> Open-Source Actuarial Science with Examples_

CAS Annual Meeting in Minneapolis

November 2022

Your Speakers

John Bogaardt
Chief Actuary
WCF Insurance

Kenneth Hsu
Lead Actuary
Breach Insurance

Agenda

- What is Open-Source
- Chainladder-Python
- Joining the Community
- Discussion

> What is Open-Source_

slido

How many open-source tools do you use?

ⓘ Start presenting to display the poll results on this slide.

Examples of Open Source Tools

Operating Systems

Software

Languages

Databases

Open-Source

adjective \ ˈō-pən-ˈsȯrs \

of software: *Open source software is a tool that is designed to be publicly accessible - anyone can **see**, **modify**, and **distribute** the code as they see fit.*

Extracted from
opensource.org

The Good

- Cost
- Permissive
- Transparent
- Flexible
- Direct access to developers
- Democratic
- Source of ideas & talent
- Pull requests
- Fork

The Bad

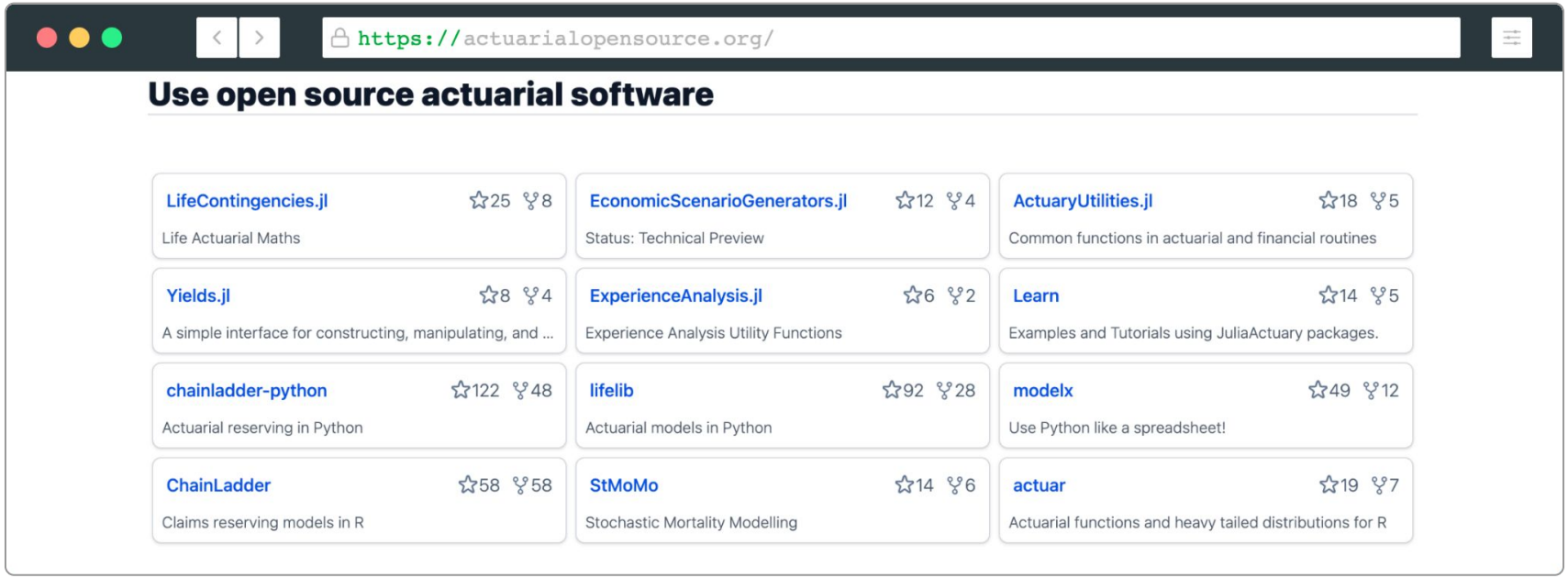
- Skills
- Steeper learning curve
- Usability
- Company restrictions
- Human resources
- Lack of usage
- Deprecation cycles

slido

How much have you interacted on GitHub?

