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Revision History

Sr. No.	Version No.	Author	Date of Release	Description of Release/Change	Approved By
1.	1.0d	Hari P Thapliyal (Author)	19-Dec-08	Initial release	
2.	1.0	Shrikant (Reviewer)	19-Dec-08	Reviewed and Approved	Shrikant
3.	1.1d	Hari P Thapliyal	05-Dec-09	Added Supporting Processes	
4.	1.1	Shrikant (Reviewer)	06-Dec-09	Reviewed and Approved	Shrikant
5.					

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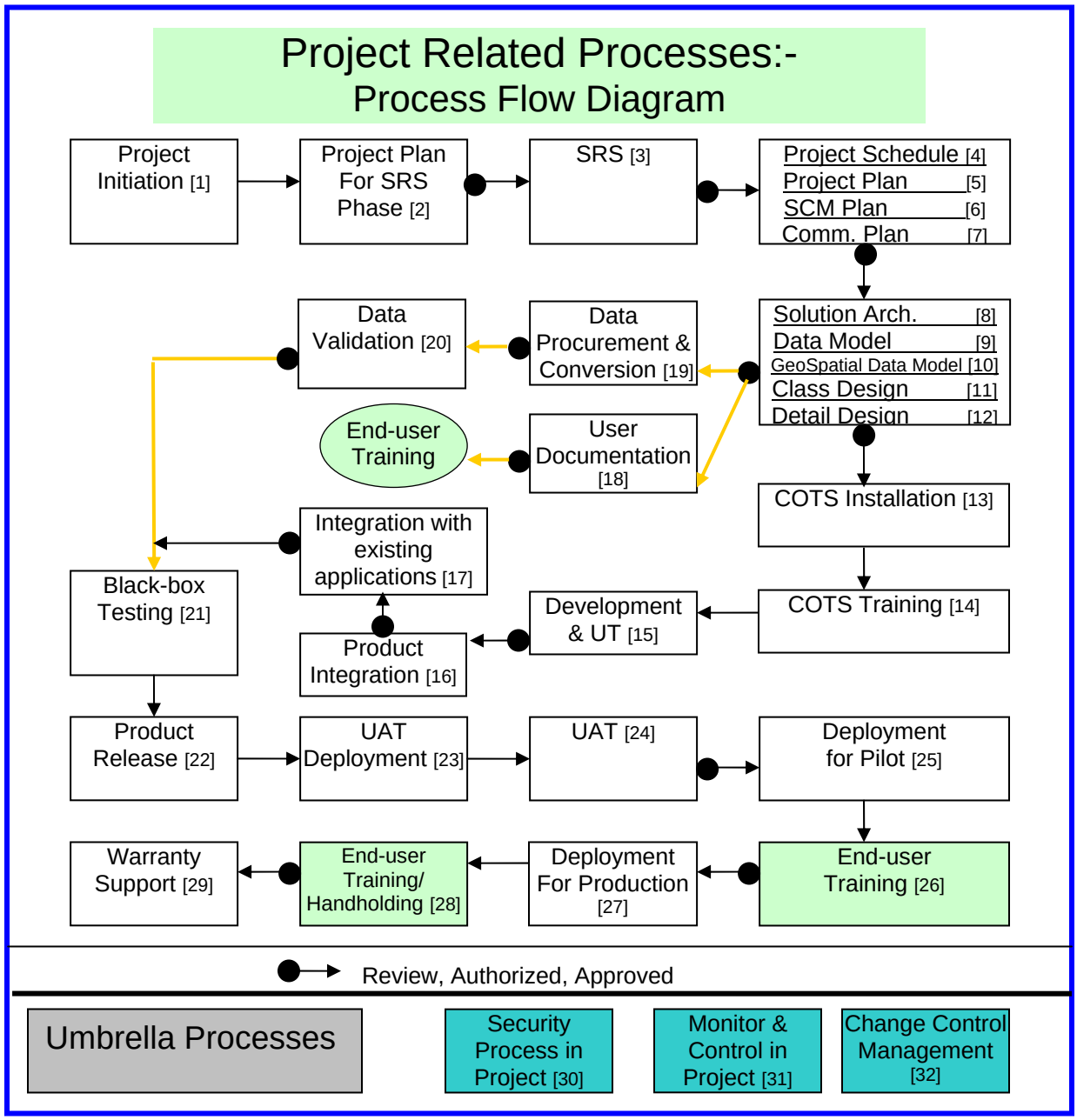

