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Service Requirements Specifications
IPPC ePhyto GeNS
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1. Introduction

1.1 Purpose

The purpose of this document is to specify the requirements for the Generic ePhyto National System (GeNS). GeNS is a basic IT system capable of sending and receiving electronic phytosanitary certificate data (ePhytos) as well as producing paper phytosanitary certificates. The GeNS is to be used by countries without a national electronic phytosanitary system and to enable the national plant protection organization (NPPO) to participate in ePhyto (electronic phytosanitary certificate) exchanges. Secure access to the GeNS will be provided by the IPPC Secretariat (or its approved service provider) to the NPPO who, in turn, will administer access to staff and its clients (e.g. exporters, brokers, etc.). This document describes all the technical components of the GeNS along with the applicable ISPM 12 ePhyto Schema without going into the details of release and implementation details.

The GeNS will produce electronic Phytosanitary Certificates (ePhyto) in accordance with ISPM 12 (including Appendix 1) and will be connected to the IPPC ePhyto Hub. The Hub is single point multilateral exchange mechanism for transfer of certificates from the NPPO of the exporting country to the NPPO of the importing country using a harmonised protocol.

1.2 Intended Audience and Reading Suggestions

This document will serve as an unambiguous and common understanding of the requirements for the GeNS, between the Project Technical Committee and the ICC; but also available for:

- Stakeholders
- System Business Analyst
- System Architect
- Quality Assurance Team
- Software Developers

It is strongly suggested to read documentation published under the FAO/IPPC ePhyto site <https://www.ippc.int/en/ephyto/> see more on the reference section of this document.

1.3 References

- [A Global ePhyto Feasibility Study](#)
- [ePhyto Hub - Frequently Asked Questions](#)
- [Global ePhyto Solution](#)
- [Codes, Schemas and technical documentation](#)
- [ePhyto Certificates ISPM 12](#)
- 7_Appendix A: Glossary

2. Overall Description

2.1 Service Operational Requirements

This section lists some key operational requirements of the GeNS; and the remainder of this document describes the technical requirements for building the service.

From a technology point of view, the GeNS system should be capable of being deployed in a centrally hosted mode and if required by the IPPC as a stand-alone.

For the Centrally Hosted mode, the service can be operated by a service provider running the software in its secure data centres. As part of the 'on-boarding' process, working with the IPPC, the service provider will provide secure access to any NPPO.

For the optional Stand-alone mode, any NPPO with the required ICT capabilities should be able to setup (with technical assistance of the service provider) and operate the GeNS independently. The specific infrastructure architecture and operational model will vary per country (leading to higher costs per NPPO). Moreover this optional mode will lead to additional changes in the design of GeNS and the implementation of a model for the distribution of GeNS updates. We know that ICC can provide its OneICT box (a prefabricated appliance with networking, storage, security and computer as a single device) for this mode, however it is expected that the security setup vis-à-vis central hosted mode (as described in the non-functional section of this document) will be significantly high per NPPO, the high availability and disaster recovery solutions will be bespoke per country (depending on the national infrastructure capabilities). The Stand-alone option is only considered here as a possible future enhancement of GeNS.

The functional and non-functional requirements for both 'modes of operation' are almost same and elaborated in this document with focus to the Centrally Hosted mode, identified as subset of the Standalone.

From a business operations point of view, IPPC's preference is a centrally hosted mode. The centrally hosted option is simple to operate, reduces operating and set-up costs and allows NPPOs with limited infrastructure and technical capacity to implement without significant changes to capacity.

The entity providing the software should be capable of providing a back-to-back 24/7 support setup for 'Level 3' support (level 1 and level 2 support being covered by the service provider). Exact activity breakdown between the different levels will be done during project implementation in compliance with ISO 20000 standard.

For the 'Centrally Hosted mode', the service provider should deliver:

- a) 24/7 (round-the-clock) Service Desk to provide assistance in technical matters only. Details of how to access the Service Desk will be defined during the project implementation. The Service Desk will interact with the NPPO itself (NPPO focal points will be nominated during the on-boarding process) and not with any in-country company (exporter).
- b) NPPO On-boarding process: Upon request of the IPPC Secretariat, 'on-board' NPPO(s) to use the GeNS. A detailed procedure will be established during project implementation. The service provider will liaise with the NPPO nominated technical focal point for this process.
- c) Service Level Agreements (SLAs): Ensure that the GeNS operates on agreed Service Levels and intervene as and when necessary to uphold these Service Levels. Some key SLAs have been identified in this document as 'Non-functional requirements'.

- d) Operational Procedures: As part of the project implementation work with IPPC to establish operational procedures for change management, monitoring & reporting as well as incident & problem handling in line with industry best practices conforming to ISO 20000 (commonly known as ITIL).
- e) Service Security: Ensure security of the service during operations, specifically on protecting the sensitive NPPO data.

2.2 GeNS Product Roadmap

Apart from the functionalities described in this section, the requirements in the document are mandatory for the Pilot phase of the IPPC project. The requirements listed in this section may be enabled/implemented as part of future updates of the GeNS specified by the IPPC. The intent of this particular section is to provide a roadmap of features that may be implemented, to be considered at GeNS design, to drive the selection and implementation of the core components and frameworks. The list here below is not prioritized; however, some of the features may be dependent on each other:

- a) Translate the service into different languages; including the user interface, lookup data, user manuals and support guides. GeNS will be capable of supporting internationalization and localization; however, no translation will be available with the first release.
- b) Mobile Apps: Whilst the GeNS should be developed with responsive-UI (ability of the website to adapt to different screen sizes); the project may also look to build mobile apps in the future to support in-field inspections.
- c) Custom reports: Allow the NPPOs to generate custom reports from GeNS based on their needs. GeNS will implement a basic set of reports during the pilot; which will be enhanced based on the feedback. Future development should allow the end-users to create custom reports without IPPC/ICC involvement.
- d) Sending 'Approved' and 'Rejected' status: GeNS will not send to the exporting NPPO UNECE Certificate Status Codes 39 (approved) or 41 (rejected); as this will require the exporting NPPO's IT system to be capable of handling this information. As the use of ePhyto increases and systems are enhanced; GeNS may add the functionality to send and receive ePhyto(s) with these status codes.
- e) Company view of Import Certificates: GeNS may provide the Company users a view of all import ePhyto certificates. To provide the importing company a view of all ePhytos 'destined' for them.
- f) Web API for GeNS data: GeNS may be enhanced to provide secure Web API interface for all the data that is held within the GeNS system.
- g) Map ePhyto to WCO data model: GeNS may be enhanced to provide the data held within it, according to WCO data model, using secure Web API interfaces. **Features (f) and (g) will facilitate technology integration with other IT systems to support Single Window Initiatives within each country.**
- h) Offline App: GeNS will provide users to import/export the information in XML format (ISPM 12 Schema) with the first release. However, in future GeNS may be enhanced with an offline App, extending the capabilities of the Mobile App, to provide a tool to create offline the Certificate Request. This will enable companies with problematic Internet access to pre-populate the required information and then upload it to GeNS once back online or using the existing XML upload feature.
- i) NPPO Inspector Management: GeNS may be enhanced to provide facility to assign inspections to specific NPPO Inspectors and allow Inspector rota scheduling.

- j) Accessibility: Based on the Pilot feedback and the demands of participating NPPOs, the web-application may be made compliant with World Wide Web Consortium's Web Content Accessibility Guide v2.0 level AA¹
- k) Online Training Module: GeNS may provide an online training module to facilitate the internal training conducted between NPPO and Company users
- l) Fee collection module: GeNS may be enhanced to allow the NPPO to set charging model and apply fees to exported commodities or issued certificates

2.3 Product Perspective

GeNS will provide a set of standardized processes for managing Phytosanitary certificates from the creation, review and final issuing including the electronic transmission.

2.4 Product Functions

The following is a list of main modules and related functionalities needed by the GeNS.

These are further elaborated in Section 4: System Features.

Component	Use Case/functionality	Description
Users Management	Administrator roles	<p>Application module providing authentication and authorization of the end user in GeNS as well as administrative users management functionalities.</p> <p>There are 4 administrator roles in GeNS:</p> <p>GeNS Administrator: To manage the entire GeNS system (including adding NPPOs in central mode). This role will be handled by IPPC with the service provider (exact breakdown to be determined during project implementation). The GeNS administrator does not have any access to the phytosanitary content but it will manage the global lookups consolidating local lookup additions to the global lists of values.</p> <p>IPPC Administrator: A read-only account with same access level as the GeNS administrator.</p> <p>NPPO Administrator: To manage the activities at the NPPO level (including adding Company) and extending the global lookups.</p> <p>Company Administrator: To manage the activities at a particular company (exporter) level.</p>
	User roles	<p><i>GeNS Administrator: grant and configure NPPO Profile & Administrators</i></p> <p><i>NPPO Administrator: Add Officers, Inspectors, Assistants, Company administrators and other</i></p>

¹ <https://www.w3.org/WAI/intro/wcag.php>

		<p><i>NPPO administrators (only the primary administrator assign and revoke additional administrator roles)</i></p> <p><i>Company Administrator: Add Company users and other Company Administrators</i></p> <p><i>IPPC User: will have read only rights equivalent to a GeNS administrator.</i></p> <p><i>Company User: Creates requests to initiate different workflows. Can view Phytosanitary certificates related information held under the company's account (previous Phytosanitary certificates, pending applications etc)</i></p> <p><i>NPPO Assistant: Administrative assistant role to initiate different workflows. Can view all Phytosanitary certificates under their NPPO.</i></p> <p><i>NPPO Inspector: In-field inspectors. Update the certificate requests and initiate other workflows. Submits request for issuance of Phytosanitary certificates. Can view all Phytosanitary certificates under their NPPO</i></p> <p><i>NPPO Officer: Only role authorized to issue, withdraw or replace Phytosanitary certificates.</i></p>
	Maintain Users list	Create, Read, Update and Delete (CRUD) ² functionalities to manage user records
	Send User validation mail	Functionality to validate user's email
	Generate temporary password	Functionality to help new user to create a password of his/her choice after logging in for first time, using a temporary password. For Administrative user, it will also ask password reset security questions.
	Modify User Password	Functionality delegated to user for changing the current password. For administrative users, it will also ask answers to security questions.
	Assign roles to users	Functionality to assign roles to users. Assignment of roles are restricted based on role level of administrator (GeNS, NPPO, Company)
	Log In	Functionality to validate users provided credentials and provide the session identity with assigned roles to access GeNS
Lookups Management		Application module providing functionalities to maintain data lookups used by GeNS. Most

