitel on a monthly basis | | **M** | -Pass: all requirements are met  -Fail: one of technical requirements is not met | No |

* 1. ***Accuracy, security, interactively.***

| **No** | **Content** | **Technical requirements** | **Mandatory criteria or not (M- Mandatory, O - Option)** | **Evaluation Criteria** | **Can Modify(Yes/ No)** |
| --- | --- | --- | --- | --- | --- |
| (1) | (2) | (3) | (4) | (5) | (6) |
| *1* | ***Accuracy*** | Data must be saved completely and accurately with information entered by user. | **M** | -Pass: all requirements are met  -Fail: one of technical requirements is not met | No |
| *2* | ***Security*** | Compliance with regulations on information security and information security guidelines on programming; Programming guide to avoid potential errors, ensuring that there are no errors when scanning by Bitel's SonarQ tool. Use safe Captcha, OTP. Meet requirements of authentication, decentralization of SSO, and decentralization of functions. | **M** | -Pass: all requirements are met  -Fail: one of technical requirements is not met | No |
| *3* | ***Interactively*** | System's data interchangeability: input and output data formats, mandatory data rules compliance; data exchanged between system and related systems. Methods/standards of communication between different systems.  Mandatory include:   * Many modules/services when connecting to must have authentication when communicating and sending execution commands. * Perform reconciliation, trace log and troubleshooting between two different systems * Save transaction history, find request and response content of each transaction. * With users: Management through Bitel’s centralized SSO system | **M** | -Pass: all requirements are met  -Fail: one of technical requirements is not met | No |

* 1. ***Non - Functionnal Criteria***

| **No** | **Content** | **Technical requirements** | **Mandatory criteria or not (M- Mandatory, O - Option)** | **Evaluation Criteria** | **Can Modify(Yes/ No)** |
| --- | --- | --- | --- | --- | --- |
| (1) | (2) | (3) | (4) | (5) | (6) |
| *1* | **Architecture and technology** | Usage includes but is not limited to the following frameworks: Angular/AngularJS Spring Boot Spring Cloud Kafka Eventuate Docker Primefaces ELK (Elastic, Logstash, Kibana) Laravel.  + Programming languages: Java, PHP.  + Databases include but are not limited to: MariaDB/Oracle/MySQL. | **M** | --Pass: all requirements are met  -Fail: one of technical requirements is not met | No |
| ***2*** | **Reliability** |  |  |  |  |
| *2.1* | Reliability | Capable of self-protection (fault prevention):  There is an overload protection mechanism for queues, stacks, hasmaps, meeting the following requirements:  + Requests that exceed the timeout time will be released  + Reject requests beyond the capacity to accept | **M** | --Pass: all requirements are met  -Fail: one of technical requirements is not met | No |
| *2.2* | Fault tolerance | The error only affects the faulty function:   * Fix timeout and errors when communicating between systems. * There are solutions to ensure shared resources are not conflicted: Connection:DB connection, FTP connection, File handler, Socket connection. * There is a mechanism to isolate faulty services. Don’nt interrupt 100% of services: Allows deployment according to HA model (active - active, active - standby) * In case there are too many requests to a service that exceeds the capacity, the system will automatically reject or reduce the receiving capacity. * In case the connections to the external system fail (for example, the database connection), the system has a handling mechanism to reduce the load (process timeout, retry, incremental retry time) and rollback the transaction. Translate. | **M** | --Pass: all requirements are met  -Fail: one of technical requirements is not met | No |
| *2.3* | Resilience | When detecting process hang/slow/high load; loss of connection allows setting scenario to restore service | **M** | -Pass: all requirements are met  -Fail: one of technical requirements is not met | No |
| **3** | **Possibility** |  |  |  |  |
| 3.1 | Ease of understanding/learning | Design interface nust be consistent:  - The buttons of the functions are placed on a toolbar.  - The system of categories, functional groups are set into module groups. - Same type of data search form on functions.  - Same form interface to import and export data.  - Icons on functional forms are identical: Add New, Delete, Save, Search, Import, Export...  - Next to the icons there are tooltip text explaining the meaning of the icons. | **M** | -Pass: all requirements are met  -Fail: one of technical requirements is not met | No |
| 3.2 | Operational Capability | There are operating and exploitation documents including but not limited to the following types of documents: Operation manual, installation manual, exploitation manual.  There is an operation monitoring solution | **M** | -Pass: all requirements are met  -Fail: one of technical requirements is not met | No |
| 3.3 | Attractiveness | Interface, color: There are 4 types of interface   * Home page interface: Warnings must be displayed in tables. * Functional interface: As tables (tables) are sorted ascending data, columns must be displayed by Number / code, Name, Date... * Input interface: Popup: Toolbars: Top (top), logically arranged controls, tabs from left to right, from top to bottom. * Search interface: The top is the search terms, the middle is the display results data table, the last side: The button layout must be arranged on the right side of the interface. | **M** | -Pass: all requirements are met  -Fail: one of technical requirements is not met | No |
| **4** | **Efficiency** |  |  |  |  |
| 4.1 | Processing time | * Response time when performing business operations ≤ 5 seconds with 90% of business operations (excluding report, query, and search operations) in conditions of Bitel's test server Sized and meets at least Concurrent users: 500 CCU | **M** | -Pass: all requirements are met  -Fail: one of technical requirements is not met | No |
| 4.2 | Responsiveness | * There is a defined number of users/concurrent transactions on the system and a technical solution for implementation | **M** | -Pass: all requirements are met  -Fail: one of technical requirements is not met | No |
| **5** | **Maintainability** |  |  |  |  |
| 5.1 | Analytical ability | * Log in according to Bitel’s regulations * Log monitoring of synchronization progress on the ability to ensure correct and sufficient synchronization data monitoring as required. | **M** | -Pass: all requirements are met  -Fail: one of technical requirements is not met | No |
| 5.2 | Possibility to change | * Allows multi-language configuration. * Functions are assigned by permissions. * System is scalable to increase responsiveness as data volume increases by adding infrastructure. * System is scalable in terms of infrastructure (server, database, storage) without changing the architecture of the application. | **M** | -Pass: all requirements are met  -Fail: one of technical requirements is not met | No |
| **6** | **Ability to transfer** |  |  |  |  |
| 6.1 | Compatibility | * Support operating systems Windows (7 and above), Window Server (2008 R2 and above), Linux/Unix. - Client supports cross-browser including at least Firefox 42 and above, Chrome 67 and above, SFive * Multi-language response system (default is English and Vietnamese) * Support for client-side multi-operating systems (OS) including at least: Windows/Linux/MAC * Support for server-side multi-operating systems eg: Windows/Linux/Unix- Support for at least one of the following Application Servers : Tomcat, Jboss, Sun Java System Application Server, Oracle Application Server, WebSphere Application Server/IIS | **M** | -Pass: all requirements are met  -Fail: one of technical requirements is not met | No |
| 6.2 | Ability to install software | * Install on virtualization server server device. * Install on windows/unix/linux operating systems | **M** | -Pass: all requirements are met  -Fail: one of technical requirements is not met | No |