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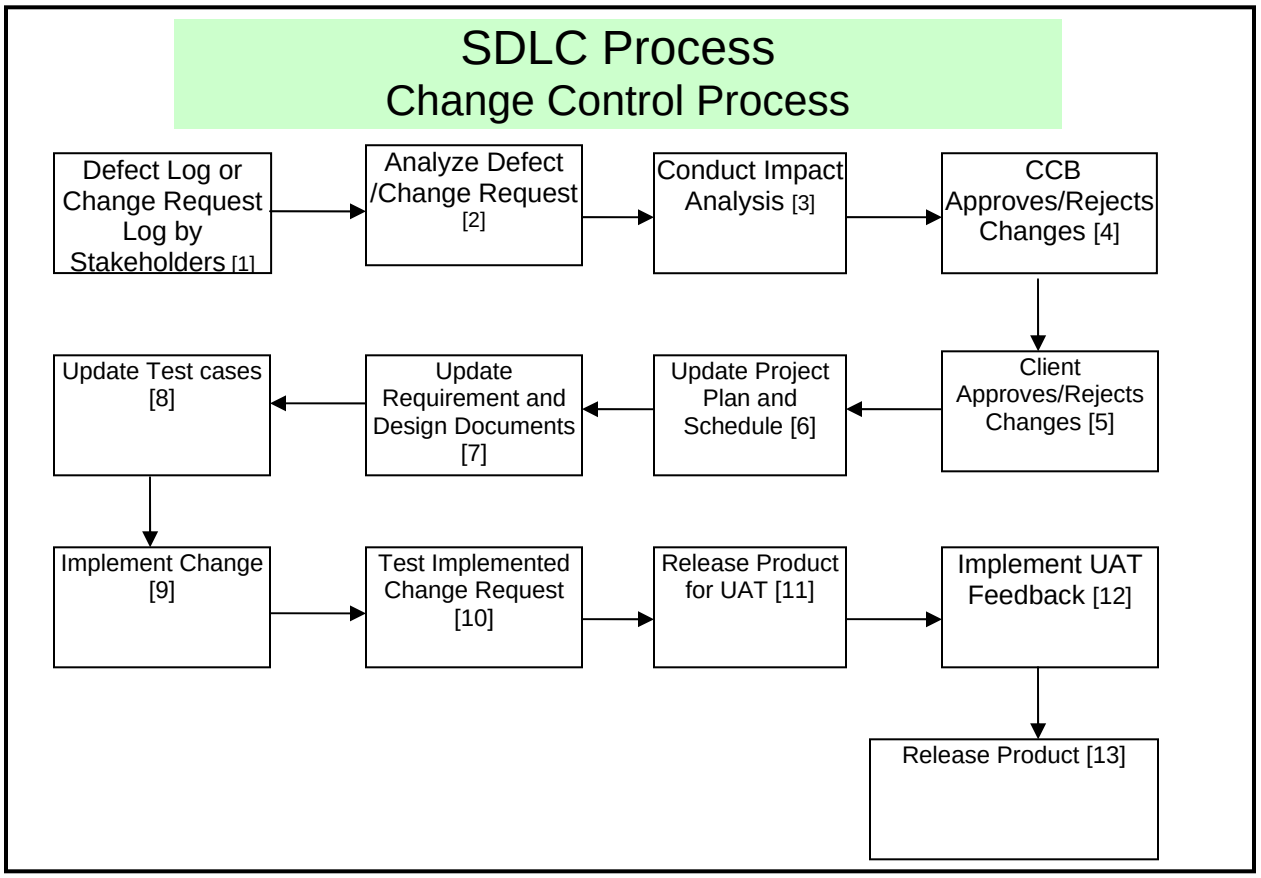

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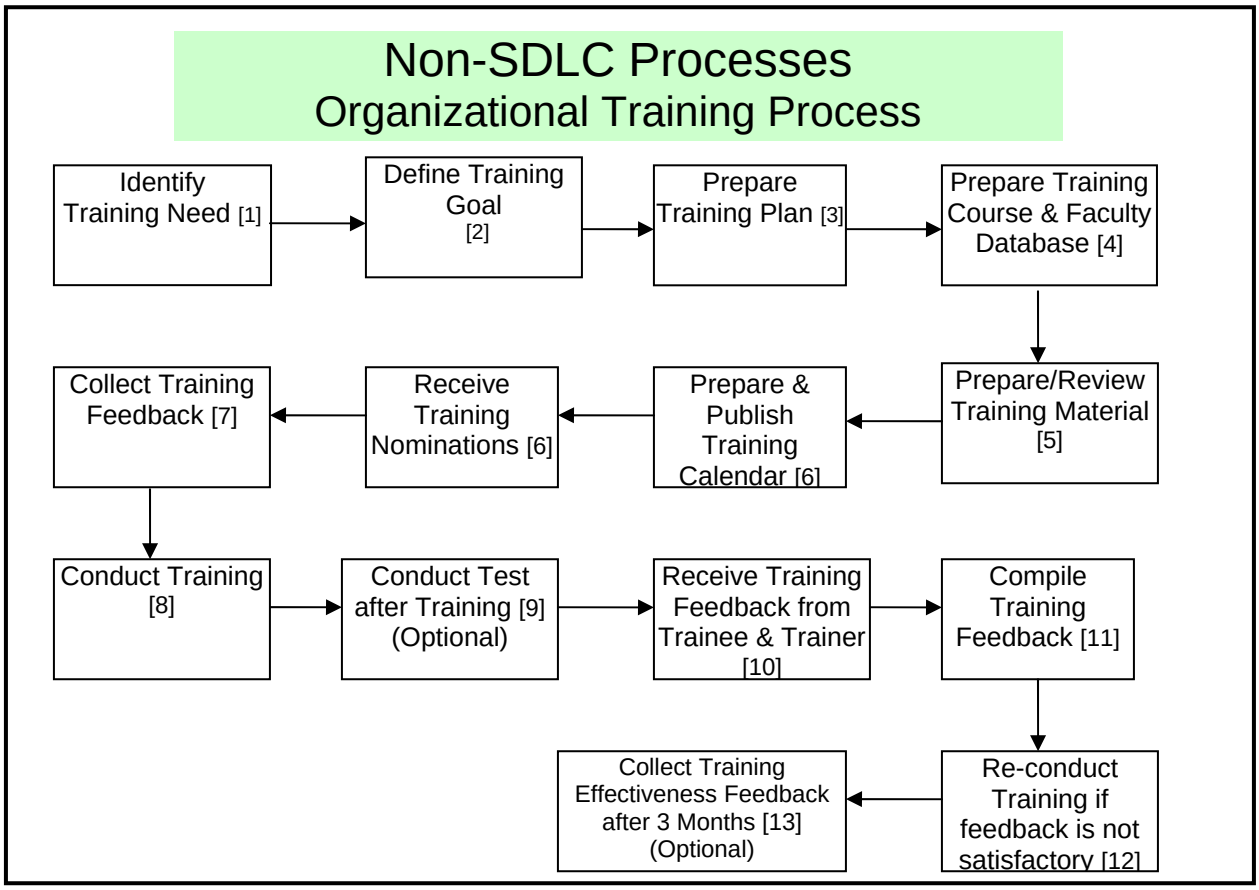