² Create, Read, Update and Delete Operations in a system

		of lookup entries will be linked and consolidated with the latest harmonization codes. Packages Types, list of conveyances scientific names and so on are globally defined. The NPPO administrator has the option to translate and extend the list only for his/her country access. The GeNS global administrator will be able to see these local additions and optionally import them in the global list.
	On-Board NPPO	GeNS administrator functionality to configure the NPPO
	Maintain list of Countries	GeNS administrator CRUD operations to update the list of countries and its associated details and/or translation depending on the role assigned
	Maintain list of package types	GeNS administrator CRUD operations to update the list of packages types referenced in the Phytosanitary data entry
	Maintain list of conveyance	GeNS administrator CRUD operations to update the list of conveyance types referenced in the Phytosanitary data entry
	Maintain list of commodities	GeNS administrator CRUD operations to update the list of commodities referenced in the Phytosanitary data entry
	Maintain list of Scientific Names	Automated process for downloading and updating the list from EPPO services
	Maintain list of additional declarations standard texts	NPPO administrator CRUD operations to update the list of default additional declarations standard texts to help the Phytosanitary data entry
	Maintain list of treatment types	GeNS administrator CRUD operations to update the list of treatment types referenced in the Phytosanitary data entry
	Maintain list of active ingredients	GeNS administrator CRUD operations to update the list of chemicals referenced in the Phytosanitary treatments data entry
	Maintain list of unit of measures	GeNS administrator CRUD operations to update the list of unit of measures referenced in the Phytosanitary data entry (Including concentration, temperature, dosage, duration...)
	Maintain list of national companies	CRUD functionalities to manage company records by the NPPO admin

	Maintain list of Partner Companies	Company Administrator CRUD operations to update the list of partner companies, his/her organization is trading with.
Phytosanitary Certificates Management		Application module providing all functionalities for creating, reviewing, sending and receiving Phytosanitary certificates. User's authorization to carry out any of these operations will depend on roles assigned to them.
	Create Certificate Request (CR)	Functionality/wizard for creating a certificate request by Company User or NPPO Assistant. The workflow will allow the user to upload necessary supporting documents. This workflow can also be initiated from search results (described below). The re-export certificate workflow will be supported using this functionality.
	Apply for Phytosanitary certificate	Functionality for the company user or NPPO AA to submit the CR to the NPPO for review and issuance
	Cancel CR or Issued Certificate	Functionality for the company user to cancel the Certificate Request at any level of the Issuing process. For Issued Certificates the Withdrawal request will be initiated. The result will be a draft CR, Draft CR will be removed from the system after cancellation.
	Edit draft CR	Functionality to change the content of a draft CR that has not been processed by the NPPO
	Update CR	Functionality for the NPPO Inspector to update the CR with field inspection data and documents
	Request Additional information or changes	For New CR: Functionality for the NPPO Inspector to send the CR back to the originator (company user or NPPO AA) and request changes in it For Withdrawal requests: allow NPPO Officer to request for further information regarding the request.
	Submit for Issuance	Functionality for the NPPO Inspector to submit the CR to the NPPO Officer for issuing the Phytosanitary certificate
	Search issued certificates	Functionality to search for an issued Phytosanitary certificate including dates, status, destination countries and then initiate different workflows (such as create new CR or re-export CR)
	View ePhyto	Functionality to view the electronic Phytosanitary certificate across all the stages, from the initial draft request, to the inspector

		review and issuing, to the receipt of ePhyto by importing NPPO
	Reject CR	Functionality to allow the NPPO Officer or Inspector to send the CR back to the originator (company user or NPPO AA)
	Issue ePhyto	Action by the NPPO Officer to Issue a Phytosanitary certificate and produce a PDF/A copy of it (in the NPPO defined format). If the importing NPPO is a HUB member; then lock the electronic Phytosanitary certificate and start the sending procedure using the communication with the HUB.
	Pull status of the ePhyto delivery	System internal process that pulls information from the HUB on the delivery status of the certificates
	Request ePhyto Withdrawal	Functionality to allow Company User, NPPO Inspector or NPPO Admin to request withdrawal of an issued Phytosanitary certificate
	Approve Withdrawal	Functionality to allow NPPO Officer to approve withdrawal requests.
	Request ePhyto Replacement	Functionality to allow Company User, NPPO Inspector or NPPO Admin to request replacement of an issued Phytosanitary certificate
	Approve Replacement	Functionality to allow NPPO Officer to approve replacement requests.
	View ePhyto under delivery	System view for All NPPO and company users to review the delivery status of the issued ePhyto
	Resubmit ePhyto failed delivery	Functionality for all NPPO users to re-submit an ePhyto that failed the delivery, back to the HUB for another electronic delivery attempt.
	HUB to paper delivery	Functionality to allow the NPPO to mark the phytosanitary certificate in the GeNS as paper only. This will instruct GeNS to do not send the certificate through the HUB in case like the delivery of the certificate though the HUB is repeatedly failing or any additional issue of the importing country in receiving the electronic version. Above feature "Resubmit ePhyto failed delivery" can revert the action.
	Create Phyto as Copy	Functionality that can be used to speed up the data entry or to be used for creating re-export. It will ensure the copy has new and unique certificate number.

	Pull certificates for import	System internal functionality to regularly pull certificates from the HUB; based on the business defined rules to connect to the HUB.
	Search importing certificates	View and filter certificates for imported consignments received from the HUB
	Print ePhyto	System functionality to print issued ePhyto into PDF/A format based on the layout determined by the NPPO. The import ePhyto will be printed in the standard ISPM 12 layout in PDF/A format.
	Usage data extracts	Functionality to extract system information for a given period and allow off-line reporting
	Pending Actions	An area of screen to indicate if the user has any specific pending actions (such as Company user to view a rejected certificate or for an NPPO Officer to process a certificate application).
Comments		Functionality to add comments to the CRs and ePhyto certificates as part of different workflows. The comments will not be part of the ePhyto certificate; but will allow all the users to exchange information within the GeNS

2.5 Design and Implementation Constraints

	Description	Rationale
NFRQ-62	Data sent to the HUB by the GeNS application is very sensitive and must be securely encrypted.	The data relates to trade between countries and thus, is highly confidential for each country. The service should be built in a manner that it is completely transparent and highly secure to provide assurance to countries about correct handling of their data. Following HUB Specification the communication will be done using Transport Layer Security (TLS- commonly referred to as SSL)
PCRQ-73	GeNS should be implemented operating system that is : Trusted, Maintainable, Patched and Supported by the Vendor	The underlying platform on top of which the HUB resides should prevent from security threats, maintainability and support issues
NFRQ-65	Web application bandwidth and communication must be optimized to be used on a low bandwidth and satellite link	Some of the countries and companies office may not have a good internet connection. GeNS should optimize bandwidth consumption and client-server chattering. The validation of GeNS will be done on the overall usability using ad-hoc simulated network environments
NFRQ-61	The GeNS application will communicate using the ePhyto HUB, no direct point to point specific connection will be implemented	GeNS should be de-coupled from the communication mechanisms

2.6 User Documentation

Manuals of the GeNS should be technically completed and up to date, with 100% coverage of all the usage scenarios and possible alternative flows.

The following products should be developed and released:

- a) Manuals on using the GeNS system for each role, with relative workflow diagrams
- b) FAQ and other information for users
- c) For the NPPO – details on how to contact the Service Provider Service Desk
- d) For the exporters – details on how to contact the NPPO service desk³

The documentation should be available online as well as for download in different formats.

These manuals will be released in ‘English’ language only; further translations will be at the responsibility of IPPC

2.7 Assumptions and Dependencies

³ NPPO is responsible for providing support to the GeNS users. ICC Service Desk will support the NPPO focal point in performing such activities.

The GeNS system will be developed to use the ePhyto HUB; thus, the assumption is that the HUB will be up and running prior to testing the communication before the development of the GeNS communication modules.

3. External Interface Requirements

3.1 User Interfaces

This document does not drill down in to the specific layout and colours for the user interface (UI). The UI will be designed first using wireframes and validated (with a sample of end users) as first phase of the development plan, however, the GeNS must follow these interface requirements:

NFRQ-56: The user interface must allow for translation in different languages

NFRQ-64: The user interface must be compatible with the widest range of browser versions and operating systems. It should at minimum be compatible with three most commonly used web browsers as well as major desktop operating systems – MS Windows, Apple OSX, Linux.

NFRQ-66: The User Interface must allow for Internationalization and Globalization. GeNS will be in English language as default language.

NFRQ-67: Colours and Symbols of the User interface should respect global cultural values

NFRQ-68: The user interface design will be consistent

NFRQ-69: The user interface must allow for keyboard navigation and shortcuts to facilitate data entry, including selection and copy of read only elements.

NFRQ-77: The GeNS should have 'responsive UI' and be able to display interface components adapting to the screen size of the device in use, including mobile devices such as phones and tablets.

NFRQ-78: The GeNS should have a modern web-UI. A majority of users are already familiar with different web-applications. Thus, a familiar layout (use of specific icons or placement of menu items) will reduce the learning effort and make adoption easier. The UI should:

- Reduce the learning curve of a new user.
- Use the vocabulary and knowledge of the user.
- Follow basic design principles: contrast (obviousness), repetition (consistency), alignment (appearance), and proximity (grouping).

Listed below are the main functional User Interface components:

- Common Area
 - Main View Port: main application responsive-area. Providing the main static components for session context information and navigation of functionalities.
 - Choose Language (for any configured non-English language)
 - Login: form to authenticate and grant authorization to users
 - Reset Password: form to reset password
 - Modify Password: User contextual windows to change password, only available to authenticated users.
 - Navigational Menu: open modules and specific functionalities based on the roles assigned to the authenticated user
 - Online Help: Static guide to help users operate GeNS

- Self-registration: Form to register as a company to the relevant NPPO
- Validate Paper Based Certificate: web page that will allow NPPO to validate an incoming paper-based certificate issued by the GeNS (See also paragraph 4.16)
- Administrative Area
 - Users Management: display to an administrator, the list of all users, based on the country and role assigned to them. Company administrators will only see users belonging to their company and the partner (agent) company. NPPO Administrators will be able to see only user in their country. The view will be composed of predefined filters and visualizations and give a free text search tool to be able to quickly find users.
 - Create/Edit User: Windows to create or modify an existing user. Based on the role of the authenticated user the roles that can be assigned will be filtered
 - Company Management: list and search for company records of the country. This view is available to NPPO Users with edit permissions only for the NPPO officer
 - Create/Edit Company Profile: NPPO Officer will be able to create company profiles and assign them Company Administrators. This will also include approving applications made by companies for registration as exporters.
- Lookups Management: Available to GeNS administrators and NPPO Administrators
 - For each of the lookups GeNS must have a list/search interface to be able to view and open existing records and a Create/Edit window to perform modifications based on the assigned role :
 - NPPO
 - Countries
 - Package Types
 - Conveyances
 - Commodities
 - Scientific Names
 - Additional Declarations
 - Treatment Types
 - Active Ingredients
 - Unit of Measures
 - One look up for the Company Administrators to manage partner company information.
 - Ability for the NPPO users to translate and extend the available lists without interfering with the standard global entries; based on the ISPM 12 specifications. The additional values will be local to each NPPO and will be added in the 'local extensions' by the NPPO Administrator. Any translations to the local extensions will be done by the NPPO Administrator.
 - The GeNS Administrator will be able to view and eventually consolidate local entries to the global lists as they get approved and included in the harmonization process
- Phytosanitary Management
 - Certificate Request: list and search for company Certificate Request created in GeNS; based on the role GeNS will filter the view, propose pre-compiled filters and visualizations as well as provide a free text search tool. The view will also show the delivery status (updated from the HUB) to mark ePhyto(s) pending delivery or with delivery errors.

