

The Zombie Eligibility Problem:

**One solution to improve
health data integrity**





I am **Carrie Minerich**

- I live in Tucson, AZ
- I have 8 years of experience in data and software
- I hold a MSc from the University of Idaho



Preacher Pulpit, Norway. 2018.



1

Identify the problem

What is a zombie eligibility?

Privacy Expectations

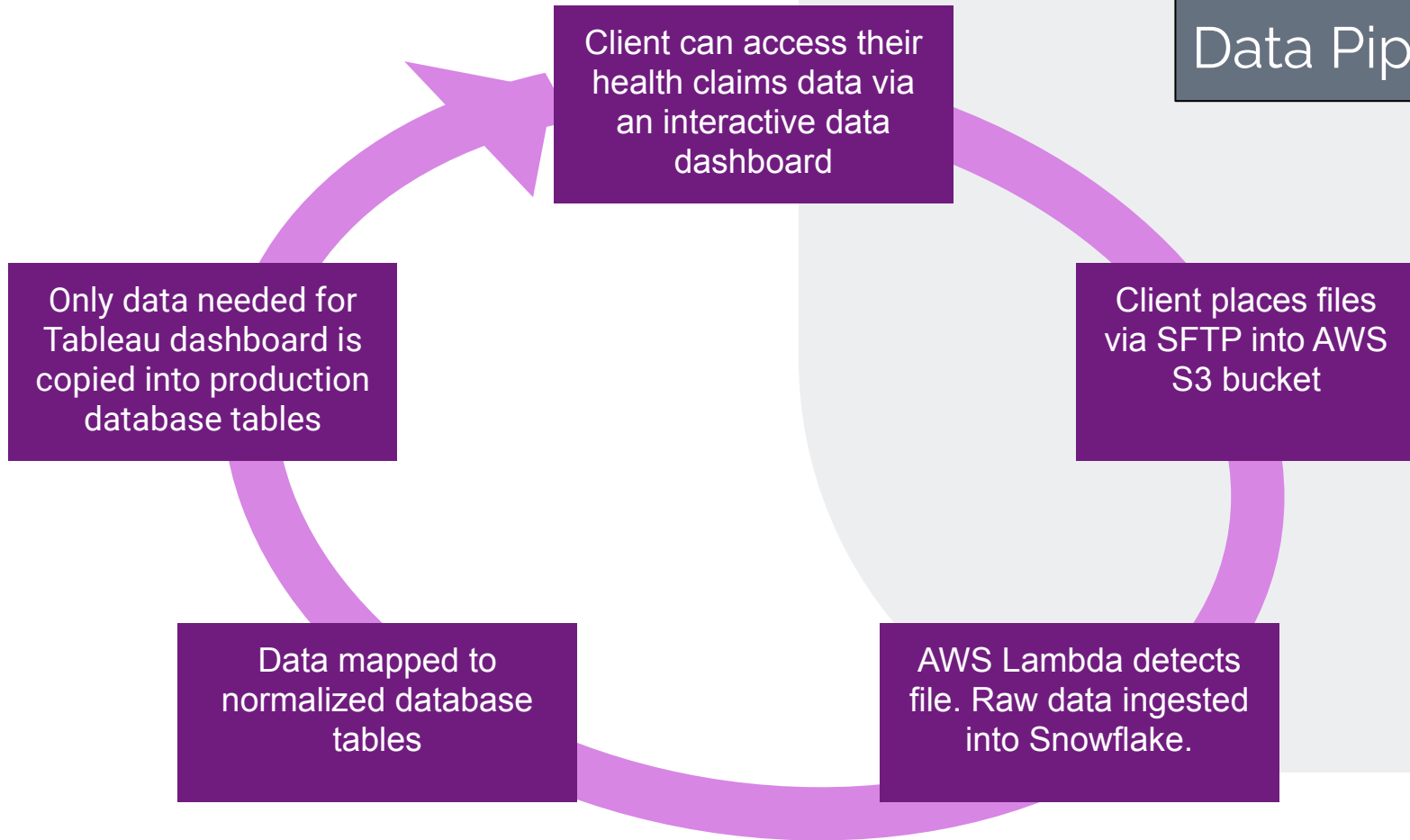
- Protect Health Information (PHI)
- Fictional database entries
- Python code IP protected

