Architecting a data compilation and information delivery system

Charles H. (Hobie) Perry
Christopher M. Oswalt
& many others
We’re developing an Engagement Portfolio to meet the needs of a Spectrum of Users.

- Power Users
- Open Communities
- Developers
- Scientists
- Resource Professionals
- Educators
- Media
- Decision Makers
- Public
### Applications Configuration

<table>
<thead>
<tr>
<th>Application / Role</th>
<th>Solution</th>
<th>Architecture</th>
<th>Total Users</th>
<th>Peak Active Users</th>
<th>Service Type</th>
<th>ArcGIS Server Site</th>
<th>Data Source</th>
<th>Basemaps</th>
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<td>ArcGIS Enterprise / Raster Analysis</td>
<td>Web App / Services</td>
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<td>Raster Analysis</td>
<td>Landsat S3 / Local Disk</td>
<td>AGOL</td>
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<td>Raster Analysis</td>
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### Infrastructure Technology Solutions

<table>
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<th>Vendor</th>
<th>Description</th>
<th>Tier</th>
<th>Target Version</th>
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<tr>
<td>Microsoft</td>
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<td>Client Desktop</td>
<td>Windows Server 2012 R2</td>
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<tr>
<td>Microsoft</td>
<td>Windows Server Operating System</td>
<td>GIS / File Servers</td>
<td>Windows Server 2012 R2</td>
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<td>Amazon EC2</td>
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<td>Amazon EC2</td>
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<td>Data Tier</td>
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<tr>
<td>Amazon EC2</td>
<td>ELB Load Balancer</td>
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Forest Atlas of the United States

The United States of America has impressive forests — more than 800 million acres of natural and planted forests and woodlands — providing clean water, clean air, wildlife and fish habitat, recreational opportunities, and resources for economic development. This Atlas combines state-of-the-art inventory and monitoring information with tree pollen counts, mill surveys, ownership records, bird observations and more to tell stories about the value of our nation’s forests and the challenges they face.
Project 1. Forest Atlas

- **FY16 Vision and Update**
  - Secure review by the Office of Communications.
  - Update companion web document navigation to “best practices”
  - *The document was not reviewed as promised by OC.*
  - *It is now under review.*

- **FY17 Vision and Update**
  - Department reviews and publishes print document
  - Web application updated with all of the print features released in print. All associated data products will be published in ArcGIS Online.
  - *The text of the print document is with Linda Heath for a policy review.*
  - *The GTAC design and programming staff are migrating existing maps to the digital environment.*

- **FY18**
  - Begin development on Version 2 of the web application by prioritizing these features. Six new features will be produced.
Forest Inventory and Analysis Annual Reporting

This site contains annual updates from the USDA Forest Service Forest Inventory and Analysis program (FIA). FIA annual updates provide current estimates of the extent and condition of forest resources for each state in the U.S.

FIA Annual Updates

FIA reports on status and trends in forest area and location, in the species, size, and health of trees; in total tree growth, mortality, and removals by harvest, in wood production and utilization rates by various products, and in forest land ownership. FIA is managed by the Research and Development organization within the USDA Forest Service in cooperation with State and Private Forestry and National Forest Systems. FIA traces its origin back to the McSweeney - McNary Forest Research Act of 1928 (P.L. 70-466). This law initiated the first inventories starting in 1930.
California Forest Inventory Data – An interactive visualization

This is an interactive forest inventory data visualization. All of the charts are linked and connected. Clicking on a chart will filter the data included in the other charts, and it’s possible to apply multiple filters. When a chart is filtered, reset text will appear that allows you to clear the filter on that chart. There is also a ‘Reset All’ option to reset all of the charts. Use the dropdown menus to select the type of data you would like to explore. Hovering over the different chart items will show the underlying data value. Although error estimates are not currently included, a lower number of research plots selected generally results in greater uncertainty in the estimate.

The source data for this visualization comes from the current PNW-FIADB database that can be found on this website under “FIA Topics - Inventory Data,” and more information about the source data can be found under “FIA Topics – Documentation.”

