

The AAO Foundation Craniofacial Growth Legacy Collections Project is available on a complimentary basis to whomever would wish access to this valuable resource of untreated cases. However, this costs the AAO Foundation, the owners of the collection, \$50,000 annually to maintain this site. Consequently, we are asking you, the users of this web site, to help fund its continued existence. Please [DONATE NOW](#) to help preserve this important legacy of orthodontics. We thank you in advance for your support.

Welcome!

With support from the American Association of Orthodontists Foundation (AAOF), nine of the eleven known collections of longitudinal craniofacial growth records in the United States and Canada have joined together to create this web site and its underlying numerical database. Our purpose is to make representative materials from the participating collections available for viewing and further investigation by clinicians, craniofacial investigators, students of human growth, and interested members of the public.

These collections represent the work of hundreds of investigators. They have been gathered, cataloged, and studied over a period of more than seventy-five years. The materials they contain are literally irreplaceable. Each of the collections is independent from the others and has pursued its own sampling and data collection strategies. Taken together, these different and complementary strategies have produced a rich longitudinal record of craniofacial development among children who did not receive orthodontic treatment. Available documentation of the growth process in the several collections includes skull x-ray images of various sorts, hand-wrist films, dental radiographs, facial photographs, and study casts as well as written records on the physical and educational development of children of varied ethnicities and growth patterns.

The contributing collections, working individually, have produced most of the information that is available in the contemporary orthodontic literature on longitudinal craniofacial growth in untreated children. Now, by merging data from the several collections, we hope to make possible further collaborative studies that will enrich and refine our knowledge of craniofacial growth in untreated children and adolescents.

During the initial phase of this project, which is now nearing completion, we have confined ourselves primarily to the collection of lateral and frontal cephalograms. Presently available on the site are more than 13,000 digital images including 8700 lateral cephalograms and over 3000 frontal (PA) cephalograms generated at different ages from 704 cases, gathered from 9 different Collections. Summary statistics on case distribution by sex/gender, age and Angle Class may be found by clicking on "Statistics" in the About menu.

This entire site is a continually developing resource for orthodontic teaching and research. Its primary role is to serve as a repository for longitudinal records of all types with sufficient numerical documentation to facilitate useful search and querying.

Getting Started

Clicking on a Collection Name in the Collections menu takes you to a page with three tabs, where you can see a description of the Collection, a detailed Inventory, and a condensed Inventory. This is the place to start if you want to browse through the images. The items on the Help menu provide more information on browsing and selecting images for your own research project.

The choices on the Search menu allow you to search for Subjects by Collection, Age, Sex, and Angle Class. You can also select from a subset of Subjects by Cephalometric measurements and Changes in Measurements.



Michigan Growth Subject 02101  
Animation of 12 Timepoints Over 12 Years



Landmark Overlays and Locations



0:00 / 0:08

Detailed Inventory for Burlington Growth Showing 100 out of 100 Subjects

Click the Plus symbol to see that Subject's Preview Images • Click any Preview Image for a Full S  
Click column headings to sort the table • Shift click for multiple column sort

|   | Subject | Sex | Angle Class | Laterals | Frontals | Hand Wrist | Study Casts | Landmarks |
|---|---------|-----|-------------|----------|----------|------------|-------------|-----------|
| + | 25      | F   | Class I     | Yes      | Yes      | Yes        | No          | No        |
| + | 76      | M   | Class I     | Yes      | No       | No         | No          | Yes       |
| + | 114     | F   | Class I     | Yes      | No       | No         | No          | Yes       |
| - | 135     | M   | Class I     | Yes      | Yes      | Yes        | No          | No        |

Subject 135: M, Angle Class I [Preview]

1 2 3 4 5 6 7 8 9 10 11 12 13

Lateral Frontal Hand Wrist

| #  | Age     | Select                              |
|----|---------|-------------------------------------|
| 1  | 3y 1m   | <input type="checkbox"/>            |
| 2  | 4y 0m   | <input type="checkbox"/>            |
| 3  | 5y 0m   | <input type="checkbox"/>            |
| 4  | 6y 0m   | <input type="checkbox"/>            |
| 5  | 6y 11m  | <input type="checkbox"/>            |
| 6  | 7y 11m  | <input type="checkbox"/>            |
| 7  | 8y 11m  | <input checked="" type="checkbox"/> |
| 8  | 10y 0m  | <input type="checkbox"/>            |
| 9  | 11y 0m  | <input type="checkbox"/>            |
| 10 | 12y 0m  | <input type="checkbox"/>            |
| 11 | 13y 0m  | <input type="checkbox"/>            |
| 12 | 13y 11m | <input type="checkbox"/>            |
| 13 | 16y 0m  | <input type="checkbox"/>            |

# AAOF Craniofacial Growth Legacy Collection

## 2017 Status Report

Sean Curry, Feb 2018





# AAOF Legacy Collection Status

- Collection Status
- Website Infrastructure
- Usage Statistics
- Image Requests
- Future Priorities



# Remembering Shelly Baumrind



My mentor and a driving force behind the AAOF Legacy Collection Project



# Legacy Collection Status

- Year 1 of the Five Year Ongoing Support is underway - thank you AAOF!
- The Collection is now in maintenance mode
- All available images have been processed and loaded to the website and database
- Website and database are stable, and software being updated as new versions become available
- Requests are being filled on a routine basis



