



1. OAP Concept Note

Overview, Instructions, and Template

Tamanu

Two-Sentence Overview

Our goal is to improve healthcare in Pacific Islands through the implementation of Tamanu, our free, open-source, patient-level electronic medical record (EMR) built for the uniquely remote settings across the region, with an offline-first, sync-enabled design across desktop and mobile. Beyond Essential Systems (BES) is well placed to achieve this goal, as we have in-depth, contextually appropriate experience in delivering successful, transformative digital projects in eight countries across the Pacific Region, with partners including the Australian Department of Foreign Affairs and Trade, the New Zealand Ministry of Foreign Affairs and Trade, WHO, UNFPA and the Bill and Melinda Gates Foundation.

Executive Summary

The Digital Square investment will contribute to the continued development of the Tamanu software, improving shelf readiness and reducing the cost of individual deployments. Optimisations will include development of quality assurance and testing frameworks, contribution to the OpenHIE Testing Framework, further documentation of our open-source code repository and further investment into aligning of Tamanu with the OpenHIE architecture. Ideally, this would include mentoring and non-financial support.

As an EMR, the primary goal of Tamanu is to support clinical workflows in low-middle income countries to improve patient care and outcomes, specifically in the Pacific setting. The system must meet the technical and operational challenges that are faced in these settings, whilst aligning with principles of OpenHIE.

Tamanu has been developed by the same software team that developed Tupaia, mSupply and mSupply Mobile, working in collaboration with Sustainable Solutions and designed specifically for the Asia-Pacific context.

Tupaia demonstrates the success that has been achieved by BES. It is a data aggregation, analysis and visualisation platform designed to provide a comprehensive map of health systems in the Pacific region. Combining data from DHIS2, mSupply and other sources in real-time, it is used for health supply chain strengthening, disease surveillance, disaster response and strengthening service provision. Tupaia is currently in 8 countries and growing.

Consortium Team

Required: Aligning Tamanu with OpenHIE architecture

This would entail non-financial support for our software development team, ideally through regular remote mentorship sessions and the development of a highly detailed interoperability roadmap.

Prime Organisation: Beyond Essential Systems (BES)

We are an Australian eHealth company that has managed large projects across the Pacific region. Our software solutions are Tamanu and Tupaia (a multi-award winning open-source health data aggregation and visualisation platform implemented in 9 Pacific Island Countries). We additionally have extensive experience implementing DHIS2 and mSupply. Tamanu has been developed solely by BES and we will continue to be the primary developer of this software.

Supporting Organisation: OpenHIE

A mentor from OpenHIE to provide support on OpenHIE architecture. Working alongside this mentor, we will conduct a system analysis of Tamanu, and put together the technical documents required to guide us on our transition towards alignment with OpenHIE architecture. Additionally, we will use this mentorship to build up a series of test suites based on the principles behind the OpenHIE Testing Framework.

Project Description

Background

In the Pacific region especially, there is an enormous need for a contextually-appropriate patient-level EMR software. Two years ago, we set out to find such a software that was appropriate for the uniquely remote and under-resourced settings in which we work.

After an extensive and unsuccessful search, we developed Tamanu. Tamanu's development has been driven by five principles for eHealth in the Pacific which we believe will ensure the system meets the challenges presented by the Pacific— it is free and open-source; sync-enabled; encryption at rest and in transit; Mobile and desktop functionality “out-of-the-box”; and integration with existing eHealth platforms in the Pacific (via REST APIs and HL7) and interoperability with major international standards (e.g. ICD-10).

We have pilot projects or planned implementations of Tamanu in three countries, with interest expressed across three further countries already. We believe Tamanu could potentially be implemented as a national system in up to eight countries in the Pacific and in several countries in Asia.

However, we see unique and significant value in further developing this software to achieve greater alignment with global frameworks and addressing current software gaps. An alignment with OpenHIE architecture will ensure that Tamanu meets standards-based approaches in future and larger scale implementations. This will maximise the interoperability of Tamanu by ensuring that it leverages health information standards, enables flexible and customisable implementation by country partners, and supports interchangeability of individual components.

We have also identified four software development priorities for the software in alignment with the shelf-readiness framework.

Tamanu's desktop client and server can currently be installed on a Windows PC from a zip file or by running an installer. There is no automatic update system in place for either the desktop or server components - this would be the next most important step in terms of productisation.

As the communication between the Tamanu server and desktop client all happens through a JSON API, any external system capable of making HTTP requests could communicate with Tamanu as capably as the desktop client does. Currently the API documentation only exists in the form of test specifications, however future work here would include writing up more structured documentation with a focus on explaining architecture and outlining how to achieve particular use cases, rather than just detailing data structures.

We have taken care to follow industry best practices around security in Tamanu's development, but we have not engaged any security experts to audit the architecture or codebase or conduct any penetration testing. These would be the ideal next steps to improve Tamanu's security.

Tamanu is designed to be used in smaller settings, where a single well-specified on-site server could handle the requirements of the facility. The central server that manages synchronisation between on-site servers is in its early stages, and no work has been put into scalability yet.

Objectives

In order to address the problem statement, we have implemented stringent processes entailing testing and documentation. Development on the backend is progressing using a test-driven approach, so we can move quickly while still being confident that the software works as expected. The frontend is tested manually, but with a component-driven approach so new screens can be assembled and rearranged without requiring large changes to the application. All changes go through a peer-review process to catch any code-level issues. Through this process we hope to ensure that the software is clinically and technically viable.

Deliverables & Schedule

Through regular meetings with an OpenHIE mentor, we hope to achieve the following as we work towards our goal of OpenHIE alignment:

- Identified list of standards to be implemented in at various interface seams, based on OpenHIE specifications. Such standards include FHRI compliance;
- Roadmap document, laying out strategy for moving from current to ideal architecture;
- Rigorous testing criteria set out in regression suites that can be replicated prior to each release.

As previously mentioned, we have pilot projects or planned implementations of Tamanu currently in three countries. We therefore hope to achieve the above deliverables by the end of 2020 to continue ongoing system enhancements for future projects.



Risk Mitigation

The following have been identified as key risks relevant to the implementation of eHealth initiatives in the Pacific and of EMRs specifically.

Long-term Sustainability

Software solutions change rapidly, and new technologies are constantly emerging to support better healthcare outcomes. As a result, there is an inherent risk that the proposed software, Tamanu, becomes obsolete or no longer supported.

BES have been operating since 2015 and have external funding to maintain our solutions for a minimum of a further six years. The underlying technologies used in Tamanu are at the forefront of software innovation, and the BES team is well placed to continue innovating and delivering cutting edge solutions. Tupaia is used in 8 countries already and we foresee a sustainable model with support from partner countries and multi-lateral donors.

BES pride themselves on maintaining a stable business model of profitable sustainability, where the primary goal is to help people and not simply to derive profits. All software created by BES, including Tamanu, has been built on free and open-source platforms, meaning the software code is publicly accessible and can be managed or modified by adequately equipped local ICT staff should they wish or need to do so.

Installing open-source software ensures that partner countries will be able to continue to use, update and maintain the software should the implementing partners cease to exist.

Security/Data Breaches

Data breaches are a major risk to any digital health project and are taken very seriously. All data in Tamanu will be encrypted at rest and in transit. Access to data within Tamanu is password-controlled. The ability to view and download data is restricted to specific user groups.

Clinical Adoption/Change Management

Clinical adoption is a primary risk in the implementation of any EMR, with clinician resistance and technical literacy frequently observed as key barriers. In order to mitigate this risk, we have developed detailed training and user manuals, as well as change management processes to ensure that adoption is maximised.