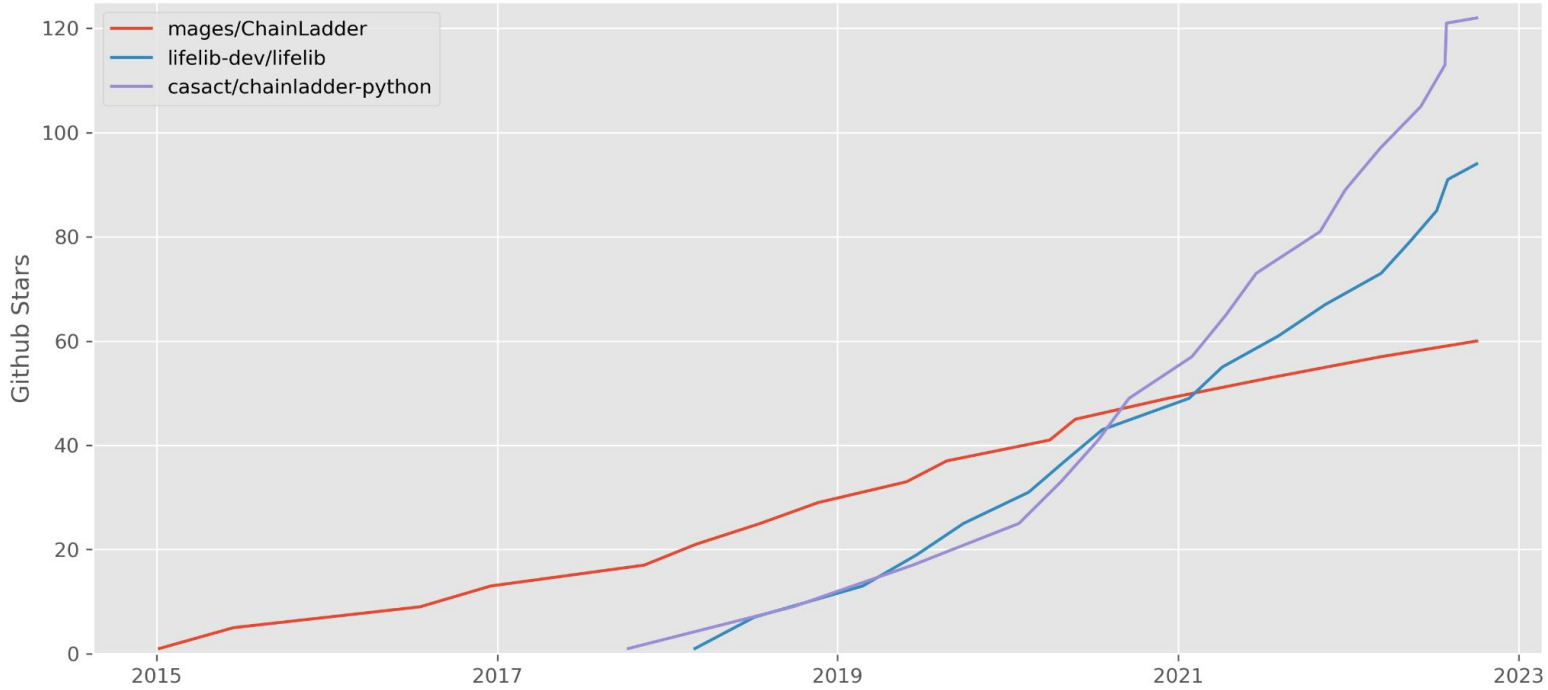
ⓘ Start presenting to display the poll results on this slide.

