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DOCUMENT : **84 – SOFTWARE MANAGEMENT
PROCEDURE**

QM3/4/84 Version 14

Implementation Date: Feb 5, 2007

ORIGINATOR:

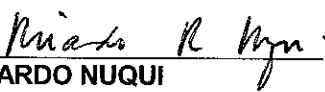


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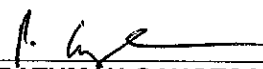


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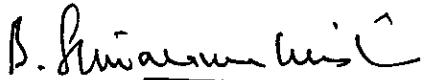


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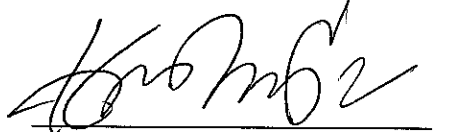
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VERSION HISTORY

Version 14 Updates:

Update Software Management Procedure to include the current process to initiate a request.

VERSION 13 (PREVIOUS VERSION)	DATE OF IMPLEMENTATION: FEB 9, 2006
Updated document to include Software Development procedure. Include Business Office as document approver.	
VERSION 12 (PREVIOUS VERSION)	DATE OF IMPLEMENTATION: MAY 19, 2005
Modified contents to describe the standard Software Management Procedure that all centers of TI Asia Pacific will follow. This includes APPC, Regional DTI, India Data Center(s) and India DTI. Change document owner to Ricardo Nuqui.	
VERSION 11 (PREVIOUS VERSION)	DATE OF IMPLEMENTATION: MARCH 3, 2003
Change the document name to Software Management Procedure. Update contents to widen the scope of the document beyond Product Evaluation. Change document owner to Heng Theng Wee.	
VERSION 10 (PREVIOUS VERSION)	DATE OF IMPLEMENTATION: JULY 1, 2002
Alignment of ISO QMS to CITMP framework.	
VERSION 9 (PREVIOUS VERSION)	DATE OF IMPLEMENTATION: FEBRUARY 1, 2002
Update originator. Include reference to license agreement & CPS process.	
VERSION 8 (PREVIOUS VERSION)	DATE OF IMPLEMENTATION: NOVEMBER 10, 2000
Change the approver to QMO Head. Change the originator's designation.	
VERSION 7 (PREVIOUS VERSION)	DATE OF IMPLEMENTATION: APRIL 10, 1999
Revised to include both Corporate and Consumer Data Centres.	
VERSION 6 (PREVIOUS VERSION)	DATE OF IMPLEMENTATION: JUNE 10, 1998
Remove line (d) of Chapter 2.4, Recommendation.	

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1. INTRODUCTION

1.1 OBJECTIVE

The purpose of this document is to define and establish the standard Software Management Procedure for Technology Infrastructure (TI) Asia Pacific.

1.2 SCOPE

This procedure shall apply to software acquisition or development and software license management activities for all platforms managed by TI Asia Pacific. The various phases in the procedure apply as shown in the following table:

	Internal Request	Internal Request (Build)	Business Request	Business Request (Build)	Business License Transfer
Initiation	Yes	Yes (Software Devt phases apply)	Only request step	Yes (Software Devt phases apply)	Only request step
Acquisition	Yes	No	Yes	No	No
License Management	Yes	No	Yes	No	Yes

Some sections of this document have references to other relevant manuals and websites. These references should be used in conjunction with this document to ensure full compliance with specific policies and regulations.

1.3 DOCUMENT REVIEW

APPC Mainframe Technical Services and Business Office are responsible for maintaining this document with inputs from the other centers within TI Asia Pacific. Review is done by all the centers within TI Asia Pacific. The document will be reviewed and updated annually or whenever there are changes to the CITMP policies and standards.

1.4 REFERENCES

Websites:

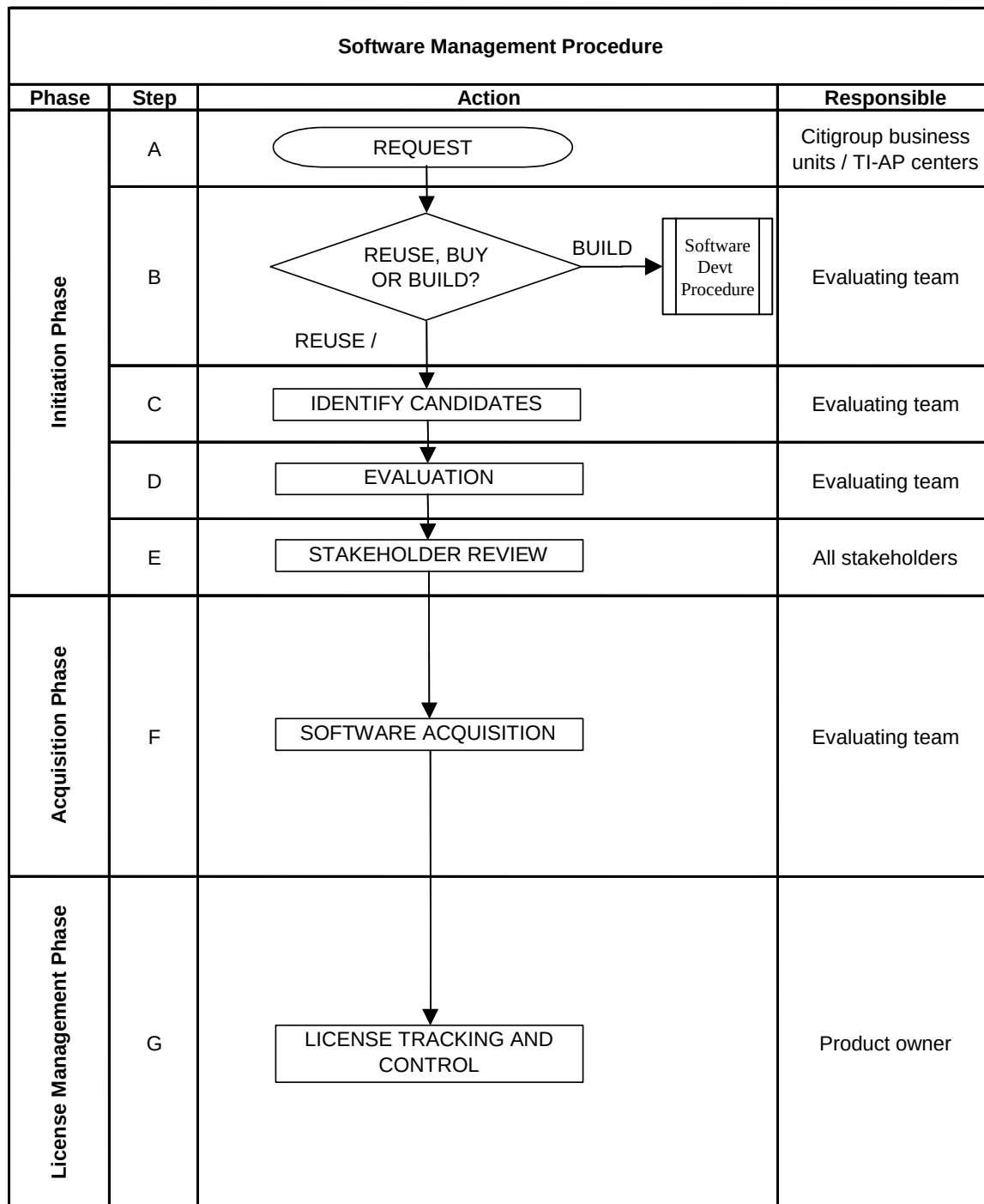
- i. MYSTIC Website
<https://cititech.ny.ssmb.com/CitiTech/>
- ii. Country Procurement Services Website
<http://qcbinfo.sg.citicorp.com/cps/>
- iii. CITMP Website
<http://www.citigroup.net/ti/compliance/citmp.htm>
- iv. Global Compliance Risk Management
<http://www.citigroup.net/ti/compliance/>
- v. Resource Management Document Index (for System Management Procedure Manuals)
http://appcweb.citicorp.com:8800/cgti-aspac/appc-units/iso/docs/level3/work/resource/toclev3v4resource.htm#P-1_0