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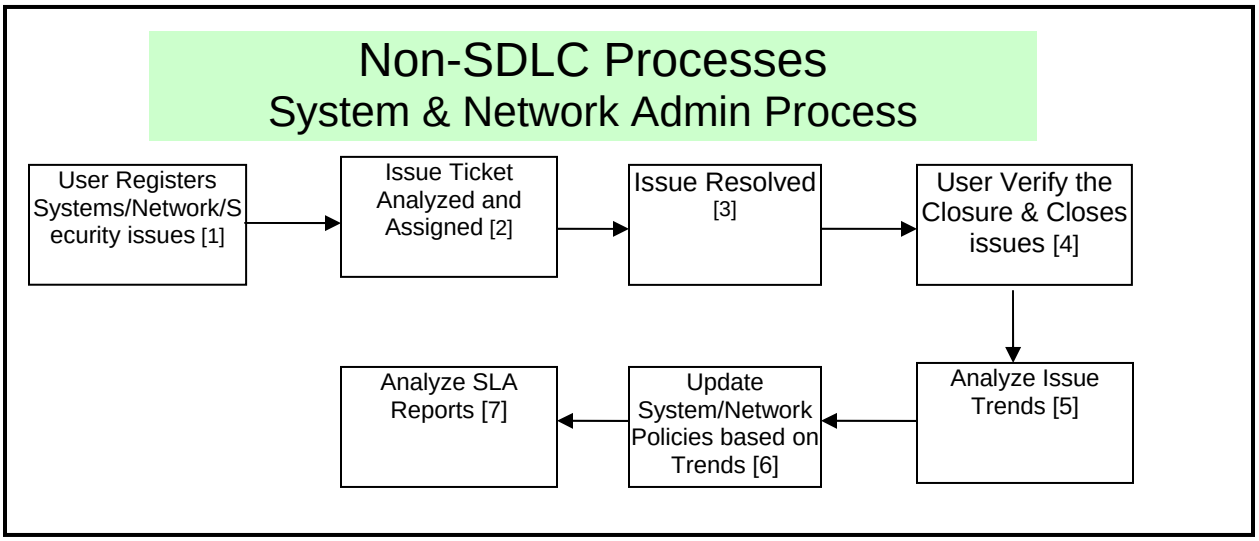