Actuarial Open-Source is Young

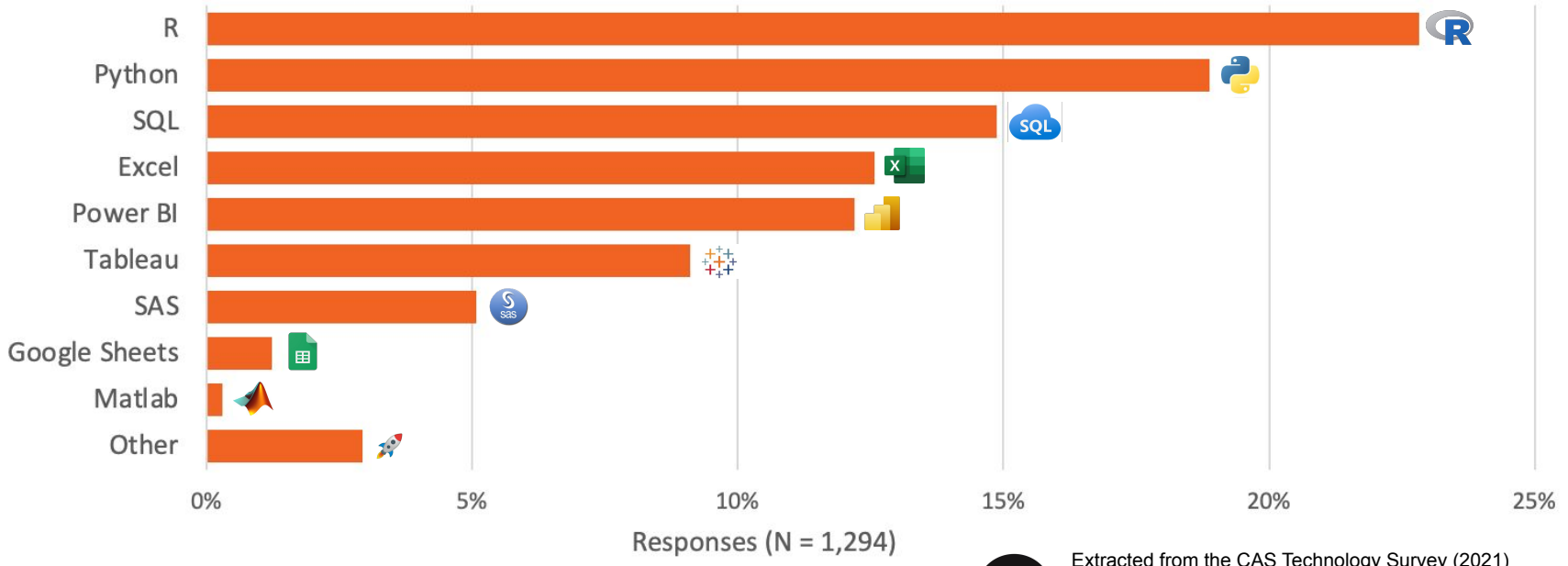


Extracted from
actuarialopensource.org

Actuarial Open-Source is Growing



Which of the following tools do you plan to increase your proficiency in the next 12 months?



Extracted from the CAS Technology Survey (2021)
Raw data and analysis can be found on
github.com/casact/technology_survey

> Chainladder-Python_

slido

How much do you know about Chainladder-Python?

ⓘ Start presenting to display the poll results on this slide.

Founding Vision

```python
import chainladder as cl

clrd = cl.load_sample("clrd")
comauto = clrd.groupby("LOB").sum().loc["comauto"]

bf_model = cl.BornhuetterFerguson(apriori=0.75)
bf_model.fit(
    comauto["CumPaidLoss"],
    sample_weight=comauto["EarnedPremNet"].latest_diagonal
)

bf_model.ultimate_
```

Practitioner Focused

Reinforce Python Data Science Stack

Bridge Modern Techniques

Journey Began

Jun 2017

Initial Commit

Building Up

- Triangle framework
- Link ratios
- Tail factors
- Deterministic models
- Refactoring

Structural Improvements

Downstream Dependencies

Nov 2020

First Research Paper Cited

The Actuary and IBNR Techniques: A Machine Learning Approach

By Caesar Balona and Ronald Richman

Jun 2021

GUI Software

FASLR
(Free Actuarial System for Loss Reserving)

By Gene Dan

Increased Popularity

Sep 2021

First CAS Technical Course

CAS Virtual Python Workshop

Oct 2021

Documentation Site (Re)launch

chainladder-python.readthedocs.io

Today

Nov 2022

68
releases

195,000
downloads

15
contributors

40
countries

123
stars

800
visitors/mo

48
forks

?
companies

> Live Demo_

chainladder-python.readthedocs.io

(or bit.ly/clpdocs)

> Joining the Community_

10 Ways to Engage

Try the Package

Ask Questions

Answer Questions

Test Codes

Report Bugs

Develop Examples

Improve Documentation

Generate New Ideas

Implement Code

Spread the Word

Information sharing is power. If you don't share your ideas, smart people can't do anything about them, and you'll remain anonymous and powerless.

- Dr. Vint Cerf
"Father of the Internet"

> Discussion_

slido

Audience Q&A Session

ⓘ Start presenting to display the audience questions on this slide.

Thank You!

John Bogaardt
jbogaardt@wcf.com

Kenneth Hsu
kenneth@breachinsured.com

Attending the Roundtable?

See you later today at **2:30 p.m.**
in **Orchestra Ballroom D**

Please bring your laptop!

To learn more...

Chainladder-Python:

- chainladder-python.readthedocs.io
- github.com/casact/chainladder-python

CAS's GitHub:

- github.com/casact

Other Resources:

- actuarialopensource.org
- *The Actuary and IBNR Techniques: A Machine Learning Approach*
- github.com/casact/FASLR