

BRITISH VIRGIN ISLANDS

National Health Insurance Project



**TECHNICAL SPECIFICATIONS
NATIONAL HEALTH INSURANCE
INFORMATION SYSTEM**

FINAL

**HEU, CENTRE FOR
HEALTH ECONOMICS**

THE UNIVERSITY OF THE WEST INDIES

DECEMBER 2011

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Submitted by

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TECHNICAL SPECIFICATIONS: NATIONAL HEALTH INSURANCE INFORMATION SYSTEM

The Information System (IS) architecture must, among other things, allow for the ‘real-time’ transfer of services (online transaction validation) data for monitoring all aspects of the benefit package (e.g. types of services, volume of services produced, providers, etc.) and the generation of health care coverage plans and programme costs and be able to efficiently manage premia collection, beneficiaries’ registration, claims payment, service utilization and maintain clients’ history profile. The IS architecture must allow for the processing of insurance benefits within the British Virgin Islands and with institutions catering to the overseas component of the benefit package.

1. Brief System Description

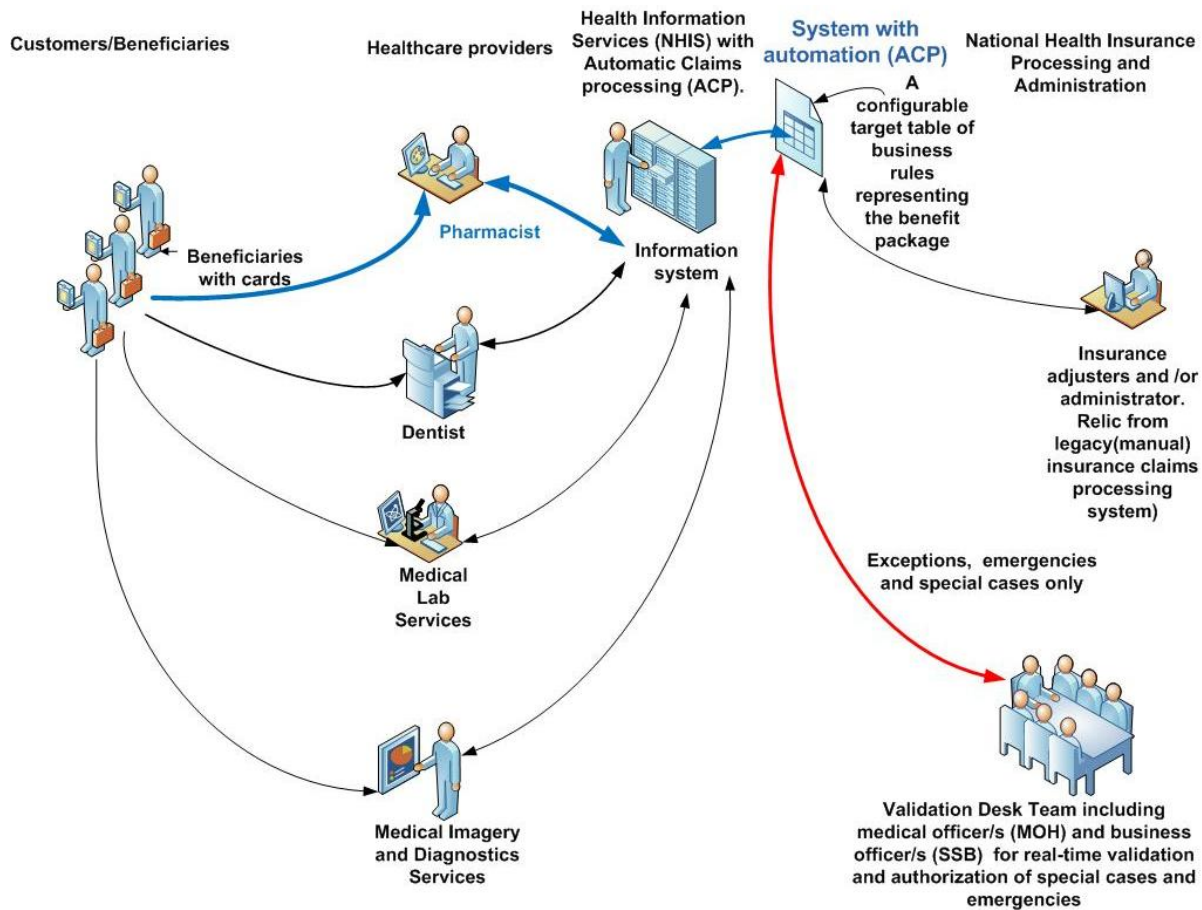
- 1.1 The National Health Insurance (NHI) system shall provide financing to facilitate access to health care services by the people of the British Virgin Islands (BVI). Each member of the country's population¹ will possess a cost effective robust magnetic swipe/identification card (with similar security to banks' debit and credit card technology) enabling access to the health care system. This is done through the public health providers such as public hospitals and health centres, as well as through the private sector health providers. The population covered by the NHI system can be referred to as **Beneficiaries**. When a beneficiary meets the health system through an encounter, he/she becomes a **Patient**.
- 1.2 The health care services, procedures and supplies that providers of the national health system deliver to a beneficiary (with or without co-payments) are called **Benefits**. The entire list of benefits available to a beneficiary for any given period of time is referred to as the **NHI Benefit Package**. Every time a patient receives a benefit, through a transaction with the health care system, it is referred to as a health care **Service**.
- 1.3 The online arbitration system shall support tight controls on the flow of all health care delivered to beneficiaries as a business commodity (similar to other industry sectors that have leveraged the benefits of modern Information and Communication Technology (ICT)) allowing the most granular levels of efficient and effective controls.
- 1.4 The arbitrating influence in the system shall be provided solely by one (1) of two (2) mechanisms, namely:
- (i) The request for service being authorized automatically in real-time (within four (4) seconds) against a predefined target set of business rules (i.e. the NHI Benefit Package); or
 - (ii) The processing of an override or special service authorization from the control desk, hereafter called the validation desk, which will comprise medical and financial officers from the Social Security Board (SSB).