# Legacy Collection Image Counts

|               | Nov 2011 | Nov 2012 | Nov 2013 | Nov 2014 | July 2015 | Jan 2018 |
|---------------|----------|----------|----------|----------|-----------|----------|
| Collections   | 9        | 9        | 9        | 9        | 9         | 9        |
| Subjects      | 194      | 566      | 696      | 752      | 752       | 752      |
| Lateral Cephs | 2000     | 6200     | 8700     | 10200    | 10200     | 10200    |
| Frontal Cephs |          |          | 3200     | 5800     | 5800      | 5800     |
| Total Images  | 2500     | 8900     | 12500    | 16000    | 16000     | 16000    |

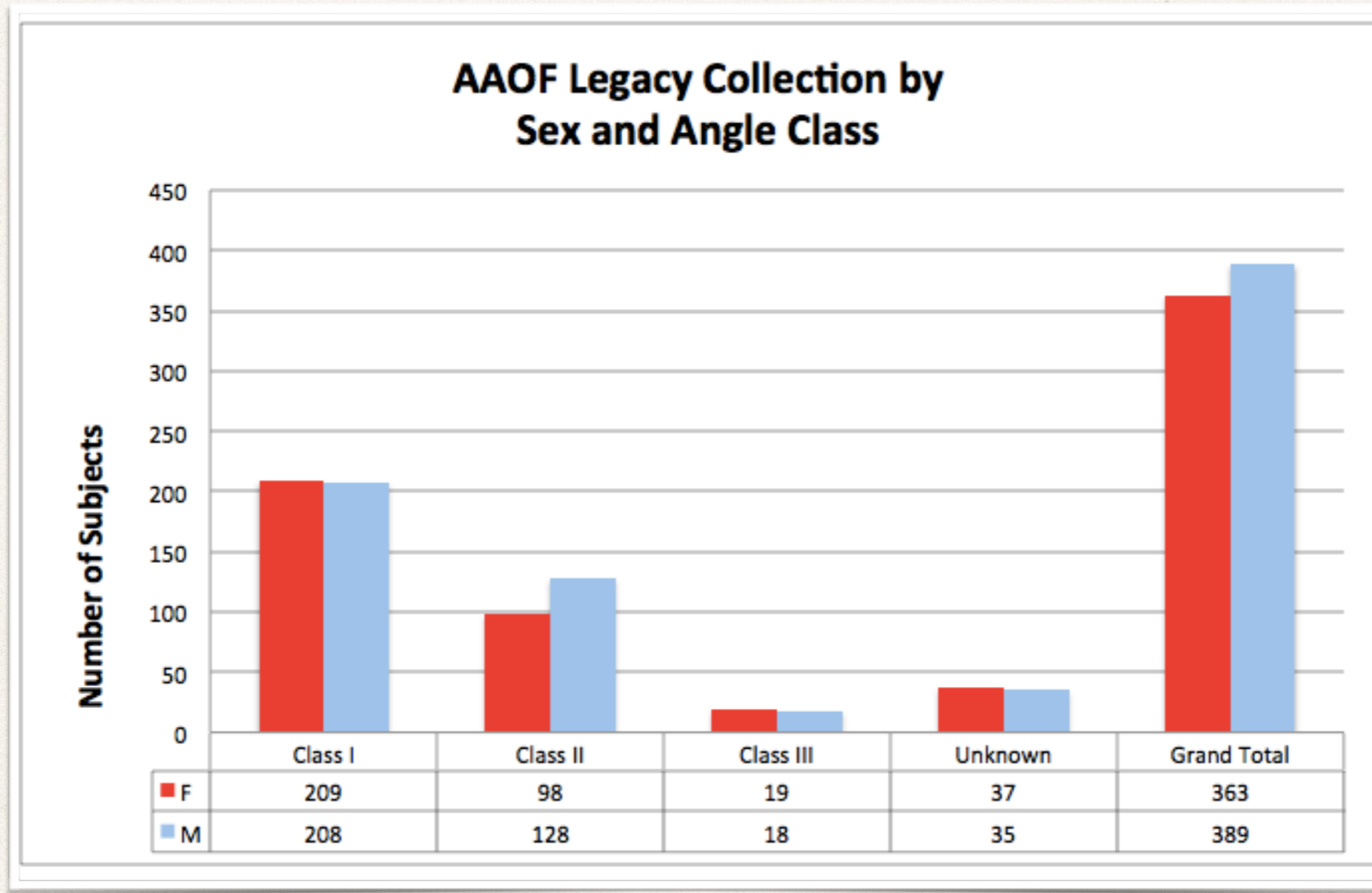


# Subjects Per Collection

| Collection          | Subjects |
|---------------------|----------|
| Bolton-Brush Growth | 102      |
| Burlington Growth   | 100      |
| Denver Growth       | 94       |
| Fels Longitudinal   | 102      |
| Forsyth Twin        | 10       |
| Iowa Growth         | 100      |
| Mathews Growth      | 35       |
| Michigan Growth     | 102      |
| Oregon Growth       | 107      |

