CITY GIS USER GROUP PRESENTATION
SDOT ARCGIS ONLINE TREE COLLECTION APP

June 5, 2017
TREE COLLECTION APP PRESENTATION OVERVIEW

- The Need
- What it is
- How it Works
- Results
- Using the Inventory Data
- Future
THE NEED

Data Need

• Previous Inventory efforts had known spatial quality issues & were known to be incomplete snapshots in time

• Hansen 8 is the System of Record for Tree Assets attributes in SDOT – Not GIS

• GIS is the Spatial System of Record

• Editing the Inventory was complicated and time consuming. Attributes had to be entered into multiple screens in Hansen then users would have to place a point in GIS using GIS editing tools on a versioned feature class
Management Need

- SDOT Urban Forestry Management wanted to proactively manage work and report performance metrics using the Tree Inventory

- New management approach
  - 9-year Street Tree Management Plan
  - 2016 – 2024 - Move Seattle Levy
  - 27 management units
  - City council districts divided along U.S. Census tracts
  - 3 units per year
THE NEED

• Use ArcGIS Collector App to update street tree inventory with handheld devices
• Hire additional inventory support staff
• Inventory all street trees in Seattle
THE NEED

• Scheduled pruning and maintenance
• Emergency Response
• Hazardous Tree Removal
• Establish recently planted trees
THE NEED

- Plant at least two trees for every one removed
- Leverage existing gaps within SDOT tree “corridors”
- Use iTree analysis of inventory to make better decisions
THE NEED

- Conduct Racial Equity Toolkit Analysis to optimize benefits and minimize harm
- Community Survey
- Fact Sheets
- Multimedia Awareness Campaign
- Partnership with Department of Neighborhoods
WHAT IT IS

• 1 Configured ArcGIS Online web map with one editable layer used in Collector for ArcGIS for data collection
• 1 Configured ArcGIS Online web map with one editable layer for content QA/QC by SDOT Urban Forestry Subject Matter Expert
• Custom developed code to move data from SDE to Hansen
  • Initially done with Python scripts that operated overnight to move data through a series of feature classes based on flagged fields
  • Currently through triggers to move data into QA/QC real-time and into Hansen real-time then scripts to push data into Production GIS datasets nightly

• [http://seattlecitygis.maps.arcgis.com/home/webmap/viewer.html?webmap=dbecf3c0d26e4781aba9bd92508a3de0](http://seattlecitygis.maps.arcgis.com/home/webmap/viewer.html?webmap=dbecf3c0d26e4781aba9bd92508a3de0)
**HOW IT WORKS**

**FIELD**

Data Collection

- Tree Data Collected in the Field for attributes defined by data dictionary
- Users will be able to:
  - Add new trees
  - Remove trees from inventory
  - Change attribute values as defined by the data dictionary
  - View the location of trees

**OFFICE**

QA/QC

- Hansen stores Attributes
- GIS stores Locations

- GS Processes to incorporate data identified as new or changed into QA/QC dataset and automated verification that all mandatory fields are populated and all data types are correct

- Processes to push QA/QC-accepted data into Hansen and GIS

- Hansen stores Attributes

- Over-night Processes to update SDOT.V_Trees—a GIS Feature Class which shows all non-expired trees and select Hansen attribute

- Copy SDOT.V_Trees including attributes to SDOT.V_Trees_Field—a versioned/editable Feature Service. This will be the dataset that new and changed data collected in the field will be written.

- Hansen stores Attributes

**GIS Processes**

- Urban Forestry Subject Matter Expert to review data for content that automated processes can not capture
Exercise – Reforestation of Lake Union

1.) Add a tree with the following parameters:
   • Edit Type – **ADD**
   • Street Segment – **10533**
   • Scientific Name – **Choose Any from List**
   • Address – **700 5th Ave**
   • Diameter – **Enter any positive number**
   • Planted Date – **Today**
   • Funding Source – **Choose Any from List**
   • Current Status – **Choose Any from List**
   • Last Verified Date – **Today**
   • Ownership – **Choose Any from List**
   • Tree Pit Treatment – **Choose Any from List**
   • Remaining fields enter as wish
Exercise – Reforestation of Lake Union