To reflect the above, Figure 1.1 below outlines the arbitration process involved when a beneficiary makes a purchase from a pharmacist. Upon swiping the magnetic card, the request is communicated to the National Health Information System (NHIS), with Automatic Claims Processing (ACP) that depends on a configuration table representing the NHI Benefit Package, for validation. This configuration table is administrated and maintained by staff at SSB. However, in the event of emergencies, officers from the SSB will provide real-time validation and authorization. Accessing the other non-pharmaceutical services in the NHI Benefit Package shall, as far as possible, follow the same workflow.

¹ In 2009, the population of the BVI was 28,882 (DPU statistics).



Figure 1.1: Example of System Automation via Automatic Claims Processing for Pharmacy Services (Blue Links)



- 1.5 Each service will be uniquely coded and assigned a monetary or economic value. The basic unit of service may include, amongst others, a visit to a physician's office, the processing of X-rays, blood tests or Electro Cardiograms (ECGs). Examples of complex services would be surgical procedures or some diagnostic studies.
- 1.6 The economic values of complex services can be split into professional fees and hospital/facility expenses, as doing so will ensure that the service costs involved can be easily managed.
- 1.7 **Treatment Modules** are arrays of services that can be negotiated (between the health care administrator and providers) in any health contract. For example, a normal birth procedure can be negotiated as a package of services that would include two (2) hospital bed-days, two (2) ultrasound graphs, one (1) ECG, obstetric fees, anaesthetist fees, etc.
- 1.8 The **Electronic Medical Record (EMR)** is the basic set of patient information that is registered by the system. It will have a unique patient identifier code so that for any one

(1) patient there will only be one (1) record. The EMR will contain biographical and demographic data, basic medical reference data and the coded data of every encounter or transaction with the National Health System, including diagnostics, health care services and medicines prescribed and delivered. Data from the EMR shall be required to process an NHI claim. A full EMR would generally be an artefact of the wider Hospital Management System (HMS).

2. General Technical Characteristics

The application system to be implemented should have the following characteristics:

- 2.1 The health management and administration system must be accessible via secured web-enabled or lightweight client server interactions, capable of real-time high speed ACP (less than four (4) seconds per transaction).
- 2.2 All claims transactions must be initiated by a swipe of the beneficiary identification (ID) card.
- 2.3 All transaction adjudications must result in unambiguous approval or rejection (with specified rejection reason) of claims i.e. there must be no pending claims.
- 2.4 The system must have the ability to reverse submitted claims. Reversal of claims must be done within 24 hours of the initial transaction otherwise it will require authorization for an override.
- 2.5 All data communications among system tasks must be reflected in real-time on the database.
- 2.6 There must be online help for the users with further access to a national help desk.
- 2.7 The system must allow for the identification of the NHI Benefit Package and individual benefits to which a patient is entitled.
- 2.8 The system must allow for the management of individual health benefits by services, drugs/medicines delivery and by clinical and surgical modules.
- 2.9 The system must have the ability to integrate with clinical support services.
- 2.10 The system must provide different environments and profiles for every possible user.
- 2.11 The system must possess or support interaction with digital dashboards for clinical and administrative monitoring.
- 2.12 The system must have security mechanisms such that user access is governed by functionality and tiered access.



2.13 The system must allow for single sign-on access to the system.

3. Standards and Future Proofing

3.1 The basic standards and coding systems that the system shall possess include:

- ICD 10 with a modular upgrade path to ICD11
- CPT 2010/11
- HL7
- ITIL

3.2 The changes, debates and flux about many standards in the modern health care industry, with pending approvals and final definitions yet to be confirmed, require a cautious approach to standards at this time. Hence, the system shall be future-proofed as far as possible i.e. the standards, methodologies and functionalities supported shall be those most likely to ensure the continued accessibility and utility of the system into the future. The vendor shall indicate the system's current ability to support standards as outlined in Table A1 (Standards and Future Proofing) in **Appendix 1** and the said table shall indicate the road map and time frame into the future to support the future standards proposed if not already compliant. This information is critical in determining the suitability of the software for this application in the BVI. Failure to provide this information could deem the submission non-responsive.

3.3 The system shall have the capability to upload and use Microsoft Excel versions of current (locally) available/used coding systems (master files) from an Excel spreadsheet which may be necessary in a transition phase of implementing the system.

4. Key Processes and Associated Data Sets

4.1 The key processes and the associated data sets require eValidation, eAuthorization, eQuotation and the details of ACP. Details of the processes required and the datasets to support them are outlined in **Appendix 2**.

5. NHI System Integration into the HMS

5.1 Access

The NHI system shall be accessible in both the public and private domains, including hospitals, clinics and other providers both on-island and off-island.

5.1.1 *Public Domain Access*

This access includes public hospitals and clinics, the Ministry of Health (MoH) and the SSB and shall be seamlessly integrated into the HMS workflow and shall support the efficient NHI transaction process (defined) at all points of care within the HMS.



5.1.2 *Private Domain Access*

This access shall be via an online interface, either web-based or lightweight client/server, supporting internationally accepted standards to secure the processing of all NHI system transactions and data and appropriate techniques including SSL, Https, AES and RSA encryption of passwords. Tiered access to client/vendor/provider terminals shall be supported thereby protecting access to patient data and eliminating or reducing system abuse. Two-factor authentication shall be implemented in the solution with respect to access to any confidential medical and/or clinical patient information (i.e. medical record or partial medical record). This two-factor authentication can be achieved via the provider having a secure password and either an authorizing magnetic swipe card or the use of personal e-tokens or equivalent security devices.

Private providers' data entry burden for the NHI system shall be minimized by using the latest methodologies and procedures in software interface design, including drop-down boxes with options for intuitive user interfaces at all levels.

- 5.2 Data sets required for each provider type, for example dentists, surgery, family medicine or emergency, must be efficient and effective such that any domain shall be captured only once thereby negating any duplication of data entry in any fields in any system after integration.