- Create/Edit Certificate Request: Window to view, create or edit a Certificate Request. Based on the role and status of the Certificate Request, GeNS will provide editing functionalities and available five workflows:
 - New Phytosanitary certificate
 - Re-export certificate
 - Withdraw certificate
 - Replacement certificate
 - Re-submit for HUB delivery

Additional windows will be used to drive the data entry (e.g.: adding additional declarations or treatments), attach supporting documents and confirm user actions

- ePhyto for Import: list and search for ePhyto received from the HUB. GeNS will filter the view based on the assigned country, propose pre-compiled filters, from dates range and exporting country, to free text search tool.
- Pending Action – a part of the UI screen that shows any events that require user to take an action (such as NPPO Officer to act on certificate applications or company user to view rejected applications).

3.2 Hardware Interfaces

As a web-technology based application, the GeNS does not have any specific hardware requirements. Intend use of the application does not warrant any interfaces with specialised hardware such as bar-code scanners etc. The application will run on a modern server Operating System Platform; thus, supporting mainstream x86 hardware.

3.3 Software Interfaces

The application will be accessed using latest browsers technologies specified in section 9 Appendix C: User Interface Compatibility List

Client workstations should also have the PDF reader software (most of modern browsers provide such support) for opening and printing the certificates.

In addition, for the usage export an Excel compatible reader should be present in order to work on the generated file.

The GeNS system should be implemented using platform operating systems that are: Trusted, Maintainable, Patched and Supported by Vendors, this is to make sure that the underlying platform on top of which the GeNS resides should prevent from security threats, maintainability and support issues.

The GeNS must also communicate with the ePhyto HUB, following the Web Service Description Language (WSDL) and operating procedures defined for the HUB.

3.4 Communications Interfaces

The GeNS will communicate using HTTPS (HTTP over Transport Layer Security (TLS)), client browsers will connect using the SSL/TLS standards. All communications will be encrypted, from

the login to the logout. The GeNS will be using a certificate signed by a globally recognized certificate authority.

4. System Features

Note: System features listed in this document are given a unique identifier (example NFRQ-15 below in section 4.1.3). These identifiers correspond to entries in a separate ICC internal document: 'Traceability Matrix'. ICC will use the Traceability Matrix to track service development during the project. The identifiers have been left in this document for linking the Requirements document to this Matrix. Please refer to Appendix A: Glossary for further details.

4.1 User Authentication

4.1.1 Description and Priority

User access to GeNS will be verified by a set of credentials maintained by the user. The identity of the user is related to his/her email address, while the password will be generated for the first access (temporary password will expire in 24 hours) and immediately changed by the user upon accessing GeNS for the first time. Password will be kept secure using industry best practices (reference: OWASP4) and in line with the identified password policy that can optionally establish composition requirements, as well as: *Max. Number of failures, Max. Age. Lockout Duration.*

4.1.2 Stimulus/Response Sequences

The user will access the GeNS via the HTTPS protocol. GeNS will validate existing session and propose the login action window. At this point the user can invoke the "Forgot Password" Procedure (defined below). If the user sends his/her credentials, the application will validate them (the password on the encryption basis), confirm that authorization exists and is valid, and if successful return the session identity completed with the assigned roles and country/company details. If the login is not successful GeNS will not grant access to GeNS, and issue a generic warning to the user about incorrect set of credentials.

The result of the authentication will provide a valid identity to continue GeNS operations and therefore, giving the default viewport.

4.1.3 Requirements

NFRQ-15: The GeNS must be able to work over HTTPS protecting the communication between users and GeNS Server

FCRQ-16: The GeNS must provide secure internal authentication

NFRQ-17: The GeNS will securely store passwords for validation.

NFRQ-70: The GeNS must maintain access log

FCRQ-55: The GeNS must implement configurable password policy controls

NFRQ-102: Company users access must be granted only if the company has an active registration

4.2 Forgot Password

⁴ https://www.owasp.org/index.php/Password_Storage_Cheat_Sheet

4.2.1 Description and Priority

The user can optionally ask the GeNS to help in resetting the password. As part of on-boarding process, GeNS, NPPO and Company administrators will be required to set-up 'security questions'. Password reset procedure will include providing correct answers to these questions.

4.2.2 Stimulus/Response Sequences

The user can invoke the "Forgot Password" Procedure from the login page, as consequence of failing login actions. GeNS will request the user to validate the registered mail and (for administrators) answer the security questions. An email will be generated and sent to the user. The user will validate the email, by following a unique web address. GeNS will generate a password and send it to the user's email. The user will be able to login and GeNS will request to change the password immediately. Password policy controls will be applied. GeNS will provide the session identity context accordingly to allow the user to continue working.

4.2.3 Requirements

NFRQ-15: GeNS must be able to work over HTTPS protecting the communication between clients and GeNS Server

FCRQ-16: GeNS must provide secure internal authentication

NFRQ-17: GeNS will securely store passwords for validation

FCRQ-18: GeNS will provide functionalities for re-setting the password using the user registered email for validating the identity

FCRQ-19: The user should be able to modify the password in use

NFRQ-20: All modifications to GeNS's user accounts (including all roles) will be logged

FCRQ-55: GeNS must implement configurable password policy controls

4.3 Modify Password

4.3.1 Description and Priority

The user can optionally change the password.

4.3.2 Stimulus/Response Sequences

GeNS allows users to change their password, using a dedicated window. The user will need to insert the old password and confirm the new one. Password policy controls will be applied. GeNS will store the new password accordingly.

4.3.3 Requirements

NFRQ-15: GeNS must be able to work over HTTPS protecting the communication between clients and GeNS Server

FCRQ-16: GeNS must provide secure internal authentication

NFRQ-17: GeNS will securely store passwords for validation

FCRQ-19: The user should be able to modify the password in use

NFRQ-20: All modifications to GeNS's user accounts (including all roles) will be logged

FCRQ-55: GeNS must implement configurable password policy controls

4.4 Company/Individual Self-Registration Application

4.4.1 Description and Priority

The user can fill up the registration form to request access to GeNS as a company or individual, commercial or non-commercial entity within a specific country.

4.4.2 Stimulus/Response Sequences

The system allows the company or individual to request for registration as a commercial or non-commercial exporter within a specific country. The form will be configured based on NPPO selection of the fields from GeNS's default configuration and in line with GeNS's minimum requirements to insert a new company record and assign the administrator. The request will be routed to the NPPO Officer who will review, set the optional expiration date (see also 4.6 Manage Companies), and approve the request enabling the access to GeNS. The email address provided by the company at the time of registration application will be assigned the company admin role.

4.4.3 Requirements

NFRQ-15: GeNS must be able to work over HTTPS protecting the communication between clients and GeNS Server

FCRQ-85: GeNS will allow for self-registration of the company

FCRQ-101: The NPPO Officer must be able to set the expiry date of the company registration

4.5 Manage GeNS Users

4.5.1 Description and Priority

GeNS provides functionalities to insert, edit, remove and de-activate users based on the assigned administrative roles. Following sequences are summarizing the different functionalities dedicated to different level of administration:

- *GeNS Administrator: grant and configure NPPO Profile & Administrators*
- *NPPO Administrator: Add Officers, Inspectors, Assistants, Company administrators and other NPPO administrators (only the primary administrator assign and revoke additional administrator roles)*
- *Company Administrator: Add Company users and other Company Administrators*
- *IPPC: will have read only rights equivalent to a GeNS administrator.*

The following are the non-administrative users:

- *Company User: Creates requests to initiate different workflows. Can view Phytosanitary certificates related information held under the company's account (previous Phytosanitary certificates, pending applications etc)*
- *NPPO Assistant: Administrative assistant role to initiate different workflows. Can view all Phytosanitary certificates under their NPPO.*
- *NPPO Inspector: In-field inspectors. Update the certificate requests and initiate other workflows. Submits request for issuance of Phytosanitary certificates. Can view all Phytosanitary certificates under their NPPO*
- *NPPO Officer: Only role authorized to issue, withdraw or replace Phytosanitary certificates.*

Assigning Administrator Rights:

GeNS admin: These rights will be assigned by service provider as per security procedure established during project implementation. In case ICC is the service provider, the rights will be controlled by the ICC CISO (Chief Information Security Officer) or someone delegated by

him/her. A detailed report on the users who have these rights (amongst other security reports) will be provided to IPPC on a periodic basis.

NPPO Admin: GeNS Admin will assign one email address the admin rights for the NPPO (the primary administrator). Subsequently this user can assign and revoke admin rights to any number of users within that NPPO.

Company Admin: As part of the company registration process; the first email address provided by the company will be assigned the administrator rights. Subsequently, the company administrator can assign any number of users within the company admin rights.

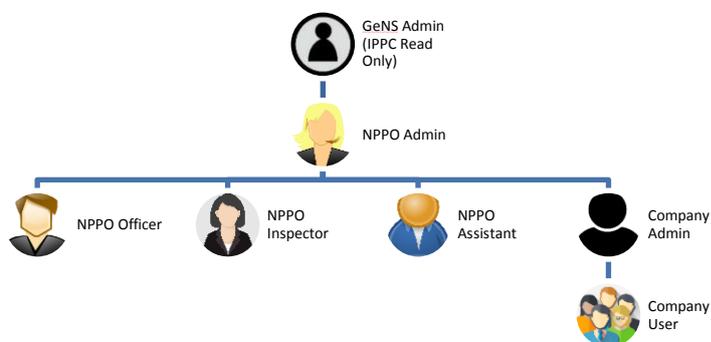
Revoking Administrator Rights:

GeNS Admin: As per procedure established by the service provider and as agreed with IPPC.

