

EcoExplore Mobile Framework

Nathan Sime, Kieran McKewan, Adrian Cross
Bachelor of Information Technology
College of Enterprise and Development
Otago Polytechnic

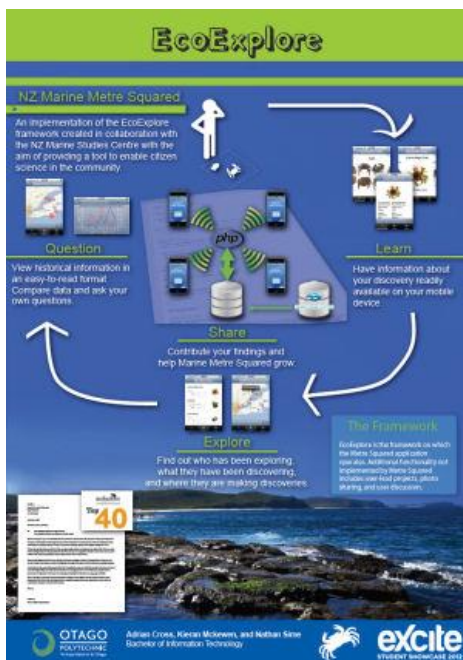
Samuel Mann
College of Enterprise and Development
Otago Polytechnic
Samuel.mann@op.ac.nz

ABSTRACT

In this paper, we describe the process we went through in creating the *EcoExplore* framework and in implementing the NZ Marine Metre Squared mobile application from this framework. We also demonstrated the ease at which a new application can be rapidly produced from our framework by implementing the *PestWatch* mobile application.

Keywords

Citizen Science, mobile, capstone



1. INTRODUCTION

EcoExplore is a flexible and scalable framework built to be a foundation for mobile applications that aim to engage members of the public in the exploration of the natural environments of New Zealand, and enable sharing of their discoveries. The *NZ Marine Metre Squared* application is an implementation of the *EcoExplore* framework we developed for the New Zealand Marine Studies Centre that enables members of the public to contribute organism population data, view trends in this data and overall learn more about the marine environment. At the end of development we implemented *PestWatch* using the *EcoExplore* framework, an application that focuses on enabling the community to track invasive species in New Zealand. It took a

total of seven and a half hours to develop this new application that addressed a new problem space. Three and a half hours were spent on the configuration of the application; the remaining four hours were spent on data sourcing and data entry. This successfully demonstrated how rapidly a new application, that satisfied a new problem space, could be developed from the *EcoExplore* framework.

2. INTERACTION DESIGN

Imagine this: You and the family are down at the beach exploring the rock pools when the kids discover an interesting looking crab you haven't seen before. The kids want to learn more about what they've found so you take out your smart phone, open the NZ Marine Metre Squared application, and use the Rocky Shore Guide to identify the species. Within moments you have learnt the organisms name and classification, about its feeding and breeding behaviors and that many others, like yourself, have discovered these interesting looking crabs in your area. You also decide to share your finding with the NZ Marine Metre Squared community knowing that your contribution will help in building up a profile of that organism's population and that area's ecology.

The above scenario describes one possible use of *EcoExplore*. The *EcoExplore* citizen science application is multi-faceted: a visual field guide; helping your family contribute to discussions; enabling contribution to science through collection of field data; and helping your family formulate scientific questions – developing a healthy curiosity and a community level science programme

The original concept of the *EcoExplore* application was designed to engage visitors to the Otago Peninsula in the exploration of the rocky shore by enabling them to identify organisms, share their discoveries, make observations and form their own questions, and then create community projects aimed at answering these questions all through the use of smart devices. The aim of the application evolved over time to focus more on visitors exploring the rocky shore by contributing their findings in a consistent format to a single project, the NZ Marine Metre Squared project.

In order to provide a tool for the NZ Marine Metre Squared project our application was divided into the *EcoExplore* framework and an implementation of that framework, the NZ Marine Metre Squared mobile application.