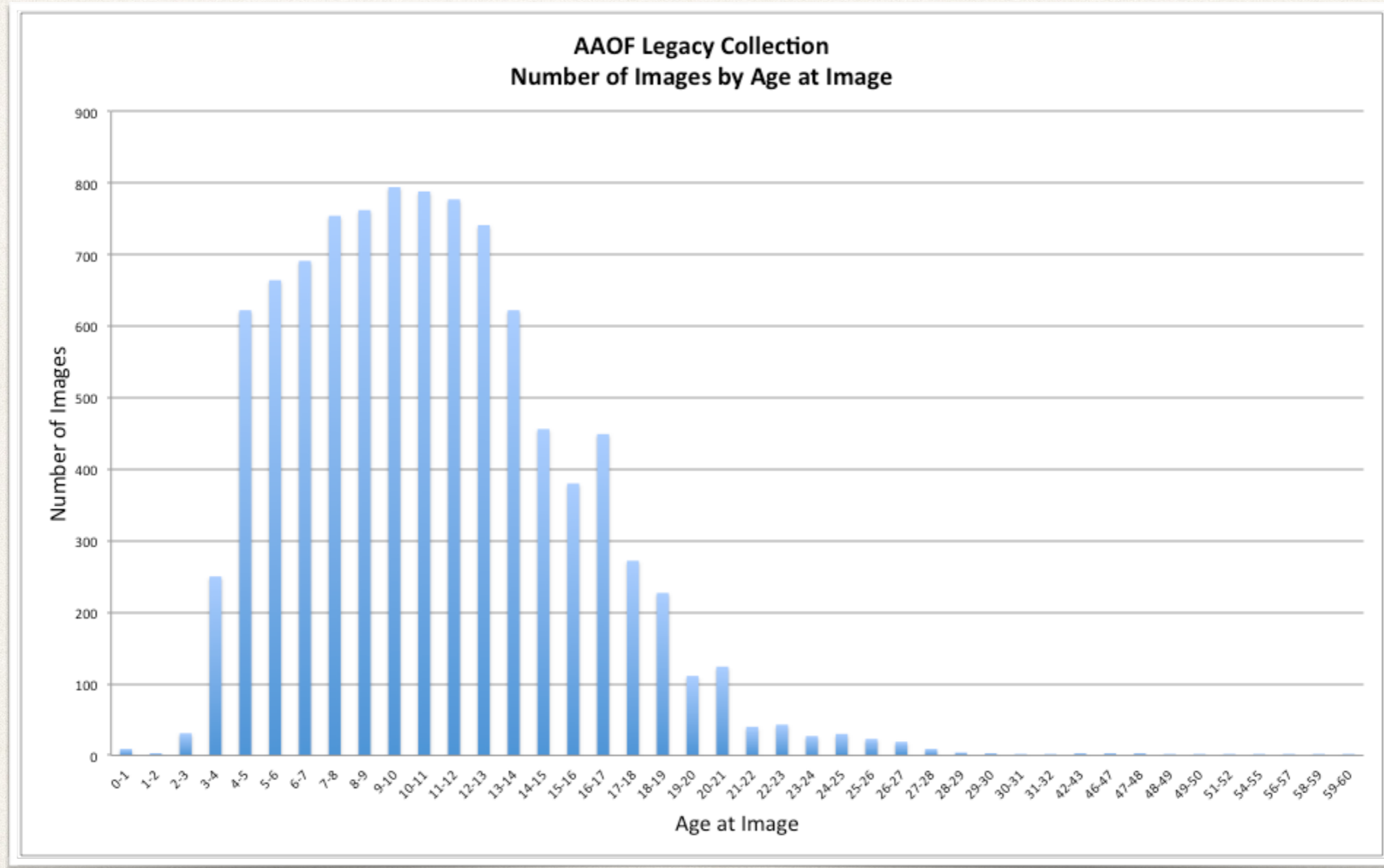


# Subject Distribution





# Subject Images by Age





# Website Infrastructure

- Website and database are hosted on Amazon AWS EC2
- Has been extremely reliable and fast, with very few uptime interruptions
- PostgreSQL Database - Updated to Version 9.6 in September 2017, 10.1 coming
- Node.js Web Server - Updated to Version 4.6 in September 2017, 8.9.4 coming
- Various Javascript libraries for web pages
- All components are updated as new software versions become available



# Ongoing Maintenance Tasks

- Website monitoring - I get automated emails and text messages if site is unavailable
- Current site has been up for 2 months - forced AWS update and restart due to Meltdown and Spectre
- New high-resolution image FTP process
- Webservice and database technical documentation - offsite copies as well as logins/passwords
- Miscellaneous bug fixes
- Request logging
- Website and database backups



# Backup Strategy

- For data security, 3 backups are needed
  - Local
  - Offsite
  - Different media
- Local backup is on Amazon AWS itself
- An offsite backup on a USB hard drive is stored in Portland, OR, and I will deliver another complete backup to CRIL later in the Spring
- Third backup on a different drive in a safety deposit box



# Fiducial Document

This document describes the fiducial mark locations and values for all 9 collections. These data are used for making accurate scaled measurements from the full resolution images.

A copy of the document is sent with the images for each request. The document is updated as new information becomes available.



