



MORE THAN  
*trees*

## **It's not *all* about research: mechanics of a successful applied biometrics program**

Nate Osborne

Manager of forest modeling and biometrics research

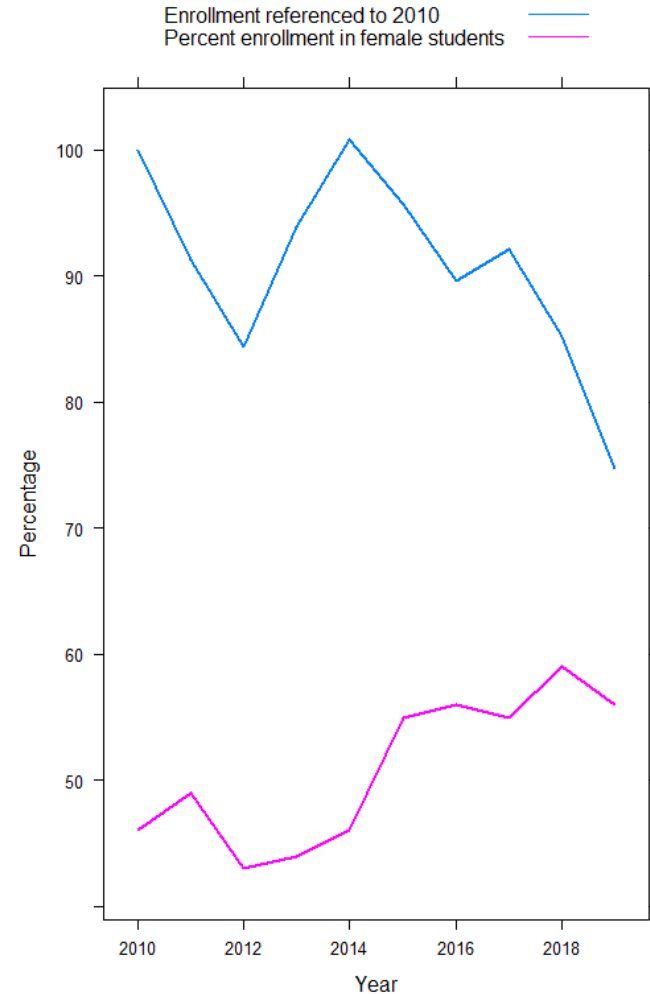
March 24<sup>th</sup> 2020



- Opportunity statement
- What should applied research teams think about
- Demonstrated success
- Call to action for industrial research

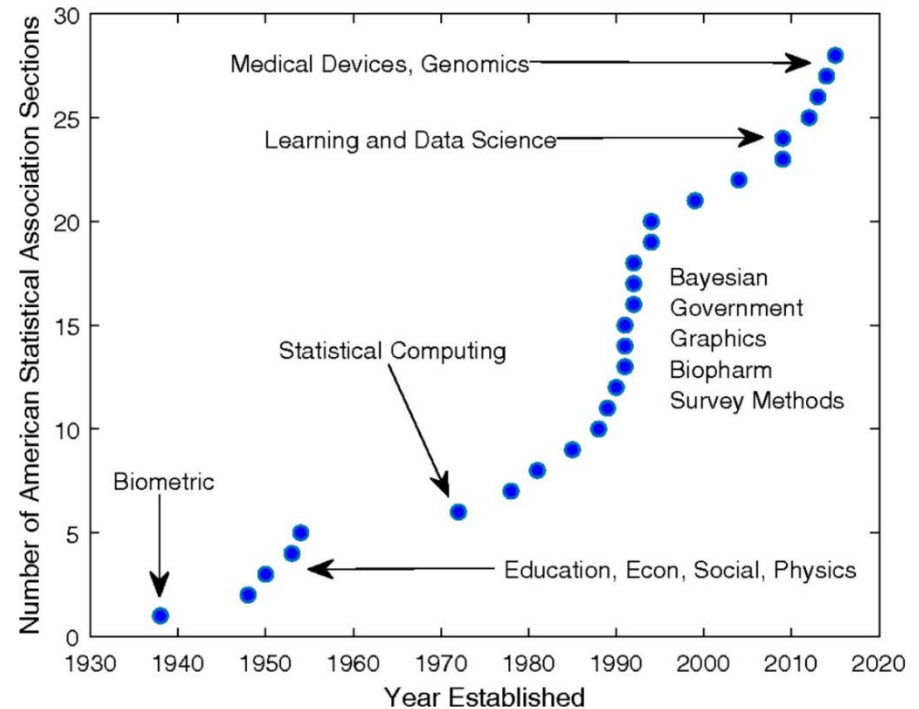
# OUR INDUSTRY IS CHANGING

- ▶ Policy and economic shifts
- ▶ Less vertical integration
- ▶ Increasing quantity of “bad data”
- ▶ Fragmented biometrics expertise
- ▶ Unbalanced age and diversity
- ▶ Lack of clarity on national priorities
- ▶ Costs on the rise at universities



