

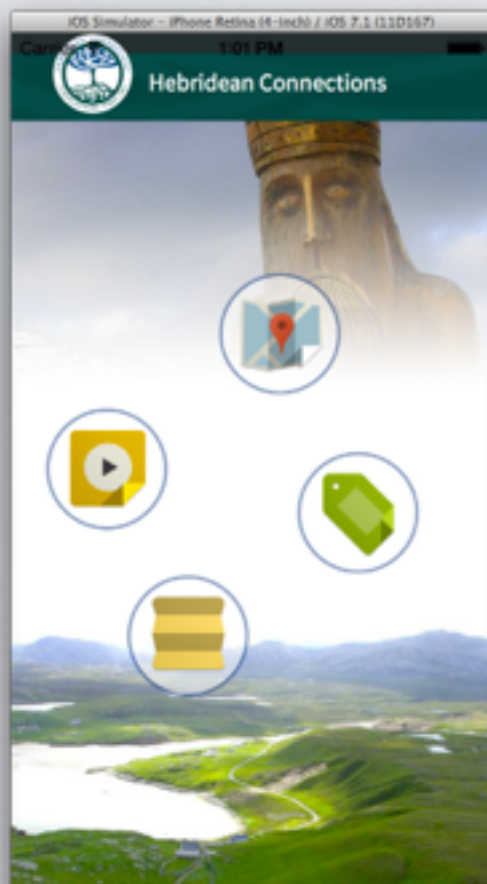
CURIOS MOBILE

Linked Data Exploitation for **Tourist Mobile Apps**
in **Rural** Scotland

Hai Nguyen

hai.nguyen@abdn.ac.uk

dot.rural Digital Economy Hub
University of Aberdeen



THE CURIOS PROJECT



- Facilitate historical societies in maintaining the **digital archive** of their **cultural heritage** more sustainably and efficiently using **open-source software** (*Drupal CMS*) and **open data standards** (*Linked Open Data*).



- Use case: Outer Hebrides
 - 45000 records
 - Rich content: people, boats, historical events, places...
 - Dedicated/active historical societies
- Project website: www.curiosproject.abdn.ac.uk

CURIOS - THE CMS FOR LINKED DATA

- *Open-sourced* CMS: Drupal as a tool to **directly** exploit and maintain **linked data**
- The **dataset** and the **software** are **loosely-coupling**.
- Live demos:
 - <http://curios.abdn.ac.uk>
 - <http://hebrideanconnections.com>
- Code: <https://github.com/curiosproject/curios>

Kennethina Mackenzie


Kennethina, daughter of Donald Mackenzie and Aline Macaulay, 7 Marvig served with the ATS during the Second World War. She was married to John Allan MacKenzie (son of [Donald](#) and [Effie](#)) of 15 Lower Bayble (born 21 Aug 1920); they emigrated to Australia in 1954 then to Auckland, New Zealand in March 1959.

They had four children; Donald, Colin, Erica, all born in Stornoway, and Murdina b 1958 Penrith, NSW, Australia.

[Back to listing](#)

Title:	Kennethina Mackenzie
Record Type:	People
Also Known As:	Ceanag Dhomhnaill Ruairaidh
Record Owned By:	CEP
Sex:	Female
Bk Reference:	CEP 5273
Record Maintained By:	CEP
Subject Id:	62546

[Day out for Marvig friends](#)



Parent Of
[Ruth Watson](#)

Child Of
[Donald Mackenzie](#)
[Aline Macaulay](#)

Emigrated To
[Australia](#)

Fosterer Of
[Ruth Watson](#)

Information Obtained From
[Paire Historical Society](#)

Lived At
[7 Marvig](#)

Associated With
[Auxiliary Territorial Service](#)
[Roll of Honour: Paire, World War](#)
[Susie Q](#)

CURIOS MOBILE

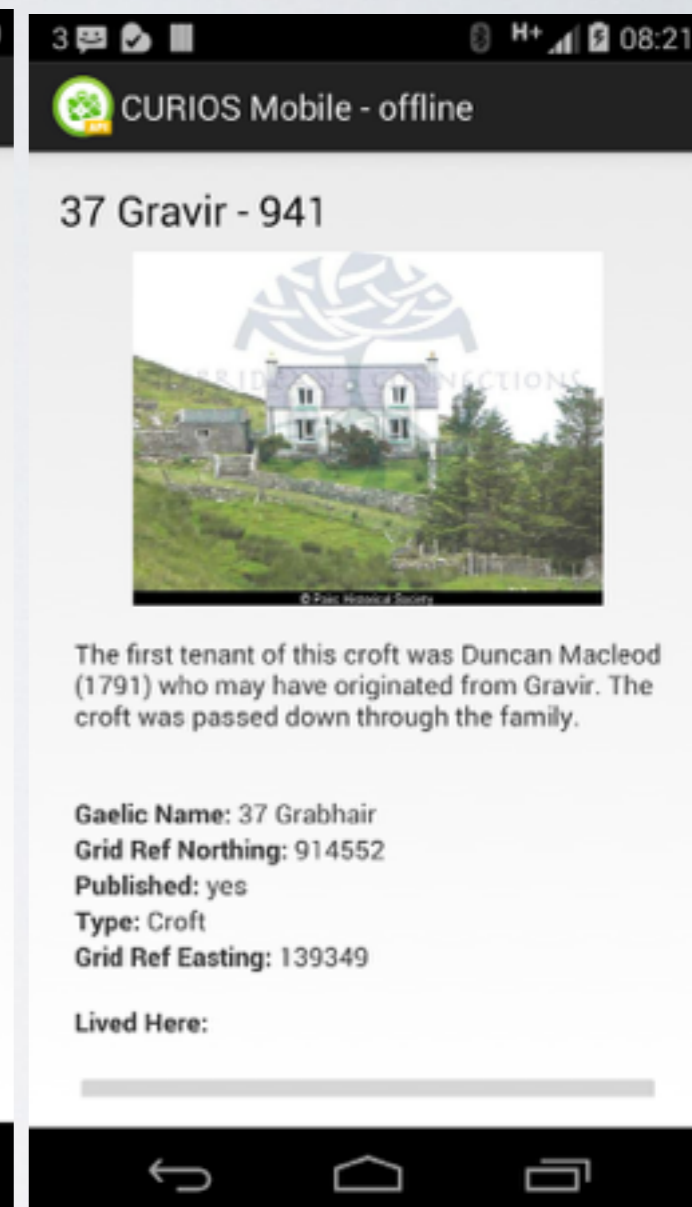
- **Motivation**

- Reusability of Linked Data
- One data - Many views
- Semantic technologies can help in rural areas (connectivity, isolated contents)

- **Aim:** a mobile app for **tourists** in **rural** area.