In general, data sets required for each provider type shall include all relevant data necessary to process NHI claims. Data required for the various medical disciplines shall not be limited to those listed in (i) and (ii) below, but shall include those outlined in **Appendix 2**.

- (i) It shall be customizable:

ICD-10 procedures and their related costs should allow for customized adjuncts made by trained client local system administrators for specialized local or regional cases.

- (ii) It shall be standardized:

CPT codes to be adjusted by trained client local system administrators and their related costs established so as to allow for customized adjuncts for specialized local or regional cases.

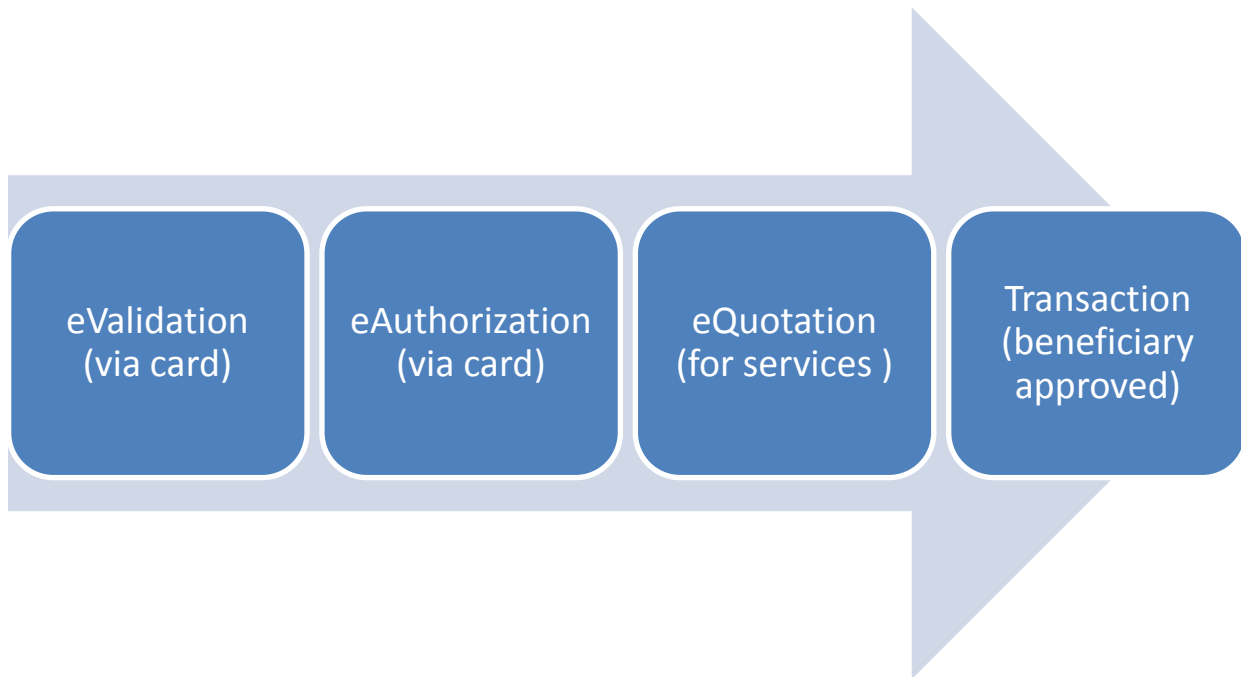
5.3 Workflow Process of NHI Transactions

In short, the NHI system shall include an additional minimum workflow time overhead of **no more than a few transaction cycles** (typically a transaction cycle shall be less than four (4) seconds) to the delivery of health care service. Provisions shall be included for patients making co-payments and for those that require others to pay on their behalf (in cases of emergency).

eValidation (via card) ---→ eAuthorization (via card) ---→ eQuotation (for expected services to be delivered {including co-payment}) ---→ Transaction (if authorized and the beneficiary agrees and makes co-payment). Figure 5.1 refers.



**Figure 5.1:
Workflow Process of NHI Transactions**



6. Failover/Backup and Data Recovery Provisions

- 6.1 The vendor shall provide a full failover/backup and data recovery strategy and methodology. The live demonstration of same shall be part of the acceptance testing of the system before purchase.
- 6.2 The vendor shall make adequate provisions for off-island data recovery, backup and redundancy in the event of hurricanes or other perilous acts of God. The items for off-island backup software shall be itemized under a subheading as Disaster Recovery.

7. Support Services and Technology Transfer

- 7.1 The vendor, with the client, shall setup a local Information Technology Infrastructure Library (ITIL) compliant service desk to ensure comprehensive on-island support of the application. This service desk shall escalate ultimately to the vendor's service desk, whose response and cost shall be covered under the warranty and extended warranty arrangements. The support shall include the training of up to six (6) on-island support service desk staff in each function of the service desk for the NHI system.

8. National Health Insurance System Modules

8.1 The modules of the IS should include, but not be limited to, the following:

8.1.1 *NHI Operations*

- Patients' database;
- Health care coverage plans (NHI Benefit Package);
- Health care providers' contracts;
- Online transaction validation (patient eligibility and service authorization) via ACP;
- Table-driven business rules (based on logic of the enforced NHI Benefit Package); and
- Health care services (coded) and drugs master files (drug formulary). Refer to **Appendix 3** for the Drug Formulary with integrated real-time business intelligence capabilities.

8.1.2 *Support for National Health Administration*

- Executive dashboard;
- National health statistics and indicators;
- National health care administration: management and performance monitoring of public health providers;
- National surveillance system; and
- Business intelligence system and data-warehousing.

8.1.3 *Interface with Hospital and Health Care Centres Information Systems*

- Clinical management system with:
 - Out-patient administration system;
 - EMR; and
 - General appointment and scheduling system.
- In-patients and out-patients administration systems;
- Bed assignment;
- ADT (Admission, Discharge, Transfer) and other forms processing;
- General clinical analysis laboratory IS and interface with any operational laboratory IS i.e. public health laboratories in the BVI;
- X-ray and imaging laboratory management systems and picture archival and communications systems (PACS). Interface with any existing imaging laboratory management system, teleradiology and PACS;
- Pharmacy and inventory management system with multiple storage capacity;
- Order processing within hospital wards and other facilities;
- Surgical theatre management system;
- Laundry, dieting and other ancillary support systems; and
- National blood bank system.



