Tourists in Smart Cities: Data mining for hidden treasures
Jon Oberlander
Structure of this presentation

1. The SICSA Smart Tourism Programme
   - Partners
   - Challenges
   - Project landscape

2. Three projects on a common theme – geo-culture
   - Palimpsest
   - Botanitours
   - Travelling Treasures
Smart Tourism: Partners & Challenges

A. Cultural visitor attractions:
   – Edinburgh Festivals Innovation Lab, Historic Scotland, Museums Galleries Scotland

B. Academics:
   – Edinburgh, Glasgow, St Andrews, Robert Gordons, Aberdeen

C. Small tech companies:
   – ADS, Bitwink, Neatebox, Qraqrbox, …

1. Personalisation:
   – Improve how visitors navigate the city/country and volume of events/sites.

2. Elastic demand and greening:
   – Make available more resources … during times of peak demand.

3. New channels, new content:
   – New digital channels … for sharing performance and cultural content, and new ‘born digital’ content …
## Smart Tourism: Project Landscape

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<th>Locate globally</th>
<th>Archives</th>
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<td>Curios Mobile</td>
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<td>Palimpsest *</td>
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<th>Archives</th>
<th>Augmentation</th>
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<tr>
<td>Living Histories</td>
<td>SMART</td>
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<td>Content Beyond</td>
<td>LADDIE</td>
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<td>SmartBeacons</td>
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<tr>
<th>Don’t locate</th>
<th>Archives</th>
<th>Augmentation</th>
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<tr>
<td>Shaping Festivals</td>
<td>Navigating Festivals</td>
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<td>All SFC funded, except * AHRC funded</td>
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Shaping the Festivals / Navigating the Festivals
SMART

St Andrews University, MUSA, Interface3
LADDIE

St Andrews University, Historic Scotland and ADS Ltd
PAST

Timespan Museum (Helmsdale), SCAPE Trust, University of St Andrews
Living History

Robert Gordon University, Historic Scotland, Ambiesense Ltd
Content beyond the edge

St Andrews University, StAnza Poetry Festival, Qraqrbox Ltd
Talisman

- Bitwink, NMS, Scottish Fisheries Museum, Stirling Smith Gallery, U of Edinburgh
SmartBeacons

Neatebox, National Museums Scotland, RGU
Historical Echoes

Edinburgh Napier, Historic Scotland and Veemee Ltd
Virtual Excavator

iPhone app that uses 3D sound to guide around Antonine Wall, Bar Hill fort
- Unsteward site
- Sounds of activities around fort
- Virtual actors that lead you around
- Can excavate objects by gesture
### SUMMIT: Supporting Rural Tourism with Motivational Intelligent Technologies

| Key technical challenges | 1. Personalisation.  
2. Reward management.  
- Virtual “Always-On” Connectivity (VAOC) to mitigate effects of signal loss and conserve battery power. |
|--------------------------|-------------------------------------------------

### Deployment

- Personalised Location Based Service (LBS) running on user’s mobile device
- Management system running on backend server
- Business users running local clients on own devices

### Beneficiaries

Tourists, small rural enterprises, regional & national bodies

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SICSA*  
Smart Tourism
Dun Carloway (in Scottish Gaelic Dùn Chàrlabhaigh) is a broch situated in the district of Carloway, on the west coast of the Isle of Lewis, Scotland. It is a remarkably well preserved broch - on the east side parts of the old wall still reaches to 9 metres tall.[1] In places there are also more modern repairs to the east wall. Dun Carloway was probably built some time in the 1st century BC, and radiocarbon dating evidence
BotaniTours

Royal Botanic Gardens Edinburgh, EDINA, U of Edinburgh
Travelling Treasures

Edinburgh Museum and Galleries, Assembly Rooms, Lothian Buses, U of Edinburgh
Palimpsest: Text mining for Literary Edinburgh
It seemed to me as if the rock and castle assumed a new aspect every time I looked at them; and Arthur’s Seat was perfect witchcraft. I don’t wonder that anyone residing in Edinburgh should write poetically.