- **Challenges:**

1. **Connectivity problem**
2. **Huge archive (with noise)**
3. **Text generation from RDFs**



CURIOS SYSTEM OVERVIEW

Database

Web servers

Clients



Read-only



Triplestore

RESTful API

CURIOSMobile API
CURIOS Mobile API is a platform to deliver linked data content to mobile apps client in the form of a RESTful web service.

Record list

Place Collection
List all places: list all cached places
/CuriosMobile/api/record/list

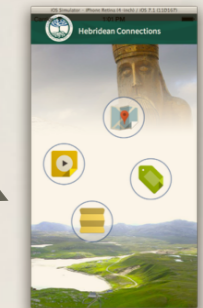
Nearby Places
List of all places within a radius of (radius) in the order of distance
/CuriosMobile/api/record/list?lat={lat}&lon={lon}&radius={radius}

CURIOS MOBILE

Android app



iOS app



Hebridean Connections Demo - Mozilla Firefox
Hebridean Connections Demo
drupaltest.local/people/2742

Home

Subject Types

- Boats
- Buildings and Public Amenities
- Businesses
- Crofts and Residences
- Gaelic Verse/Riachais
- Historical Events
- Landmarks and Archaeological Sites
- Locations
- Natural Landscape Features
- Objects and Artefacts
- Organisations
- People
- Resources
- Story Reports and Traditions
- Vehicles
- ALL SUBJECTS

Dolina Macdonald
Dolina Macdonald, Doileag a Ghreusaich (1898-1990), was the daughter of Donald Macdonald and Peggy Macritchie from Geshader. Dolina was married to Finlay Macleod from 2 Enaclete, where they both lived and raised a family.

Back to listing

Subjectid: 2742
English Name: Dolina Macdonald
Bk Reference: 68
Born: 1898-12-17
Date Of Death: 1991-03-03
Sex: Female

Associated With
Oral Tradition

Child Of
Donald Macdonald...
Margaret Macri...

Lived At
2 Enaclete
1 Geshader

Married
Finlay Macleod

Parent Of
Dolly Alice Mac...
Margaret Cath...

User login

drupaltest.local/crofts-and-residences/3097

Content Management System



APPROACHES TO TOURIST MOBILE APPS

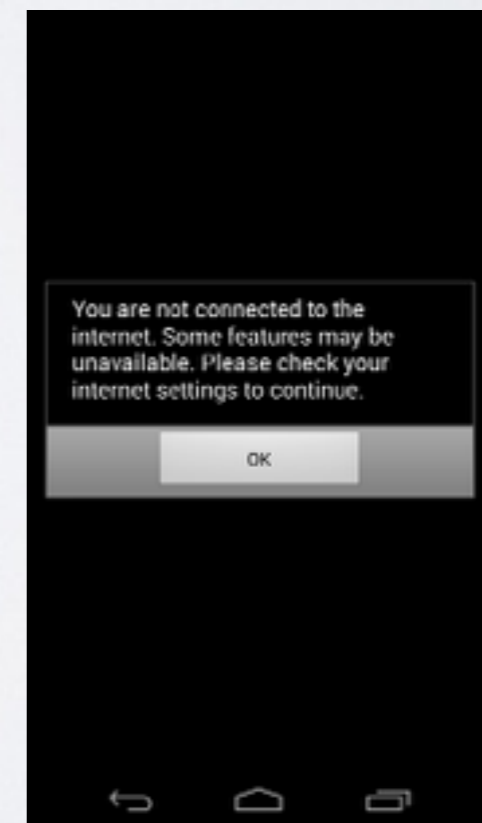
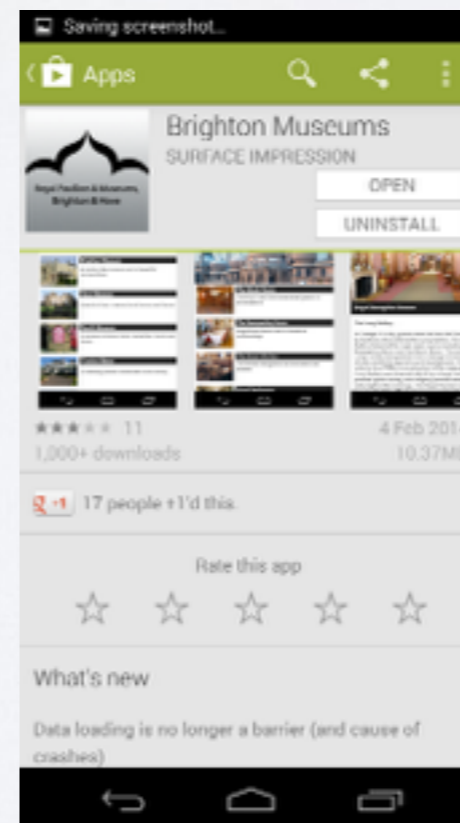
1. One-off download

- Rich-content
- Not up-to-date content
- **Heavy download:** 40-500 MB per application (excl. updates)



2. Pay as you go requests

- Needs **reliable** mobile connectivity
- Usually presented as a Web-app.
- **CURIOS Mobile:** pre-cached some data as seeds, growing the cache based on semantical relevance and user locations.