Health data is sensitive and complex

3 common data types

- Medical Claims
- Prescription Claims
- Enrollment or Eligibility
 - Employee
 - Members
 - Members: dependents & spouses included on a health plan
 - Member count includes employee count

Data Pipeline



Eligibility data

Known Eligibility Data Issues

- Duplicate data
 - Existing logic to detect duplicate files / individuals regardless of data type
 - Exclude duplicate data source i
- Ghost Eligibility
 - We have claims but no eligibility file for an individual
- Termed by Absence
 - If individual absent from eligibility file, we disenroll that individual

Two data **pipeline** options

Health Risk and Health Management (HCRM)

HCRM is a company that has a well established health data pipeline.

Direct Data Consumption (DDC)

Developing Python mapping scripts to have more control over data pipelines

Contract with HCRM to provide client normalized data

What is a **Zombie** Eligibility?

A “Zombie” eligibility is when an individual is still enrolled on the HCRM data source and is also enrolled on the new DDC data feed

HCRM won't automatically disenroll an individual

- The individual didn't actually disenroll from a plan. We changed our data source causing inflated eligibility counts.
- Once individual is disenrolled from HCRM data source, we will exclude HCRM data source for that individual or group

Why does it **matter?**

Inflated enrollment counts results in overcharging clients

Accurate health data builds trust in other forecast and predictive health modeling for a population



2

Develop a solution

How to accurately disenroll a zombie individual

What is a **Zombie** Individual?

- Individual must have minimum two rows in database:
 - HCRM data source with null disenrollment date
 - DDC data source with enrollment date
- Edge cases
- HCRM disenrollment date is:
 - One month before DDC enrollment date

OR

 - One month before DDC enrollment month and one day after the max HCRM enrollment date

Example 1: Individual defined as having a 'zombie' eligibility entry

employer_ id	individual_id	first_name	last_name	enrollment_ date	disenrollment_ date	data_source
101	987654	Peppa	Pig	01/01/2018	06/01/2018	HCRM
101	987654	Peppa	Pig	07/01/2018		Anthem

Peppa converted to DDC pipeline on July 1, 2018
However Peppa was never disenrolled from the EDC pipeline after the migration

Example 2: Individual defined as having a 'zombie' eligibility entry

employer_id	individual_id	first_name	last_name	enrollment_date	disenrollment_date	data_source
102	123456	Sonic	Hedgehog	01/01/2019	12/01/2019	HCRM
102	123456	Sonic	Hedgehog	01/01/2020	12/31/2020	Anthem

Sonic is disenrolled from the health plan on our DDC feed
Sonic is still showing as enrolled in EDC

Example 3: Individual defined as having a 'zombie' eligibility entry

employer_id	individual_id	first_name	last_name	enrollment_date	disenrollment_date	data_source
103	456789	Spongebob	Squarepants	01/01/2020	01/02/2020	HCRM
103	456789	Spongebob	Squarepants	01/01/2020	06/30/2020	Anthem
103	456789	Spongebob	Squarepants	01/01/2020		Anthem

- Spongebob is still enrolled in the HCRM pipeline
- Spongebob is currently enrolled in Anthem data source
- Same enrollment date for all rows require us to set disenrollment date for HCRM as 01/02/2020