# OUR FIELD BENEFITS FROM SCIENTIFIC ADVANCES

- ▶ Artificial intelligence
- ▶ Statistics
- ▶ Computing
- ▶ Remote sensing
- ▶ Material science
- ▶ Social media
- ▶ Collaborative tools



*How science and technology developments impact employment and education, Proceedings of the National Academy of Sciences of the United States of America, Martinez (2018)*

It's not *all* about research. Successful applied research teams will have to evolve in light of changes to the industry. While we face many challenges, thinking strategically about how we work together is key to continuity in our ability to advance understanding.

# WHAT SHOULD SUCCESSFUL TEAMS THINK ABOUT



Project Management

Clearly Defined Strategy Avoiding Incremental Thinking by Default



Broad Thinking



Meaningful Cooperation



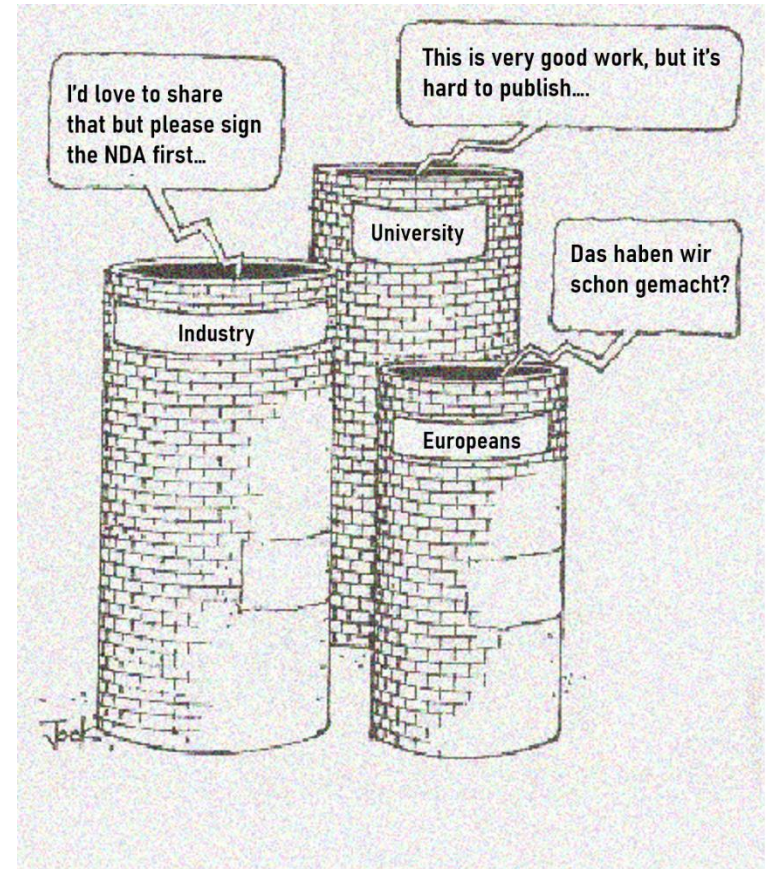
Telling Our Story

# PROJECT MANAGEMENT TECHNOLOGY

Tool	Description
GitHub	Code sharing and project management tools
devtools	Simplified building of R packages
CRAN	Platform for sharing R based tools
Asana	Project management and coordination
Google	Developing shared documents

# MEANINGFUL GLOBAL COOPERATION

- ▶ Prolific knowledge silos
- ▶ Minimal coordination across regional cooperatives
- ▶ Almost total separation from European R & D organizations
- ▶ Current incentives do not motivate experience or data sharing
- ▶ Not *all* information is sensitive, but we treat it that way
- ▶ Possible for industry to share in a meaningful way but it takes effort





# TELLING OUR STORY

- ▶ Recruiting industrial forest biometricians is difficult
- ▶ An unbalanced age distribution continues to provide challenges
- ▶ How can we engage with high school and college students?
- ▶ Social media platforms are providing new ways to tell the story
- ▶ Get creative, get your foot in the door

# CONSIDER IMPACTS ON THE SUPPLY CHAIN

What is the value signal for superior wood properties?