Select the type of estimate:
- Totals

Reset All

Select an attribute:
- Area

Number of plots selected: 5983

Units selected:
- Area of forest land, thousand acres

Ownership
- All Private owners
- Bureau of Land Mgmt
- Dept of Defense/Energy
- Fish and Wildlife Service
- Local govt (City/County)
- National Forest System
- National Park Service
- Other federal
- Other non-federal public
- State govt

Forest Type Group
Project 2. Story maps for reporting

• **FY17 Vision and Update**
  • Publish at least two annual reports within each station using story map templates.
  • NRS will publish two 5-year reports using story map templates.
  • *11 annual reports are published in the story map format, including examples from every region except IW; New Mexico is under review.*
  • *Production work continues on the MD 5-year as a story map.*
  • *Exploring several Business Intelligence dashboards (e.g., Pyramid Analytics, Qlik, and PowerBI) as data delivery tools.*

• **FY18**
  • We have the capacity to increase annual and 5-year report production in out years, but targets will depend upon the user response to this new reporting format.
Mapping Occurrence of Tree Damage in the Forests of the Northern United States

This story map is intended to accompany a General Technical Report published in 2016.

Tree damage is an important visual indicator of tree and forest health. The impact on health, vigor, and value can be quite different depending on the damaging agent and where the damage occurs. This report describes the types of damage and occurrence as measured across a 24-state study area between 2009 and 2013.
Project 3. Story maps for tech transfer

• FY17 Vision and *Update*
  • Publish at least two science products within each station using story map templates.
  • Define and develop additional story maps relevant to national themes and pushes outlined in the Farm Bill.
  • *NRS published a companion story map for a recent GTR: "Mapping Occurrence of Tree Damage in the Forests of the Northern United States."
  • *A story map will accompany the upcoming RPA Forest Resources Report.*

• FY18
  • We have the capacity to increase the number of science products we share out years, but targets will depend upon the user response to this new reporting format.
Project 4. Publishing geospatial datasets

• FY17 Vision and *Update*
  • An additional 20 tree species will be published based upon demand.
  • *There is no progress on this project to report at this time.*

• FY18
  • We have the capacity to increase data publication in out years, but targets will depend upon the user response to this new reporting format.
Project 5. Operations dashboard for plot production

• FY17 Vision and *Update*
  • Build out the plot production dashboard for all 50 states in collaboration with regional IM groups. Achieving this target will depend upon access to regional instances of MIDAS, NIMS and FIADB since the dashboard hits the databases directly.
  • *Initial discussions have begun with our Esri collaborators, but our progress was slowed by the sudden loss of a key collaborator.*

• FY18
  • We have the capacity to create dashboards for other relevant attributes. Targets will depend upon national program requirements and access to regional instances of MIDAS, NIMS and FIADB.
Project 6. Training

• FY17 Vision and *Update*
  • Additional training events will be held in each region to demonstrate story maps for reporting.
  • *Events beyond the "Train the Trainer" have been held in NRS and SRS. The materials have been shared with others both inside and outside FIA for their use.*

• FY18
  • Additional training events on story maps for reporting may be held as needed. Training on other, novel applications, is referenced in New Projects, below.
New Project 1. Tech Transfer to Others

• FY17 Vision and *Update*
  • Facilitated strategic planning and training for WO NPLs with GTAC in November.
  • Training will be procured through direction consultations with Esri staff during the stand-up of the massive raster processing environment and associated software as required.
  • *WO NPL training did occur, and we remain in contact with WO collaborators.*

• FY18
  • Training will be procured through the EEAP for existing and/or additional applications as required.
A planetary-scale platform for Earth science data & analysis

Powered by Google's cloud infrastructure

Meet Earth Engine

Google Earth Engine combines a multi-petabyte catalog of satellite imagery and geospatial datasets with planetary-scale analysis capabilities and makes it available for scientists, researchers, and developers to detect changes, map trends, and quantify differences on the Earth's surface.
Earth on AWS

Build planetary-scale applications in the cloud with open geospatial data

Landsat on AWS

Landsat 8 data is available for anyone to use via Amazon S3. All Landsat 8 scenes from 2015 are available along with a selection of archived scenes from 2013 and 2014.
New Project 2. Massive Raster Processing Environment

- **FY17 Vision and Update**
  - Design, stand-up and populate a secure cloud-based development massive raster processing environment dedicated to our purposes, reducing strain upon the VDC.
  - Esri will stand-up and populate a production environment hosting secure massive raster processing.
  - Esri and FIA will collaborate to define and demonstrate four use cases applying raster analytics.
  - "Prototyping Plan for USFS FIA Raster Analytics Platform (RAP)“ is currently under review. Four demonstration use cases are identified: 1) Forest carbon modeling and mapping, 2) Implementing base learners for the Landscape Change Monitoring System (LCMS), 3) Small-area estimation, and 4) Digital engagement through a sustainability tool.
  - Option Year 1 was funded for FY18 activities.
  - **OPEN QUESTION:** May we put NIIMS in this environment?