AAOF Legacy Collection

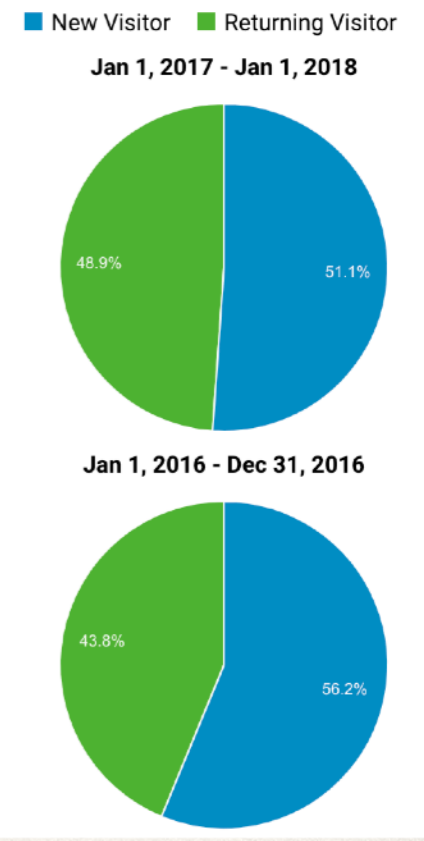
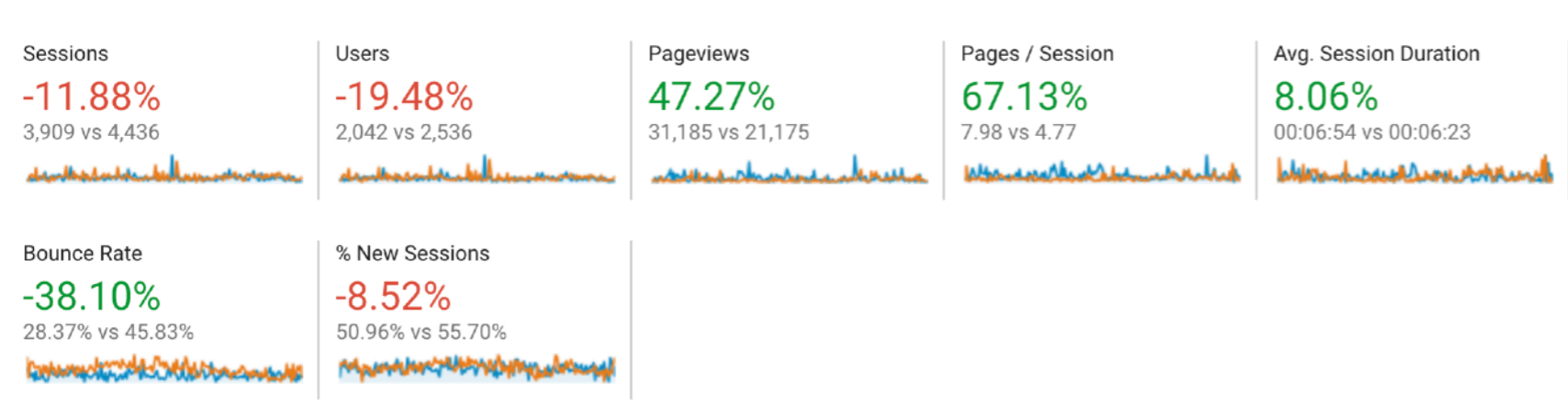
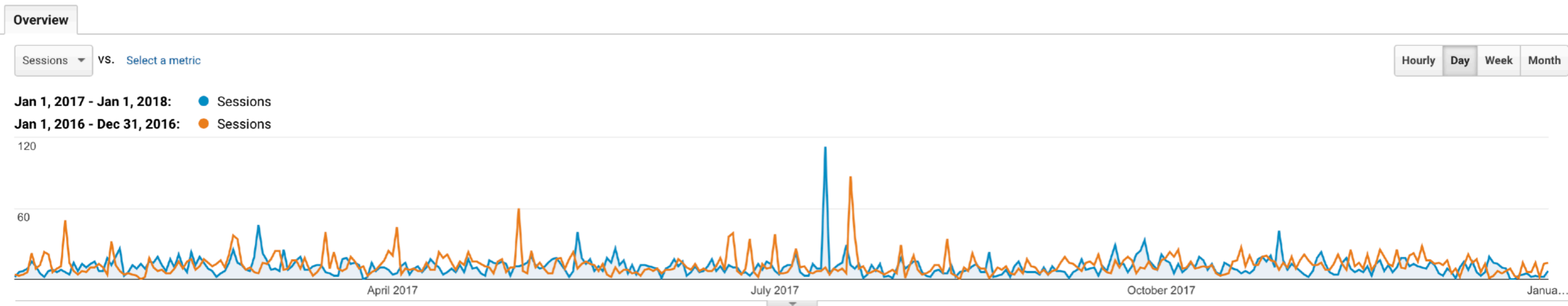
Scaled Measurements from the  
AAOF Legacy Collection Images