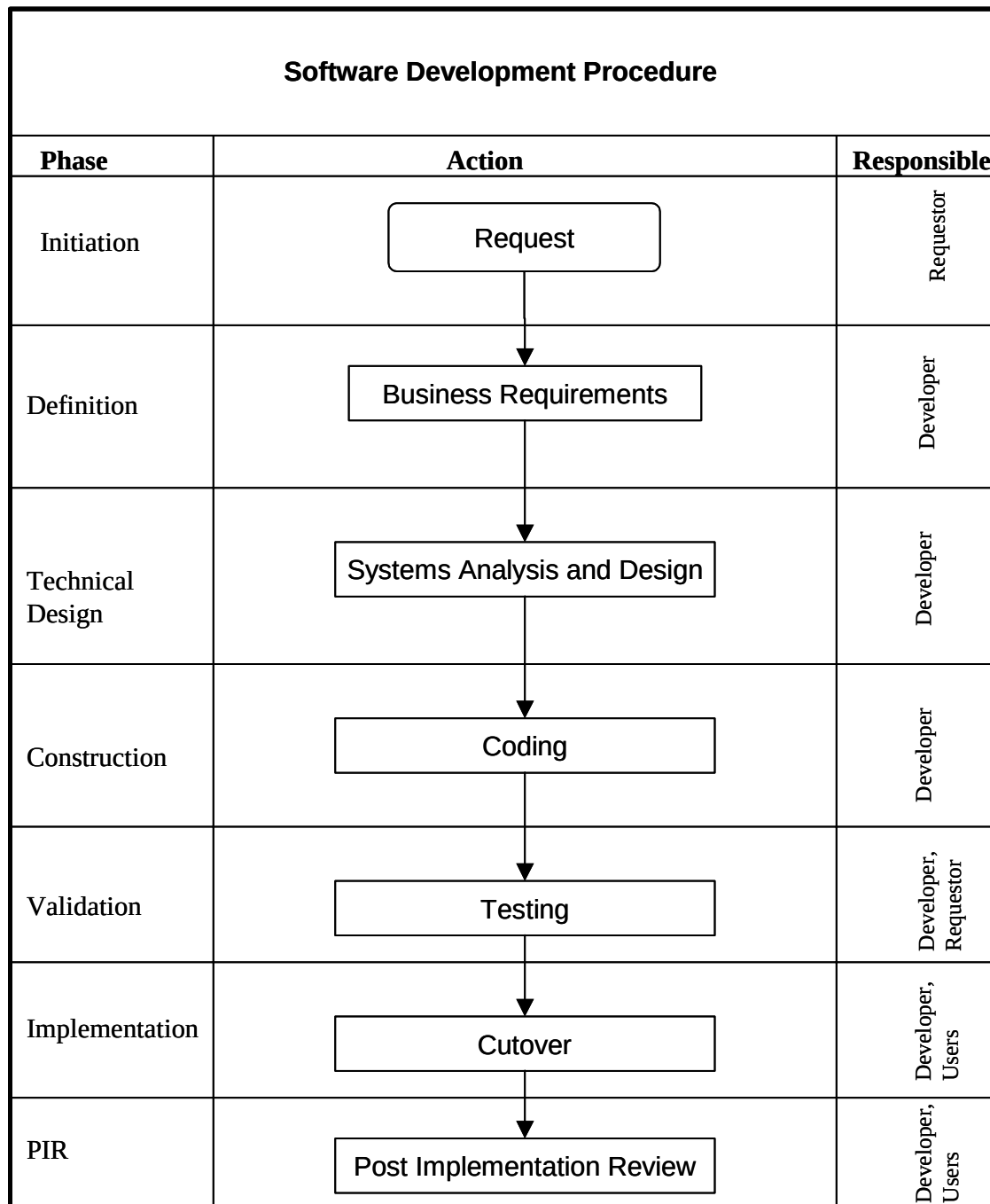
- vi. Archer Website
<https://archer.ti.citigroup.net>

Documents:

- vii. CTI Asia Pacific – Contracting and Outsourcing Procedure Manual
http://cti.asiapacific.citigroup.net:8800/cti_citmp.htm
- viii. Information Security Product TRAM
http://www.citigroup.net/ti/compliance/docs/citmp/trams_citmp/infosec_product.xls
- ix. CTI Asia Pacific – Project Management Procedure Manual
http://cti.asiapacific.citigroup.net:8800/cti_citmp.htm
- x. Citigroup Source Code Escrow Policy
http://www.citigroup.net/operationsandtechnology/data/escrow_policy.doc
- xi. CTI Asia Pacific – Change Management Procedure
http://cti.asiapacific.citigroup.net:8800/cti_citmp.htm

2. SOFTWARE MANAGEMENT PROCEDURE FLOW





3. INITIATION PHASE

3.1 STEP A – REQUEST RECEIVED

Requests for software may be internal or external. External requests originate from other Citigroup business units. Internal requests originate from within TI Asia Pacific centers as a result of internal requirements such as monitoring and tuning.

External requests where the software product has already been identified and finalized will proceed directly to the Acquisition Phase. For business license transfers, the request will proceed to the License Management Phase.

3.2 STEPS B AND C – IDENTIFYING CANDIDATE SOLUTIONS

Once a request is received, the next step is to identify suitable candidate solutions. Based on the requirements, research the Citigroup Systems Inventory (CSI) and Citigroup Technology Catalog (CTC) for suitable internally developed software or 3rd party products. Refer to the MYSTIC website for links to CSI and CTC.

If no suitable solution is found in the global inventory or catalog, the evaluating team may decide to acquire a 3rd party product or develop a software solution internally. Internally developed software solutions will adhere to the Software Development Procedure in Section 6.

The team responsible for product selection and evaluation will do the following to identify candidate solutions for all business and functional requirements:

- a) Define the evaluation criteria. Requirements for the products need to be documented in terms of:
 - Conformance to current business requirements
 - Adaptability to future (and perhaps) unknown business requirements
 - Maturity and market penetration of the solution and the solution provider
 - Conformance to architecture policy and standards
 - Support complexity
 - Cost
 - Time to market
 - Impact on other Citigroup systems
 - Potential for reuse elsewhere in Citigroup
 - Effect on Citigroup's competitive advantage
 - Information security requirements
 - Escrow requirements.
- b) If the product is not in the global inventory and catalog, eventual acquisition of the product may require that a deviation be raised.
- c) Check with vendors for available products. This may require a comparison of a number of identical software products.

The comparison of candidate solutions should include not only objective and measurable differences between them, but also a qualitative evaluation of the benefits and risks.
- d) Shortlist the available products.