- **FY18**
  - Pending successful application, Esri will maintain the environment while we continue to populate and use it.
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<th>Task Deliverable Description</th>
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<th>OY 2</th>
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New Project 3. Migrate Reporting

• FY17 Vision and *Update*
  • The lead for the Forest Resources of the US report will share her vision of how storytelling and storymaps fit into core reporting to national and international audiences at a WO training program targeting NPLs.
  • The lead for the Forest Resources of the US report will develop a strategy for implement story mapping technology into traditional workflows.
  • *We have had initial discussions with the lead for the Forest Resources report. We are waiting for other authors to submit their content to best assess which items lend themselves to digital reporting tool.*

• FY18
  • We have the capacity to transition Business Report report production in out years, but our goals will depend upon the user response to this new reporting format.
This is the community's public platform for exploring and downloading open data, discovering and building apps, and engaging to solve important local issues. You can analyze and combine Open Datasets using maps, as well as develop new web and mobile applications. Let's make our great community even better, together!
New Project 4. Increase access to FIA's geospatial content

• FY17 Vision and **Update**
  • Publish at least five datasets in the Living Atlas and geoplatfom.gov.
  • Investigate the publishing process for NatureServe and Databasin.
  • *We have made initial connections with CIO and Esri collaborators to stand-up an open source data portal.*
  • *The CIO wants to help us develop a phone app.*

• FY18
  • The team will publish at least five datasets in appropriate portals.
New Project 5. Safety application for check-in/check-out

• FY17 Vision and *Update*
  • The prototype will be completed and shared with DAB.
  • *PNW has produced a prototype application allowing field crews to monitor field plots in relation to existing wildland fires. Testing is underway.*

• FY18
  • Additional applications will be developed in consultation with regional safety teams.
New Project 6. Geo-enable FIADB

• FY17 Vision and *Update*
  • Investigate the process for geo-enabling FIADB. Three uses cases will be developed to demonstrate the benefits of this approach.
    • *Conversations have begun, but there is little tangible progress to report at this time.*

• FY18
  • The team will geo-enable FIADB.
New Project 7. Ops Dashboard for QA/QC

• FY17 Vision and *Update*
  • The team will develop a plan for building the QA/QC dashboard based upon the plot production dashboard.
  • *Conversations have begun, but there is little tangible progress to report at this time.*

• FY18
  • The team will standup an OpsDashboard.
New Project 8. Applications for partners

• FY17 Vision and *Update*
  • Work with Esri and open source tools to develop inexpensive and/or free solutions to publishing digital stories.
  • Continue consultations with IP. Collaborations with international partners will occur as appropriate.
  • *Conversations have begun, but there is little tangible progress to report at this time. Our first test of this approach will be with the American Forest Foundation as part of the massive raster processing environment. The tool will leverage applications related to green infrastructure and sustainability reporting.*

• FY18
  • See FY17.
Key questions going forward

1. What are the opportunities for new e-/d-publication series?

   • *We need to maintain the credibility provided by our brand, the shield.*
The digital chicken/egg challenge
Key Questions

1. What are the opportunities for new e-/d-publication series?
   • We need to maintain the credibility provided by the shield.

2. Are we counting the right bean?
   • Is it about reaching scientists or reaching out?
Usage details for the period:

Views this Period: 1,759
Avg Views Per Day: 9.72

Usage Time Series
Forests of New Jersey, 2015

Usage details for the period:

Views this Period: 453
Avg Views Per Day: 2.50

Usage Time Series:

Usage activity is based on GMT time reporting. Your local time zone is GMT -5 hours.
Key Questions

1. What are the opportunities for new e-/d-publication series?
   • We need to maintain the credibility provided by the shield.

2. Are we counting the right bean?
   • Is it about reaching scientists or reaching others?

3. What do we want the future to look like?
   • This requires skills beyond FIA’s current capacity, but we want to influence the future.
Resource Needs & Opportunities

- Atlas web development @ GTAC
- Massive Raster Processing environment
- BI licenses ($0 to $108K + 18K/year)
- Developer time
  - Visualizations
  - Extending EVALIDator API
  - Other partnerships (e.g., UMN 3D visualizations)