# Website Usage 2017

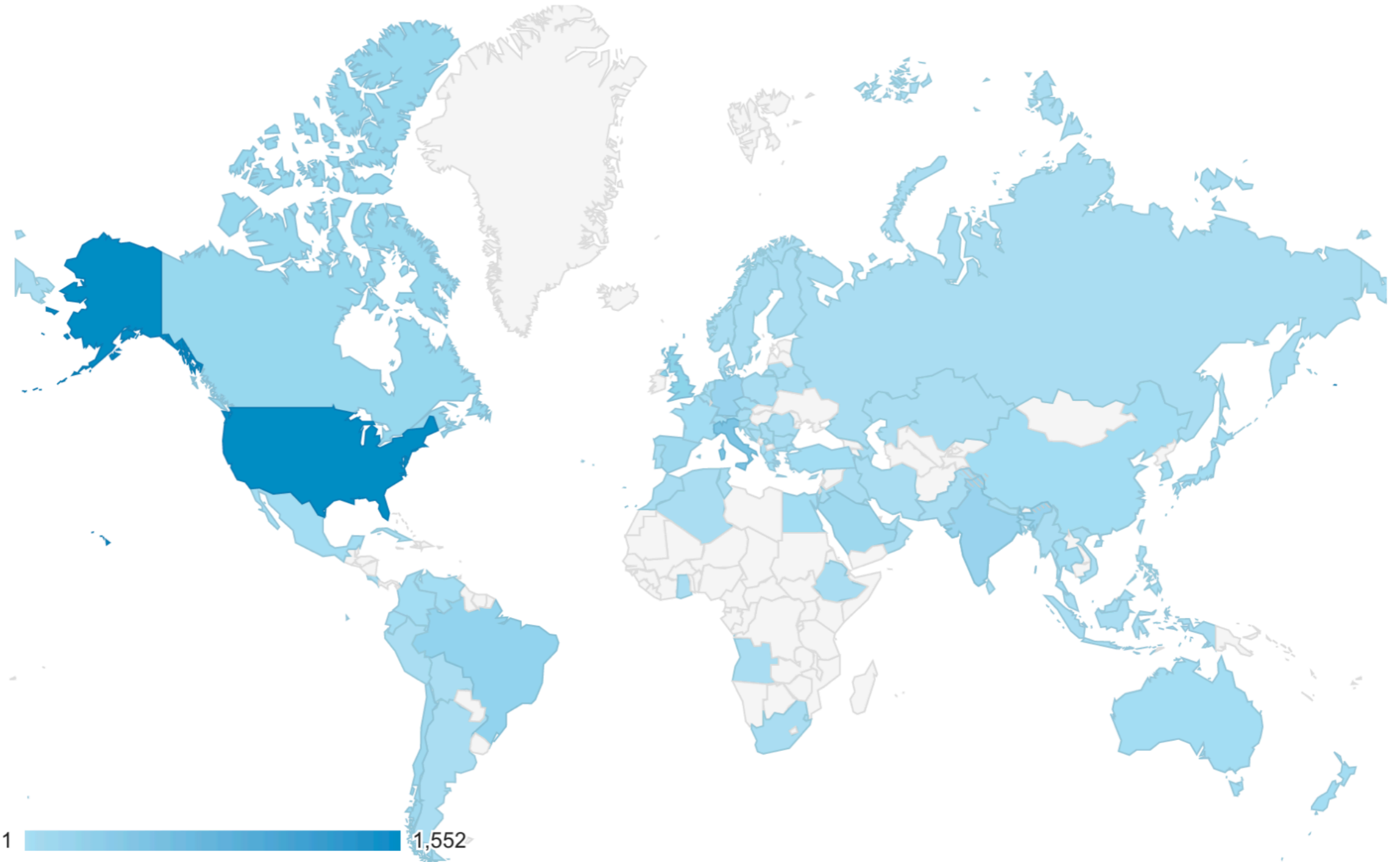
- Results from Google Analytics Data
- Approximately 31,000 Pageviews
  - Up 47% from 2016
- 2040 Users, 3900 Sessions vs. 2500 Users, 4430 Sessions a year ago - fewer users but they are staying longer and doing more
- Most visited Collections:
  - Bolton-Brush Growth
  - Burlington Growth
  - Michigan Growth
  - Denver Growth