- e) Check whether there is Global ELA or Master Agreement for the vendor and product. Refer to the Contracting and Outsourcing Procedure Manual on information relating to Citigroup ELA and Master Agreements.

3.3 STEP D – PRODUCT EVALUATION AND SUPPLIER ASSESSMENT

This step may be skipped for software products that are within the corporate standards. Examples are software listed in the CSI and CTC websites.

The short listed products will go through an evaluation process that includes assessment of business requirements and functionality through the tests performed. The testing of the products may involve:

- a) Documentation of the testing environment: Requirements such as CPU, DASD/hard disk capacity, on-line environment, database and network should be clearly documented.
- b) Documentation of the test plan: This should clearly state if user testing and verification/sign-off are required. Timeframes, types of testing (batch, on-line, network or stress tests) also need to be specified.
- c) Documentation of the test objectives: Test inputs and expected output should be defined and stated clearly. Performance tests should include expected performance thresholds.
- d) Setup of the test environment: After the product has been installed and set up, any extra environmental requirements for the test need to be set up (on-line CICS environment, database, batch JCL and TWS, scripts, for example).
- e) Testing of the product itself: Based on the test plan and test objective as documented above.
- f) Verification/Sign-off: Based on expected output (including performance and quality criteria), verification and sign-off for the product need to be achieved.
- g) The respective unit manager should approve the test and verification procedures.

An assessment of the vendor support will be done to ensure there is adequate support for the product should any problem be encountered in using it. The evaluating team must use the Country Procurement Services (CPS) Approved Suppliers program for the purchase of software products and services. CPS is the owner of, and will manage and control, the Approved Suppliers program.

The team must be aware that for suppliers not in the CPS Approved Suppliers program, CPS must be brought into the procurement process at the earliest date to assess the status of the new supplier. CPS will also advise in the legal aspect in regards to software licensing:

- Any licensing restriction can be met provided that they do not restrict what TI Asia Pacific is trying to do, that Citigroup is the owner of any derivative work created using the acquired software, and that proper export controls are in place.

- Unless there is another means of risk mitigation, Citigroup has access, either in-hand or in escrow, to the source code for all software used in the production systems.
- TI Asia Pacific has the right to use the software both on and off Citigroup premises in any manner consistent with its continuity of business (COB) plans.

Refer to the Country Procurement Services website for the legal review process.

All new software products evaluated will also need to do a Product Risk Assessment and Infrastructure Compliance Questionnaire (ICQ). The evaluating team should work with the BISO to complete the assessment. The Product Risk Assessment and ICQ are available from the Archer website.

During the deployment of the product, the assigned product owner and the Information Security Administrator should review the security requirements. Both must agree that the requirements are sufficient to mitigate any risk introduced by the software product.

3.4 STEP E – STAKEHOLDER REVIEW

Software acquisition often has significant stakeholders beyond the evaluating team and/or business that are performing the work. The candidate solutions and recommended alternatives must be reviewed with the other groups who have a stake in the implementation. Depending on the scope and complexity of the product, the key stakeholders may include:

- The global architecture team who will ensure that the solution fits with the strategic architecture of the organization and affected business channels
- Financial support groups who will validate financial assumptions and implications
- Support/Development teams of key partner systems (upstream/downstream interfaces)
- All business areas that will interact with the system who will evaluate the functional richness of the solution
- The Business Information Security Officer (BISO) who will evaluate security functions within the solution
- Systems administration, data center and other support groups who will ensure that the proposed solution can be properly supported.

A Product Evaluation and Recommendation Document will be written and presented to management for approval. It should include the following:

- Acquisition analysis: Requirements, selection process, vendor and product quality backgrounds
- Evaluation and test process
- Cost factors.

Refer to Appendix A for a copy of the Product Evaluation and Recommendation Document template.

4. SOFTWARE ACQUISITION PHASE

Once the software product and supplier has been finalized, the acquisition of the product can be set in motion.

4.1 STEP F – SOFTWARE ACQUISITION

The evaluating team must adhere to the checklist as specified below:

- a) Follow the procedures as documented in the CITMP Contracting and Outsourcing Procedure manual and in the Country Procurement Services website to carry out the check on Export Control and vendor contract review.
- b) Obtain quotations from vendors.
- c) A Citigroup Expense Proposal may need to be raised if the price of the software product is above the approved amount.
- d) Cost estimates for the product will be entered into the TRIAGE System as forecasted figures for tracking purposes. Refer to the Project Management Procedure Manual for information on the TRIAGE process.
- e) Raise Purchase Order (PO) for the selected software product.
- f) Obtain approval from management.
- g) Place order for software product with the vendor. In order to purchase the product, a contract must be executed between the vendor and Citigroup. The project team, in establishing an adequate contract, should be guided by the Country Procurement Services. Refer to the Country Procurement Services website for additional information.
- h) Attach duly approved PO to invoice, when received, and submit to the payment-processing unit (i.e. Voucher Processing Unit (VPU)) via department administrative staff.
- i) Unless it is included in the globally pre-approved software lists, the software product must be categorized as “No Escrow”, “Third Party Escrow Agreement” or “Source Code License” using the Escrow Decision Tree. Refer to the Citigroup Source Code Escrow Policy for more information.