NPPO Admin: The user with primary registered email address (at the time of NPPO on-boarding) will be able to revoke the admin rights from other users. Only the GeNS admin can change the registered email address.

Company Admin: The user with primary registered email address (at the time of company being registered in GeNS) will be able to revoke admin rights of other users. The NPPO admin will be able to change the registered email address (and thus, revoke admin rights from an individual).

The NPPO Administrators will be able to assign roles to other NPPO users and implement delegation of rights in event of absence.



4.5.2 Stimulus/Response Sequences

The GeNS Administrator can create a new user assigning the role of NPPO Administrator and providing the Country for which he/she will be the administrator.

The NPPO Administrator role will review and update the country NPPO details including address of different offices.

GeNS will send a welcome email message to the NPPO Administrator and also the link to the procedure for setting the initial password (the link that will be valid for 24 hours). No temporary password will be provided, the first password will be set by directly by the user. Until password is not set the account cannot be used. The password will be encrypted locally in GeNS and used to validate the authentication of the user. NPPO or Company administrators, will not be able to retrieve or distribute password to users.

The GeNS Administrator can open an existing NPPO Administrator, edit the email or any other information or disable the access.

The NPPO Administrator can create new users for the country they are from. Assign the following roles (NPPO Administrator, NPPO Officer, NPPO Assistant, and Company Administrator, as well as the office address of the location in which the user belongs – which can be more than one). The Country will be inherited from the administrator profile. A Company Administrator role can be assigned to a company, whose records exist in GeNS. During the setup of a Company Administrator, GeNS will propose the existing companies, as well as allow creation of a new Company (described below).

The NPPO Administrator can view an existing NPPO user or Company Administrator, edit the information or disable the access.

The Company Administrator will be able to create, view, edit and disable access of Company Users and Partner Companies. The role, country, company of the created/modified user will be inherited from the Company Administrator.

Users of the GeNS will be administered by three different administrative roles at the level of respectively GeNS, NPPO and Company.

4.5.3 Requirements

PDRQ-6: GeNS Administrator must be able to configure the country to use the GeNS system (e.g.: insert the first NPPO Administrator).

PDRQ-7: NPPO Administrator must be able to configure and manage the access permissions and country configuration parameters including different office addresses.

PDRQ-8: Company Administrator must be able to manage and update the company details with the NPPO and manage the company users and partner companies

PDRQ-10: NPPO users are the main users of GeNS having to deal with the review, approval and issuance of Phytosanitary certificates

NFRQ-20: All modifications to GeNS's user accounts (including all roles) will be logged

FCRQ-33: The NPPO Administrator must be able to maintain the list of NPPO Officers and accounts

FCRQ-37: The Company Administrator must be able to maintain the list of company users (notes will be available to further describe the type of user)

FCRQ-94: The NPPO Administrator can assign administrative role to other NPPO users. Revoking the administrator rights will only be allowed to the user with 'primary' registered email address or the admin higher up in the hierarchy.

FCRQ-98: The Company Administrator can assign administrative role to other company users. Revoking the administrator rights will only be allowed to the user with 'primary' registered email address or the admin higher up in the hierarchy.

4.6 Manage Companies

4.6.1 Description and Priority

GeNS provides functionalities for the NPPO administrator to insert, edit, remove and de-activate companies

4.6.2 Stimulus/Response Sequences

The NPPO Administrator can create, edit, and disable company records for the country he/she is from. Assign the Company Administrator if already registered as user or create a new user using the functionalities described above.

GeNS will store company information, including the optional expiry date

GeNS will provide a dedicated view to show company records by expiry date to facilitate the finding of such records and the relevant administrative actions.

4.6.3 Requirements

PDRQ-8: Company Administrator manages and updates the company details with in the NPPO and manages the company users

FCRQ-34: The NPPO Administrator must be able to maintain the list of companies in GeNS

FCRQ-35: The NPPO Administrator must be able to maintain only Companies registered under the NPPO Country

FCRQ-36: The NPPO Administrator must be able to register the Company Administrator

NFRQ-71: All modifications to Company records must be logged

4.7 Manage Lookups

4.7.1 Description and Priority

GeNS provides functionalities to insert, edit, and remove records used to facilitate data entry.

4.7.2 Stimulus/Response Sequences

The GeNS administrator will be able to insert, edit, and remove entries used to support data entry in the following fields:

- Countries
- Certificate Request Fields (only translation available)
- NPPO
- Package Types
- Conveyances
- Commodities
- Scientific Names
- Additional Declarations templates
- Treatment Types
- Unit of Measures

Each of the lookup entities may have different set of attributes and source of information (e.g.: XML Schema, Excel). The GeNS Administrator will be able to change the data without the need of a new system release.

The GeNS Administrator will be able to configure the NPPO details, selecting the Country, the address, adding NPPO Offices, adding NPPO Users, giving roles and assigning offices, selecting

visible and mandatory fields to accept the Certificate Request raised by the companies, templates used for producing digital and printable version of the ePhyto.

The GeNS Administrator and the NPPO Administrator will be able to translate entries in one of the available languages of the GeNS. Additionally the NPPO can extend the local list that will be available only for his/her country and cannot remove any of the global entries in the master data list. Local additions will be visible to GeNS administrator to optionally consolidate them in the global list. GeNS will provide such translated entries if the user switch the user interface language. If the entry is not translated the English version will be used.

The Company Administrator will be able to insert, edit and remove entries regarding the 'partner' companies; his/her company deals with as source or destination for import or export certificate. The Company Administrator will be able to insert partners (exporters and importers) companies with Country, Name, Addresses, Commodities, Contact Information.

GeNS will store company information and relationships.

4.7.3 Requirements

FCRQ-21: The GeNS Administrator must be able to administer all the global lookups (Harmonized codes)

FCRQ-103: The NPPO Administrator can add entries to the 'local list'

NFRQ-22: All modifications to GeNS's lookups will be logged and versioned

FCRQ-27: GeNS will provide functionalities to guide the Company User or the NPPO Officer through the preparation of the certificate request

FCRQ-42: The Company User must be able to maintain the list of names and addresses of exporters.

FCRQ-43: The Company User must be able to maintain the list of declared name and address of consignees

FCRQ-54: GeNS must have functionalities for NPPO administrator to translate lookups into different languages

NFRQ-71: All modifications to Company records must be logged

FCRQ-84: The NPPO Administrator must be able to maintain NPPO list of offices and assign users to them

FCRQ-95: NPPO user can be assigned to multiple offices

4.8 Create Certificate Request

4.8.1 Description and Priority

GeNS provides functionalities to create Phytosanitary certificates providing the user with guided data entry windows in line with the ISPM12 Appendix 1 definition.

The workflow diagram is attached in Appendix B

4.8.2 Stimulus/Response Sequences

The Company User or the NPPO Assistant can create a new Certificate Request filling out a dedicated form (customized based on country NPPO requirements). They will also select the NPPO Office to route the request.

For Phytosanitary certificate fields that can be multi-lingual; GeNS will allow entering the data in different languages. However, if the data is coming from an existing lookup field, the

information will be displayed in the language of the user interface. The certificate request and the final Phytosanitary data will be saved with the translated language (as this is the information that is being used in the issued ePhyto)

GeNS will automatically populate fields pertaining to the user context (e.g.: Country, Exporting Company) and where applicable propose lookups entries (searchable drop down lists) to enter the information of the CR.

The interface will have all the sections of the certificate as specified in the ISPM12 Appendix 1. The sections will change based on the nature of request: such as new CR or re-export certificate request. The GeNS will store all the information in order to facilitate searches, reports, printing and creation of the required electronic format to be sent through the HUB. With each new certificate request, GeNS will automatically create the initial records of the final phytosanitary certificate.

GeNS will allow import of a valid (compliant with ISPM 12 schema) XML file to automatically populate a CR, as well as allow to export the drafted CR as XML (such functionality will be available also off-line) for a later processing

A company user will be able to upload up to 10 files of maximum 3MB each, in support of the CR.

An NPPO user can also upload up to 10 files of same maximum size in addition to the files supplied by the company user.

Draft CR can be deleted or sent to the NPPO Inspector using the Apply action 4.9 Apply for Certificate described below.

GeNS will allow the NPPO Assistant to select any company and prepare the certificate request on their behalf (and attach up to 10 files as supporting documents). GeNS will also allow the NPPO Assistant to mark the certificate as “Non-Commercial”, this will allow reporting and differentiate charging on non-commercial certificates.

GeNS will also allow to create a new CR as a copy of an existing record. The new CR will be created with pertinent status and time stamp. Similarly, a re-export request can also be created from an existing record. This functionality will be available against search results as well.

Re-Export Requests:

Re-Export request workflow diagram is attached in Appendix B: Analysis Models.

A new re-export certificate will have the original certificates attached. GeNS will allow uploading and storing the original Paper Certificate, and attach them in the generated ePhyto for re-export, as well as produce the re-export certificate as paper only printing the original ePhyto(s) from GeNS. The below table summarizes the main combinations and expected behaviour of the GeNS system, in the GeNS will allow for recording the re-export certificate including the originals as scanned and uploaded documents:

Original Certificate	Re-export Certificate	GeNS Outcome
ePhyto	ePhyto	Original is converted into PDF/A (as per the ISPM 12 schema) and embedded into re-export ePhyto

ePhyto	Paper Phytosanitary Certificate (new destination is not part of HUB)	Original is printed in the preferred format. <u>The Original has 'Certified Copy' printed on it.</u> The NPPO Officer will sign & stamp this (outside the GeNS). The re-export is printed as per NPPOs required format (custom format of NPPO for their Phytosanitary Certificates)
Paper Phytosanitary Certificate	ePhyto	Original is scanned in PDF or JPEG format and embedded (per ISPM 12 Schema) into the re-export ePhyto
Paper Phytosanitary Certificate	Paper Phytosanitary Certificate	<u>The user scan the original into GeNS in order to have a copy filed in GeNS.</u> GeNS produces a re-export certificate (PDF/A). The Original is physically 'attached' to the paper re-export.

Compared with a new certificate request, some fields in a re-export certificate differ with some new data required and some existing data being discarded (as per ISPM 12 standard). GeNS should prompt the user for additional data and produce a certificate compliant with the ISPM 12 re-export certificate.

Original copies of re-export certificates will be kept in GeNS together with the re-export certificate records.

GeNS will delete all other supporting documents uploaded after 6 months from the issue of the relevant certificate.