2.) Either Change Attributes, Move a Tree, Change Attribute & Move a Tree or Remove a Tree

- Change the Tree Species
- Move a Tree from elsewhere on the map into Lake Union
- Change a Tree Species and Move the Tree into Lake Union
- Remove a Tree around the perimeter of Lake Union
Exercise – Reforestation of Lake Union

3.) SME QA/QC by SDOT Urban Forestry Arborist

http://seattlecitygis.maps.arcgis.com/home/webmap/viewer.html?webmap=416833bb7d1b4787baad755f7e18d7b1
RESULTS

- 2016 Completed Units:
  - South Park/Highland Park (Unit 3)
  - Rainier Beach (Unit 5)
  - Lake City/Olympic Hills (Unit 18)

- 2017 In Progress Units:
  - First Hill/Central District (Unit 10)
  - University District/Ravenna/Eastlake (Unit 14)
  - Ballard/Fremont (Unit 23)

SDOT Urban Forestry Tree Management Plan
**RESULTS**

- 36,351 edits have been made since November 2015
- Currently 127,976 Active Trees in Production SDOT.V_Trees feature class (aka Street Trees in Seattle Tools)
- June – September 2016 had an Urban Forestry intern dedicated to collecting tree data
- Summer of 2017 will have 4 Urban Forestry interns and 4 contractors collecting tree data

<table>
<thead>
<tr>
<th>Month</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>November 2015</td>
<td>392</td>
</tr>
<tr>
<td>December 2015</td>
<td>760</td>
</tr>
<tr>
<td>January 2016</td>
<td>1503</td>
</tr>
<tr>
<td>February 2016</td>
<td>3713</td>
</tr>
<tr>
<td>March 2016</td>
<td>3014</td>
</tr>
<tr>
<td>April 2016</td>
<td>1515</td>
</tr>
<tr>
<td>May 2016</td>
<td>1174</td>
</tr>
<tr>
<td>June 2016</td>
<td>3322</td>
</tr>
<tr>
<td>July 2016</td>
<td>4709</td>
</tr>
<tr>
<td>August 2016</td>
<td>5703</td>
</tr>
<tr>
<td>September 2016</td>
<td>2604</td>
</tr>
<tr>
<td>October 2016</td>
<td>1625</td>
</tr>
<tr>
<td>November 2016</td>
<td>2779</td>
</tr>
<tr>
<td>December 2016</td>
<td>1493</td>
</tr>
<tr>
<td>January 2017</td>
<td>1258</td>
</tr>
<tr>
<td>February 2017</td>
<td>310</td>
</tr>
<tr>
<td>March 2017</td>
<td>219</td>
</tr>
<tr>
<td>April 2017</td>
<td>180</td>
</tr>
<tr>
<td>May 2017</td>
<td>78</td>
</tr>
</tbody>
</table>
# Results

