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| **No** | **Idea** | **Area** | **Potential Benefits** |
| 1. | Implemented scalable, open source real-time streaming Data platform tool called Cloudera Dataflows (NiFi) for ingesting data from different source systems into Hadoop Data lake.  We implemented this on a Test Data Lake and replicated data to production Data Lake to overcome Cloudera’s Licensing Cost on NiFi Tool | Data Lake | **• Reduce Data integration development time**  **• Processing real-time data streaming at high volume and high scale and tracking data provenance, lineage of streaming data**  **• Lends well to visual creation and management of directed graphs of processors** |
| 2. | Automated bulk metadata Tagging in Data Lake for all SAP ISU tables and field names in German to English | Data Lake | **Improved Data Quality due to explanation of all abbreviated SAP Fields in German to English** |
| 3. | Implemented NFS Gateway Architecture for file transfer from SAP DS Prod servers directly to Prod HDFS Directory.  This integration allows SAP DS extracts to be ingested directly to Hadoop in place of a Linux directories and then Sync with Hadoop. | Data Lake | **Significantly reduced the latency of 4-5 hours for daily batch suite.** |

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| ***Response:***  TCS has a comprehensive quality framework called the Integrated Quality Management SystemTM (iQMS) that addresses the quality requirements across the entire lifecycle of the service’ delivery be it support services or projects’ delivery. iQMS is adopted by TCS at enterprise level and incorporates the quality practices of ISO 9001:2008, P-CMM® Ver. 2.0, CMMI®- DEV+IPPD, Version 1.2, CMMI® for Services Ver.1.2, ISO/IEC 27001:2005, ISO/IEC 20000-1:2005, ISO 14001:2004 and OHSAS 18001:2007. TCS’ iQMS provides a complete set of Policies, Procedure Manuals, Process Handbooks, Standards, Guidelines, Checklists and Templates for all the delivery processes. Our current Data Engineering deliveries within ESB comprising continuous changes and support services covering SSIS, HADOOP and BODS are delivered with an average customer satisfaction score of ~94%, which stands as a testimony to the robust quality that TCS bring in our service delivery.  Snapshot below enumerates the TCS iQMS framework: -    **TCS iQMS framework**  Below sections provide a more detailed view on TCS Quality Assurance processes **–**   * **Current processes** * **Proposed approach**   **Current Process:**    **Service Quality Standard inputs**  While iQMS provides guidelines about processes and procedures, an understanding of ESB expectations plays important part to define what service quality standards needs to be adhered to. TCS’ delivery excellence group (DEG), which ensures that optimal quality standards are followed across our engagements, liaises with on-ground delivery teams to firm up the working quality framework inspired from iQMS.  TCS currently follows a 4-Step Quality assurance processes for project and support service delivery at ESB – same is depicted below: -    **Quality Assurance Framework Implemented**   1. **Service delivery standards:**   TCS service delivery in Data Engineering has matured over a period and today TCS takes a lead whenever there is an opportunity to not only adopt new standards but also help ESB define them. Below sections will elaborate how TCS has defined these service standards in SSIS, HADOOP and BODS.  **BODS:**  TCS Lead along with ESB counterpart have defined a performance framework for support services and change request, which details delivery KPIs (example Change Requests KPI - On time delivery, Support KPI - task and Incident completion on time) associated with the service.   1. **Investigate:**   TCS leads in consultation with ESB have adopted below processes to investigate and measure quality for Data Engineering   1. **Delivery Governance**: SSIS, HADOOP and BODS leads from TCS ensure that Quality processes are followed in their respective tracks. Review with SDM is to assure it further. These reviews are conducted on a weekly basis. Primary aim is to ensure the work is being delivered as planned and that there are no quality issues. There is a standard checklist that is used to assess the work quality in these meetings  * For Project and Change Request delivery these checks would be: - (**for SSIS, HADOOP and BW)** * Delivery tracker and check deliverable status * Check all quality procedures are followed such as standards, peer reviews etc. * Identify and review TCS service delivery risk/issues * Any recent feedback received from ESB leads * For Support service delivery: Following service KPIs are checked * Completeness of support request + ensuing communication with Business * Quality and volume of tickets delivered * Response times and Resolution times of Ops/tickets * Support service delivery risk/issues * Feedback received from ESB leads  1. **Technical Governance:** To ensure services are being delivered as per right technical standards, TCS follows below investigation methods: ­-   **BODS Technical investigation:**   * Design review by Technical leads * Peer review for development (code review) * Test proof validation  1. **Review by TCS DEG** is conducted every quarter for all the projects in a planned manner to evaluate the compliance with iQMS and the effectiveness of the quality of the services delivered. The audits are conducted using checklist developed for each type of services and the findings are recorded, and any non-conformance and corresponding actions recorded. All of this is managed using in-house tool called TCS Quality Audit System (TQAS). 2. **Publish/Present findings:**   TCS has enabled various forums to present findings and recommendations. Below sections will detail out how the findings gets presented for SSIS, HADOOP and BODS   * **Individual TEAM level presentation:**   **BODS:**  There are weekly reports and KPI’s which provide details on Service quality, issues, risks and recommendations. Based on nature of engagements in project delivery and support service delivery TCS adopts below method to publish/present findings-   * Daily stand up call between TCS team and ESB Lead. In this meeting daily delivery updates are presented, and any risk and issues are discussed. * Weekly status Meeting attended by ESB & entire SAP BODS BAU team. In this meeting support KPI’s, progress on change requests are presented. Weekly status reports are published to SharePoint site.   **Weekly status reports for BW:**   |  | | --- | |  |  * **Portfolio level presentation:** * Monthly review with Portfolio manager- Service score card, Project delivery and Support service delivery is discussed with portfolio manager in monthly Governance.   **Service delivery dashboard:**   |  |  | | --- | --- | |  |  |   Overall Service score card, Project delivery and Support service delivery is discussed with portfolio manager in monthly Governance.  **Portfolio level Scorecard**  **Take corrective measures/manage exception:** As part of the recommendations, if TCS is to take any corrective measures, then the same is accomplished in a defined timeline with rigor and this has been a cornerstone of TCS quality delivery. TCS has always delivered corrections as per agreed plan and timeline  Good working relationship built up with TCS over a number of years  (**as highlighted in service feedback received in Aug’20)**  **While TCS has been able to deliver a high-quality service so far, the team is continuously looking for opportunities to improve. We shall bring the same rigor and commitment to drive high standards of quality assurance to the SSIS, HADOOP and BODS work streams in future.**  Insert Screenshot of appreciation PPT    Few of the major deliverables by TCS team are detailed in **Appendix Q5.3.1.1\_A** |