* 1. ***Criteria of commitments, services and other requirements***

| **No** | **Content** | **Technical requirements** | **Mandatory criteria or not (M- Mandatory, O - Option)** | **Evaluation Criteria** | **Can Modify(Yes/ No)** |
| --- | --- | --- | --- | --- | --- |
| (1) | (2) | (3) | (4) | (5) | (6) |
| *1* | User Manual | * Software User Manual | **M** | -Pass: all requirements are met  -Fail: one of technical requirements is not met | No |
| *2* | Configuration and installation documents | * Instructions for using administrative tools, configuration, adding functions | **M** | -Pass: all requirements are met  -Fail: one of technical requirements is not met | No |
| *3* | Document test case | * Instructions for testing each function: step by step * Test cases must cover all cases including possible exceptions of the function and must specify desired results to be achieved when testing. | **M** | -Pass: all requirements are met  -Fail: one of technical requirements is not met | No |
| *4* | Source code | * Handover enought product source code (Source code). | **M** | -Pass: all requirements are met  -Fail: one of technical requirements is not met | No |
| *5* | Document, Source code | * Document describes structure of source code | **M** | -Pass: all requirements are met  -Fail: one of technical requirements is not met | No |
| *6* | Support after deployment | Provide support staff when deploying, ensuring support for problems to complete the application deployment | **M** | -Pass: all requirements are met  -Fail: one of technical requirements is not met | No |

**Appendix 02: KPI for Quality and On time**

1. **KPI for On time:**

**≥ 98%**

**Explain:**

- Total number requirements complete acceptance test on time is total number requirements complete acceptance test on time according to Bitel’s plan give to Partner in outsource contract cycle.

- Total number of outsourced requests is: Total number of outsource requests Bitel give partner in outsource contract cycle.

1. **KPI for Quality:**
   1. **KPI about total quality**

**= 100%**

**Explain:**

* + Total number requirements handover with PASS is total number requirements handover source code, program, document (**on Item I)** for Bitel with PASS (no error). Which is detected immediately handover or after completion of handover according to Bitel’s regulation (about quality criteria source code, document, program).
  + Total number of outsourced requests is: Total number of outsource requests Bitel give partner in outsource contract cycle.
  1. **KPI about error during acceptance stage**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **KPI =** (**Error i \* Error weighti )/  Outsource effortsi**  **Results for acceptance testing as follows:**  **PASS: KPI ≤ 1**  **NOT PASS: KPI >1**  ***Explain:***  **- Error i:** errors in program/document of work performed by Outsourcing partner (Part B) during acceptance due to "Solution", "Development", "Testing"; Information Security Error; Error coding convention.   |  |  |  |  | | --- | --- | --- | --- | | **Error weight** | **Minor** | **Major** | **Crash** | | During acceptance test | 1 | 3 | 5 | |
| * **Error weight:**    + Crash error (weight is 5): slow/hang application server, application crash, process crash, database connection loss; Errors of violation of information security according to the instruction manual to do as required   + Major error (weight is 3): System function/business failure; Solution document error, test scenario error.   + Minor error (weight is 1): Remaining error   - **Outsource effort:** Based on the estimated outsourcing effort signed for each PO order (unit: MM) |
|  |

**Appendix 3. Effort Estimation Regulation**

1. **Effort Estimation according to Bitel’s regulation:** Bitel will send regulation before doing outsource.
2. **Template for Effort Estimation**

|  |  |  |  |
| --- | --- | --- | --- |
| **Effort of project** | | | |
| **No** | **Work** | **Explain** | **Effort (MD)** |
| 1 | Effort for non-reusable functionality | Total effort performed for functionality including test development solution |  |
| 2 | Solution | Total effort to implement solution |  |
| 3 | Development | Total effort of doing development including coding, unit testing, fixbug |  |
| 4 | Testing | Efforts for: writing test reports, reviewing and approving test reports, executing and recording test results, managing defects on IBM systems making test reports |  |
| 5 | Total functional effort after reuse | Is total functional effort after reuse |  |
| 6 | Non-functional implementation effort | Total functional implementation effort including test development solution |  |
| 7 | Total Effort (MD) | Total effort of the project after deducting effort of final phase. |  |