

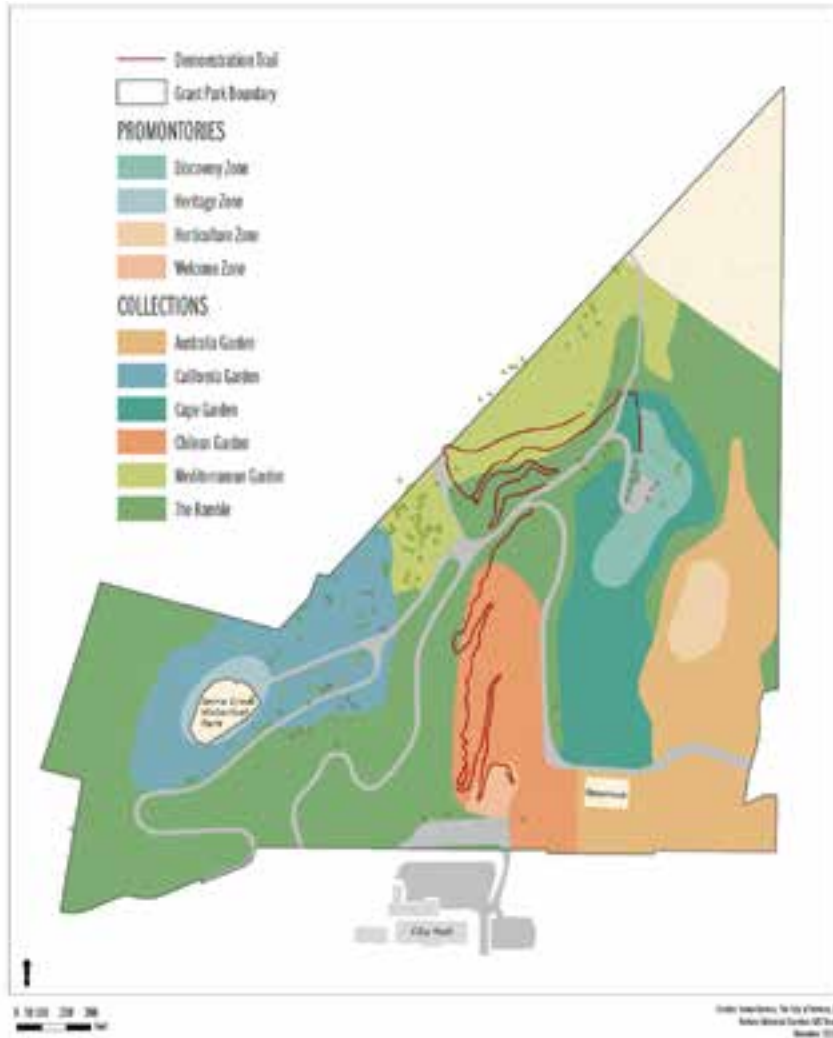


Mobile Story Trail Tours with Geofencing and Multimedia Content Delivery

Michele Dunham, Nathan Strout, and Joseph Cahill
Esri User Conference July, 2014



Photo Courtesy of the Ventura County Star. November 2012



About Ventura Botanical Gardens (VBG) in Grant Park

- The land covers 109 acres. Resident Kenneth Grant and his wife Toni deeded the initial 30-acre parcel to the City of San Buenaventura in 1918 for a public park or resort.
- Grant Park is bordered to south by the City of Ventura's historic downtown district and the Pacific Ocean; to the west by the Ventura River; to the north by open coastal sage scrub and grass land; and to the east by midtown Ventura.
- VBG built its first Demonstration Trail in 2012 and planted its first gardens in the Chilean Collection in January of 2014.
- Ventura Botanical Gardens is a new Mediterranean climate region garden for Southern California.



Education is a Core Mission of Botanic Gardens, Zoos, and Parks

- Monthly *botany*, *geology*, and *birding* tours along VBG's new 1 ¼ mile Demonstration Trail attracted large groups.
- The trail and its close proximity to the historic downtown presented many opportunities to engage the community through Story Maps.



Geologist John Dunham guides interested participants on an educational tour of the Demonstration Trail in Grant Park.



The Mission San Buenaventura founded in 1782.



Mission period agricultural stone terraces along the trail.



Eriogyne curvispina in bloom. Planted January in the Chilean garden.



Historic photo of the Ventura Anticline prior to the building of California Highway 101.



Pleistocene fossils found along the Demonstration Trail.



The Ventura Botanical Gardens Story Trail Project

In the Fall of 2012,

- An all volunteer team composed of botanists, birders, geologists, horticulturalists, cultural anthropologists, historians, and retired Hollywood screen writers collaborated and wrote an audio script for 18 tour stops along the Demonstration Trail.
- The VBG Story Trail Team finalized its requirements for the Smartphone App.



Stephanie Edwards recording at Goldmine Studio in Ventura.