4.8.3 Requirements

PDRQ-1: Data entry for export certification

PDRQ-5: Storing, Viewing, Reporting and Printing of the sent and received electronic Phytosanitary Certificates

FCRQ-23: GeNS must allow for the preparation of the Phytosanitary certificate

NFRQ-24: GeNS will log all modifications of the certificate

FCRQ-27: GeNS will provide functionalities to guide the Company User or the NPPO Assistant through the preparation of the certificate request

FCRQ-30: GeNS will allow Company Users to see certificates pertaining only to their company

FCRQ-39: GeNS must provide Company Users the functionalities to create certificate requests

FCRQ-44: The NPPO Assistant must be able to create a certificate request on behalf of a Company within the remit of the NPPO

FCRQ-57: GeNS should propose existing records of exporters and (optionally) consignees in the input fields

FCRQ-60: The Phytosanitary Certificate must follow the ISPM12 Appendix 1 definition (plus harmonised schema and codes)

FCRQ-74: GeNS must allow Company Users and NPPO Assistants to create a new certificate request as copy of an issued certificate

FCRQ-86: Certificate Requests must be addressed to an NPPO Office

FCRQ-87: GeNS must provide functionality to export any Phytosanitary certificate as XML

FCRQ-88: GeNS must allow to valid XML file to be imported and initiate a certificate request workflow

FCRQ-89: The certificate request must allow company user and NPPO attach max 10 documents of max 3MB each per request.

FCRQ-90: The documents attached to CR will be stored for up to 6 months in GeNS

FCRQ-93: GeNS must support the workflow for creating re-export certificate requests

NFRQ-97: The create certificate request functionalities must be developed to be packaged as off-line tool

FCRQ-100: GeNS must allow to mark certificates as non-commercial by the NPPO user

4.9 Apply for Certificate

4.9.1 Description and Priority

GeNS provides functionalities to submit the certificates request to the NPPO Inspectors for their review and update. The NPPO inspector should be able to submit completed request to the NPPO Officer.

The workflow diagram is part of 'New Phytosanitary Certificate' in Appendix B.

4.9.2 Stimulus/Response Sequences

The Company User or the NPPO Assistant (together termed as originator of the CR) can find and open a draft CR using the functionalities exposed in the Phytosanitary management views and they can "Apply" for the certificate issuance.

GeNS will perform data validation, store modification and lock the editing of the certificate, change the status to Pending Review and log all the actions.

GeNS will notify the action to the NPPO Inspector, providing direct links to be able to perform the required actions.

The originator can 'withdraw' their certificate requests before the NPPO Inspector starts processing it. Once the NPPO Inspector has opened a CR; the originator will not be able to edit and/or request a cancellation.

The NPPO Inspector will process the CR and can attach up to 10 documents (max file size of 3 MB each). The inspector can also request changes or reject the CR providing a description via the GeNS comment system.

In the event NPPO Inspector request changes or reject the CR, GeNS will notify the originator who in turn can either modify and resubmit the CR or delete it.

At the end of the processing, the NPPO Inspector will submit the CR to the NPPO Officer to issue the Phytosanitary certificate. Once the certificate is issued the exporter can only withdrawn the certificate, no cancelling and/or delete actions can be performed.

4.9.3 Requirements

PDRQ-5: Storing, Viewing, Reporting and Printing of the sent and received electronic Phytosanitary Certificates

NFRQ-24: GeNS will log all modifications of the certificate

FCRQ-28: The Company user must be able to apply for the issuing of the certificate

FCRQ-29: The Company user must be able cancel the application that is pending NPPO review

FCRQ-30: GeNS will allow Company Users to see certificates pertaining only to their company

FCRQ-40: GeNS must provide Company Users functionalities to search and view all certificates that have been entered for the Company

FCRQ-41: The NPPO Officer must be able to cancel a pending certificate

FCRQ-57: GeNS should propose existing records of exporters and (optionally) consignees in the ePhyto input fields

FCRQ-60: The Phytosanitary Certificate must follow the ISPM12 Appendix 1 definition plus harmonised schema/codes

4.10 Issue Phytosanitary Certificate

4.10.1 Description and Priority

GeNS provides functionalities to reject or process CR and issue Phytosanitary certificate – either paper or as ePhyto.

4.10.2 Stimulus/Response Sequences

The NPPO Officer can look for and open a pending CR using the functionalities exposed in the Phytosanitary management views. The NPPO Officer can view the CR and can either issue a Phytosanitary Certificate or reject the CR.

In case of 'Issuance', GeNS will perform data validation, store any modifications, and produce the PDF /A version. The NPPO Inspector will have the option to print and store it outside the GeNS, however GeNS will keep the printed version of the phytosanitary certificate (including any original version that are attached during the re-export process) and only remove the supporting documents after 6 months.

If the certificate is to be issued in paper format, the NPPO officer can choose to print the PDF/A (and secure printing features are out the GeNS). If the certificate is to be issued as an ePhyto GeNS will queue the certificate for delivery using the HUB web service. In the case of the certificate for re-export GeNS will prompt the NPPO officer to verify that all original certificates are digitally embedded.

The original applicant, will get a notification with details of the certificate and result of the NPPO Inspector's decision.

The rejected certificate can be amended, deleted or resubmitted using the functionalities described (Create and Apply)

The sending of the ePhyto to the HUB will follow HUB specifications and related WSDL. The delivering status of the ePhyto will be monitored through the HUB services (see Re-submission of delivery failed certificates below).

4.10.3 Requirements

PDRQ-3: Issuance/authorization of a Phytosanitary Certificate

PDRQ-4: Sending and receiving ePhyto

PDRQ-5: Storing, Viewing, Reporting and Printing of the sent and received electronic Phytosanitary Certificates

NFRQ-24: GeNS will log all modifications of the certificate

FCRQ-45: The NPPO Officer must be able to work on the CR and amend it before issuing

FCRQ-46: The NPPO Officer or Assistant must be able to reject the certificate request and send it back to be amended by the Company user (request originator)

FCRQ-50: The NPPO Officer must be able to issue the certificate, sending it to the HUB for delivery

FCRQ-57: GeNS should propose existing records of exporters and (optionally) consignees in the Phytosanitary input fields

FCRQ-60: The ePhyto must follow the ISPM12 Appendix 1 definition (plus harmonised schema/codes)

FCRQ-91: GeNS will produce a PDF/A version of each Issued Phytosanitary Certificate and make it available to be retrieved for printing at anytime

FCRQ-92: GeNS must allow the NPPO Officer to issue the certificate on paper

4.11 Re-Submit ePhyto

4.11.1 Description and Priority

GeNS provides functionalities to view delivery failed certificates, open the document and re-submit it for HUB delivery or send as paper certificate

4.11.2 Stimulus/Response Sequences

All NPPO Users can find and open certificate with a 'delivery failed' status using the functionalities exposed in the Phytosanitary management views. They can then decide to re-submit the certificate back into the HUB for another delivery attempt or remove it from the HUB delivery process. If they make the latter decision (and use a paper Phytosanitary instead); GeNS will update the records to indicate that a Paper phytosanitary certificate was issued.

The delivery status of the certificates is periodically pulled from the HUB; which marks a certificate with delivery failed status based on the business rules set in the HUB system.

4.11.3 Requirements

PDRQ-3: Issuance/authorization of a Phytosanitary Certificate

PDRQ-4: Sending and receiving ePhyto

PDRQ-5: Storing, Viewing, Reporting and Printing of the sent and received electronic Phytosanitary Certificates

NFRQ-24: GeNS will log all modifications of the certificate

FCRQ-45: The NPPO Inspector must be able to work on the CR and amend it before issuing

FCRQ-46: The NPPO Inspector or Assistant must be able to reject the certificate and send it back to be amended by the Company user (request originator)

FCRQ-50: The NPPO Officer must be able to issue the certificate, sending it to the HUB for delivery

FCRQ-51: The NPPO Users must be able to view the status of the delivery of the issued ePhyto(s)

4.12 Withdraw Phytosanitary Certificate

4.12.1 Description and Priority

GeNS provides functionalities to view issued certificates, open the record and request to withdraw the certificate.

The workflow is described below and represented by the diagram in the Appendix B.

The withdraw request for Phytosanitary certificate will cover all of the consignment on the certificate. There is no partial withdrawal certificate; covering only part of the consignment.

4.12.2 Stimulus/Response Sequences

The Company User, NPPO Assistant and the NPPO Inspector can find an issued certificate (either as paper or ePhyto) using the functionalities exposed in the Phytosanitary management views. They can then request to withdraw the certificate, also providing a reason for the action, in the comments section.

GeNS will generate notification for the NPPO Officer to take action. The Officer can either approve the request, reject it or request for more information (using the comments functionality)

In case the NPPO Officer does not approve the withdraw request, it will be sent back to the requestor with a comment explaining the reason. In case of approval the original certificate will be copied, the status will be set to withdrawn (Code 40). Then a PDF/A copy can be optionally generated and printed (for any off-line archiving requirements), the withdrawn (cancelled) certificate will be submitted to the HUB for delivery.

4.12.3 Requirements

PDRQ-4: Sending and receiving ePhyto

PDRQ-5: Storing, Viewing, Reporting and Printing of issued and received electronic Phytosanitary Certificates

NFRQ-24: GeNS will log all modifications of the certificate

FCRQ-47: The NPPO Officer must be able to search and view issued certificates

FCRQ-52: The NPPO Officer must be able to withdrawn or replace an issued certificate

4.13 Replace Phytosanitary Certificate

4.13.1 Description and Priority

GeNS provides functionalities to view issued certificates, open the document and request to replace the certificate.

The replace request for Phytosanitary certificate will cover all of the consignment on the certificate. There is no partial replace certificate; covering only part of the consignment.

4.13.2 Stimulus/Response Sequences

The Company User, The NPPO Assistant and the NPPO Inspector can find an issued certificate (either as paper or ePhyto) using the functionalities exposed in the Phytosanitary management views.

GeNS will guide the user in performing a withdrawn and subsequent replacement CR.

GeNS will open the original CR as draft of the CR for the replacement. Once modifications are completed, the Company User or NPPO Assistant/Inspector will submit the CR for the replacement.

GeNS will generate notification for the NPPO Officer to take action. The Officer will be able to view the replacement CR and either approve the request, reject it or request for more information (using the comments functionality).

In case the NPPO Officer does not approve the replace request, it will be marked as rejected and sent back to the requestor for further amendments. In case of approval, GeNS will change the status of the original certificate to Replaced (Code 44) (without sending it to the HUB) and issue the new certificate. Then a PDF/A copy will be generated for the certificate, and submitted to the HUB for delivery (when the importing country is connected to the HUB).

