| ***Transition from manual data extraction to API-Based Real-Time Integration*** | |
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| **Date:** | 16/02/2025 |
| **Change No:** | 01 |
| **Description**: | Modification in data integration strategy for the BI system. Initially, data from different sources (POS, CRM, inventory) was planned to be extracted and loaded using manual data entry and batch processing. This change request proposes a shift to real-time API-based data integration, ensuring faster updates, increased accuracy, and better system efficiency. |
| **Reason**: | 1. Optimized data accuracy & efficiency: Manual data extraction may result in delays and inconsistencies, whereas real-time API integration synchronizes data instantly, reducing errors.  2. Cost efficiency & Long-term scalability:   * While initial setup requires API development, it reduces long-term operational workload compared to maintaining batch processing. * The system will be easier to scale as more data sources and modules are added in future phases.   3. Better integration with existing IT infrastructure:   * Golden Gate is already using cloud-based CRM and POS systems, making API integration a natural extension for smoother operations. * Ensures faster reporting for sales and marketing teams, enabling better decision-making. |
| **Scope** **Impact**: | No changes to scope – The BI system was designed to collect data from various sources; this change only modifies the data collection method (from manual/batch processing to API-based integration). |
| **Timelines Impact:** | Minor impact on the development phase (+1 week) for API configuration and testing. However, this is within the project’s contingency buffer, meaning the overall go-live date remains unchanged. |
| **Budget Impact:** | 1. No additional costs - The switch to API integration will be implemented using existing BI tools and infrastructure, avoiding new software expenses.  2. Cost-saving advantage: Reduces the need for long-term manual data processing and maintenance, making the system more efficient in the long run. |
| **Other Impact:** | 1. Enhanced real-time analytics: Faster and more accurate reporting for sales and marketing teams.  2. Lower manual workload: Less reliance on manual data imports, freeing up team resources for strategic analysis.  3. Improved security & compliance: API-based integration provides better data control and reduces the risk of human errors. |
| Change Requested By: | Nguyen Huynh Kim Suong – Product Developer |
| Approver: | Assoc. Prof. Ho Trung Thanh, Ph.D – Project Sponsor  Approval Date: 18/02/2025 |

| ***Upgrade to a Cloud-Based Data Warehouse for Enhanced BI Performance*** | |
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| **Date:** | 05/03/2025 |
| **Change No:** | 02 |
| **Description**: | This change request proposes migrating the **Business Intelligence (BI) system** from on-premise servers to a **Cloud-Based Data Warehouse (Cloud DWH)** to improve data processing speed, expand storage capacity, and enhance query performance. This upgrade aims to enable faster big data processing and support more advanced analytics. |
| **Reason**: | 1. Higher performance & scalability: The current BI system faces limitations in processing power as data volume increases. Cloud DWH provides automatic scaling to meet business demands.  2. Faster query execution & reporting: The current system takes a long time to execute complex queries. Cloud DWH significantly reduces query response time.  3. Better integration with modern BI tools: Many advanced analytics tools work more efficiently with cloud infrastructure, optimizing data analysis and reporting capabilities. |
| **Scope** **Impact**: | Significant scope change – Migrating to Cloud DWH not only alters data storage methods but also requires updates to data processing workflows and integration with existing BI tools. |
| **Timelines Impact:** | Estimated **2-3 additional months** for setup, data migration, testing, and system optimization. |
| **Budget Impact:** | Current On-Premise BI System Cost:  * **Fixed Setup Costs:** $187,600 * **Annual Operational Cost:** $32,000 (including maintenance, power, internet, and software updates)  Cloud-Based Data Warehouse (AWS) Cost Estimate:  * **Setup Costs:** $50,000 (initial migration, cloud infrastructure setup, security configuration) * **Monthly Cost:** $8,000 - $12,000 (compute instances, storage, BI analytics tools, data transfer fees) * **Annual Cost Estimate:** $96,000 - $144,000  Key Budget Impacts:  1. **Higher recurring costs** – Cloud DWH increases operational expenses significantly, with estimated annual costs ranging from **$96,000 - $144,000**, compared to the current on-premise system's $32,000/year. 2. **Data migration expenses** – The transition requires specialized technical resources, increasing consulting and labor costs. 3. **Not feasible within the current budget** – The additional **$64,000 - $112,000 per year** for cloud operations exceeds the allocated budget, potentially affecting other critical initiatives. |
| **Other Impact:** | **1. Improved system performance** - If implemented, the BI system would run faster and handle large-scale data analysis more efficiently.  **2. Increased operational costs** - Cloud infrastructure requires ongoing monthly fees, adding financial pressure in the long term.  **3. Security and compliance risks** - Migrating data to the cloud requires additional security measures to ensure compliance with data protection regulations. |
| Change Requested By: | Tran Thi Thuy Loi – Data Analyst and Engineer |
| Approver: | Assoc. Prof. Ho Trung Thanh, Ph.D – Project Sponsor  Approval Date: 07/03/2025 |