Washington Irving (1817)
Project Overview

- AHRC big data project: Jan 2014 – Mar 2015
  - Interdisciplinary research project between literary scholars and computer scientists working on text mining and visualisation

- Aims:
  - Capture and visualise the spatial and temporal dimensions of Edinburgh as a city of the literary imagination.
  - Focus on the setting of literature and its context.

- Support:
  - UNESCO City of Literature adopted the Palimpsest prototype.
  - Collaboration with the Scottish Storytelling Centre and the International Book Festival
  - Data provided so far by the National Library of Scotland, Oxford Text Archive, The British Library, HathiTrust.
Processing the archive

1. Retrieve a “collection” of literary works which are at least partly set in Edinburgh from all available literature.
3. Create a fine-grained location gazetteer for Edinburgh.
4. Use this to filter the collection, via assisted curation.
6. Analyse the linguistic context of locations.
7. Document and publish all methods to recreate similar outputs for other cities of literature.
Datasets: $\sim 10^{10}$ words

- The British Library Nineteenth Century Books collection.
- HathiTrust collection
  - all out-of-copyright material
- Internet Archive literature
  - based on meta-data-specific queries
- English Project Gutenberg books
- Oxford Text Archive data
- Eighteenth Century Collections Online
- Early English Books Online (?)
BotaniTours: Text Mining for Botanical Tourism

Royal Botanic Gardens Edinburgh, EDINA, U of Edinburgh
Project Overview

- **Smart Tourism/dot.rural project (Oct 2013 - June 2014)**
  - Creating a GPS- and time-aware app/web service to identify interesting botanical points of interest
    - e.g. plants in the wild or in gardens.
  - Planning to extend the app to crowd-source images from users for phenology research.

- **Text mining unstructured and semi-structured text to extract relevant information including plant descriptions, usages and images from aggregated sources:**

- **Mobile app based on FieldTrip GB**
- **Future part of RBGE’s ‘Scotland’s Plants’**
Progress

- Collected nearly 26K geo-located observations (from Year 2000) of 2,150 flowering plant species from GBIF.
- Common names for the species from GBIF and Flora Celtica.
- Images from EOL and Wikispecies.
- Textual descriptions from Wikipedia.
- Garden information from Scotland’s Gardens.
- Usages from Flora Celtica.
Geo-coordinates, Images, Gardens

- **GBIF:** [http://www.gbif.org/species/5414995](http://www.gbif.org/species/5414995)
- **EOL:** [http://eol.org/pages/578392/overview](http://eol.org/pages/578392/overview)
- **Scotland’s Gardens:**
  - [http://www.scotlandsgardens.org/gardens/district/5](http://www.scotlandsgardens.org/gardens/district/5)
Flora Celtica Common Names: e.g. Species Digitalis Purpurea

- Foxglove
- Dead men's bells
- Witch's Thimbles
- Gensie Pushon
- Lus a bhalgair
- Lus nam Ban-sidh
- Bloody fingers
- Foxter
- Witch's thimble
- Bloody bells
- Fairy's thimbles
- Deadmen's fingers
- Scotch mercury
- Wild mercury
- An lus mor (the big plant)
- Ciochan nan cailleachan marblia (dead old women's paps)
- Meuran nan caillich mharbha (dead women's thimbles)
- Meuran nan davine marbh (dead men's thimbles)
- Sionn
Flora Celtica (Usages)

- 3 MATERIALS - Dyes/Inks/Pigments
- 2 SOCIAL USES - Witchcraft/Charms/Magic
- 2 MEDICINES - Skin/Subcutaneous Cellular Tissue Disorders
- 2 MEDICINES - Inflammation
- 1 SOCIAL USES - Stories, myths, literature
- 1 SOCIAL USES - Religious Uses
- 1 MEDICINES - Respiratory System Disorders
- 1 MEDICINES - Pain
- 1 MEDICINES - Muscular-Skeletal System Disorders
- 1 MEDICINES - Digestive System Disorders
- 1 MEDICINES - Circulatory System Disorders
- 1 MATERIALS - Toys and games
Flora Celtica (References)

- **Lightfoot (1777)** The bitter qualities of this plant made a decoction of the leaves suitable for use as an emetic and cathartic, as well as in cases of scrofula (in ointment).

- **Beith (1995)** The roots of foxgloves, when pounded up, heated and used in a poultice were employed to counteract swelling and internal growths.