A LINKED DATA SOLUTION

- **Caching data based on**
 - Euclidean distance (location-based caching)
 - Semantic relevance (semantics-based caching)
 - User Preferences
 - Help for Initial downloads



LOCATION-BASED CACHING

- Caching data based on Euclidean distance
- Caching distance depends on **signal distance**
- **Good** for places where Internet connection is **unreliable** (“on/off” pattern)
- **Bad** for places where the whole area of interests does not have any signal at all (over-caching if caching distance is large)
- **Only caching places. How about other record types (people, traditions, events, stories) ?**



SEMANTICS-BASED CACHING

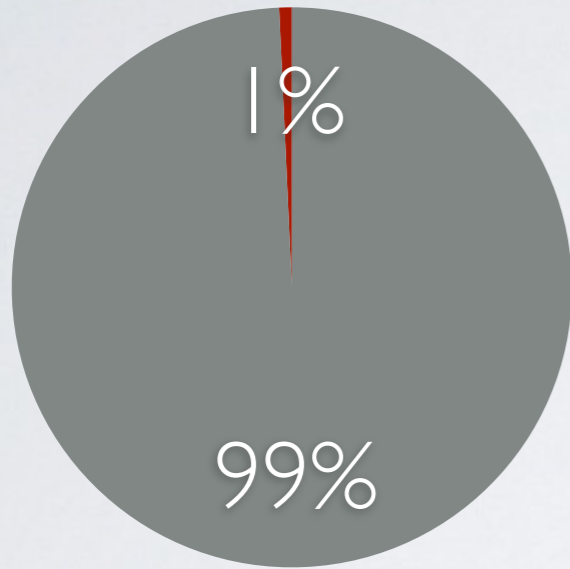
- Caching data based on **semantic relevance (object-property links)**
- Allow **all record types** to be cached
- The more users browse, the more the cache grows
- If a record is linked to many other records, only cache the **most interesting** ones.
- Cached records can be used to push notifications while the user is moving in a no-connection area. (only GPS is required)



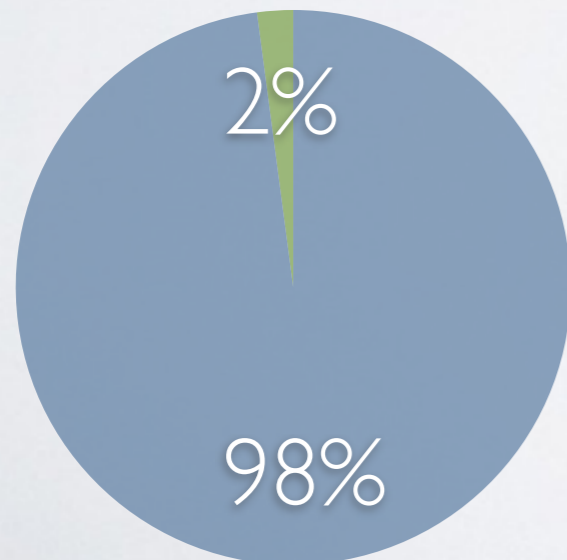
Red: viewed
Dark blue: cached
Light blue: uncached

AUTO-RECOMMEND CONTENTS

- Unsuggested records
- Suggested records



- Unsuggested places
- Suggested places



- **Huge archive!!!**

- 45000 individual records
- 33685 are people records
- 3001 places

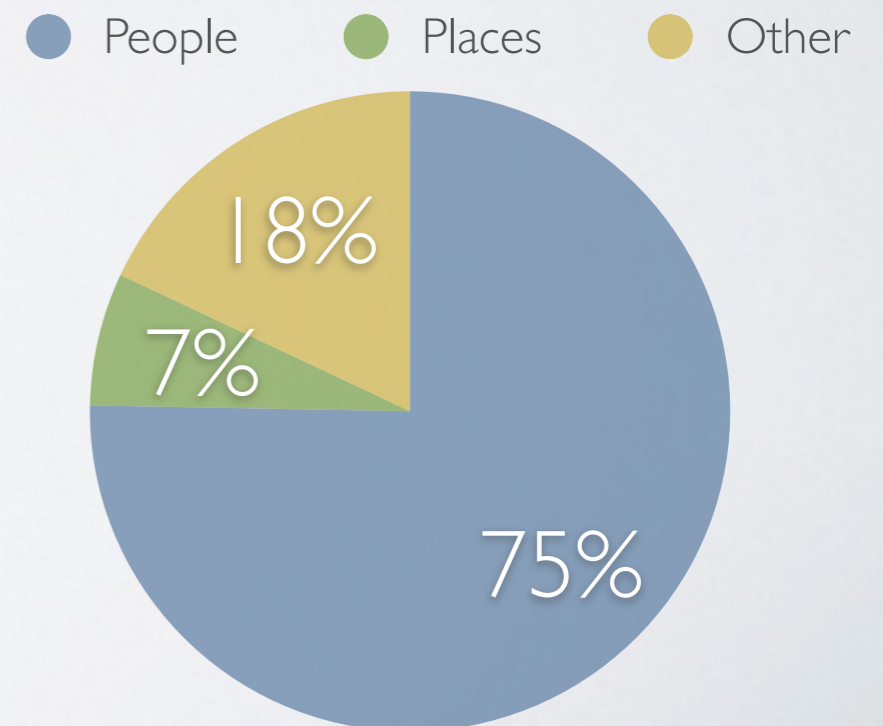
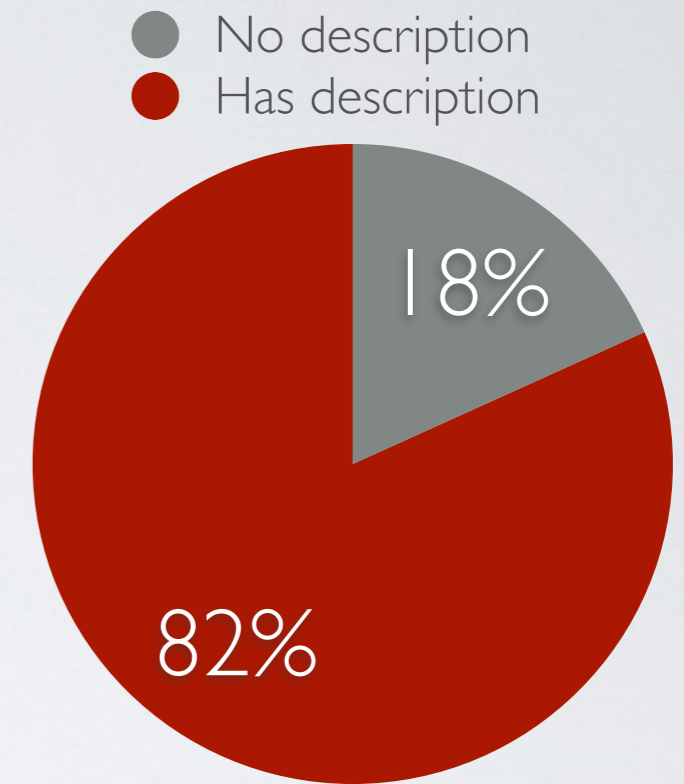
- **What to pick?**