8.1.4 Other Services

- Implementation of user training including the development of all training manuals (to be made available in both hardcopy and editable softcopy), source code modifications and adaptation services for any customization required.
- Application software maintenance and general support services.
- Technical support of the NHI IS and its commissioning.
- Submission of a two (2) year service level agreement with warranty proposal.

9. Central Server Cluster and Connectivity

9.1 The provider will identify the centralized server cluster required, with all recommended attendant firewalls, security controls, data recovery and scalability and maintenance services, for the application as separate itemized components.

9.2 Web-Enabled System Application

The application shall be available through a central server cluster and web-enabled or lightweight client-server application system for users to be able to access the system through internet (or intranet) connectivity using standard browsers or lightweight interfaces using secure protocols.

Non-qualified users or the general public could have restricted access to the system via a portal through the internet using a browser. A separate internet access point should be used for this purpose. The internet architecture for this purpose must be robust enough to accommodate modifications or expansions for public access.

NOTE (i) - A project to connect MoH facilities has been developed and implemented through the BVI Government Communications Network project. This project shall be upgraded to underpin the application with at least 1Mbps broadband connectivity to the internet and at least 5 Mbps intranet connectivity providing redundancy in connectivity for all sites. All relevant documentation of the existing LAN/WAN architecture will be provided.

The server cluster site operations will be equipped with the following features:

- Disaster recovery back-up facilities;
- Server scalability features;
- Solid data communications structure with scalable bandwidth and network monitoring;
- Solid user access security structure including firewalls, DMZ and user monitoring; and
- Scalable database hardware including image storing and retrieval.

NOTE (ii) - Backbone Connectivity and Underlying Infrastructure

The BVI Government Communications Network project has been completed and the sites have been connected. Provisions shall be made for internet backup redundancy connection with a minimum of 1Mbps for the NHI system. A sample of the typical



backbone underlying infrastructure links is shown in **Appendix 4** (Sample Map of Underlying Infrastructure).

The Government's backbone project has delivered intranet connectivity to every public site. Each site has the available LAN structure with a LAN server and/or a PC to become the connectivity gateway. Provisions have to be made in some areas for reliable power protection and backup (out of the scope of this project). For redundancy and business continuity, the minimum number of nodes per site with the (NHI IS) application shall be two (2).

9.3 Supplemental Hardware Requirements

If the need arises, the service provider and software vendor should propose the necessary hardware or make other recommendations in order to support the proposed software. A detailed itemized listing of the cost of requirements entailed should also be made available.

10. Scope of Works (NHI System)

10.1 Health care services are provided by the network of hospital, district health facilities, health centres, private health care facilities and overseas health care centres. The following is a conceptual framework of the proposed NHI System Network:

The public health system comprises one (1) hospital which delivers a mixture of secondary and tertiary care and some specialist services. There are eleven (11) health centres and remote sites that deliver primary care services. These institutions are spread in a decentralized manner across the multiple-island divide. Private care providers shall connect via broadband.

10.2 The objective of the application to be deployed is to capture the information at the moment and place that the beneficiary of the NHI system encounter occurs, with a minimum of applied resources.

10.3 The system required to achieve this should utilize current and appropriate tools, technology, methodology and state of the art data processing techniques. Data recorded from the encounter or transaction will allow for the generation of different layers of information in order to satisfy the requirements of all the stakeholders of the NHI system and the wider HMS.

10.4 The end result will be a platform with general characteristics which would cover the data processing needs of:

- All health care providers or ad-hoc groups thereof;
- All MoH offices, auditors, quality assurance departments, etc.;
- The public (beneficiaries of the health system); and
- Connectivity to the existing LAN/WAN deployments.



- 10.5 The vendor shall, with the client, formulate a detailed implementation schedule and strategy for deployment. This should include IT architecture, dovetailed into indicative architecture and functionality guidelines as outlined in this document (illustrated in Figure 1.1 above). Transition support and management of change (see Section 11) shall be one (1) of the key focus areas of the vendor during implementation.
- 10.6 The scope shall encompass the following workflows and functionalities:
- Nationwide patient registration. This shall be integrated into the HMS;
 - Accessing the EMR or subsets of data from same, where necessary, using the unique identifier;
 - Online transaction, validation and authorization of benefit eligibility for patients;
 - Administration of “Business Rules” for the MoH/SSB: NHI Benefit Package, health providers’ contracts, co-payments, etc;
 - Billing and invoicing control and the payment of health care providers; and
 - Online medical auditing and quality control, etc.
- 10.7 The scope shall also include the following tasks during implementation:
- Support to the MoH and the SSB to the application for policy making on software services support, statistical analysis for health care related problems (morbidity/mortality, etc), quality control, policy making, generating reports and customization, support and compliance to legal requirements i.e. for securing data and records;
 - Liaise with ICT departments that manage the BVI’s ICT backbone, the Department of Information Technology (DOIT), Peebles Hospital ICT and other information systems related to service functionality as needed to complete the project;
 - Full system implementation starting at pilot sites on a phased basis;
 - Training of staff in the use of the new system(s), including technology transfer;
 - Changing the management process and implementation; and
 - Provision of full documentation on the IS.
- 10.8 An itemized guide outlining the scope of the project is presented below:
- (i) Develop an implementation plan (including identifying resources, site assessments and collaboration with the Steering Committee of various high level sponsors, key stakeholders and functional managers);
 - (ii) System documentation I;
 - (iii) Initialize setup of support service desk and preliminary training of initial teams;
 - (iv) Assess and perform customizations and system integration if necessary;
 - (v) Further training and support development based on point iv above;
 - (vi) Deliver and deploy application (Pilot);
 - (vii) System documentation II;
 - (viii) Gather feedback and address issues (iterative process) including further training until client sign-off;
 - (ix) Full deployment and acceptance testing;
 - (x) Setup final support and warranty period;
 - (xi) System documentation III.