Producers



Consumers

Will silviculture regimes preserve current properties?

# DEMONSTRATED SUCCESS



# A NEW INTERFACE FOR THE CIPS MODEL

CIPS-OregonState / cipsanon Private

Watch 1 Star 0 Fork 0

Code Issues Pull requests Actions Projects Wiki Security Insights Settings

No description, website, or topics provided

Manage topics

41 commits

Branch: master New pull request

Nate Osborne Woops error in SDI

.github/ISSUE\_TEMPLATE

R

data

demo

inst/libs

man

tests

DESCRIPTION

NAMESPACE

NEWS

Help people interested in this repository

## Home

Nate Osborne edited this page 14 days ago · 7 revisions

## Welcome to the cipsanon wiki!

This is the documentation package for cipsanon model. The intent of this page is to provide examples of using the model and associated model components. Users can find examples of using the package in the /demos folder of the R package. Those examples are given on the pages of this Wiki, along with more verbose explanations.

Pages 13

Find a Page...

Home

Example 01 | Getting started

## Installation of cipsanon

To get started with the cipsanon model, installation with devtools ensure you have the following installed:

```
install.packages(c("plyr", "tidyr"))
```

To execute the following code, set your working directory to the cipsanon folder itself.

```
# Build the package
require(devtools)

build(pkg = "cipsanon",
      path = dir,
      binary = TRUE,
      vignettes = TRUE
    )

# Install package
install("cipsanon")
```

CIPS-OregonState / cipsanon Private

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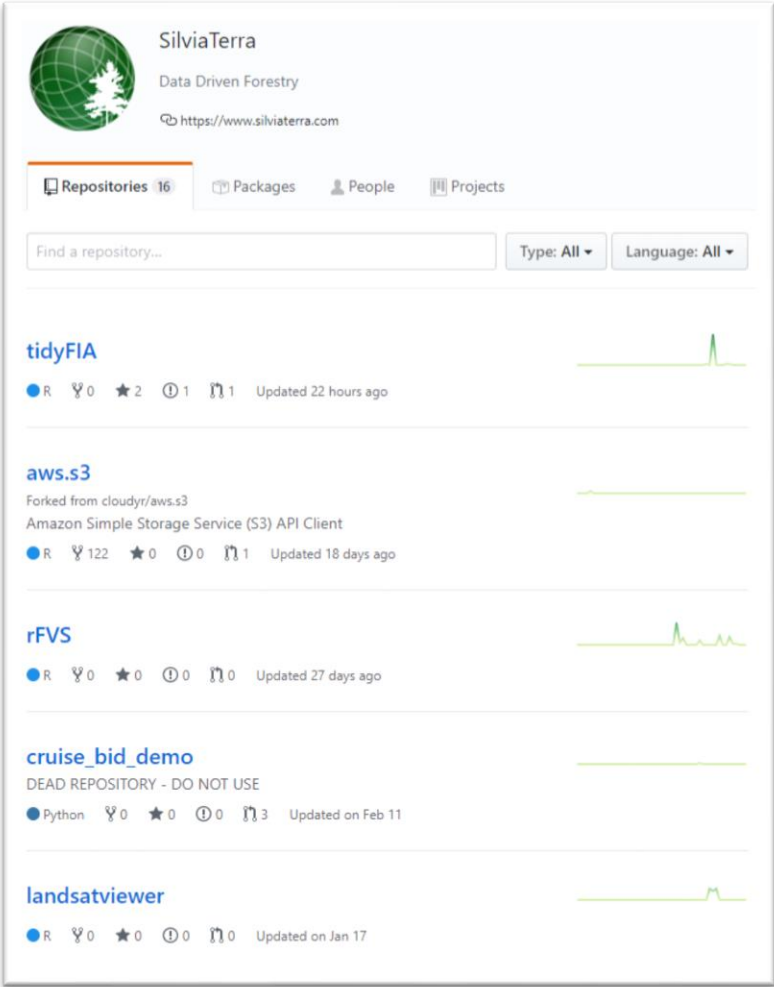
Filters is:issue is:closed

Labels 9 Milestones 0 New issue

Clear current search query, filters, and sorts

Open	Closed	Author	Label	Projects	Milestones	Assignee	Sort
3	35						
🔴	🟢	#36 by biometrica	bug				2
🔴	🟢	#35 by biometrica					1
🔴	🟢	#34 by biometrica					4
🔴	🟢	#33 by biometrica	help wanted				2
🔴	🟢	#32 by biometrica					2
🔴	🟢	#31 by biometrica					10
🔴	🟢	#29 by biometrica					2
🔴	🟢	#28 by biometrica	bug				2