- Solutions:

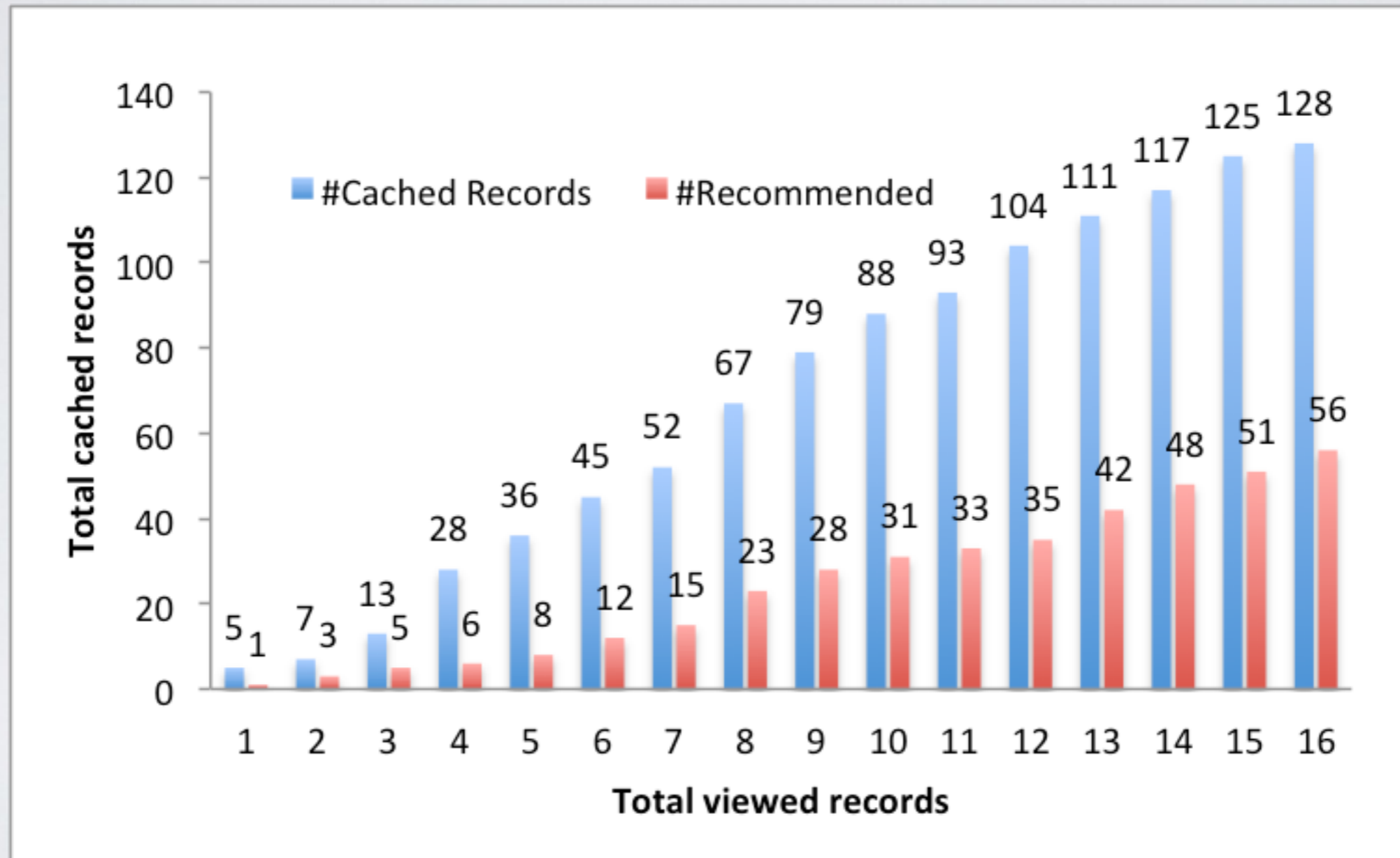
- **Locals' suggestions:** 325 records (64 places)
- How to **automate** this process?
- Build a Utility function based on level of significance/user preferences/locals' suggestions.
- Level of significance: based on the links to and links from the record URI
- Also used to sorted records before caching on devices

TEXT GENERATION FROM RDF

- **Some records don't have descriptions.**
- **How to generate an interesting story?**
 - User preferences (people/places/historical events etc)
 - Type of records: people/place
- **Proposed solution**
 - Directly generate text from RDF triples using properties and classes' **labels** (Sun&Mellish, 2007)
 - Only include "interesting" properties for special types (e.g., liveAt, childOf, etc.)
 - Pros: Simple and flexible to data availability
 - Cons: requires commitments from ontology designers