All third party licensed software should be held in escrow in case of failure to perform or cease to exist on the part of the vendor. If the evaluating team cannot get the vendor to escrow, a deviation form has to be completed and forwarded as per the instructions.

Refer to the Contracting and Outsourcing Procedure Manual and the Country Procurement Services website for bidding requirements, contract engagement and legal review.

5. SOFTWARE LICENSE MANAGEMENT PHASE

5.1 STEP G – SOFTWARE LICENSE TRACKING AND CONTROL

The platform manager will assign a Product Owner to the software product acquired.

The Product Owner is responsible to:

- a) Register the new software product in the software inventory. For software products that come with software license agreement of acceptable evidence, such as “Proof of License”, the Product Owner will also keep such document.
- b) Ensure that the software is copied, distributed, transferred, removed and used only in accordance with applicable copyright laws, conventions, treaties and license agreements. When in doubt, legal counsel opinion should be consulted.
- c) Update the license records in the software inventory regularly to track the number of licenses that are currently available and in use.
- d) Check against the license records on the software availability before distribution, transfer of any existing licenses or purchase of any additional licenses.

The information needed to accomplish the above is included in the software inventory and is maintained by the Product Owner.

Refer to the System Management Procedure Manual (under Resource Management) for each platform for information on the platform’s software inventory.

Product Owners manage software licenses based on the following criteria:

- a) Vendor specific “code/key” word controlled software

These software licenses are based on the unique host specific information, which the software validates periodically, or during startup, and are controlled by the vendor. The Product Owner must track and obtain valid license prior to the expiry date of the license key.

Product Owners or authorized representatives shall provide the required information to the vendor responsible for supplying the product. This includes:

- CPU ID/Host ID
- IP Address (Midrange only)

As part of the unit’s DCFC, Product Owners must perform license key checks weekly and ensure that they are renewed before they expire.

- b) Paper based licensed software

These software products are issued based on the purchase agreement. The Product Owner responsible for managing these software products shall allocate the software based on the purchase agreement with the vendor.

The Product Owner must reconcile deployment records with records of proof of ownership of the software product. A review of the currency of the installed version of the software should also be done to ensure that it is still within the support scope of the vendor. This should be done at least once a year.

Any changes in the software license agreement must be reviewed with Legal Counsel. Refer to the Country Procurement Services website.

Other acceptable evidences of "Proof of License" include the following:

- Vendor invoice for the purchase
- Serialized License Certificate or authorization keys
- License number, password, key or serial number assigned by the vendor
- Certificate of Authenticity
- Original Distribution Media (diskettes, CD-ROM or tapes)
- Documentation from the publisher indicating that the product is a Freeware
- Global Procurement Order Form and payment record
- Executed license contract from vendor

The following should be included in the DCFC of the Product Owner to ensure that reviews and self-assessments are properly executed:

- a. At least annual review of currency of the product;
- b. At least annual reconciliation of product inventory against product license.
- c. At least annual completion of the Software Management RCSA self-assessment entries.

The RCSA template can be downloaded from the Global Compliance Risk Management website.

Completed execution of the reviews and self-assessments should be duly noted in the DCFC.

6 SOFTWARE DEVELOPMENT PROCEDURE

The software development procedure is divided into 2 sections:

- Section 6.1 documents the various stages of software development life cycle (SDLC)
- Section 6.2 documents the change control procedures used for source management

6.1 SYSTEM DEVELOPMENT PHASES

The stages of the systems development life cycle is as follows:

- a) Initiation Phase
- b) Definition Phase
- c) Technical Design Phase
- d) Construction Phase
- e) Validation Phase
- f) Implementation Phase
- g) PIR – post implementation review

6.1.1 Initiation Phase

Request for a software solution may be internal or external. External requests originate from other technology units, while requests originating from Regional CTI AP units as a result of internal requirements for productivity gains, elimination of manual tasks and strengthen compliance are considered internal requests.

A request must be initiated through the ARTS – Automation Request Tracking System which is the current formal process set up by the Workflow Automation unit in CTI AP Business Office for review. Each request shall follow the Request Process specified in Appendix B.

Requestor Manager shall approve the request initiated prior to the next phase.

6.1.2 Definition Phase

Requestor for software solution shall provide business requirements in the Business Requirement Documentation template.

Requests for a software solution may be simple or complex. For simple software solutions or enhancements, where development time is less than 10 days, documentation should contain only the high level function of the system.

For complex software solutions of development time greater than 10 days, it is essential every requirement be documented in detail to prevent dispute with developers due to time lapse and information loss between start and delivery of system.

Documentation in the definition phase consists of the business and functional requirements documents.

The Software Development Unit Manager shall approve the definition document/(s) prior to the next phase.