10.9 Health Programmes Integration

The NHI System will integrate with other health-related initiatives as defined by the MoH and the future needs of the country. This shall include the following:

- Financial Management Information System (FMIS);
- Human Resources Information System (HRIS); and
- Existing PACS.

11. Transition Support and the Management of Change

11.1 The introduction of IT throughout the health care sector will require change management. The vendor would be expected to engage in some of the key activities of the MoH/SSB: information sharing, knowledge transfer of applications software and if applicable, the source code, facility assessments, training and implementation planning.

11.2 **High-Level Activities** - Effect new and/or different behaviour in key stakeholders through active participation in the change initiatives for this project. Minimize the adverse impact of changes throughout the organization. Allow for planning and coordination of changes in order to provide a stable working environment. Maximize the productivity of persons involved in the change process.

11.3 **Business Process Mapping** - Taking the processes of the daily functions in the running of the facilities and ensuring that they are captured and correctly implemented into the electronic system.

11.4 **Implementation Planning** - The approach to implementation will be done in phases as outlined in the deployment plan and as part of the implementation phase. Communication to the right audience must also be taken into consideration. Implementation should be clearly defined, outlining tasks, resources and durations.

11.5 **Identify Learning Needs** - The process of determination of the type of users must be defined as user classification. It is necessary to ensure that the best training programmes are developed based on competency levels.

11.6 **Training** - Training programmes will be developed and training provided for application operations to facilitate the use of the system and build user competency.

11.7 **Change Management** - Build a systematic change management methodology to implement change and simplify the process of helping employees transition from the current state to the future state in a way that minimizes productivity loss, negative customer impact and employee turnover. A description of the proposed methodology inclusive of business process mapping, acceptance testing, quality assurance/control, implementation and training should be provided along with examples of how it was successfully employed.



- 11.8 **Data Conversion** - Making manual or paper-based processes electronic or automated by using the right software and coding methods. Coded information on diagnosis in service areas accessed will allow for more informed provision of clinical services. The system should have an integral mechanism that extends to reveal potential matches between the current and other entries even when a surname has changed and which explains to the user the basis of such a match. It should also have the ability to link and/or split patient records at any time with the ability to nominate the principal record.
- 11.9 **Troubleshooting/Problem Solving** - This support should be provided through online interfacing. Online help should be available for every user at every screen with further access to a national help desk. The system should also respond with clear and consistent error messaging with suggested corrective action.
- 11.10 **Process Assessment** - Health service processes depend on sound information management. System performance assessments, gap analysis assessments, work plans, risk management and metric reporting are some of the measures to be used for defining and documenting the entire transition phase and assist in improving processes.
- 11.11 **Post-Implementation Evaluation** - Identify success or failure, monitor change, status reporting, evaluation sheets and questionnaires.
- 11.12 **Document Lessons Learnt and Best Practices** - Analyze feedback from process assessment and post-implementation evaluation and outline corrective actions to reinforce the culture of continuous improvement to sustain and continually improve the desired level of health care provided.

12. Licensing Requirements

- 12.1 A detailed listing of the costs of all licensing requirements (if applicable) regarding usage of the software for a period of five (5) years must be clearly defined. All requirements pertaining to the distributions, restrictions, additional features, updates, amendments to pricing terms or other matters pertaining to the software should be clearly outlined in the licensing agreement. The complete agreement should also outline any prior representations, discussions, undertakings, warranties, communications or advertising relating to the software.
- 12.2 The terms and conditions of termination should be clearly defined inclusive of expectations of both the vendor and the MoH/SSB.
- 12.3 The vendor will be required to continually place in escrow, for the MoH/SSB of the BVI, the most recent version of the source code for all proposed software. In the event that the vendor is adjudged bankrupt or ceases to provide software support, the MoH/SSB shall have full access to the source and object codes, all documentation and any modifications made to the software prior to and after the vendor has been adjudged bankrupt or ceases to provide support. If the vendor is adjudged bankrupt or ceases to provide support and



no other supplier agrees to provide support for the product, then the source code shall become the property of the MoH/SSB in its entirety.

13. System Warranty and Maintenance

- 13.1 The warranty period shall start on the date of successful completion of the acceptance test(s) agreed on by the vendor and the MoH/SSB.
- 13.2 The initial warranty period shall be a minimum of two (2) years. The vendor shall indicate options and terms related to the warranty for the client's consideration which will necessarily include the terms and conditions as stated in the Standard Maintenance under Warranty section outlined below.
- 13.3 An extended maintenance plan shall apply to the system for a minimum period of five (5) years after the expiration of the warranty period. The MoH/SSB reserves the right to have the period of the maintenance contract (for standard maintenance) extended. The vendor shall **at the time of submission** indicate the estimated cost per year of additional extended warranty from year one (1) to year five (5) (indicating price per year) after the initial warranty period. These figures shall be used in determining the Total Cost of Ownership (TCO) of the application over the period. Failure to provide this information at the time of submission could deem the submission non-responsive for evaluation.
- 13.4 In the event of any defect in the media upon which the software is provided arising within five (5) years of the date of delivery of the software, upon return to the vendor of the software or original media, the vendor shall provide the MoH/SSB with a new copy of the software.
- 13.5 The maintenance coverage shall be inclusive of the provision and installation of patches and updates, as well as second level user support. This coverage shall facilitate extensive and full training of local resources to perform these operations and support the application.
- 13.6 **Standard Maintenance under Warranty and the Client's Future Proof Protection**
During the warranty period, the vendor shall provide to the MoH/SSB any new, corrected, enhanced versions or incarnations of the software as created by the vendor. Such enhancement shall include all modifications to the software which increases the speed, efficiency or ease of use of the software, or adds additional capabilities, standards' compliances or functionality to the software (refer to **Appendix 1**).
- 13.7 **Extended Maintenance Plan**
The estimated charge for extended maintenance plans shall be provided for system warranty and maintenance as outlined above. The plan shall essentially consist of the terms and conditions as outlined in the Standard Maintenance under Warranty section above, but shall apply outside of the initial warranty period.