In the Winter of 2013,

- Stephanie Edwards recorded the audio script at Goldmine Studios in Ventura.

In the Fall of 2013,

- VBG and the University of Redlands Center for Spatial Studies signed a contract to develop the App.



Recording day from left to right: Michael Beeler, Alex Uvari, Michele Dunham, Joe Cahill, Stephanie Edwards, Holly White, Jeff Cowan, Tracy Long, Doug Halter, and Diane Beeler.

Tour Stops

1. Welcome at Trailhead
2. Lookout Over Downtown
3. Mediterranean Climate
4. Central Chile Collection
5. Old Stone Terraces
6. Orientation to Coast and Channel Islands
7. Coastal Sage Scrub
8. Hawks
9. Willow Thicket
10. Geology
11. Eucalyptus Trees
12. The Ramble
13. Chaparral
14. Conservation and Coastal Cholla
15. Mediterranean Pine Forest
16. Restoration Process
17. Mediterranean Basin Collection
18. Western Cape Collection



Cylindropuntia prolifera flower.; commonly named Coastal Cholla.



Cylindropuntia prolifera stem.



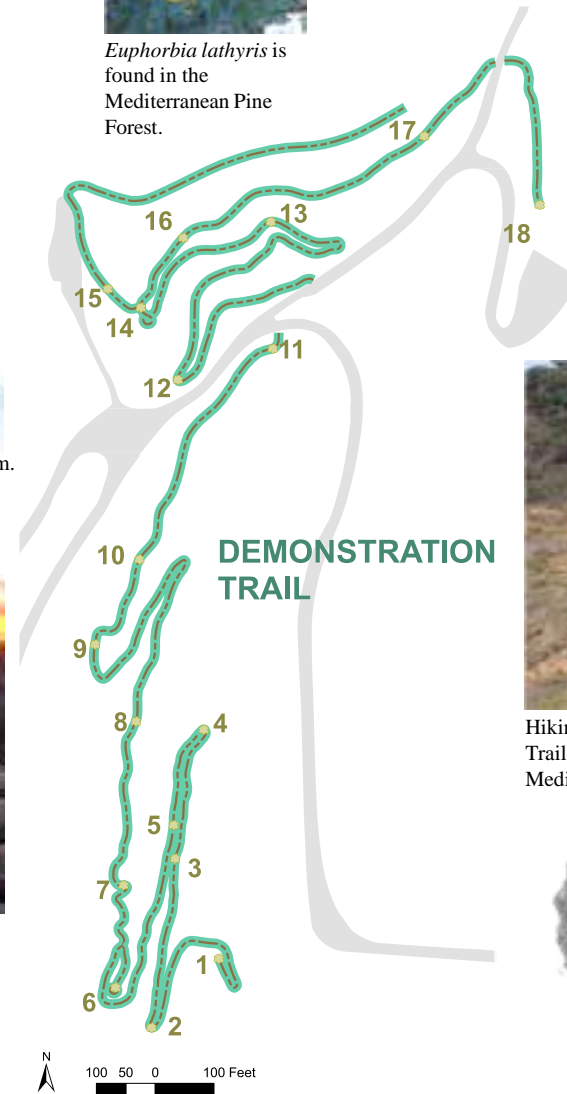
Newly planted *Echinopsis bolligeriana* cactus at sunset in the Chilean garden.



Euphorbia lathyris is found in the Mediterranean Pine Forest.



Salvia leucophylla is a native species found along the trail.



Hiking along the Demonstration Trail in view of the Mediterranean Pine Forest.





Trail Survey Guides Development of App

- Survey was conducted November 2012 to October 2013
- Survey results (n = 115) estimated 2000 visitors per week.
- 70% of users owned smartphones. Great majority of those who did not were over 65 years of age.
- Visitors did not prioritize technology in the initial survey; however, in follow up interviews (n = 24) Story Trail technology was explained and demonstrated, which reversed the unfavorable opinion.



Educational walks along the Ventura Botanical Gardens Demonstration Trail attract many visitors.



Trail Survey Guides Development of App

- Demonstration of audio clips elicited the greatest positive responses.
- Visitors expressed a desire for information about what is in the field of view along the trail including botany, history, culture, anthropology, and geology.
- Visitors wished to see minimal or no signage and greater directional information.



Educational walk participants listen to a lecture on local Geology.

Cahill, J. and M. Dunham, 2014 (In Press), Engaging Communities through Smart-Phone Technology, Proceedings of 5th Botanic Gardens Congress. Botanic Gardens Conservation International. Dunedin, New Zealand



Application Development Goals

- Support multiple tours (Botany, Birding, Geology, Regional History, Cultural Anthropology) on multiple basemaps (Site, Topographic, Aerial) on multiple devices.
- Access audio, video, and slideshow content for each tour stop.
- Activate GPS on map views.
- Engage with tour stop content by tapping on the map or walking the trail in a location-aware scenario.
- Require no on-premise servers or other IT infrastructure.