The replacements actions in GeNS are totally done by the exporting country; with this version there are no functionalities for the importer to request replacement of a received phytosanitary certificate.

4.13.3 Requirements

PDRQ-4: Sending and receiving ePhyto

PDRQ-5: Storing, Viewing, Reporting and Printing of the sent and received electronic Phytosanitary Certificates

NFRQ-24: GeNS will log all modifications of the certificate

FCRQ-47: The NPPO Officer must be able to search and view issued certificates

FCRQ-52: The NPPO Officer must be able to withdraw or replace an issued certificate

4.14 View Import Certificates

4.14.1 Description and Priority

GeNS provides functionalities to view received Phytosanitary certificates for import (and its status), open the document and print it (the print will be using standard ISPM 12 format). This is only meant for incoming ePhyto certificates. Paper based import certificates will continue to be handled as per NPPO's current business process. This view is only available to the NPPO users and not any company user/admin.

4.14.2 Stimulus/Response Sequences

The NPPO users can search and find all received ePhyto certificates using the functionalities exposed in the Phytosanitary management. They can open the received ePhyto and print it. GeNS will regularly pull import certificates. If the exporting NPPO has sent a certificate with updated status (withdrawn or replaced), GeNS will update the information. .

4.14.3 Requirements

PDRQ-4: Sending and receiving ePhyto

PDRQ-5: Storing, Viewing, Reporting and Printing of the sent and received electronic Phytosanitary Certificates

FCRQ-48: The NPPO Officer must be able to search and view certificates for imported consignments

FCRQ-49: GeNS will pull certificates for import from the HUB on a regular basis

4.15 Print ePhyto Certificate

4.15.1 Description and Priority

GeNS provides functionalities to export the Phytosanitary certificates into PDF/A format, which can be sent for printing or stored in external file systems. The GeNS does not provide space to store the PDF/A files, unless it is an original copy of re-export; however, at that point in time the NPPO or Company user can create a PDF/A from an issued ePhyto or imported ePhyto and print it or save to local storage.

The printing of the ePhyto will also include a unique verification code that can be used by the importing country for verification, using the functionality described here below 4.16 Certificates Verification.

4.15.2 Stimulus/Response Sequences

The NPPO User can open the ePhyto and select to print the document. For any (export or import) Phytosanitary certificate, GeNS will produce a PDF/A version using NPPO's preferred format of the certificate.

4.15.3 Requirements

PDRQ-5: Storing, Viewing, Reporting and Printing of the issued and received electronic Phytosanitary Certificates

FCRQ-25: GeNS must allow for printing the certificate to be able to include the paper format to the exporting documents

NFRQ-26: GeNS should implement the printing functionality using templates that can eventually be modified by the Country NPPO to address their formatting needs

FCRQ-60: The ePhyto must follow the ISPM12 Appendix 1 definition

4.16 Certificates Verification

4.16.1 Description and Priority

GeNS will mark all printed certificates with a unique identifier and also may provide a batch of blank Phytosanitary certificates as PDF/A files, each uniquely identified from a specific number series, to be able to track and validate the off-line paper based delivery process.

4.16.2 Stimulus/Response Sequences

The importing NPPO will be able to visit a 'public' page of the GeNS and enter the Phytosanitary certificate number, the exporting NPPO country name and the verification code. GeNS will confirm if the certificate 'belongs' to the exporting NPPO by providing a set of fields or the entire certificate, based on the exporting country configuration in GeNS. A list of available fields will be given to the NPPO administrator to select for displaying in the verification page including, and not limited to, the following:

- Importing Country
- Name of produce and Quantity declared
- Botanical names
- Place of origin
- Replacement information

For certificates that are generated in a blank batch (see below), GeNS will also print a disclaimer text in order to warn the reader on the fact that the original certificate was written by hand and that a limited data is available.

If the GeNS produce a blank batch of formatted Phytosanitary certificates to be filled manually; each of them will have a unique certificate number from a defined number series.

These certificates can be printed and stored by the NPPO Officer and used in the rare event that the GeNS is not accessible by the NPPO-the NPPO can issue a phytosanitary certificate using the pre-printed blank certificate.

Once the exporting NPPO can access the GeNS again – NPPO users will update each paper certificate used, marking them as “issued”.

The NPPO will also enter the date when the certificate was issued the required information for the verification, comments and optionally upload the scanned version.

Once the exporting NPPO has updated the certificate status the GeNS can display to the importing NPPO that the certificate validation content in order to verify the authenticity of the one received.

4.16.3 Requirements

FCRQ-96: GeNS may provide batch generation of paper version certificate with pre-allocated certificate numbers

FCRQ-104: GeNS should provide a system for validating all printed phytosanitary certificates

4.17 Archive Import Certificate

4.17.1 Description and Priority

GeNS provides functionalities to view received import certificates open and or archive them.

4.17.2 Stimulus/Response Sequences

The NPPO Officer can search and find all the ePhyto certificates received by the country, using the functionalities exposed in the Phytosanitary management. The NPPO Officer can open the received ePhyto and in addition to the rest of the functionalities can mark the document as Archived.

GeNS will move it from default to archived views to reduce the working document list. The reverse operation should also be feasible (i.e. moving from archived to default working area).

4.17.3 Requirements

PDRQ-5: Storing, Viewing, Reporting and Printing of the sent and received electronic Phytosanitary Certificates

FCRQ-48: The NPPO Officer must be able to search and view certificates for imported consignments

FCRQ-72: The NPPO Officer must be able to archive the received certificate for imported consignment

4.18 View Usage Statistics

4.18.1 Description and Priority

GeNS provides functionalities to view information related to number of certificates by type (import/export) company (inc partner company), country, status, commodity and time frame.

4.18.2 Stimulus/Response Sequences

The NPPO Officer will be able to export statistical data from GeNS in the excel format (XLS or CSV). Such exports can be further used to prepare ad-hoc reports.

4.18.3 Requirements

PDRQ-5: Storing, Viewing, Reporting and Printing of the sent and received electronic Phytosanitary Certificates

FCRQ-53: The NPPO Officer must be able to run reports on number of certificates issues and received

5. Other Non-functional Requirements

5.1 Performance Requirements

GeNS response time must be in average with standard web applications, keeping the usability of GeNS in line with the following definition⁵:

0.1 second: Limit for users feeling that they are directly manipulating objects in the UI. For example, this is the limit from the time the user selects a column in a table until that column should highlight or otherwise give feedback that it's selected. Ideally, this would also be the response time for sorting the column — if so, users would feel that they are sorting the table. (As opposed to feeling that they are ordering the computer to do the sorting for them.).

1 second: Limit for users feeling that they are freely navigating the command space without having to unduly wait for the computer. A delay of 0.2–1.0 seconds does mean that users notice the delay and thus feel the computer is "working" on the command, as opposed to having the command be a direct effect of the users' actions. Example: If sorting a table according to the selected column can't be done in 0.1 seconds, it certainly has to be done in 1 second, or users will feel that the UI is sluggish and will lose the sense of "flow" in performing their task. For delays of more than 1 second, indicate to the user that the computer is working on the problem, for example by changing the shape of the cursor.

10 seconds: Limit for users keeping their attention on the task. Anything slower than 10 seconds needs a percent-done indicator as well as a clearly signposted way for the user to interrupt the operation. Assume that users will need to reorient themselves when they return to the UI after a delay of more than 10 seconds. Delays of longer than 10 seconds are only acceptable during natural breaks in the user's work, for example when switching tasks.

GeNS must be designed to minimize the waiting time for a single action to be performed, maximizing the use of caches as well as asynchronous calls.

Some actions in GeNS will need to be executed on the central server (e.g. HUB communication); in such cases GeNS will be responding immediately.

⁵ <https://www.nngroup.com/articles/response-times-3-important-limits/>

GeNS should be designed in order to be deployed and used on a low-bandwidth and high-latency networks, minimizing the round trips to servers, compressing and exchanging only partial application data changes using Single Page Application⁶ practices.

Additional reported requirements:

	Description	Rationale
NFRQ-65	Web application bandwidth and communication must be optimized to be used on a low bandwidth and satellite link	Some of the countries and companies office may not have a good internet connection. GeNS should optimize bandwidth consumption and client-server chattering

Number of NPPOs using GeNS:

Pilot	3
From Go-live (BaU) to next 1 year	9 (6 new NPPOs in additional to the 3 above)

Number of Users using GeNS:

GeNS should be sized for following order of magnitude estimate on number of users. As the service progresses, based on the expansion, GeNS size should be adjusted.

Pilot Phase:

User Type	# Estimates
NPPO Administrators	5
NPPO Officers	10
Company Administrators	50-150
Company Users	100-300

From Go-live (BaU) to next 1 year:

User Type	# Estimates
NPPO Administrators	15
NPPO Officers	30
Company Administrators	150-450
Company Users	300-900

System Scalability and Architecture:

As it is difficult to build the GeNS user growth and utilization model, the underlying technology stack for GeNS should allow for very easy horizontal and vertical scaling. GeNS should use modern application technology stacks (and frameworks), which provide these functionalities inherently without any major code re-write or database re-design.

5.2 Safety Requirements

⁶ https://en.wikipedia.org/wiki/Single-page_application

No safety requirements are identified that are not covered in the Security Requirements here below.

5.3 Security Requirements

The primary security constrain is that all NPPO data (phytosanitary certificates, internal company information) should be secure. Furthermore, this data can be subject to various national data protection legislations (e.g. if any European Union country were to use GeNS, the personally identifiable information of the users' needs to be kept secure in-line with EU regulations).

Data Security during processing: the service provider will ensure that GeNS , as part of processing, storing and transferring all data, handles all sensitive information to meet the primary security constrain; particularly the details of ePhyto certificates.

ICT operations access to the GeNS (Central Hosted Mode): the service provider will ensure that all access to the GeNS is adequately logged and monitored; including access at application developer/maintainer, Operating System, database and network levels. The service provider will operate the service in compliance with internationally accepted security standard ISO 27001.