The MoH/SSB shall notify the vendor in writing if it desires to receive the extended maintenance plan for a twelve (12) month period. If the MoH/SSB fails to take optional extended maintenance plans and later elects to receive it, the vendor reserves the right to negotiate (based on work required to bring the application up-to-date with the latest updates) with the MoH/SSB, a charge up to the maintenance fees for the period of the lapse in maintenance.

In short, the cost to extend the warranty and maintenance per year after the initial two (2) years (i.e. provision of an extended maintenance plan) shall be estimated and identified in the vendor's submission for up to five (5) years after the initial warranty period at a yearly cost.

14. Turnkey Operation with a One-Month Handholding Period

The vendor shall provision to deliver a turnkey operation, which when complete will be followed by a one month handholding period, with a quoted price provision for an additional month of handholding, if the client deems it to be necessary.

Herein, a turnkey operation shall include everything needed to immediately start and run the system, including tangibles such as inventory and equipment and intangibles such as previously established best practice methods and methodologies i.e. a franchise-type operation.

The project (Turnkey Operation) would involve the following elements:

- Project administration;
- Licensing of process;
- Design and engineering services;
- Management control;
- Procurement and expediting of equipment;
- Materials control;
- Inspection of equipment prior to delivery;
- Shipment and transportation;
- Control of schedule and quality;
- Pre-commissioning and completion;
- Performance-guarantee testing;
- Inventoring spare-parts;
- Training of owner's/system operations and maintenance personnel; and
- Work flow analysis and optimization of all parts.

The handholding operation shall start only after the system has been accepted and the training to the local support staff has been completed and signed off.



APPENDIX 1**STANDARDS AND FUTURE PROOFING****Vendor Information**

- A1.1 The columns labelled (1), (2) and (3) in Table A1 below are to be filled by the software vendor(s).
- A1.2 If the application offered is already compliant in the standard indicated, please tick (√) under the compliance column (3) for that standard and do not enter any information in columns (1) and (2) for that standard.
- A1.3 If the application is not compliant, please fill in columns (1) and (2).
- A1.4 Codes are to be included and, if not, shall be easily upgradable as per the vendor's quote but including any licence fees due to copyright of coding scheme e.g. from the American Medical Association (AMA), etc.



TABLE A1
STANDARDS AND FUTURE PROOFING

Item	Description	Code	Meaning	Present BVI Standard or Master File	Future BVI Standard	Comments - Timeline for Future Proofing to Future Standard (1)	Estimate Cost of Future Proofing to Future Standard (2)	Compliant (3)
						<i>To be filled by Vendor</i>		
1.	Diagnostic Codes	ICD-10CM	US ICD-10 CM (with clinical modifications: approx. some 155,000 codes)	Local customized on Excel	US ICD-10 CM (with clinical modifications: approx. some 155,000 codes)			
2.	In Hospital Procedure Codes	ICD-10-PCS	Procedure Coding System ICD-10-PCS for inpatient hospital procedure coding	Local customized on Excel	Procedure Coding System ICD-10-PCS for inpatient hospital procedure coding			
3.	Drug Formulary			Local customized on Excel	Preferably dynamically updated and globally referenced			
4.		EDI			EDI Version 5010			
5.		HL7		HL7	HL7			
6.		HIPPA*						

*HIPPA compliance to the extent of non-disclosures, but not to the extent of disallowing online Automatic Claims Processing.



APPENDIX 2

KEY PROCESSES AND ASSOCIATED DATA SETS

The key processes and the associated data sets required are eValidation, eAuthorization, eQuotation and their related data sets. These processes shall be completed within four (4) seconds.

A2.1 Data for eValidation and Patient Admission

A patient's access to health care resources is validated and authorized by a magnetic swipe card and a light weight application running on the provider's PC, querying a data centre server with the ability to do ACP. All sites will access the same data centre application and the patients' database.

A2.2 The functionalities required for a clinical interaction are:

Patient Identification - With the swipe of the health care card (secure bank ATM card type technology), the patient will be identified and all his/her demographic data will be retrieved from the central database and displayed on the screen for further validation. The clerk would confirm the patient's name, address and family status. If the patient's personal data is not updated, the clerk can update his/her demographic data. If the patient is not registered, the clerk could (if authorized) open a pre-registration file allowing temporary coverage. If the patient did not bring his/her health card, the system could (but probably should not for security and possible abuse reasons) be allowed an identification process through his electronic birth certificate number, driver's permit, passport number, etc. or finally by his/her name and address.

Screen # 1 - Admissions Desk

The data sets required are listed below and shown in Figure A2.1.

- Patient's ID
- Patient's Name
- Patient's Demographic Data (via pull-down entries)
- Health Plan or NHI Benefit Package
- Health Care Service Requested
- Health Care Service Prescribed
- Health Care Provider ID
- Service Authorization Status
- Co-payment



Figure A2.1: Sample of Data Set on Admissions Screen

Patient ID	<input type="text"/>	Name	<input type="text"/>
Patient's Demographic Data			
Health Plan	<input type="text"/>	HC Provider ID	<input type="text"/>
HC Service Prescribed	<input type="text"/>	Service Authorization Status	
HC Service Requested	Pull-down List ↓	Approved	<input type="checkbox"/>
Co-payment	\$ <input type="text"/>	Rejected	<input type="checkbox"/>
		Pending	<input type="checkbox"/>

A2.3 Interaction Data Capture

The objective of an NHI System business process is to capture essential data from **each patient's interaction** or each "transaction". Thus far, through the patient's registration process, part of the essential transaction data has been captured, namely:

- (i) Encounter date and time;
- (ii) Patient ID; and
- (iii) Health Care Provider ID.

The Healthcare Provider ID is automatically submitted via the clerk's PC where the patient was registered. If several physicians or health care providers are serviced by the same clerk's PC, then the clerk must input the attending physician's or health care provider's ID in the system.