# Website Usage 2017 vs 2016





World Wide Interest - Google Analytics Website Visits 2017



| <input type="checkbox"/> | Source <sup>?</sup>                         | Sessions <sup>?</sup> ↓       | % New Sessions <sup>?</sup>        |
|--------------------------|---|-------------------------------|------------------------------------|
|                          |   | <b>67.26%</b> ↓<br>311 vs 950 | <b>0.36%</b> ↑<br>73.63% vs 73.37% |
| <input type="checkbox"/> | 1. <a href="#">aaofoundation.net</a>        |                               |                                    |
|                          | Jan 1, 2017 - Jan 1, 2018                   | <b>117</b> (37.62%)           | 59.83%                             |
|                          | Jan 1, 2016 - Dec 31, 2016                  | <b>122</b> (12.84%)           | 54.92%                             |
|                          | <b>% Change</b>                             | <b>-4.10%</b>                 | <b>8.94%</b>                       |
| <input type="checkbox"/> | 2. <a href="#">m.facebook.com</a>           |                               |                                    |
|                          | Jan 1, 2017 - Jan 1, 2018                   | <b>28</b> (9.00%)             | 100.00%                            |
|                          | Jan 1, 2016 - Dec 31, 2016                  | <b>3</b> (0.32%)              | 100.00%                            |
|                          | <b>% Change</b>                             | <b>833.33%</b>                | <b>0.00%</b>                       |
| <input type="checkbox"/> | 3. <a href="#">outlook.live.com</a>         |                               |                                    |
|                          | Jan 1, 2017 - Jan 1, 2018                   | <b>15</b> (4.82%)             | 13.33%                             |
|                          | Jan 1, 2016 - Dec 31, 2016                  | <b>0</b> (0.00%)              | 0.00%                              |
|                          | <b>% Change</b>                             | <b>∞%</b>                     | <b>∞%</b>                          |
| <input type="checkbox"/> | 4. <a href="#">free-fb-traffic.com</a>      |                               |                                    |
|                          | Jan 1, 2017 - Jan 1, 2018                   | <b>13</b> (4.18%)             | 100.00%                            |
|                          | Jan 1, 2016 - Dec 31, 2016                  | <b>0</b> (0.00%)              | 0.00%                              |
|                          | <b>% Change</b>                             | <b>∞%</b>                     | <b>∞%</b>                          |
| <input type="checkbox"/> | 5. <a href="#">orthocorner.blogspot.com</a> |                               |                                    |
|                          | Jan 1, 2017 - Jan 1, 2018                   | <b>13</b> (4.18%)             | 84.62%                             |
|                          | Jan 1, 2016 - Dec 31, 2016                  | <b>12</b> (1.26%)             | 91.67%                             |

How do Users Find the Website?

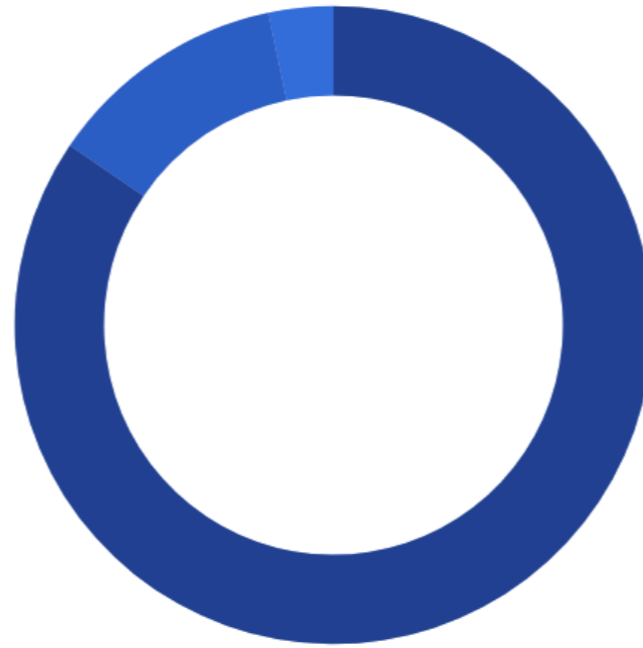


| Country <span>?</span>  | Acquisition                                    |
|---|--|
|   | Sessions <span>?</span> <span>↓</span>         |
|   | <b>3,909</b><br>% of Total: 100.00%<br>(3,909) |
| 1.  United States  | <b>1,552</b> (39.70%)                          |
| 2.  Italy          | <b>435</b> (11.13%)                            |
| 3.  United Kingdom | <b>235</b> (6.01%)                             |
| 4.  Brazil        | <b>194</b> (4.96%)                             |
| 5.  India        | <b>174</b> (4.45%)                             |
| 6.  Germany      | <b>153</b> (3.91%)                             |
| 7.  Canada       | <b>142</b> (3.63%)                             |
| 8.  Chile        | <b>97</b> (2.48%)                              |
| 9.  Saudi Arabia | <b>95</b> (2.43%)                              |
| 10.  Spain       | <b>92</b> (2.35%)                              |

Sessions From Top 10 Countries 2017



### Sessions by device



Desktop

84.5%

↓5.7%



Mobile

12.2%

↑3.8%



Tablet

3.3%

↑1.8%

Last year ▼

[MOBILE OVERVIEW >](#)

# More Mobile and Tablet Usage



| Browser                     | Avg. Page Load Time (sec) |
|-----------------------------|---------------------------|
| <b>1. Internet Explorer</b> |                           |
| Jan 1, 2017 - Jan 1, 2018   | 0.87                      |
| Jan 1, 2016 - Dec 31, 2016  | 11.97                     |
| <b>% Change</b>             | <b>-92.71%</b>            |
| <b>2. Firefox</b>           |                           |
| Jan 1, 2017 - Jan 1, 2018   | 1.45                      |
| Jan 1, 2016 - Dec 31, 2016  | 2.18                      |
| <b>% Change</b>             | <b>-33.60%</b>            |
| <b>3. Edge</b>              |                           |
| Jan 1, 2017 - Jan 1, 2018   | 2.38                      |
| Jan 1, 2016 - Dec 31, 2016  | 2.29                      |
| <b>% Change</b>             | <b>3.92%</b>              |
| <b>4. Chrome</b>            |                           |
| Jan 1, 2017 - Jan 1, 2018   | 3.57                      |
| Jan 1, 2016 - Dec 31, 2016  | 5.14                      |
| <b>% Change</b>             | <b>-30.47%</b>            |
| <b>5. Safari</b>            |                           |
| Jan 1, 2017 - Jan 1, 2018   | 4.13                      |
| Jan 1, 2016 - Dec 31, 2016  | 4.01                      |
| <b>% Change</b>             | <b>3.07%</b>              |