	Description	Rationale
NFRQ-62	Data processed, stored and transmitted by the GeNS is very sensitive and must be adequately protected.	The data relates to trade between countries and thus, is highly confidential for each country. The service should be built in a manner that it is completely transparent and highly secure to provide assurance to countries about correct handling of their data.
NFRQ-15	GeNS must be able to work over HTTPS protecting the communication between users and GeNS Server	
NFRQ-16	GeNS must provide secure internal authentication	GeNS will store credentials internally. The authentication and identity management will be implemented in GeNS, providing ad-hoc security measures, in line with OWASP recommendations and tools
NFRQ-17	GeNS will securely store passwords for validation	GeNS will not store the password in clear text
NFRQ-12	GeNS will allow NPPO to view and report on certificates issued or delivered only by the NPPO	NPPO's should not be able to view certificates that do not pertain to their country.
NFRQ-99	GeNS will allow Company users to view and perform activities only on certificate requests of their own company	Companies should not be able to view certificates and requests pertaining to other companies

NFRQ-75	GeNS should protect stored sensitive information of each country	GeNS should prevent from running reports or viewing sensitive information of un-authorized persons including platform and system's administrators
NFRQ-76	The use of GeNS should not make any changes on the Users' Personal Computer (PC); except when storing PDF files or saving different reports/exports from GeNS.	
NFRQ-45	The service should be given adequate security to protect it from being hacked or misused	<p>Provide application level security:</p> <ul style="list-style-type: none"> (*) Application code audit and use of application development best practices (prevent OWASP Top 10, SANS top 25 software errors) (*) Use of a Web Application firewall <p>Provide Network level security:</p> <ul style="list-style-type: none"> (*) Use of network level firewall and multi zone network. (*) Use of Intrusion detection system <p>Provide server level security:</p> <ul style="list-style-type: none"> (*) use of anti-malware tools on server (*) 'host hardening' of bastion servers <p>Data Security:</p> <ul style="list-style-type: none"> (*) Only very limited set of operational team will have capability to view data and applications. (*) Each access to system will be logged and an alert generated. The alert will be send to non-operational service manager.

5.4 Software Quality Attributes

The software should satisfy all the requirements defined in this document. The development of the GeNS will also follow a quality plan that will include, unit, functional, and regression tests, as well as User Acceptance Tests of each single deliverable functionality/component.

Some of the requirements that should be considered as key indicators are reported below:

	Description	Rationale
NFRQ-65	Web application bandwidth and communication must be optimized to be used on a low bandwidth and satellite link	Some of the countries and companies office may not have a good internet connection. GeNS should optimize bandwidth consumption and client-server chattering
NFRQ-62	Data sent to the HUB by the GeNS is very sensitive and must be securely encrypted.	The data relates to trade between countries and thus, is highly confidential for each country. GeNS should be built in a manner that it is completely transparent and highly secure to provide assurance to countries about correct handling of their data. Following HUB Specification the communication will be done using TLS
PCRQ-63	GeNS must be built in a form that can be deployed to country data centres without any additional changes	if a country NPPO decide to implement GeNS on their premises for any technical or non-technical reason the application can be easily configured without the need of specific changes
FCRQ-60	The Phytosanitary Certificate must follow the ISPM12 Appendix 1 definition	GeNS will provide tools to produce the ePhyto in line with the agreed standard

5.5 Availability Requirements

GeNS will be designed with 99% availability. This implies that the GeNS can have approximately 3 days of unscheduled downtime within one calendar year.

The target availability for the Business As Usual (BaU) phase will be 99.5%; which implies that the GeNS can have approximately 44 hours of unscheduled downtime within one calendar year. Based on the experience during the Pilot phase, this can be modified.

IPPC and the service provider will work towards improving this metrics as part of regular service optimization.

5.6 Data Life-cycle Requirements

The audit logs and ePhyto certificates can be stored perpetually within the GeNS system. Depending on the usage and system data growth, this decision can be revisited.

System Back-ups: For the purpose of meeting Service Availability metrics, the service provider will maintain back-up copies of the live system and its data. This implies that all the information

residing in GeNS will get backed up. All backup shall be kept in ICC datacentres (under UN jurisdiction). The backup will be kept for the duration listed below:

Backup schedule	Backup retention
Daily backups	1 week
Weekly backups	4 weeks
Monthly backups	12 months

5.7 Business Rules

Following business rules are in addition to those covered in the Design & Implementation Constraints:

FCRQ-83: The ePhyto certificate XML will not be digitally signed

6. Other Requirements

	Description	Rationale
PDRQ-2	Defined exchange mechanism and the IPPC version of the standardized UN/CEFACT schema	GeNS must comply with the defined standards in terms of exchange mechanism and data definition
PIRQ-13	For countries that can provide required ICT infrastructure, the GeNS should be designed so that it can be deployed in 'Standalone' mode.	This to allow countries decision to host the service at their premises.
PIRQ-14	The development of changes and fixes to the application will be published and available within GeNS for automatic update	To give countries hosting the GeNS the option to update their version
PCRQ-80	Use a technology stack that minimize licensing fees	Keep the cost of solution at minimum for IPPC as well as for NPPOs deploying in 'standalone' mode
PCRQ-81	GeNS should be designed to run multiple tenants securely, on single solution stack. This will ensure that the total cost of the solution is low.	This will avoid deploying a dedicated instance of GeNS on per NPPO basis.

7. Appendix A: Glossary

ePhyto: electronic phytosanitary certificate. In the document specifications is referring to the XML representation of the phytosanitary certificate information exchanged.

Phyto: short name of Phytosanitary certificate, used in the document to generalize the input/output of GeNS to either paper or electronic (XML) version.

Phytosanitary certificate: as above, the extended version.

NPPO: National Plant Protection Organization

CRUD: Create, Read, Update and Delete operations

GeNS: Generic ePhyto National System, generic application that will provide functionalities for generating, sending and receiving phytosanitary certificates

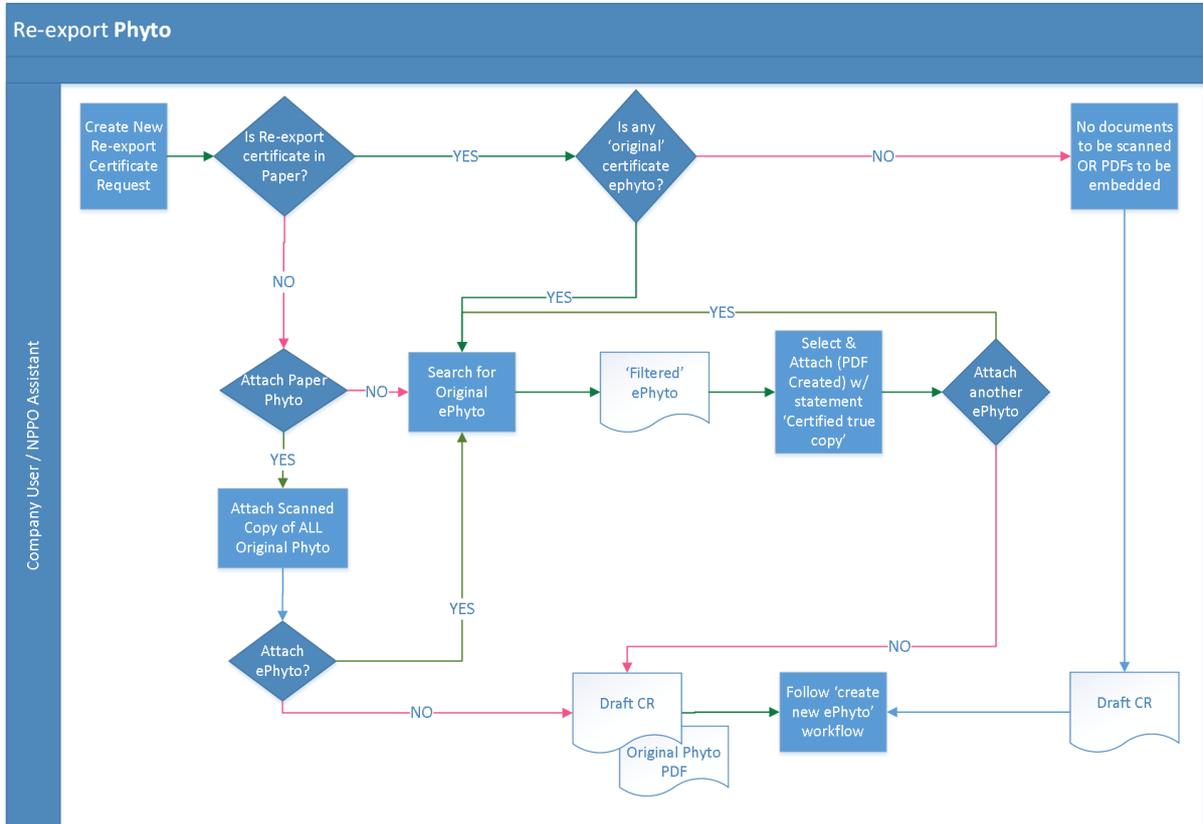
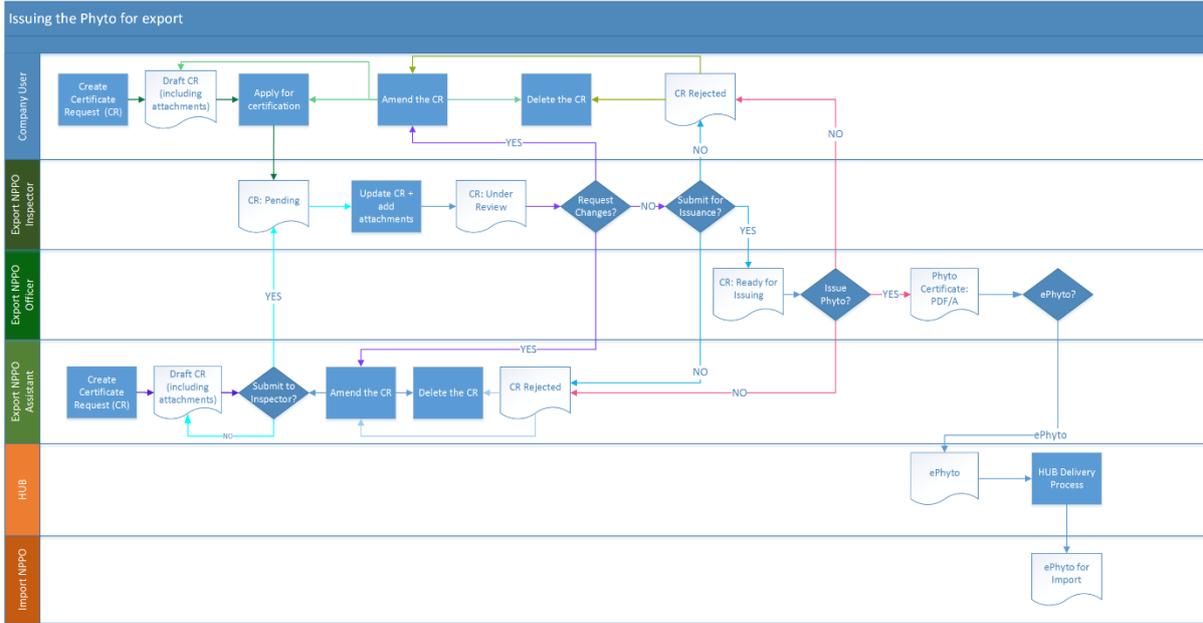
HUB: Set of internet web services available to countries for orchestrating the ePhyto certificates exchange