<table>
<thead>
<tr>
<th>Month</th>
<th>Added</th>
<th>Changed Attributes</th>
<th>Moved</th>
<th>Moved &amp; Changed Attributes</th>
<th>Removed</th>
</tr>
</thead>
<tbody>
<tr>
<td>November 2015</td>
<td>257</td>
<td>46</td>
<td>15</td>
<td>15</td>
<td>59</td>
</tr>
<tr>
<td>December 2015</td>
<td>453</td>
<td>60</td>
<td>34</td>
<td>60</td>
<td>153</td>
</tr>
<tr>
<td>January 2016</td>
<td>403</td>
<td>446</td>
<td>77</td>
<td>293</td>
<td>284</td>
</tr>
<tr>
<td>February 2016</td>
<td>781</td>
<td>844</td>
<td>842</td>
<td>702</td>
<td>544</td>
</tr>
<tr>
<td>March 2016</td>
<td>1111</td>
<td>645</td>
<td>421</td>
<td>147</td>
<td>690</td>
</tr>
<tr>
<td>April 2106</td>
<td>572</td>
<td>425</td>
<td>213</td>
<td>124</td>
<td>181</td>
</tr>
<tr>
<td>May 2016</td>
<td>378</td>
<td>430</td>
<td>73</td>
<td>88</td>
<td>205</td>
</tr>
<tr>
<td>June 2016</td>
<td>1405</td>
<td>665</td>
<td>111</td>
<td>637</td>
<td>504</td>
</tr>
<tr>
<td>July 2016</td>
<td>2039</td>
<td>596</td>
<td>194</td>
<td>1555</td>
<td>325</td>
</tr>
<tr>
<td>August 2016</td>
<td>2927</td>
<td>685</td>
<td>189</td>
<td>1200</td>
<td>702</td>
</tr>
<tr>
<td>September 2016</td>
<td>744</td>
<td>415</td>
<td>105</td>
<td>970</td>
<td>370</td>
</tr>
<tr>
<td>October 2016</td>
<td>759</td>
<td>254</td>
<td>194</td>
<td>195</td>
<td>223</td>
</tr>
<tr>
<td>November 2016</td>
<td>1089</td>
<td>708</td>
<td>240</td>
<td>428</td>
<td>314</td>
</tr>
<tr>
<td>December 2016</td>
<td>475</td>
<td>278</td>
<td>103</td>
<td>325</td>
<td>312</td>
</tr>
<tr>
<td>January 2017</td>
<td>254</td>
<td>336</td>
<td>89</td>
<td>288</td>
<td>291</td>
</tr>
<tr>
<td>February 2017</td>
<td>69</td>
<td>27</td>
<td>154</td>
<td>3</td>
<td>57</td>
</tr>
<tr>
<td>March 2017</td>
<td>88</td>
<td>26</td>
<td>62</td>
<td>14</td>
<td>29</td>
</tr>
<tr>
<td>April 2107</td>
<td>100</td>
<td>12</td>
<td>31</td>
<td>3</td>
<td>34</td>
</tr>
<tr>
<td>May 2017</td>
<td>44</td>
<td>10</td>
<td>0</td>
<td>4</td>
<td>20</td>
</tr>
</tbody>
</table>
RESULTS & USING THE INVENTORY DATA

Unit 3 – South Park / Highland Park

- Inventory is 100% Complete
- Trees Added to Inventory: 3,685
- Total Trees Inventoried: 6,081
- 153% Inventory Increase
- Initial Annual Benefits of Inventory: $122,201
- Annual Benefits of Final Inventory: $375,364
  - Energy
  - CO2
  - Air Quality
  - Storm Water
  - Aesthetic
RESULTS & USING THE INVENTORY DATA

UNIT 3 – TOP 5 GENERA

Top 5 Initial Genera
- Maple (25%)
- Cherry (15%)
- Ash (10%)
- Crabapple (8%)
- Hawthorne (5%)
- Other (37%)

Top 5 Final Genera
- Maple (25%)
- Cherry (15%)
- Pear (7%)
- Crabapple (6%)
- Serviceberry (5%)
- Other (42%)
2016 In Review

• Estimated Annual Benefits To-Date: $841,647

• 2016 Total Expenditures: $990,828
  • Inventorying: $56,022
  • Pruning: $477,442
  • Removal: $32,070
  • Planting: $297,997
  • Watering: $127,297
USING THE INVENTORY DATA

Maintain

• A complete and accurate inventory allows work orders to be written against a specific tree that actually exists
• 9-Year Management Plan implemented based on accurate and complete inventory

Replace

• Types and number of trees to replace can be determined and managed with a data-driven approach

Connect

• Analyses can be preformed for Race & Social Justice initiatives and performance metrics
• Community Outreach materials generated
  • Story Map - http://seattlecitygis.maps.arcgis.com/apps/MapSeries/index.html?appid=831222921aa24d868f1a9ab1d7eba728
FUTURE

• Complete inventory for entire City

• Work with Parks who maintains a separate tree inventory
  • Is there a good way to ensure consistency between the inventories

• Collaborate with Office of Sustainability and Department on Neighborhoods efforts around Seattle Trees

• Consider the Tree Inventory in Storm Response preparedness work

• Others to consider?