To ensure *EcoExplore* truly was framework we developed it so it would be easy to plug in new organism datasets and to configure the application to offer different functionalities. We also developed it so that new ways to collect organism population data, as well as new ways to report trends in this data could be developed and easily implemented

This poster paper appeared at the 4th annual conference of Computing and Information Technology Research and Education New Zealand (CITRENZ2013) incorporating the 26th Annual Conference of the National Advisory Committee on Computing Qualifications, Hamilton, New Zealand, October 6-9, 2013. Mike Lopez and Michael Verhaart, (Eds).

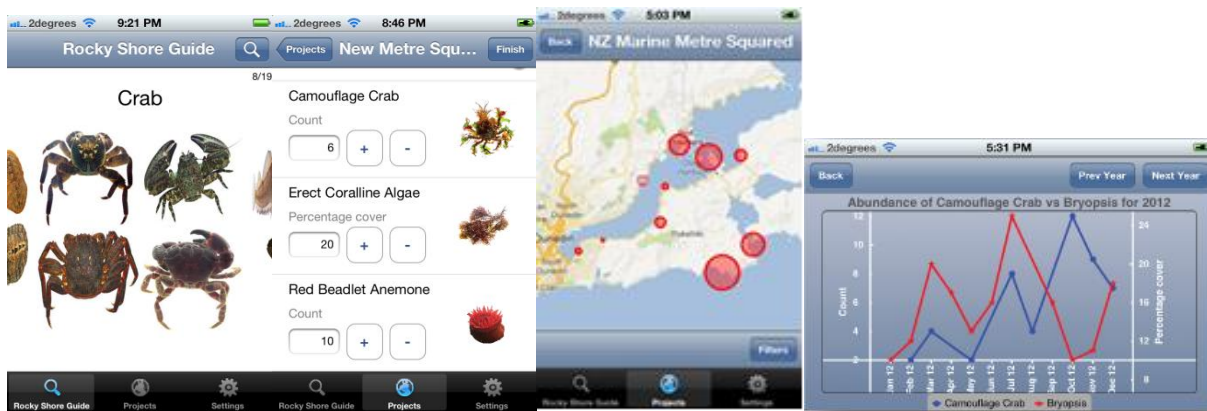


Figure 1: Screenshots from *EcoExplore* implemented for the Metre Squared project. a) species identification, b) data collection, c&d) user driven data analysis.



Figure 2: Screenshots "Pestwatch". a) pest identification b) user-led citizen science questions and projects.

At the end of development we demonstrated the flexibility of the *EcoExplore* framework and how rapidly a new application with new goals could be produced from the framework by implementing PestWatch, an application that focuses on enabling the community to track invasive species in New Zealand.

3. CITIZEN SCIENCE

The project was aimed to bring the scientific community and the public together in collaboration by enabling participants to record, share and discuss observations and questions while also facilitating the collection of scientific data.

The concept of citizen science, members of the public participating in the large scale collection of scientific data, has been used by many mobile applications to encourage the exploration of natural environments, but few have facilitated true collaboration between the public and the scientific community [1, 2]. *EcoExplore* is then more than a database of rocky shore plants and animals.

4. PLATFORM

EcoExplore was built as a native iOS application. This was client preference, but also to allow core application functions to be accessible offline. A separate database was developed to push information to the mobile application.

The deployed *EcoExplore* in the Metre Squared project contains species identification (Fig 1a), data collection (Fig 1b), and user driven data analysis (Figs 1c & 1d). The analysis screens show dynamic trends in populations of organisms using the data collected from users. The parameters of the mapping of abundance and diversity are easily selected by the user. Unfortunately (despite being functional), the deployed *EcoExplore* in the Metre Squared project does not contain the ability for users to create projects. To demonstrate this functionality, Figure 2 shows *PestWatch*, a demonstration application that focused on enabling the community to track invasive species in New Zealand.

5. REFERENCES

1. Aoki, P. M., Honicky, R. J., Mainwaring, A., Myers, C., Paulos, E., Subramanian, S., & Woodruff, A. (2009). A vehicle for research: using street sweepers to explore the landscape of environmental community action. Boston, MA, USA: ACM.
2. Rotman, D., Preece, J., Hammock, J., Procita, K., Hansen, D., Parr, C., . . . Jacobs, D. (2012). *Dynamic changes in motivation in collaborative citizen-science projects*. Paper presented at the Proceedings of the ACM 2012 conference on Computer Supported Cooperative Work.