A2.4 Health Care Service Code

The other essential transaction information that must be captured is the **health care service code** related to the service to be delivered. This code should indicate a physician's visit, a laboratory test, an X-ray, a cast, a physiotherapy session, etc. In general, at any patient admissions desk, the different service codes that the clerk can enter shall be limited to a maximum of twenty (20) by the system administrator configuration. In actual implementation, the client would be encouraged to keep these to a minimum. The clerk will simply select from an appropriately customized pull-down menu of those authorized services that the health care provider is contracted to perform.

A2.5 Diagnostic Code (ICD-10)

The essential transaction information is the **Diagnostic Code (ICD10)**. The patient may have a valid diagnostic of his/her ailments (i.e. diabetes, hypertension, etc.), which were

previously registered in the patient's record database and retrieved by the system to process this transaction. It may also be the case that the patient's complaint indicates a potential diagnostic that should be entered by the referring physician. Where there is no valid diagnostic for the current encounter, the attending physician will enter it when the diagnosis is finally available.

A2.6 eValidation eAuthorization and eQuotation Processing

eValidation, eAuthorization and eQuotation processing shall respectively test the patient's eligibility and authorization to access the service and then provide him/her with a costing (co-payment) for the service. At this point, he/she may choose to access the service after making the co-payment to complete the transaction or he/she may choose not to do so. The system shall capture either decision.

With the data captured (in item A2.1 to A2.5), the patient's eligibility or transaction validation process can be determined/performed.

The four (4) data items - date/time, patient ID, physician ID and health care service ID - are all captured by the admissions clerk. This data plus the Diagnostic Code stored in the database shall, through the connectivity link, allow the system to perform an online validation (eligibility) process against the business rules defined at the central database. This validation process, after consulting the business rules, should answer the following types of questions (with flexibility for additions and combinations):

- (i) Is the patient entitled to receive the health care service submitted? Yes/No
- (ii) Does the health care provider have a contract with the health system that supports that particular service? Yes/No
- (iii) Is the patient's gender, age and diagnostic acceptable for the health care service requested? Yes/No
- (iv) Does the patient need previous authorization? Yes/No. If "Yes", does the system's database have it? Yes/Pending Authorization
- (v) The previous four (4) questions would be answered by confronting the coded encounter data items (patient ID, health care provider ID, health care service code and diagnostic code) to comply with the business rules, then display the appropriate legend: Approved - Rejected - Pending Authorization
- (vi) If approved, does the patient's health plan coverage require co-payment for the health care service requested? Yes/No. If "Yes", display it on the screen.

A2.7 Business Rules

The business rules can have an increasing degree of complexity. Starting with a single universal health plan for everyone and uniform health care providers' contracts, it can evolve into a complex matrix of health plans for different populations and specific and specialized contracts with health care providers (and private carriers) with the possibility of implementing pay-per-service/performance criteria.



A2.8 Data for Electronic Medical Records

Screen # 2 – Physician’s Desk

The data sets required are listed below and shown in Figure A2.2 below.

- Patient ID
- Patient Name
- Patient Electronic Medical Records
- Bio-data, plus past encounters data (Date, Health Care Service Performed, Attending Physician, Diagnostic, Prescriptions)
- Diagnostic
- Health Care Service Prescribed
- Drugs Prescribed
- Co-payment

Figure A2.2: Sample of Data Set on Physician’s Screen

Patient ID		Name	
Patient’s Electronic Medical Records Bio-data plus Past Encounters Data: <ul style="list-style-type: none"> • Date • HC Service Performed • Attending Physician • Diagnostic • Prescriptions 			
Diagnostic		Pull-down List	↓
HC Service Prescribed		Pull-down List	↓
Drugs Prescribed		Pull-down List	↓

Once the transaction is validated (approved), the patient’s health records (EMR) can be accessed by the system’s authorized users (physicians). The EMR data fields will contain the patient’s demographic data, the patient’s basic medical data (blood type, allergies, main diagnostic, etc.) and the patient’s encounter data starting with the last encounter.

The attending physician/clinician or authorized physician shall have exclusive access to the patient’s medical record(s) through his/her workstation; the patient’s bio-data as well as past encounters data with the health system. The system shall support two (2) factor authentication security access (for example e-token or similar methodology) to secure the confidentiality of patients’ data - partial or complete medical record - at all times.



A2.9 Data for Medical and Business Validation Desk

The validation desk (medical) officer(s) will receive at his/her workstation in real-time all health care services requested. The medical officer(s) will approve or reject services and as soon as the decision is entered into the screen, it will be recorded in the database and attached to the patient’s records.

Screen # 3 - Medical and Business Validation Desk

The data sets required are listed and shown in Figure A2.3 below.

- Patient ID
- Patient Name
- Patient Electronic Medical Records
- Bio-data, plus past encounters data (Date, Health Care Service Performed, Attending Physician, Diagnostic, Prescriptions)
- Diagnostic
- Health Care Service Prescribed
- Drugs Prescribed
- Co-payment
- Service Authorization Status

The validation desk officer(s) shall have the ability to change the status of the case/request from pending by choosing (after analysis and deliberation at the validation desk level) to approve or reject the request.

Figure A2.3: Sample of Data Set on Medical and Business Validation Screen

Patient ID		Name			
<p>Patient’s Electronic Medical Records</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;"> Bio-data plus </td> <td style="width: 50%; border: none; vertical-align: top;"> Past Encounters Data: <ul style="list-style-type: none"> • Date • HC Service Performed • Attending Physician • Diagnostic • Prescriptions </td> </tr> </table>				Bio-data plus	Past Encounters Data: <ul style="list-style-type: none"> • Date • HC Service Performed • Attending Physician • Diagnostic • Prescriptions
Bio-data plus	Past Encounters Data: <ul style="list-style-type: none"> • Date • HC Service Performed • Attending Physician • Diagnostic • Prescriptions 				
Diagnostic		Service Authorization Status			
HC Service Prescribed		Approved Rejected Pending 			
Drugs Prescribed					