Note same enrollment date regardless of data source

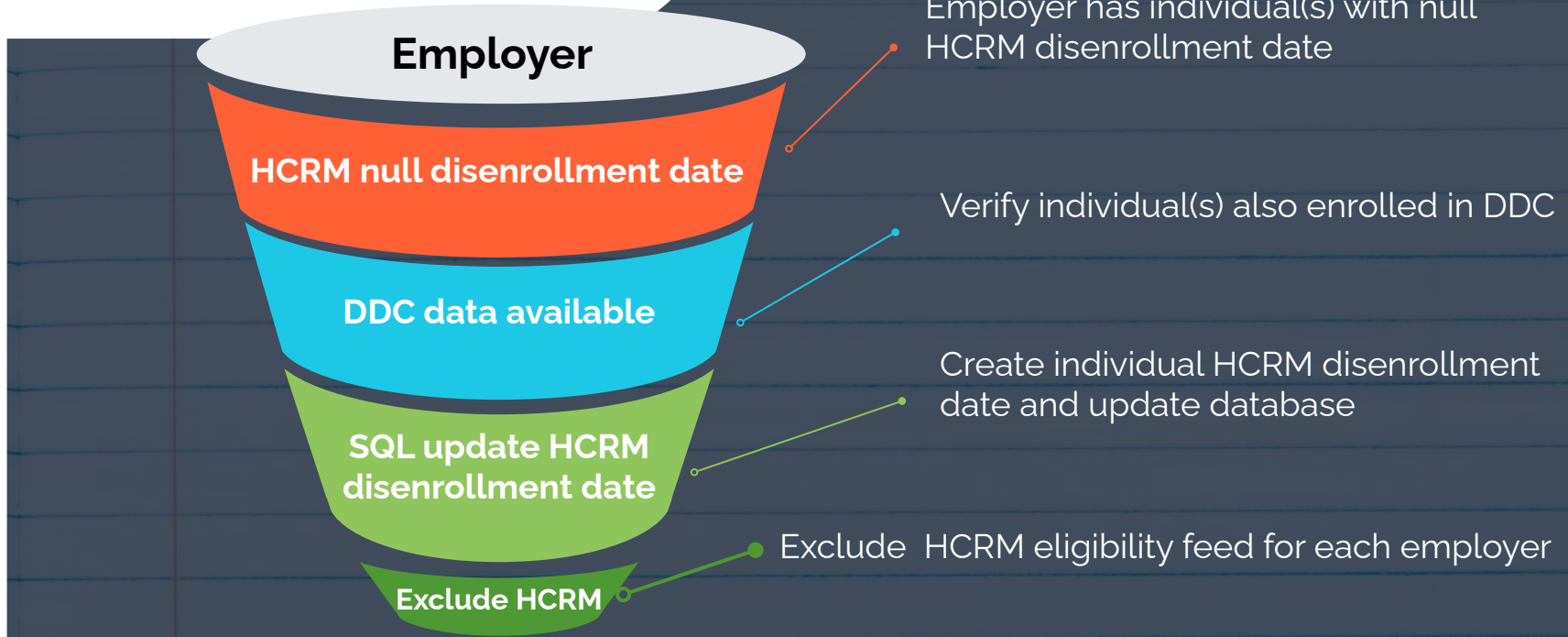


3

Implement Solution

Python and SQL

Solution Funnel



Other factors to consider during implementation

- Accuracy and precision > speed
- Documentation
- Error handling, Log files
- Sandbox testing
- Peer Review
- 2-week completion

A stylized illustration of a laptop with a black frame and a light gray screen. The screen displays the text 'Python script available by invite from:'.

Python script
available by invite
from:

https://github.com/caminerich/Zombie_Eligibility



4

Results and future uses

How to prepare for the next zombie eligibility

Overall results

Wide reaching impacts

9.2%

197 of 2000 employers had eligibility counts reduced

65,397

Total count of members disenrolled from EDC

2021 results

A Focused Analysis

19.4%

38 of 197 employers had eligibility counts reduced > 15% in 2021

7,047

Count of members disenrolled from EDC

Review of how **2021 zombie disenrollment results** are presented

	Employer Name	Member Count Pre	Member Count Post	Disenrolled	% enrollment improvement
No Change:	Piglets LLC	100	100	0	0%