- **NULL** 2nd year leaves were boiled in water and then taken when cool as a circulatory stimulant, although the process had to be supervised.

- **Beith (1995)** A condition called 'the rose' (from the Gaelic 'Ros') was cured by applying a moistened foxglove leaf onto the affected area. 'The rose' is thought to refer to a variety of skin conditions, such as eczema.

- **Beith (1995)** "In the braes of Lochaber chopped foxglove leaves and butter and garlic or onion heated were deemed 'good for drawing things, good for bad knees and for diphtheria - as a poultice on the knees, neck, and so on.’’
Text Mining Descriptions

*Digitalis purpurea*

From Wikipedia, the free encyclopedia

This article is about the flowering plant. For the band, see *Digitalis Purpurea (band)*.

*Digitalis purpurea* (foxglove, common foxglove, purple foxglove or lady's glove), is a species of flowering plant in the genus *Digitalis*, in the family Scrophulariaceae, native and widespread throughout most of temperate Europe. It is also naturalised in parts of North America and some other temperate regions. The plants are well known as the original source of the heart medicine digoxin, (also called digitalis or digitalin).

**Contents**

- [1] Description
- [2] Subspecies
- [3] Hybrids
- [4] Toxicity
- [5] Uses
- [5.1] Use in molecular biology
- [6] In literature and music
- [7] Gallery
- [8] References

**Description**

*Digitalis purpurea* is an herbaceous biennial or short-lived perennial plant. The leaves are spirally arranged, simple, 10–35 cm long and 5–12 cm broad, and are covered with gray-white pubescent and glandular hairs, imparting a woolly texture. The foliage forms a tight rosette at ground level in the first year.

The flowering stem develops in the second year, typically 1 to 2 m tall, sometimes longer. The flowers are arranged in a showy, terminal, elongated cluster, and each flower is tubular and pendent. The flowers are typically purple, but some plants, especially those under cultivation, may be pink, rose, yellow, or white. The inside surface of the flower tube is heavily spotted. The flowering period is early summer, sometimes with additional flowering stages developing later in the season. The plant is fragrant by day, which helps attract insects. The flowers are pollinated by bees.
Text Mining Descriptions

- Using WordNet?

  Part Meronyms of noun flower
  1 of 3 senses of flower

  Sense 2
  flower, bloom, blossom
  HAS PART: stamen
  HAS PART: pistil
  HAS PART: carpel
  HAS PART: ovary
  HAS PART: floral leaf
  HAS PART: perianth, chlamys, floral envelope, perigone, perigonium
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<th>SICSA*</th>
<th>Smart Tourism</th>
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<th>Result</th>
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<tr>
<td>Stobo Japanese Water Garden</td>
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<td>Platanthera cholorantha (Custer) Rchb.</td>
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<td>Cardamine corymbosa Hook.f.</td>
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<td>Aerostis canina L.</td>
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<td>Scientific Name</td>
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<td>Trifolium repens L.</td>
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<td>Trifolium pratense L.</td>
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<td>Urtica dioica L.</td>
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<td>Ulmus glabra Huds.</td>
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<td>Geum urbanum L.</td>
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<td>Geum rivale L.</td>
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<td>Caltha palustris L.</td>
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<td>Capsella bursa-pastoris (L.) Medik.</td>
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<td>Stellaria media (L.) Vill.</td>
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<td>Primula vulgaris Huds.</td>
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<td>Juncus bufonius L.</td>
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<td>Juncus effusus L.</td>
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From Walking Through Time to Travelling Treasures
Pilot: 40 buses, 100 objects
Deployment: 750 buses, 10^6 objects
Conclusions

- Cities contain tourists as well as residents
- Mining for hidden gems helps meet two of the three challenges
  1. **Personalisation:**
     - Improve how visitors navigate the city/country and volume of events/sites.
  2. **Elastic demand and greening:**
     - Make available more resources ... during times of peak demand.
  3. **New channels, new content:**
     - New digital channels ... for sharing performance and cultural content, and new ‘born digital’ content ...
- **Hidden Gems = Data + Places + Visitor experience**
  - Rich archives
  - Text mining
  - Geo grounding
  - Mobile access