Code Development

- A Native or Hybrid Approach?
 - Native apps provide the best performance and direct access to low-level hardware; however,
 - Hybrid apps are written with one code base using web technologies (HTML, CSS, Javascript, AJAX) and can be compiled, packaged, and deployed as native apps to multiple devices.



Testing Native-built versus Hybrid-built Apps

- The development team built two simple apps – one native iOS app and one hybrid app using the Apache Cordova API - comparing performance for list scrolling and map behavior.
 - List-scrolling performance was nearly identical.
 - Map performance was slightly better in the native app.
- Additional research and testing was conducted to ensure access to device hardware through the hybrid APIs was acceptable.



Project's Development Frameworks

- ArcGIS Javascript API
- Apache Cordova – <http://cordova.apache.org>
- ChocolateChip-UI – <http://chocolatechip-ui.com>
- Cordova provides access to native device hardware and functions including GPS, notification systems, accelerometer, and camera.
- Cordova supports iOS, Android, Blackberry, Windows Phone, Palm WebOS, Bada, and Symbian with very little modification to the code base.
- ChocolateChip-UI emulates the look and feel of native apps for each OS and allows for tailoring of the user experience on each device.





Application Infrastructure Costs

- No on-premise infrastructure required with minimal annual subscription costs.
 - ArcGIS Online offers 50% discount subscription to nonprofits.
 - SoundCloud annual subscription to “Pro Unlimited” \$135/year.
 - Flickr and YouTube are free.
 - Apple Developer \$99/year and Google Developer \$25/year.





 **ArcGIS Online**

Application Data

Application Config

Key (PK)
Value
Shape * (Point)

Tours

TourTag (PK)
Name
Description
StopService
DefaultBasemap
Visible
Lat
Long
FID
Shape * (Point)

Tour Stop Service

StopTag (PK)
StopOrder
Name
Lat
Long
Caption
PrimaryImage
AudioClip URL
VideoClip URL
FID
Shape * (Point)

Sponsors

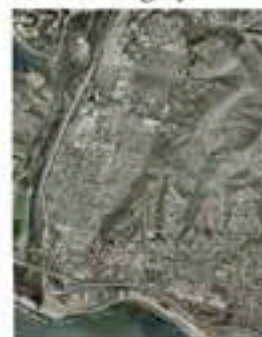
SponsorID (PK)
Name
TourTag
LogoImage
Website
Address
Lat
Long
FID
Shape * (Point)


Application Basemaps

Garden Map



Aerial Imagery



 **World Topo**
Community Maps Program



Application Site Map





Tour Stop Screen



- Tap on the Map Icon to switch to the Tour Map screen.
- Tapping on the arrows will move you forward or back through the tour stops.

- This is the multimedia control bar. Tap on the far left icon to listen to the audio clip. The middle icon displays a picture list. The far right icon plays video. If an icon grayed out, content isn't available.



Tapping on the sound icon changes the multimedia control bar to the audio player.



Tour Map Screen



- If you tap on the far left icon and your GPS is activated, the map will move to locate your current position.
- If you tap on the four arrows icon the map will move to its fullest map extent around Grant Park.



Auto-guided Tour with Geofencing



Example Scenario

User selects *Enable Audio checkbox* and taps the *Start “auto-guided” tour button* on the Tour List page.

1. As the user walks the trail and they enter a geo-fenced tour stop zone, the Tour Stop page displays and the audio track plays.
1. When the user leaves the geo-fenced zone the App switches back to the user’s last selected page.
2. Repeat at 1 above, until user selects *Stop “auto-guided tour button* on Tour List or Tour Stop pages.



Lessons Learned in Development

- Cordova learning curve was initially challenging, but worth the effort.
- ChocolateChipUI framework for native app “look and feel” really helped.
- Debugging tools for Android hybrid apps are built into Chrome, but there is no comparable browser-based tool for iOS.
- ArcGIS Online
 - Tour managers can edit stop content directly in an AGO web map.
 - Presently need to “fake” points for non-spatial tables and publish table data as a feature service.
 - Currently cannot access CSV tables due to CORS limitations.



A Vision for a Nonprofit Commons Collaborative

Mission

To build, provide, and maintain map-centric applications as a nonprofit commons collaborative for the benefit of botanic gardens, museums, zoos, parks, private lands, campuses, and governmental organizations at a significantly reduced cost.

Share in the Code

The Story Trail Tours App hosted on ArcGIS Online and developed by The University of Redlands (Center for Spatial Studies) for the Ventura Botanical Gardens is offered to Commons members through a nonprofit collaborative. The App can be branded and tailored for members and then published to their respective App store accounts. This custom work would be done for a minimal product fee and a small yearly maintenance fee to cover updates.





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- Esri

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- The University of Oregon's Infographics Lab

Ken Kato



Redlands development team members from left to right: Nathan Strout, Rodolfo Godinez, and Vani Nellaiappan.