# SILVIATERRA SHOWS INDUSTRY LEADERSHIP



The screenshot shows the GitHub profile for SilviaTerra, a company focused on Data Driven Forestry. The profile includes a green globe logo with a white tree silhouette. Below the profile information, there are tabs for Repositories (16), Packages, People, and Projects. A search bar and filters for repository type and language are visible. The repository list includes:

- tidyFIA**: Updated 22 hours ago. Metrics: 0 forks, 2 stars, 1 issue, 1 pull request.
- aws.s3**: Forked from cloudyr/aws.s3. Amazon Simple Storage Service (S3) API Client. Updated 18 days ago. Metrics: 122 forks, 0 stars, 0 issues, 1 pull request.
- rFVS**: Updated 27 days ago. Metrics: 0 forks, 0 stars, 0 issues, 0 pull requests.
- cruise\_bid\_demo**: DEAD REPOSITORY - DO NOT USE. Updated on Feb 11. Metrics: 0 forks, 0 stars, 0 issues, 3 pull requests.
- landsatviewer**: Updated on Jan 17. Metrics: 0 forks, 0 stars, 0 issues, 0 pull requests.



# UNDERSTANDING MODELS USING PICTURES

Rayonier / rSVS

Watch 1 Star 0 Fork 0

Code Insights

### Home

James McCarter edited this page 23 hours ago · 6 revisions

Welcome to the rSVS wiki!

The rSVS package will create stand level visualizations using the Stand Visualization System (SVS) Windows software. This package includes the executable files needed to run the software along with a distribution of Python which is used for much of the setup. rSVS supports FIA# and NRCS species codes.

```
SVS( Data, ... )
```

```
SVS_Example( 'BottomlandHardwood' )
```

SVS - BottomlandHardwood.svs

Stand Visualization System BottomlandHardwood.svs

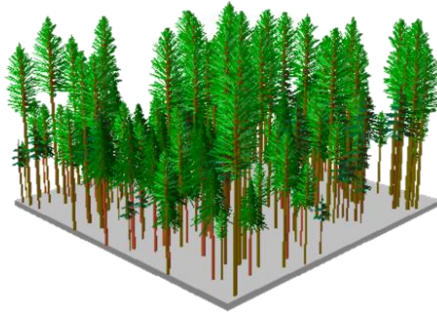
The screenshot shows a software window titled "Stand Visualization System" with a menu bar (File, Edit, Display, SVS options, Help). The main area is divided into two panes. The left pane shows a 3D perspective view of a forest stand with various tree heights and a top-down view of the stand layout. The right pane shows a 3D perspective view of a forest stand with a top-down view of the stand layout. The top-down view shows a diamond-shaped plot with a grid of trees and a red horizontal line across the middle.

- .Rbuildignore Add SVS\_Der...
- BinaryFiles Update Binar...
- DESCRIPTION Finish FIA2NF...
- NAMESPACE Add example data...