6.1.3 Technical Design Phase

The technical design phase starts after the definition phase. For simple software solutions, the Software Development Unit Manager may consider to combine the

business requirement document, functional requirement and technical design document into a single technical design document. For complex workflow solutions, the technical design document will be completed per prescribed format.

The Software Development Unit Manager shall approve the documents prior to the next phase.

6.1.4 Construction Phase

Construction of the software solution is to be carried out by an internal or an authorized external software developer. Test data is to be created for proper testing of the codes developed.

Systems integration testing will be organized where necessary to ensure completeness and correctness of codes developed.

The Software Development Unit Manager shall approve the test results prior to the next phase.

6.1.5 Validation Phase

Following the completion of a successful systems integration test, the requestor will perform the User Acceptance Test to ensure all business requirements are met and system is working as expected. The test data is to be created by the tester.

User signoff is required prior to the next phase.

6.1.6 Implementation Phase

With the completion of a UAT, developers will proceed to move the source codes into the production area. The software developers will follow the change control procedure.

6.1.7 PIR

The Software Development Unit Manager shall order a Post-Implementation Review at his discretion.

6.1.8 Documentation Control

The latest documents for each phase in the SDLC will be kept in a specified document depository ordered by the Software Development Manager.

6.2 CHANGE CONTROL PROCEDURE

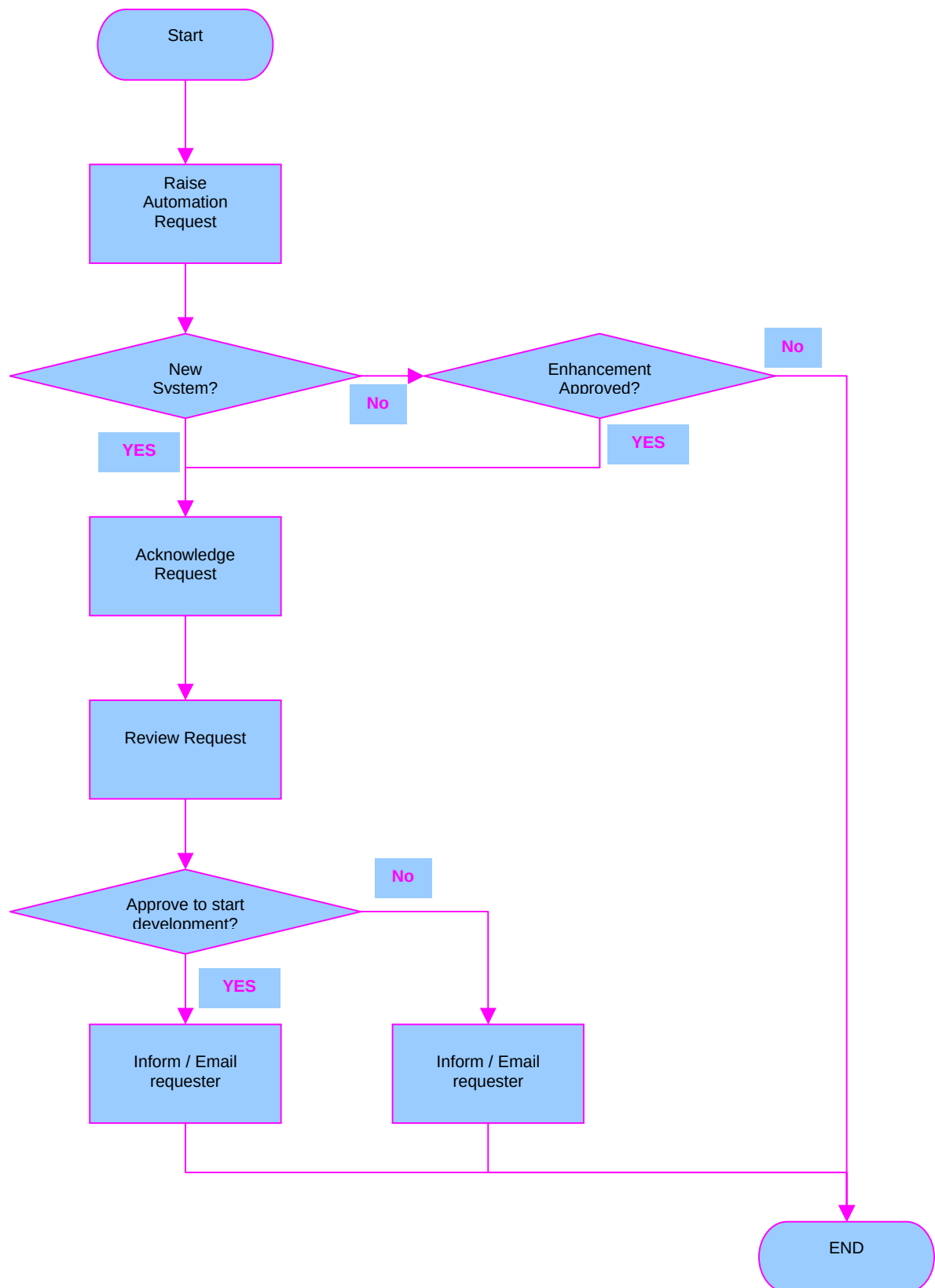
Software solution sources developed are subjected to the CTI Change Management procedure. The change process flow for a normal, an unscheduled and an emergency change is as defined in Appendix C.