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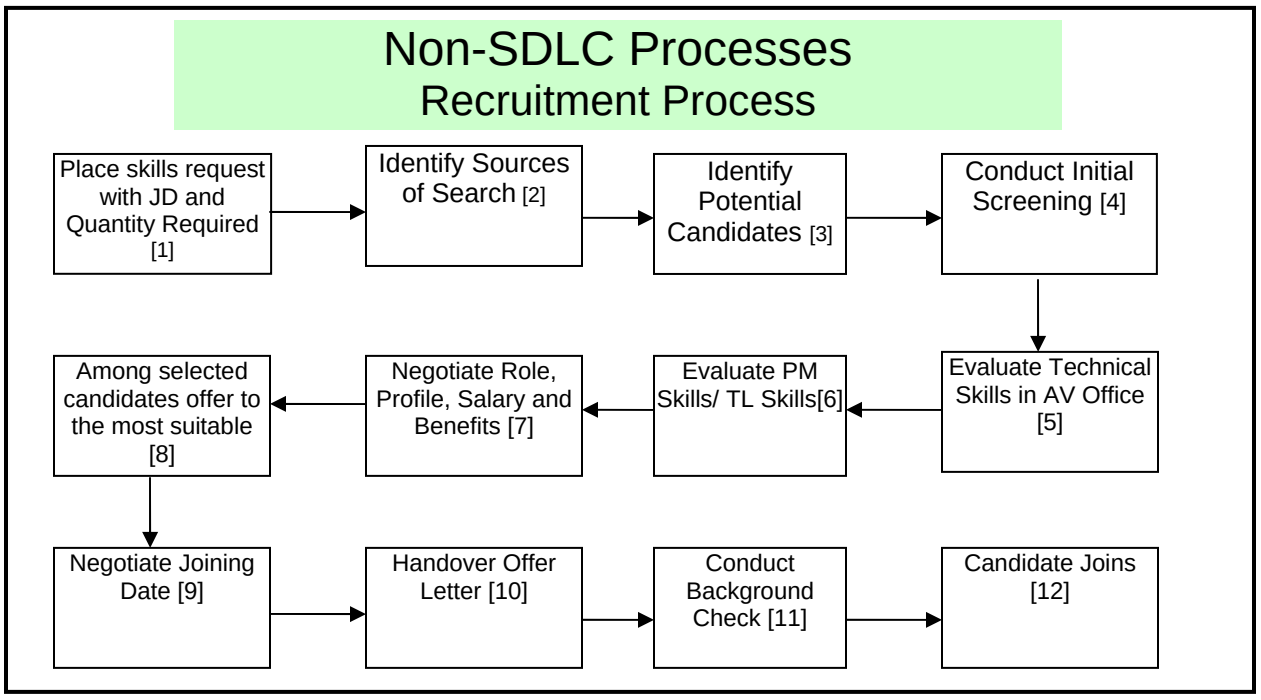

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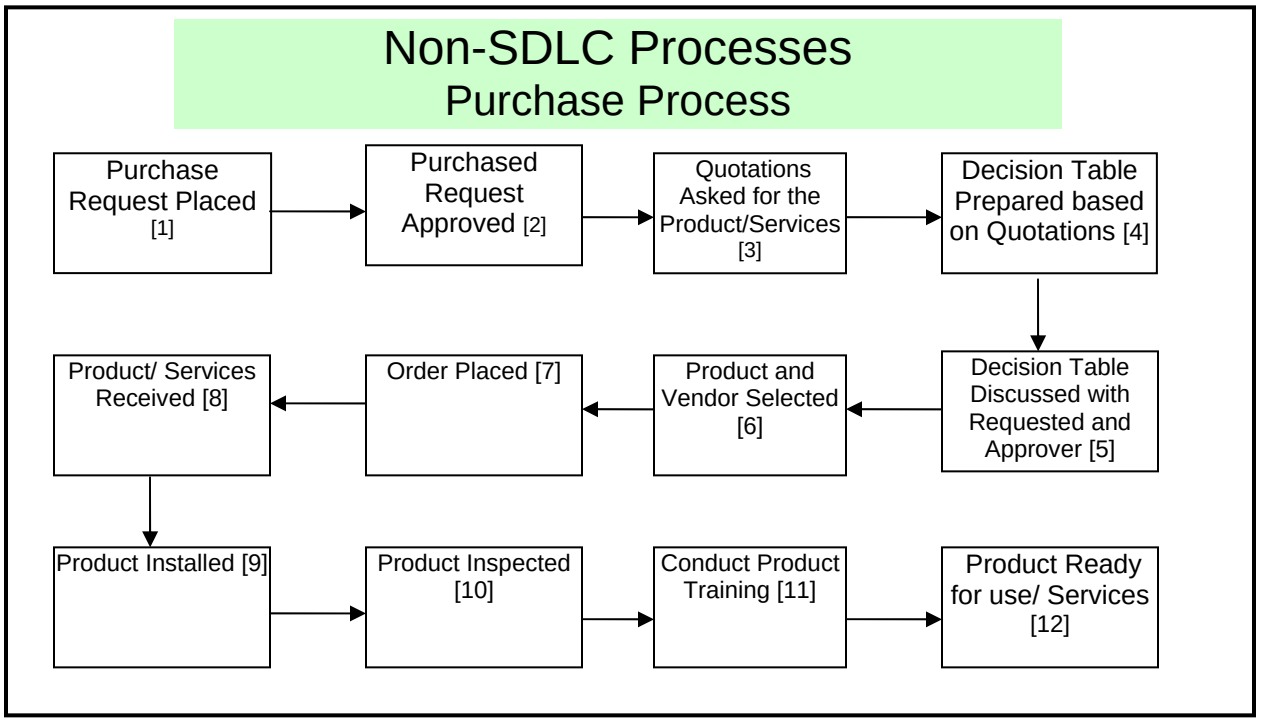

G. Abbreviations

- TM- Team Member
- PSM- Project Software Manager
- TL- Technical Lead
- CM- Configuration Manager
- CMP- Configuration Management Plan
- SPP- Software Project Plan
- STP- Software Test Plan
- SCCB- Software Change Control Board
- CI- Configuration Item

SCCB is comprised of PSM, Architect, Quality Engineers & Senior Management Representative. This board is authorized to evaluate change request and its impact, categorize the changes, accept or reject the changes.