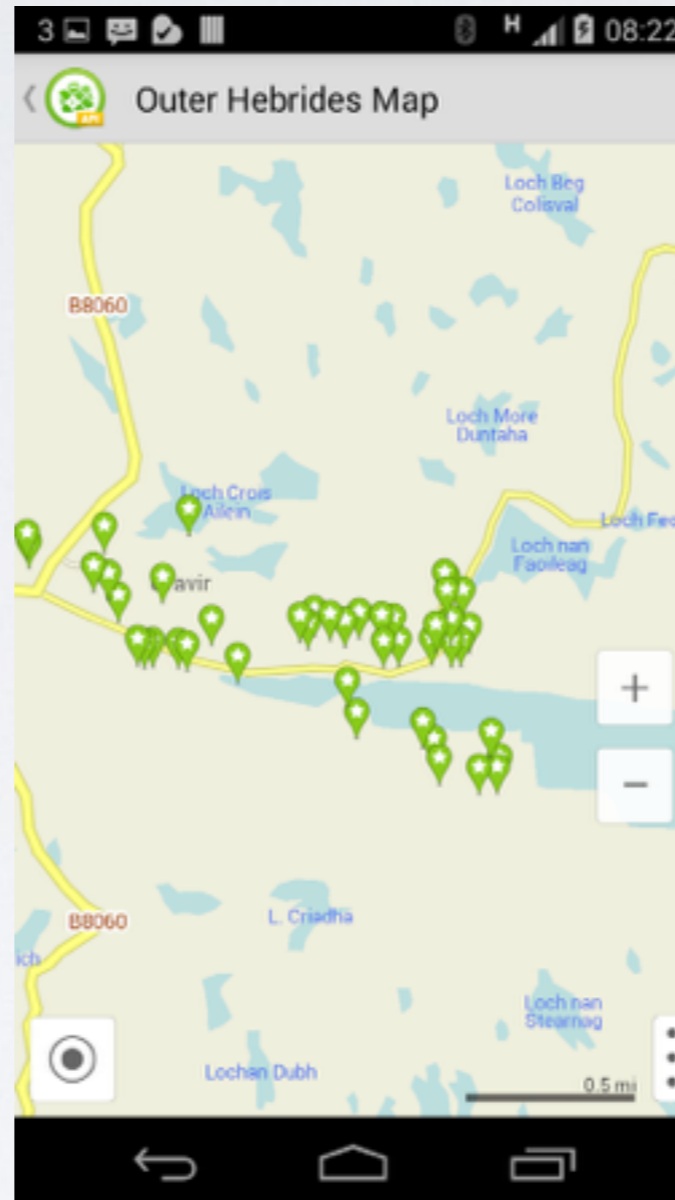
INITIAL RESULT



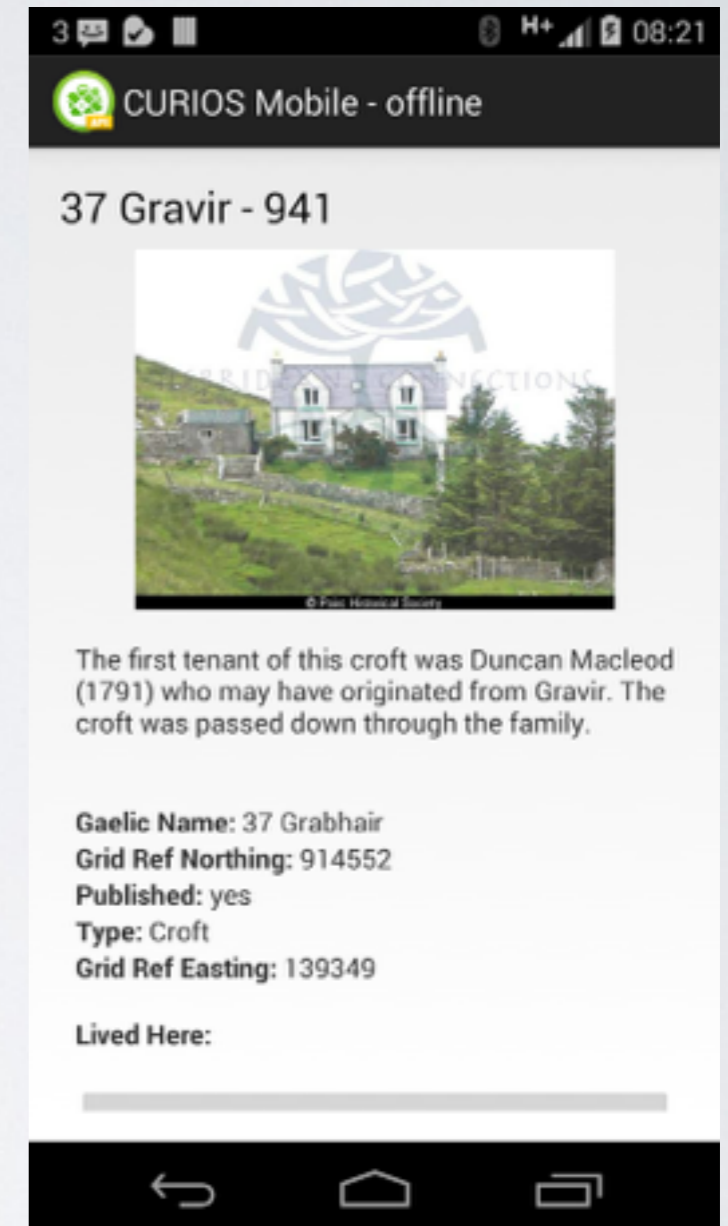
SCREENSHOTS - ANDROID



Online map



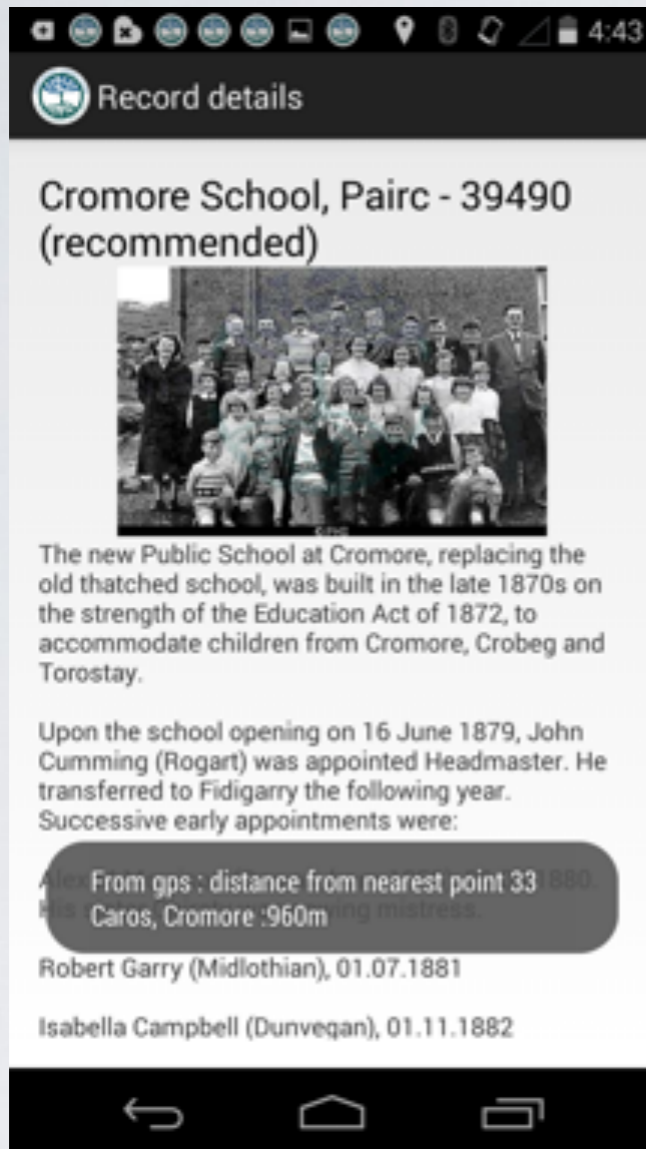