APPENDIX A – PRODUCT EVALUATION AND RECOMMENDATION DOCUMENT TEMPLATE



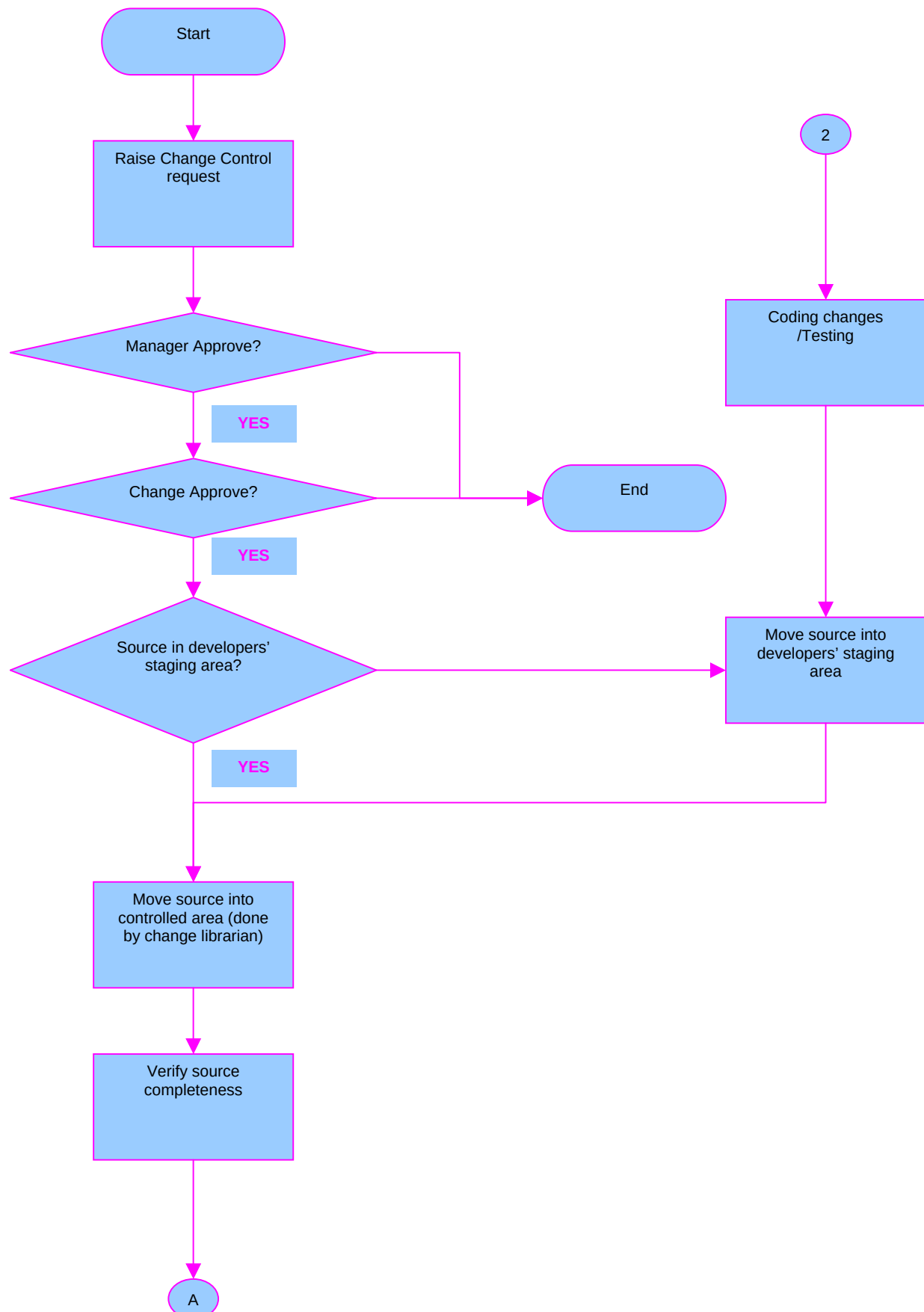
Product Evaluation
and Recommendation

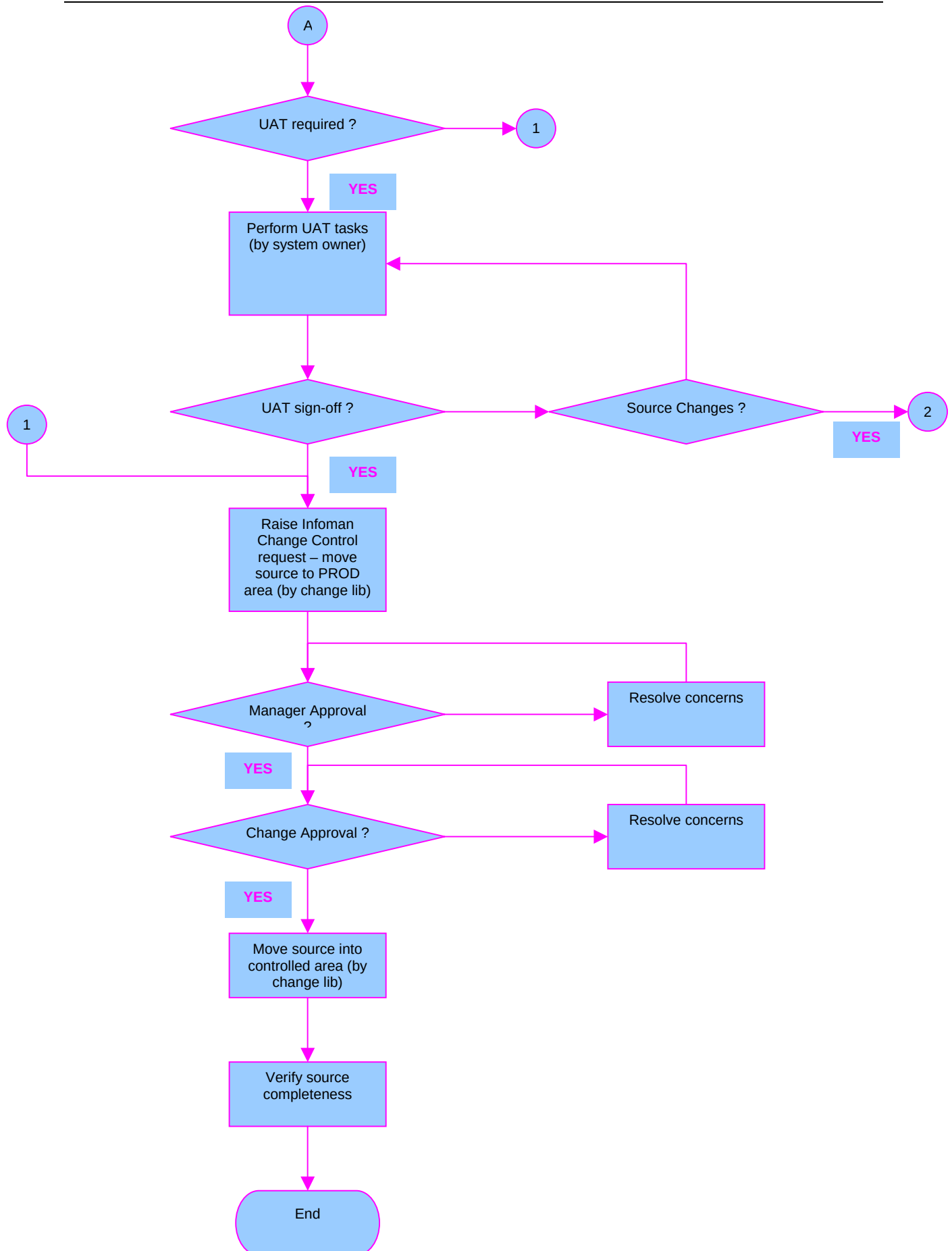
APPENDIX B – REQUEST PROCESS



APPENDIX C – CHANGE CONTROL PROCESS

Normal / Unscheduled Change Control Process





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graph TD; Start([Start]) --> Validate[Validate problem ticket]; Validate --> Raise[Raise Emergency Infoman request record – move source to Prod area]; Raise --> Manager{Manager Approve?}; Manager -- YES --> Change{Change Approve?}; Manager -- NO --> End([End]); Change -- YES --> Staging{Source in developers' staging area?}; Change -- NO --> End; Staging -- YES --> Controlled[Move source into controlled area (by change librarian)]; Staging -- NO --> StagingArea[Move source into developers' staging area]; StagingArea --> Controlled; Controlled --> Verify[Verify source completeness]; Verify --> A1((A)); A1 --> Review[Review solution]; Review --> Close[Close problem ticket]; Close --> End2([End]);
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The flowchart illustrates the process for handling an Emergency Infoman request record. It begins with a 'Start' terminal, followed by 'Validate problem ticket' and 'Raise Emergency Infoman request record – move source to Prod area'. A decision point 'Manager Approve?' follows. If approved (YES), the process moves to 'Change Approve?'. If not approved (NO), it goes to 'End'. If 'Change Approve?' is YES, it proceeds to 'Source in developers' staging area?'. If YES, it moves to 'Move source into controlled area (by change librarian)'. If NO, it moves to 'Move source into developers' staging area', which then leads to 'Move source into controlled area (by change librarian)'. After moving to the controlled area, the process goes to 'Verify source completeness', which leads to a connector 'A'. From 'A', the process continues to 'Review solution', then 'Close problem ticket', and finally 'End'.