Page Load Speeds - Website Is Much Faster Now





**Client Id**  
2077913319.1499109354

**Date Last Seen**  
Dec 17, 2017

**Device Category**  
desktop

**Device Platform**  
web

**Acquisition**  
Date  
Jul 03, 2017

Channel  
Direct

Source / Medium  
(not set)

Campaign  
(direct)  
(not set)

[Return to User Explorer Report](#)

|   |   |   |   |   |   |
|---|---|---|---|---|---|
| Sessions (LTV) ?<br><b>51</b><br>Sessions (Current): 51 | Session Duration (LTV) ?<br><b>05:37:29</b><br>Session Duration (Current): 05:37:29 | Revenue (LTV) ?<br><b>\$0.00</b><br>Revenue (Current): \$0.00 | Transactions (LTV) ?<br><b>0</b><br>Transactions (Current): 0 | Goal Completions (LTV) ?<br><b>0</b><br>Goal Completions (Current): 0 | Goal Value (LTV) ?<br><b>\$0.00</b> ><br>Goal Value (Current): \$0.00 |
|---|---|---|---|---|---|

Filter by: 4 selected | Sort by: Descending | Expand All | Collapse All

|  |            |
|--|------------|
| Dec 17, 2017   | 1 session  |
| <ul style="list-style-type: none"> <li>5:31 PM 00:58 [device icon] Organic Search 4</li> </ul>   |            |
| Dec 15, 2017   | 1 session  |
| <ul style="list-style-type: none"> <li>1:38 PM 00:28 [device icon] Organic Search 4</li> </ul>   |            |
| Dec 12, 2017   | 1 session  |
| <ul style="list-style-type: none"> <li>4:10 PM 02:55 [device icon] Organic Search 7</li> </ul>   |            |
| Nov 14, 2017   | 3 sessions |
| <ul style="list-style-type: none"> <li>10:45 PM 01:44 [device icon] Organic Search 4</li> <li>3:30 PM 05:25 [device icon] Organic Search 2</li> <li>12:15 PM 00:19 [device icon] Organic Search 4</li> </ul> |            |
| Nov 8, 2017  | 1 session  |
| <ul style="list-style-type: none"> <li>2:15 PM 05:06 [device icon] Organic Search 5</li> </ul>   |            |
| Oct 16, 2017   | 1 session  |
| <ul style="list-style-type: none"> <li>3:26 PM 06:12 [device icon] Organic Search 7</li> </ul>   |            |
| Oct 2, 2017  | 1 session  |

# Anonymous User Report



# High Resolution Image Requests - 2017

- Approximately 24 Image Requests in 2017, compared to 21 in 2016 - note that I have adjusted to calendar years for reporting, for consistency going forward
- Approximately 5200 images requested, over 48GB of data
- Mostly Lateral Cephs, some PA and HandWrist
- As in prior years, many international requests
- A wide variety of research projects
- These statistics cover only requested high-resolution images - Users are free to download the low-resolution images without a formal request



# Requests by Collection

| Collection          | Requests |
|---------------------|----------|
| Bolton-Brush Growth | 10       |
| Burlington Growth   | 7        |
| Denver Growth       | 4        |
| Fels Longitudinal   | 3        |
| Forsyth Twin        | 0        |
| Iowa Growth         | 4        |
| Mathews Growth      | 3        |
| Michigan Growth     | 3        |
| Oregon Growth       | 8        |

Note: A single request sometimes involves multiple Collections



# Legacy Collection Analysis

## American Association of Orthodontists Foundation Craniofacial Growth Legacy Collection in the orthodontic literature—use and trends: A systematic review

Thikriat Al-Jewair (a) Elizabeth Stellrecht (b) Lauren Lewandowski (a) and Rania Chakaki (c)

a Department of Orthodontics, School of Dental Medicine, State University of New York, Buffalo, NY.

b Health Sciences Library, State University of New York, Buffalo, NY.

c Private Practice, Vernon Hills, Ill.

January 2018 Vol 153 Issue 1 American Journal of Orthodontics and Dentofacial Orthopedics

**Introduction:** The American Association of Orthodontists Foundation (AAOF) Craniofacial Growth Legacy Collection is a digital repository of records from 9 craniofacial growth study collections in the United States and Canada. The purposes of this article were to describe the use of materials from the AAOF Craniofacial Growth Legacy Collection in the orthodontic literature in comparative and follow-up studies, and to analyze trends before and after the project's launch in 2009.

**Conclusions:** The overall numbers of published studies in the comparative and follow-up categories increased after 2009, reflecting the efforts of the AAOF team and collection curators to make the records available worldwide. Further research should consider studying each collection to identify utilization predictors.