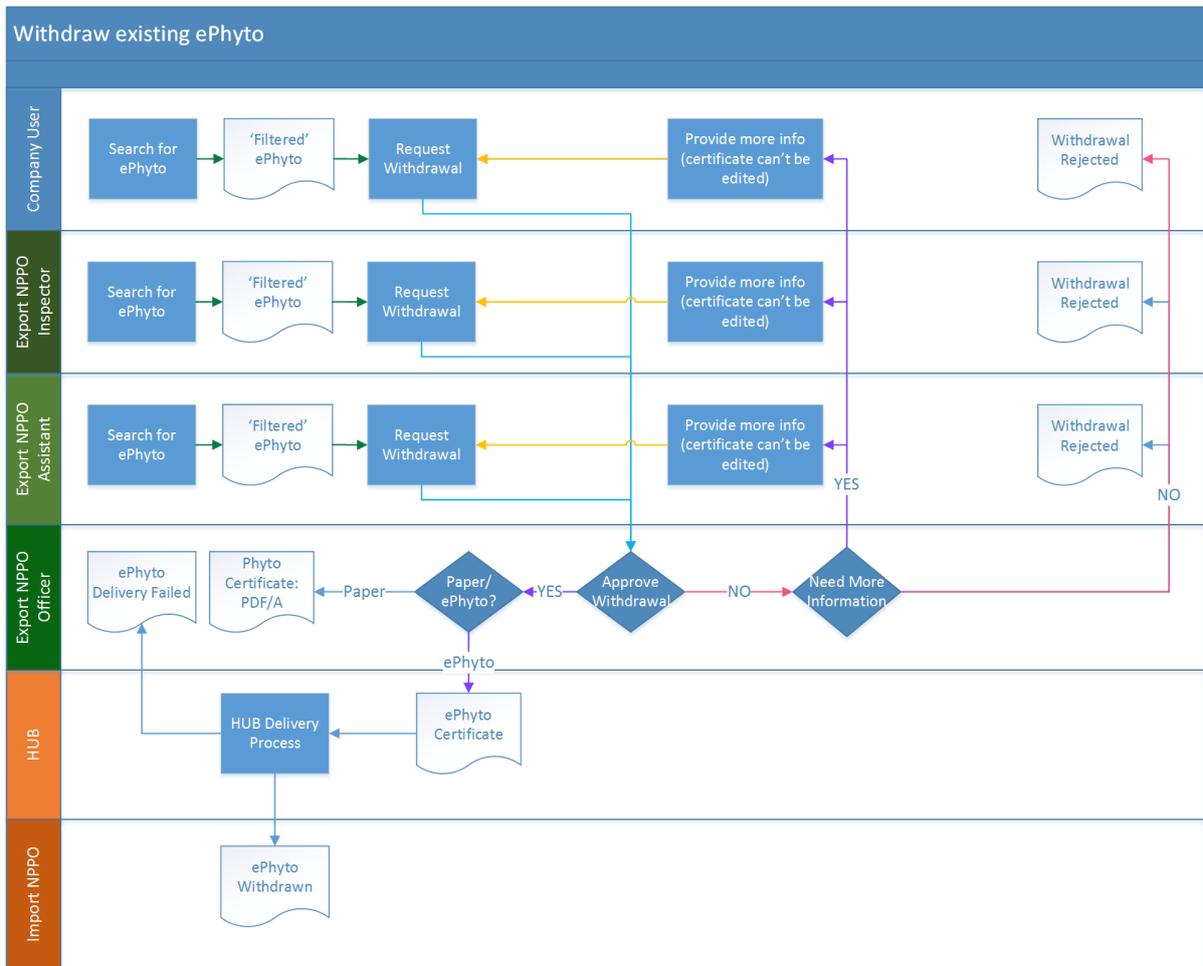
Requirement type prefixes:

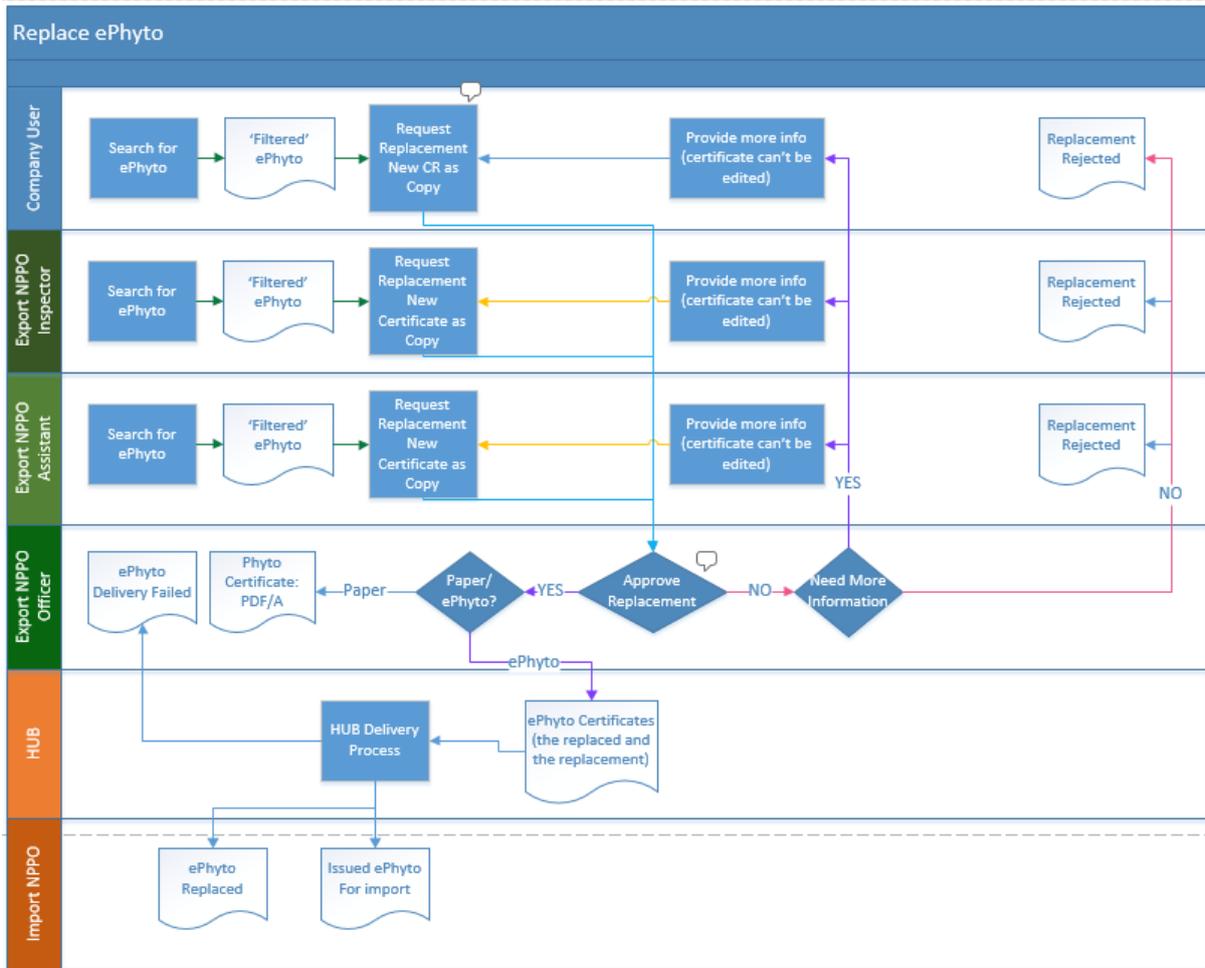
Code	Name	Description	Examples
FCRQ	Functional	the fundamental or essential subject matter of the product and are measured by concrete means like data values, decision-making logic and algorithms	The Scope of the Work The Scope of the Product Functional and Data Requirements
NFRQ	Non-Functional	Are behavioural properties that the specified functions must have, such as performance, usability, etc. Non-functional requirements can be assigned a specific measurement.	Look and Feel Requirements Usability and Humanity Requirements Performance Requirements Operational Requirements Maintainability and Support Requirements Security Requirements Cultural and Political Requirements Legal Requirements
PCRQ	Project constraints	Identify how the eventual product must fit into the world. For example the product might have to interface with or use some existing hardware, software or business practice, or it might have to fit within a defined budget or be ready by a defined date	Mandated Constraints Naming Conventions and Definitions Relevant Facts and Assumptions
PDRQ	Project drivers	Are the business- related forces. For example the purpose of the project is a project driver, as are all of the stakeholders – each for different reasons	The Purpose of the Project Client, Customer and other Stakeholders Users of the Product

PIRQ	Project Issues	Define the conditions under which the project will be done. Our reason for including these as part of the requirements is to present a coherent picture of all the factors that contribute to the success or failure of the project and to illustrate how managers can use requirements as input to managing a project	<ul style="list-style-type: none"> Open Issues Off-the-Shelf Solutions New Problems Tasks Cutover Risks Costs User Documentation and Training Waiting Room Ideas for Solutions
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8. Appendix B: Analysis Models







9. Appendix C: User Interface Compatibility List

DESKTOP - Windows, OSX, Linux	
	Microsoft Edge 12
	Internet Explorer 11
	Chrome 57-59 (2017)
	Firefox 52+ (2017)
	Firefox 45 - 50 (2016)
	Safari 11+ (2017)
	Safari 10 (2016)
	Safari 9 (2015)
	Opera 43+ (2017)
TABLETS - iOS, Android, Win Phone	
	iOS 11 – Safari
	iOS 10 – Safari
	iOS 9 – Safari
	Android 7.0 Nougat - Stock Browse (Chrome)r
	Android 6.0 Marshmallow - Stock Browse (Chrome)r
	Android 5.0/1 Lollipop - Stock Browser (Chrome)
	Android 4.4 Kit Kat - Stock Browser (Chrome)
	Windows 10 Mobile – Edge
SMARTPHONES - iOS, Android, Win Phone	
	iOS 11 – Safari
	iOS 10 – Safari
	iOS 9 – Safari
	Android 7.0 Nougat - Stock Browse (Chrome)r
	Android 6.0 Marshmallow - Stock Browse (Chrome)r
	Android 5.0/1 Lollipop - Stock Browser (Chrome)
	Android 4.4 Kit Kat - Stock Browser (Chrome)
	Windows 10 Mobile – Edge