Roles are mentioned in square brackets []

H. Processes

1. Project Initiation

Purpose	Identify the team members from Aurovision and MCGM side, Project briefing, sign project charter, assign roles & responsibilities to people, identify stakeholder & communication interfaces, discuss the project risk strategy
Key Inputs	• Contract • Team • QMS-Documents
Key Output	• Project manager formally assigned to the project • Project Team with roles and responsibilities assigned in place • Project Team has understanding about the individual expectations and product of the project • Resources are allocated to address the known risks • List of stakeholders, end-user their functional department name • Communications interfaces are established • Signed project charter
Key Tasks with Role	• Conduct Project Kickoff meeting [Delivery Head] • Draft MoM and circulate to all relevant stakeholders [PSM]

2. Project Planning for SRS

Purpose	Prepare a feasible plan to carry out SRS phase
Key Inputs	• Contract • Output of Project Initiation Phase • Planning Tool • QMS-Documents, Systems & Guidelines
Key Output	• Project plan for SRS phase • Risk plan for SRS phase • Approved Project Plan and Risk Plan
Key Tasks with Role	• Prepare a WBS for SRS phase [BA/PSM] • Identify requirement capturing technique based on the profile of user [BA/PSM] • Identify type of questionnaire required [BA/PSM] • Indentify interviewees [BA/PSM] • Prepare a project plan [PSM] • Take approval of project plan and risk plan

3. System Requirement & Specification (SRS)

Purpose	Gather and document the complete functional & non-functional requirements of the system. SRS phase document will help in knowing best possible estimations to make a detail development plan
Key Inputs	• Output of Project Planning for SRS phase • Output of Project Initiation phase • Existing Legacy system • Details of proposed system • Integration requirements • Artifacts

	• Complains from Pilot run • Source of available GIS data • QMS-Documents, Systems & Guidelines
Key Output	• Functional Specifications • SRS with NFR • GUI Wireframe • Use-case diagram • RTM, RRM • Request for Survey Tender • GIS Data • Approval of all above documents from authorized person
Key Tasks with Role	• Identify stakeholders and users of the product [PSM/BA] • Interview people as per the plan [BA & Team] • Circulate questionnaire as per the plan [BA & Team] • Study the artifacts and existing systems [BA & Team] • Collect feedback and analyze the requirements [BA & Team] • Categorize the requirements [BA] • Document and analyze the need of integration with legacy systems and COTS systems requirement [BA] • Prepares Functional Specification (FS) Document [BA & Team] • Prepare System Requirement and Specification (SRS) document [BA & Team] • Prepare Use case documents [BA & Team] • Prepare GUI-wireframe [BA & GUI Team] • Develop UI design [Visualizer] • Develop Wire-frame [Web Designer] • Send FS, SRS, Usecase, GUI Wireframe to authorized person for review and approval [PSM] • Review & Approve FS, SRS, Usecase, GUI-Wire-frame [Client] • Baseline Requirement documents [PSM] • Develop/Review RTM [PSM/BA] • Develop/Review RRM [PSM/BA] • Prepare survey tender [PSM]

4. Project Planning

Purpose	Develop a complete project plan and estimates the size, schedule, efforts, resources. Develop a risk management plan
Key Inputs	• Contract • Output of SRS Phase • Output of Project Initiation Phase • QMS-Documents, Systems & Guidelines
Key Output	• Software Project Plan (SPP) • Estimates • Milestones and release plan • Project Schedule • Risk Management Plan • Configuration Management Plan • Change Control Management Plan • Approval of all above plans as per authorization capacity mentioned in charter

Key Tasks with Role	• Prepare a detailed WBS as per contract/proposal [TL/PM] • Review and Approve the Detail WBS as per contract [BA, PSM] • Estimate the efforts [TM] • Review, validate and finalized the efforts [TL/PSM] • Identify resources, skill and experience required for each WBS item [TL/PSM] • Get the list of activities to be done for the delivery of each WBS item [PSM] • Prepare the schedule [PSM] • Review the schedule plan [Program Manager] • Change the priority, milestones and scope of milestone to adjust the schedule, if required [Client/PSM] • Develop Software Project Plan (SPP) [PSM] • Review Project Schedule & SPP [Process Team/Program Manager] • Review and Approve Project Schedule and SPP [Delivery Head] • Review and Approve Project Schedule and SPP [Client] • Allocate resource to project [Program Manager] • Assign resources to project schedule [Project Manager] • Baseline the Project Schedule, Efforts and SPP [Project Manager] • Publish the Project Schedule [Process Team]