APPENDIX 3

DRUG FORMULARY WITH INTEGRATED REAL-TIME BUSINESS INTELLIGENCE CAPABILITIES

Drug Formulary: Pharmacy Standards, Dynamic Drug Formulary (DDF) with Real-time Business Intelligence Capabilities

The solution shall use globally accepted pharmacy standards and shall allow for the deployment, maintenance and support of a modern drug formulary permitting an efficient methodology to ensure timely and automated updating of the countrywide drug formulary used in the NHI System. This shall herein be referred to as a real-time or e-Dynamic Drug Formulary (e-DDF) optimized for regional use, bearing in mind that, like the BVI, countries in the region have much to gain both financially and otherwise from the use of cost effective, approved, globally available drugs. It is important that the classification of these substitutes be up-to-date and accessible by all system users, mainly clinicians and pharmacists. The updates of inclusions and removals for the formulary shall be captured, defined and classified in the system as early as possible if not as soon as they become available on the world market, pending approval from the BVI Pharmacy Board and/or other legal approver of drugs for use in the BVI's health care system.

Business Intelligence Capabilities

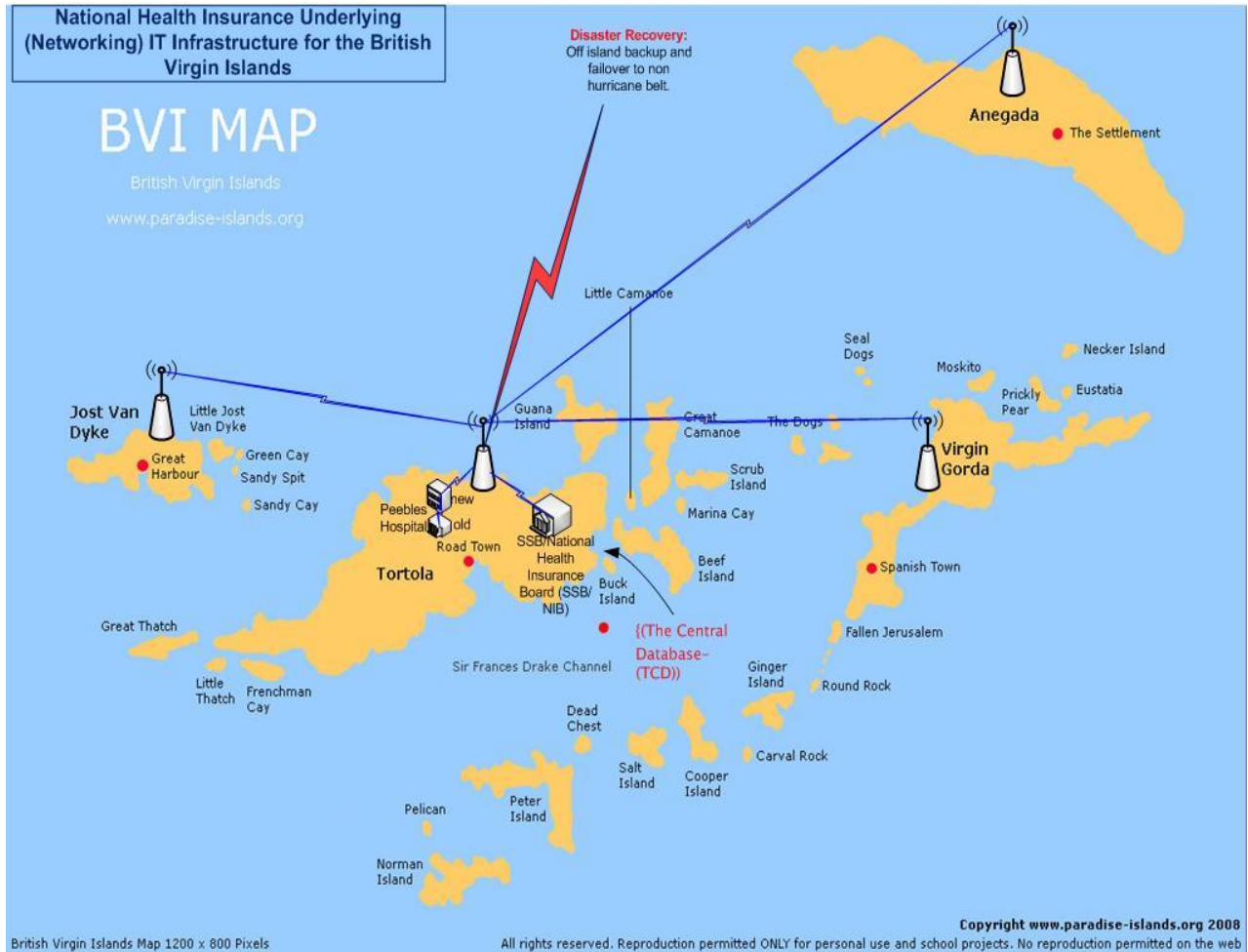
The system shall, via its built-in real-time business intelligence capabilities, flag and act as configured in the detection of drug interaction and enable system controls on Pharmacy and Therapeutic (PT) dispensing. For example, the system shall be able to enforce (if required, by simple client configuration) rules such that a specific medical specialty can (only) prescribe a particular class of drug i.e. the client shall be able to control prescribing in the system whereby only a psychiatrist can prescribe drugs classified as mental health drugs or only a cancer specialist can prescribe cancer treatment drugs, etc. The system shall be flexible, allowing client configurable rules-based support to customize and flag drug-to-drug interaction, drug duplicate, drug allergy, drug pregnancy, drug generic ethnic group, drug food interaction, drug overdose, etc., thus minimizing medical and dispensing errors.

The above requirements shall be key capabilities enshrined in the system or accessible by the system, which will be evaluated owing to its significant impact on cost savings and safety afforded in the efficient and cost effective distribution of medications in the country's health care system.



APPENDIX 4

SAMPLE MAP OF UNDERLYING INFRASTRUCTURES



The blue links indicate connections to the Peables Hospital, public clinics and the SSB with at least 10 Mbps intranet connectivity and at least 1Mbps internet backup connectivity, which are to be provisioned for the NHI System.