Offline map



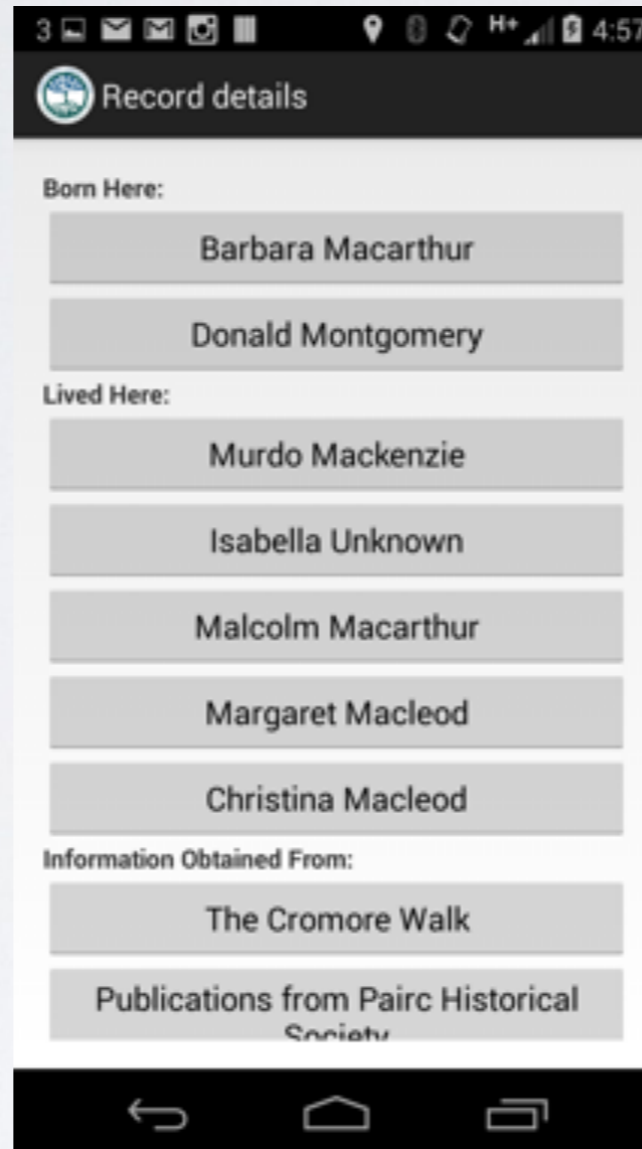
A croft

Prototype

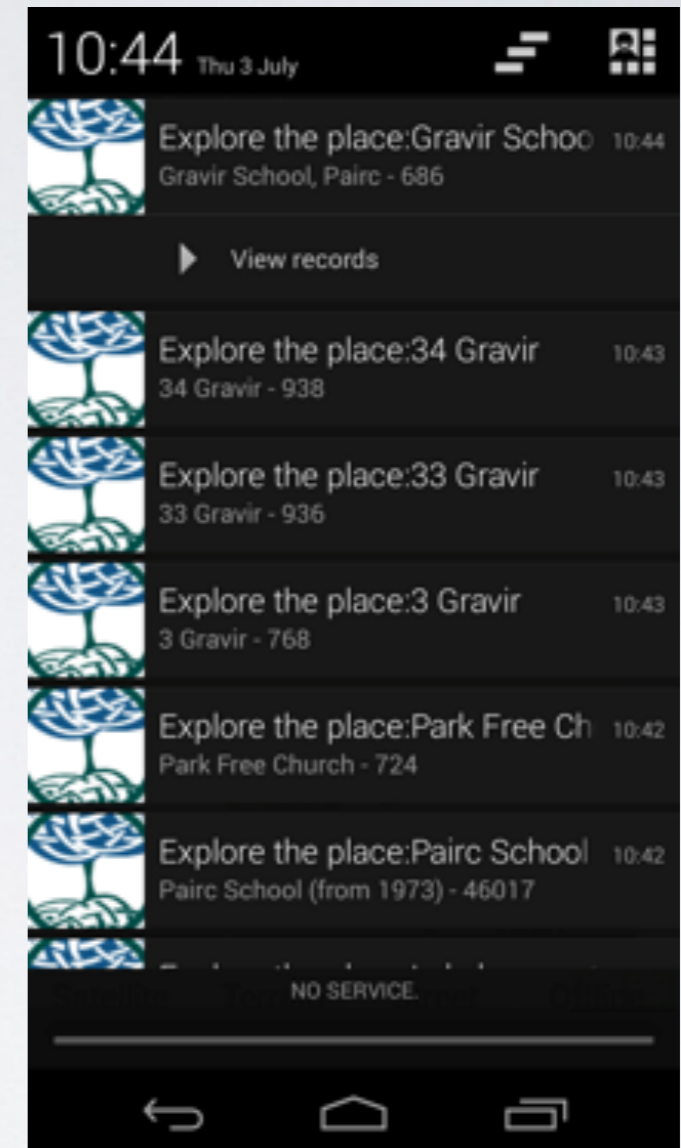
SCREENSHOTS - ANDROID



A record



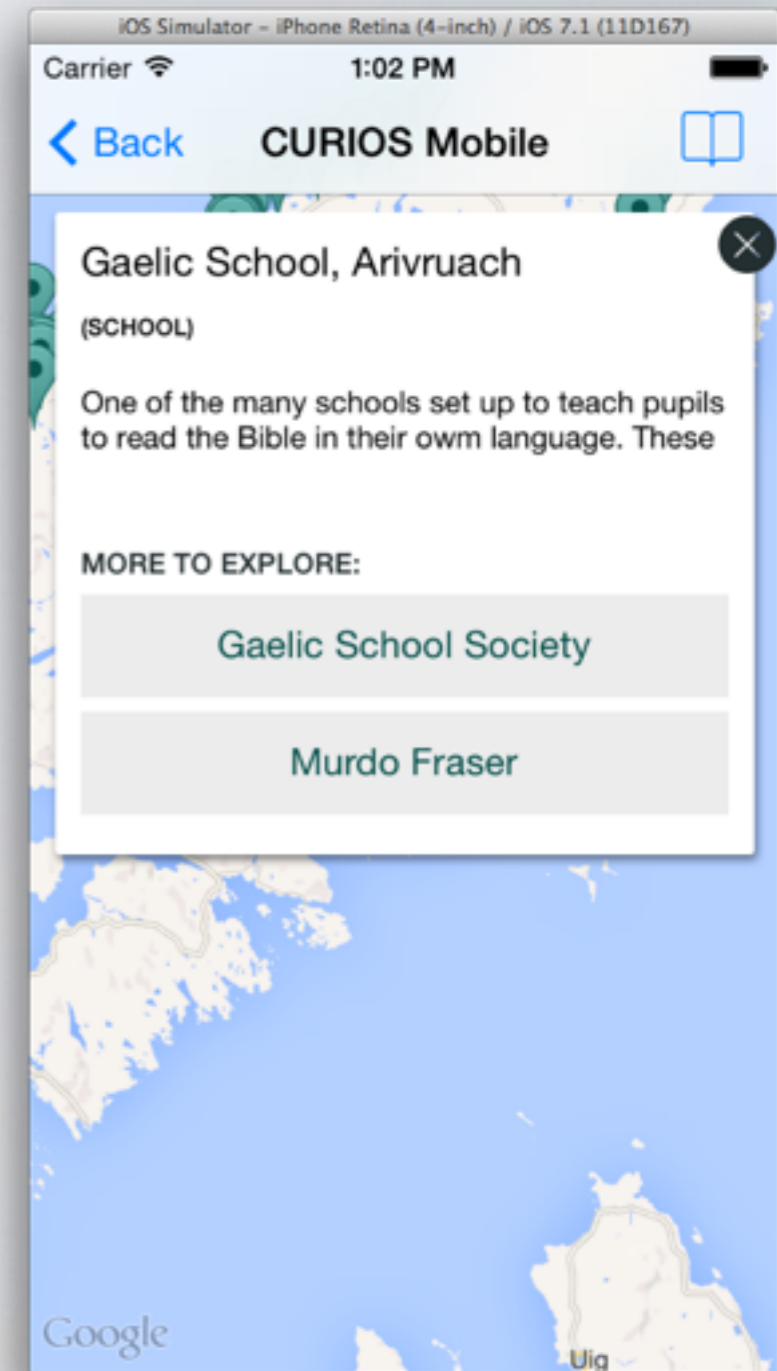