5. Configuration Management (CM)

Purpose	Develop a configuration management plan, implement the plan and make sure that plan is implemented
Key Inputs	• All kind of work product developed by Aurovision, supplied by client, executable, non-executable & product/component purchased • Versioning strategy • Definition for CI and non-CI • Backup & Archival Requirement • QMS-Documents, Systems & Guidelines
Key Output	• Approved Directory Structure • Approved Naming Convention • Approved Backup/ Retrieval/ Archival/ Disaster Recovery Plan • Base-lining of CI • Implementation of CMP • Authorized access to project work products/documents • Baseline the project configuration plan
Key Tasks with Role	• Identification of project artifacts and source code [PSM] • Categorize the CI and Non-CI items [PSM] • Finalized location of repository and permission on various artifacts [PSM] • Create directory structure as per Aurovision QMS [PSM] • Communicate the backup/retrieval/archival/disaster recovery requirement to system support [PSM] • Backup of the project repository as per the plan [System Support] • Archival of repository as per the plan [System Support] • Surprise DR drill once in a month [PSM] • Surprise rollback request of source code/ project document/ executable code at test and UAT sever, once in a month [PSM] • Configuration Audit [Quality Team]

6. Communication

Purpose	Identify reporting, review requirements of the stakeholders. Define the reporting/review interfaces, escalation mechanism
Key Inputs	• Contract • SPP • Output of Project Initiation documents • Project Communication requirement from stakeholders • QMS-Documents, Systems & Guidelines
Key Output	• Escalation mechanism • List of interface available at both site to communicate • List of reporting format with its frequency & audience • Stakeholders' review meeting • Team status review • Each review and reporting should have a. Name of report or review committee b. Purpose, c. Audience, d. Frequency • Approved communication plan • Team members are available for the planned communication • MoM of meetings are shared to the participants • Status reports are shared as planned • Adhoc reports are available on request basis
Key Tasks with Role	• Identify method of communication; email, telephone, web-ex, face to face meeting [PSM/Client] • Make sure that review and reporting is happening as per the communication plan [PSM] • Make sure that communication systems are available to authorized persons [PSM] • Escalation; project organization chart (POC) represents the hierarchy of reporting and escalation within Aurovision. Escalation hierarchy within client organization shall be discussed at planning stage • Make sure communication is happening in timely manner.

7. Design Process

Purpose	Develop system architecture, data model, details design which can be provided to development/integration team to carry out the project's development/integration work.
Key Inputs	• Contract • SPP • SRS Phase documents • QMS-Documents, Systems & Guidelines
Key Output	• Functional Architecture • System Architecture • Deployment Architecture • Update GUI Wireframe • Data Model • GeoSpatial Data Model • Class Design • Detail Design • COTS identification & evaluation
Key Tasks with Role	• Develop Functional Architecture [Architect] • Develop System Architecture [Architect]

	• Develop Deployment Architecture [Architect] • Identify classes [TM/TL] • Develop class design [TL/TM] • Review class design [Peer TL/Senior Developer] • Develop Database Model for RDBMS [DBA] • Develop Database Model for GeoSpatial [DBA] • Review RDBMS & GeoSpatial Data Model [Peer DBA/Architect] • Develop detail design [TL] • Identify the interfaces required to communicate with legacy systems [TL/Architect] • Identify the interfaces required to communicate with COTS [TL/Architect] • Provide the definition of each interface to communicate with legacy systems & COTS [TL/Architect] • Review detail design along with system class design and integration class design [Peer TL] • Baseline Design documents [PSM] • RTM is tracked and updated [TL/PSM/BA]

8. Data Procurement & Conversion

Purpose	Extract the data into newly designed spatial and RDBMS database schema for the purpose of integration
Key Inputs	• List of database sources need to be imported • Mapping of data elements • Unique key/Primary key information of schema tables • QMS-Documents, Systems & Guidelines
Key Output	MGIS usable GIS & Legacy Data available in MGIS's Geospatial & RDBMS databases
Key Tasks with Role	• Create the Spatial and RDBMS schema as per the GeoSpatial and RDBMS design [TL/DBA] • Develop ETL to Map the data elements and extract data [TL/DBA] • Run ETL to extract data [TL/DBA] • Verify and Validate the quality of data using samples [TL/DBA]

9. User Documentation for Training

Purpose	Develop user manual for each category of users.
Key Inputs	• SRS phase documents • Design phase Documents
Key Output	• Operation Users Manual [TL/Technical Writer] • Managerial Users Manual [TL/Technical Writer] • Executive Users Manual [TL/Technical Writer] • Technical Users Manual [TL/Technical Writer] • Review All user manuals [Peer Technical Writer] • QMS-Documents, Systems & Guidelines
Key Tasks with Role	• Develop Operation User Manual • Develop Managerial User Manual • Develop Executive User Manual • Develop Technical User Manual • Review all above type of manuals.