# Sample Image Requests 2017

- University of Rochester - I'm a 2nd year Ortho resident in Rochester, NY. We are conducting research on finger sucking habit and we need controls. We thought about your frontal ceph collection for that purpose.
- St. Louis University Center for Advanced Dental Education - Need these images for a control sample for my master's thesis project. Going to trace them for 1 year eruption rates.
- Bauru School of Dentistry - University of Sao Paulo - I am requesting the images to be used for the academic research. It will be used as a control group for evaluation of the effects of orthodontic appliances in the long term, in the future we will try to publish a scientific article with the results.
- Eastman Institute for Oral Health - My orthodontic residency research project is investigating the use of mini-implants for posterior intrusion in non-growing patients. I am gathering a control sample of untreated patients with at least no more than 0mm of anterior overbite from the legacy sample. These images will be traced and compared to the treated sample.



# Usage Analysis

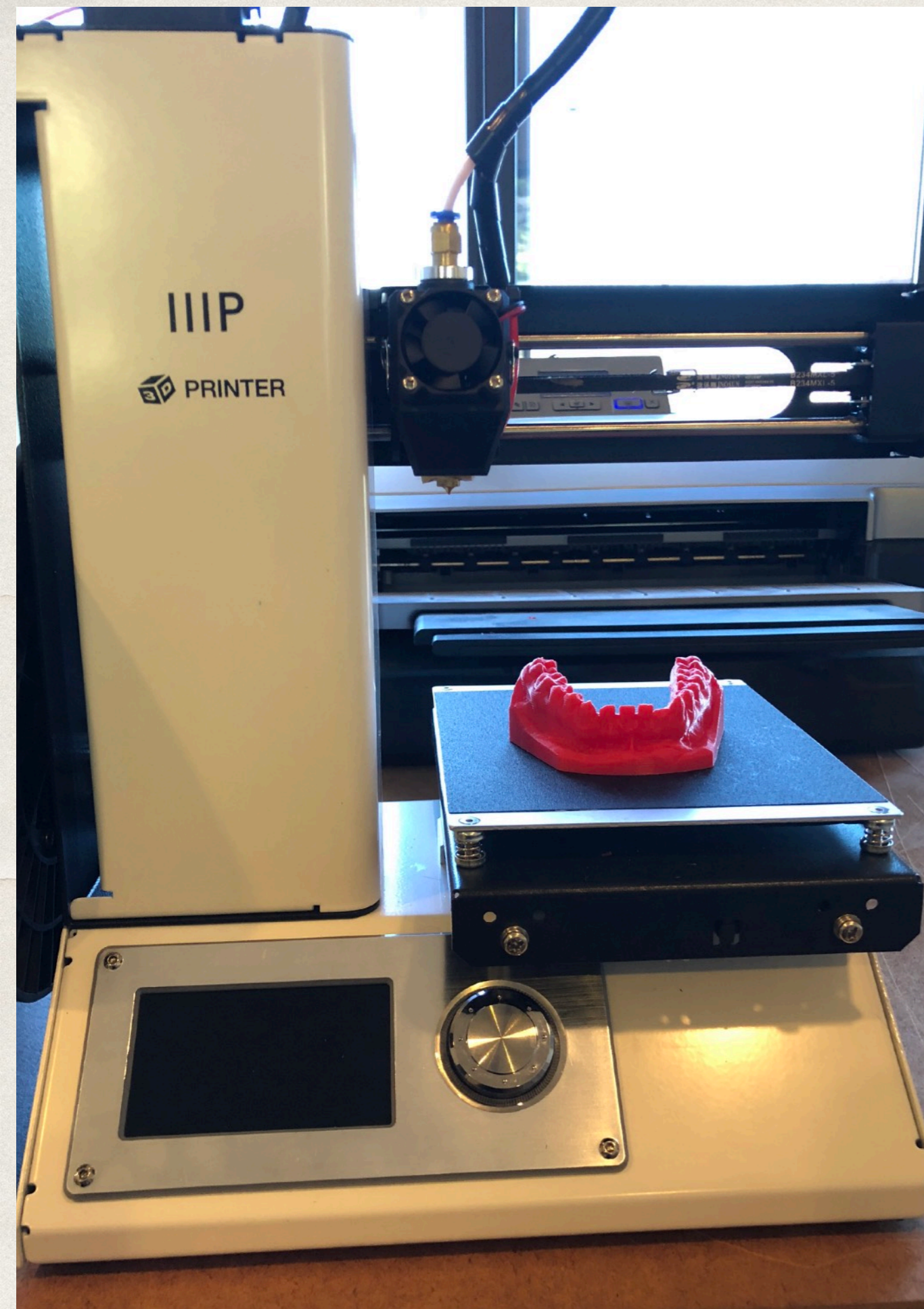
- Once an Institution makes use of the Legacy Collections, there tend to be additional users from the same Institution in the following months and years.
- Most users are extremely grateful for access to the full resolution images.
- Some users ask for an unreasonable number of images (ie All Class II images from all Collections). I work with them to reduce their request to what is really required. This is one reason that the total number of images supplied last year has dropped.
- The website also receives a number of requests for technical information on image specifications, demographic data, etc



# Future Priorities

- Updating and maintaining the website and database
- Improving website accessibility on mobile devices
- Adding analytics for downloaded low-resolution images
- Study Casts?
- Ongoing Promotion - AAOF is preparing a new Collections Project Press Release





3D Printed Study Cast



# Summary

- All current images have been loaded to the website and database
- The AAOF Legacy Collection Website and database are stable
- Usage has increased over the prior year
- Questions?