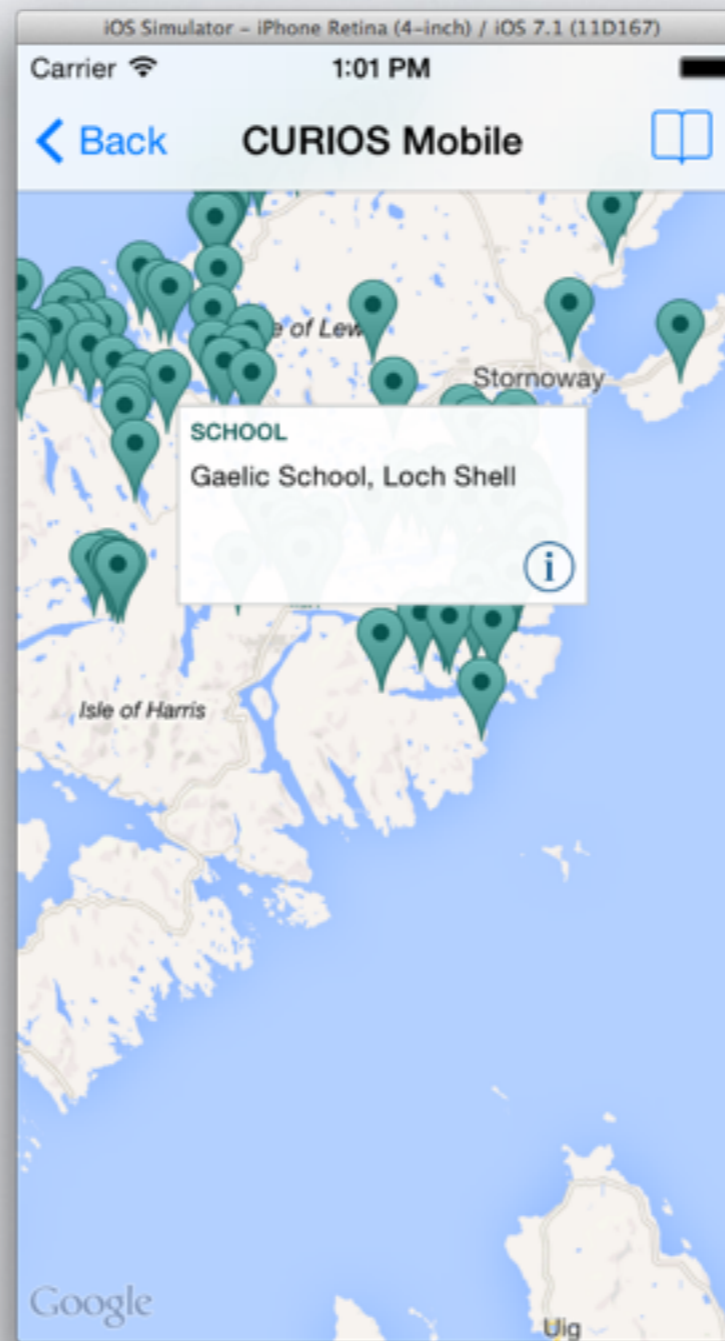
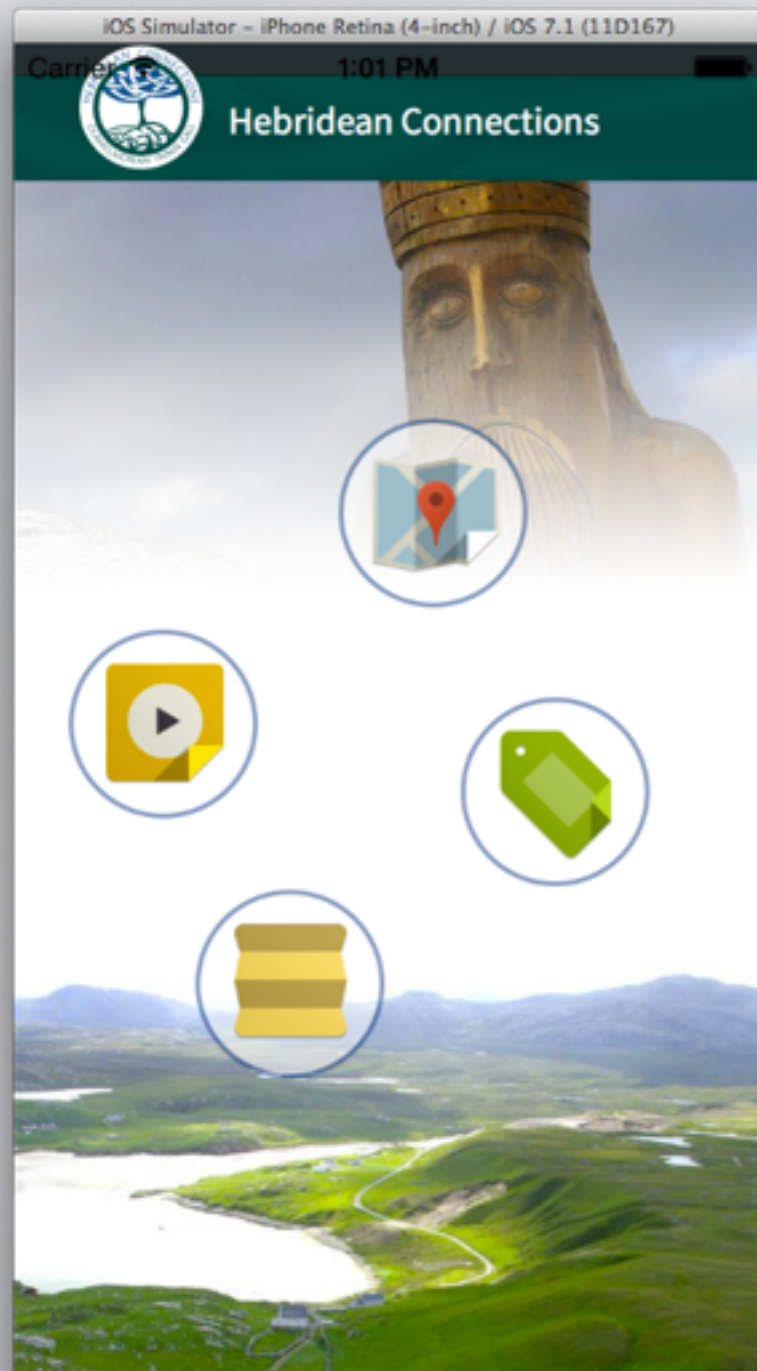
Links



Pushed Notifications
from cached records

Prototype

SCREENSHOTS - IOS



Prototype

CONCLUSION

- CURIOS and CURIOS Mobile
- Linked data-based solutions for
 - Unreliable connection problem in rural areas
 - Auto-recommend interesting contents
 - Generate texts directly from RDF