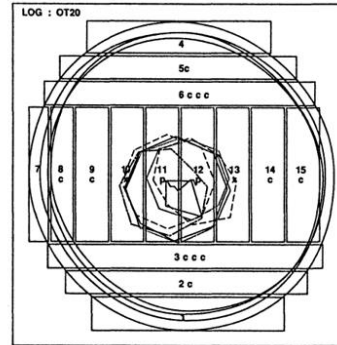
# LINKING GROWTH AND QUALITY MODELS



**Forest inventory**



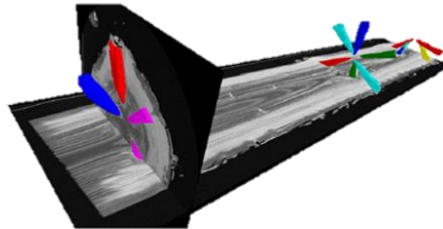
**Growth estimation**



**Sawing simulation**



**Distribution of lumber design values**

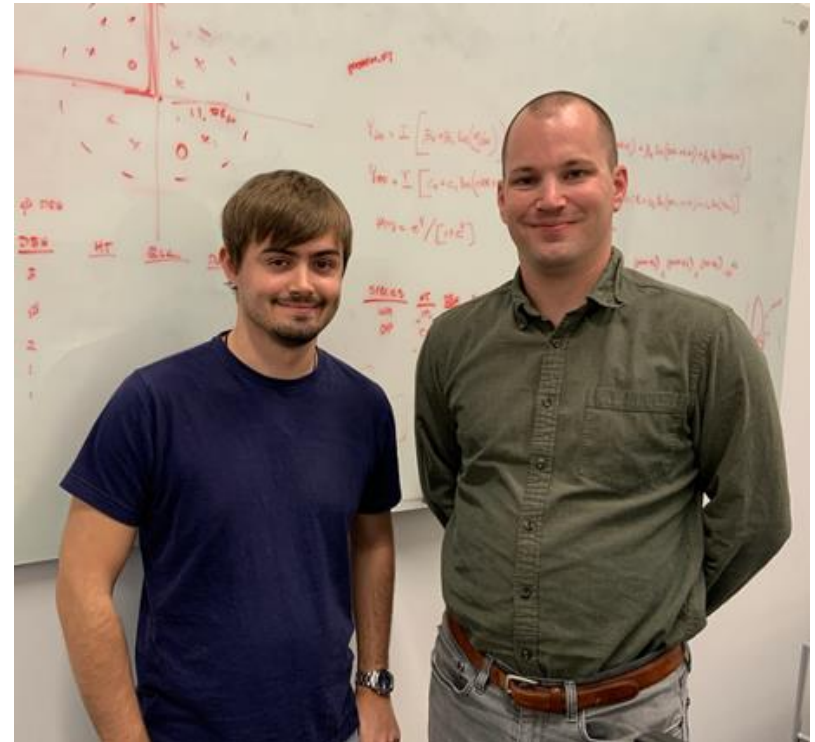


**Merchandizing forms a virtual log**

Virtual log from Krähenbühl (2014) *Knot segmentation in 3D CT images of wet wood* & log sawing pattern from Todoroki (1990) *AUTOSAW system for sawing simulation* & forest from rSVS.

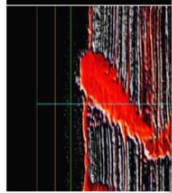
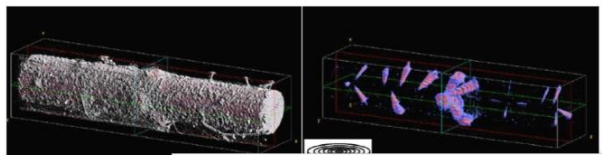
# FINDING A WIN-WIN INTERNATIONAL PARTNERSHIP

- ▶ Université de Lorraine, AgroParisTech, INRAE
- ▶ UMR Silva, Nancy, France
- ▶ ExtraFor Est Programm
- ▶ CAPSIS platform
- ▶ Support from French LABEX Arbre
- ▶ Fit models using hierarchical bayesian structural approach
- ▶ GRETA and TensorFlow
- ▶ Finding a win-win project





# EVALUATING BIOLOGICAL REALISM OF MODELS



**greta**

## Inferring bayesian network: Machine learning package

R package: Classic and bayesian inference by **Tensorflow**  
(Neural network computing platform):

- ✓ Easy d
- ✓ Re-sam
- ✓ High-th
- ✓ Intensi

→ Best explor

## Correlation matrix for wood properties at tree scale

- Cumulated basal Branch area  $\propto$  Diameter at breast height  
*Pipe model*
- Cumulated basal Branch alive area  $\propto$  Cumulated basal Branch area
- Tree crown projection on ground  $\propto$  Cumulated basal Branch area
- Mean ring width  $\propto$  Tree crown projection on ground  
*Pressler's law*
- % alive of basal Branches area  $\propto$  % crown lenght  
*Crown length  $\rightarrow$  competition proxy*

How can we adapt the Bakuzis matrix to evaluate if wood properties model chains refute or corroborate theories of wood formation?

# FORESTRY FIELD DAY AND BEYOND...



# SOUTHERN MENSURATIONIST SCHOLARSHIPS



This year we gave scholarships to Laura Ramirez, Daniel Boczniewicz, Ricardo Rodrigues de Oliveira Neto and Sunil Nepal. The recipients came from three universities, including the University of Canterbury. Funds were set aside to continue the scholarship program next year

# CALL TO ACTION



## **DOES THE PROJECT ADDRESS...**

- A knowledge gap or incremental improvement?
- How improvement over the base rate is measured?
- A method to share results beyond a research note?
- Alignment with efforts outside the region?
- How to share results outside the profession?
- Implications on the broader supply chain?
- How to get continuous feedback from other teams?