10.	Development
Purpose	Write source-code for the modules to be developed and send unit tested application for product integration
Key Inputs	• Detail design • Defect Report • QMS-Documents, Systems & Guidelines
Key Output	Unit tested Code
Key Tasks with Role	• Develop unit test cases [TM] • Writer code for the module as per the defined coding S&G [TM] • Code change log and description of functions should be available in source code [TM] • Review source code of unit developed [Peer TM] • Execute unit test cases for developed unit [Peer TM] • Send unit for product integration [TL] • RTM is tracked and updated [TL]

11.	Product Integration
Purpose	Ensure that individual well tested units of the project are working as required after integrating them to the main project
Key Inputs	• Source code of unit to be integrated • QMS-Documents, Systems & Integration guidelines
Key Output	Usable product after integration testing
Key Tasks with Role	• Integration plan [Test Manager] • Write integration test case [Tester] • Built the product after integrating code [CM] • Execute the integration test case [Tester] • Report the defects [Tester] • Fix the defects [Developer] • Release the integrated work product for black-box testing [PSM]

12.	Integration with Existing Application
Purpose	Ensure that product developed is communicating with legacy systems
Key Inputs	• Legacy systems • Interfaces of legacy systems • Application using legacy system interfaces • Requirement Documents • Design Documents • QMS-Documents, Systems & Integration guidelines
Key Output	Tested MGIS Application integrated with specified legacy systems and COTS
Key Tasks with Role	• Integration plan [Test Manager] • Write integration test case [Tester] • Execute the integration test case [Tester] • Report the defects [Tester] • Fix the defects [Developer] • Release the integrated work product for black-box testing [PSM]

13.	Software Test Planning
Purpose	Develop a software test plan identify testing environment, resource, efforts, schedule and risk related to testing the product
Key Inputs	• Contract • Software Project Plan • Output of SRS Phase • Output of Design Phase • RTM • QMS-Documents, Systems & Guidelines
Key Output	• Approved Software Testing Plan
Key Tasks with Role	• Identify the black-box testing environment [PSM/Test Manager] • Identify the UAT testing environment [PSM/Test Manager/Client] • Indentify testing approaches and methodologies for each type of testing [PSM/Test Manager/Client] • Prepare and baseline the Testing Schedule, Efforts and STP [Project Manager] • Publish the Testing Schedule [Process Team] • Develop Software testing plan [Test Manager] • Allocate resource to project [Program Manager] • Assign resources to project schedule [Project Manager]

14.	Black-box Testing
Purpose	Ensure that product is developed as per the specification and unearth any existing defects
Key Inputs	• Product to be tested • Requirement Documents • QMS-Documents, Systems & Integration guidelines
Key Output	List of defect in the product as the specifications.
Key Tasks with Role	• Software Test Plan (STP) [Test Manager] • Built the product and control the release of the product [Release Manager/ PSM] • Review and Approve test plan [PSM] • Develop black box test-cases [Tester] • Review and approve black box test cases [Peer Tester] • Deploy the testable product on test server [SCM] • Verify the defect closure of previous iteration testing [Tester] • Test the product against test cases [Tester] • Update the status of test-cases and log defects [Tester] • Analyze defects and assign closure of defects to team [TL/PSM] • RTM is tracked and updated [TL/Tester] • Black box testing includes but not limited to • Functional testing • Regression Testing • System Testing • Security Testing • Performance Testing • Penetration Testing

15.	Release
Purpose	Ensure that right product is released as per the software project plan (SPP)
Key Inputs	• Work product • SPP • Defect Report • QMS Documents/ Systems & Guidelines
Key Output	Product released to the customer with release note and release advice
Key Tasks with Role	• Prepare a defect report and send to QA team [Tester] • Prepare a release note and release advice [QA Team/TL] • Deliver the product to client for UAT [QA Team] • Deploys the product in UAT environment as per the instruction [TL]

16.	UAT (Product Validation)
Purpose	Ensure that product is usable in the intended environment
Key Inputs	• Application • Requirement documents • UA test plan • QMS-Documents, Systems & Guidelines
Key Output	List of UAT defects
Key Tasks with Role	• User Acceptance test-cases developed [Tester] • Product UAT as per the scope of milestone [Client] • Log the defects of product in Aurovision System [Client] • Clarification of scope and requirement, if any [Client] • Accept the product as per UAT result and acceptance criteria mentioned in SPP. [Client]

17.	Deploy for Pilot
Purpose	Release the UAT passed application for pilot use
Key Inputs	• Application • Identify the people involved in pilot testing • Training Plan for initial batch • Deployment Environment • Pilot test plan • QMS-Documents, Systems & Guidelines
Key Output	• Application deployed for selected users for dry run • Suggestion in training module or work product
Key Tasks with Role	• Deploy the application on the identified deployment environment [TL] • Provide trainings to the user involved in pilot testing [Trainer] • End-user test the application [Client] • End-user register the complaints, wherever they feel training is required or change in system is required [Client]

18.	Deploy for Production use
Purpose	Release the Pilot tested application for production use
Key Inputs	• Application • Deployment plan • Deployment environment

	• Deployment Architecture • QMS-Documents, Systems & Guidelines
Key Output	Application deployed on production server for all the users
Key Tasks with Role	• Deploy the application on production environment [TL] • Ensure that application is working as was working in pilot test [PSM]

19. End-user Training

Purpose	To train the different category of end-users for the use of the system and support of the system developed
Key Inputs	• Training Manuals for each category of users • No of users in each category • Batch Size of training • Training need • List of trainees • QMS-Documents, Systems & Guidelines
Key Output	• Training Plan • Training Calendar • Provide trainings to Operations users • Provide trainings to Managerial users • Provide trainings to Executive users • Provide trainings to Technical users for DBA, Network, h/w, software maintenance and design related supports of the system
Key Tasks with Role	• Prepare training plan [PSM/Client] • Prepare training calendar as per no of the batch and suitability of time [PSM/Client] • Determine the methodology of training [PSM/Client] • Conduct training [Trainer] • Conduct training feedback [Trainer] • Analyze the training feedback and determine the need of re-training to an individual or a batch

20. Warranty

Purpose	Ensure that product is running error free and support minor changes
Key Inputs	• Product Developed • Minor change request • Request to fix the detected defect • QMS-Documents, Systems & Guidelines
Key Output	Bug fixed/ Minor releases during warranty period.
Key Tasks with Role	• Analyze the change request or defect [TL/PSM] • Study the module where change is required or defect identified [TL/BA] • Study the RRM and analyze the dependency [CM/BA] • Carry out the changes [Developer] • Update relevant documents [TL] • Test the change [Tester] • Release the changed work product [PSM] • Test the release [Client]

21.	Authorization and Acceptance Plan
Purpose	Ensure that right product is being developed and only authorized people are reviewing the critical inputs of next phase.
Key Inputs	• "Review-Approval" request • QMS-Documents, Systems & Guidelines
Key Output	Document is reviewed and approved by authorized person
Key Tasks with Role	• Authorized representative from client to review and approve the project plan and schedule [PSM] • Authorized representative from client to review and approve requirements [PSM] • Authorized representative from client to review and approve Design [PSM] • Authorized representative from client to complete the UAT and accept the product [PSM]

22.	Security
Purpose	Only authorized people has the permissions granted to them on project related documents, source code, data & client supplied documents.
Key Inputs	• Configuration Management Plan • Name of the requester and person who needs permission • Permission request for any project work product/item • QMS-Documents, Systems & Guidelines
Key Output	• Permission Requested Accepted/Rejected • Access permission to project documents, projects sites, project data only to authorized period for a specified time period • Revoke the permission once not required or person leaves the project • Physical security of the project repository and database • Logical security of the project repository and database • Only authorized people with access card can access to secured zones • Log of people visited to different area of the organization • Rotate the Outsourced people on project or in system admin • Only client requested and PSM requested people will get user-id/ password to access the repository • Permission on individual folder or file within the repository will be decided by PSM • Each and every change will be versioned and will remain traceable • Hardware firewall keeps check of all the traffic and stops/reports unauthorized transaction
Key Tasks with Role	• Provide the permissions as per the CMP [CM] • Inform to the relevant people about the permission provided [CM] • Enable secured zones as per the project need [System Admin/HR]

23.	Monitor & Control in Project
Purpose	To know the status of overall project, milestones, any critical task, proactively work on any risk. Address the risk and resolve the issues proactively/ whenever identified
Key Inputs	• Variance Report • Casual Analysis • List of Risk

	• List of Issues • List of pending Action Items • Earn Value • Earn Schedule • Defect Density • Productivity • Resource Utilization • Resource Loading • QMS-Documents, Systems & Guidelines
Key Output	• Reviews • Reporting in predefined format • Reported Timesheet • Plan Updates • Audit Report • Corrective/Preventive Actions
Key Tasks with Role	• Enter timesheet [TM] • Update and submit task status [TM] • Approve timesheet [PSM] • Regular work status review with team [PSM] • Verify task status and update project schedule [PSM] • Periodic project review with client [PSM] • Send periodic status reports to client [PSM] • Periodic senior management review [Aurovision Management] • Periodic steering committee meeting & review [Aurovision and MCGM Management] • Periodic internal audit [Quality Team] • Analyze project data and suggest preventive/corrective action, process adjustment [Process Team]

24. Change Request

Purpose	Control the changes request and plan the release according to the priority of customer
Key Inputs	• Change request • Project Planning Documents • SRS and Design phase project document, Wireframe • Source Code • RTM, RRM • QMS-Documents
Key Output	• Accept/Reject the change request based of input from customer; after submitting impact analysis report • Updated change request register • Update releases plan • Updated related documents • Updated source code • Release the change request implemented application for UAT • Release the change request implemented documents for review and approval
Key Tasks with Role	• Change request [Client] • Impact Analysis [TL] • Review impact analysis and review the impact on schedule, cost and scope [SCCB]

	• Send the impact report customer [PSM] • Accept/Reject the change request [Client] • Approve/Reject the changes, based on contract type and feasibility etc. [SCCB] • Update the project schedule and project plans and baseline them as per approval [PSM] • Execute new release plan [PSM]

I. Project Organization Chart