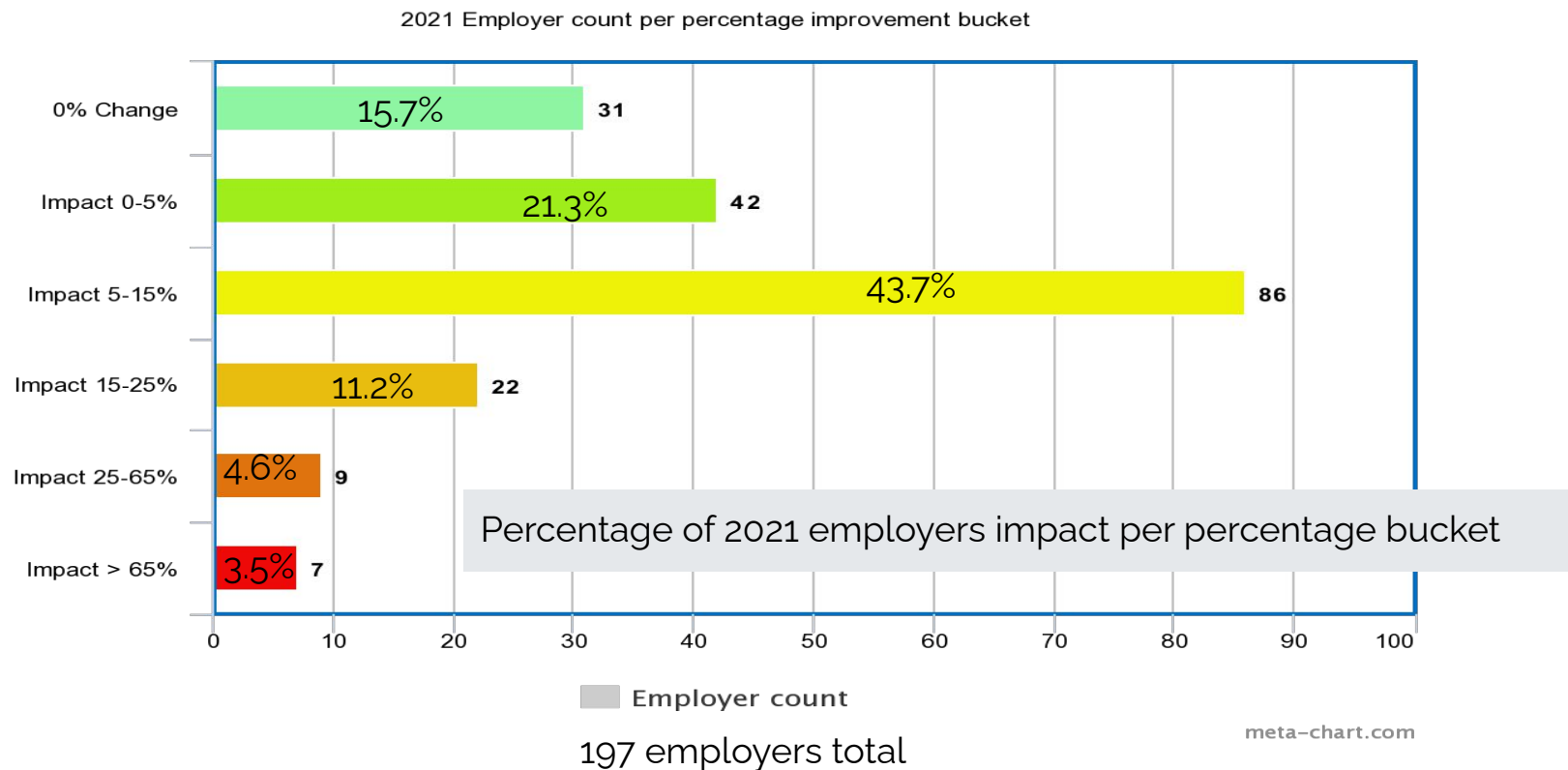
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Zombie Impact 5-15%	Hedgehog Holdings	101	89	12	13.5%

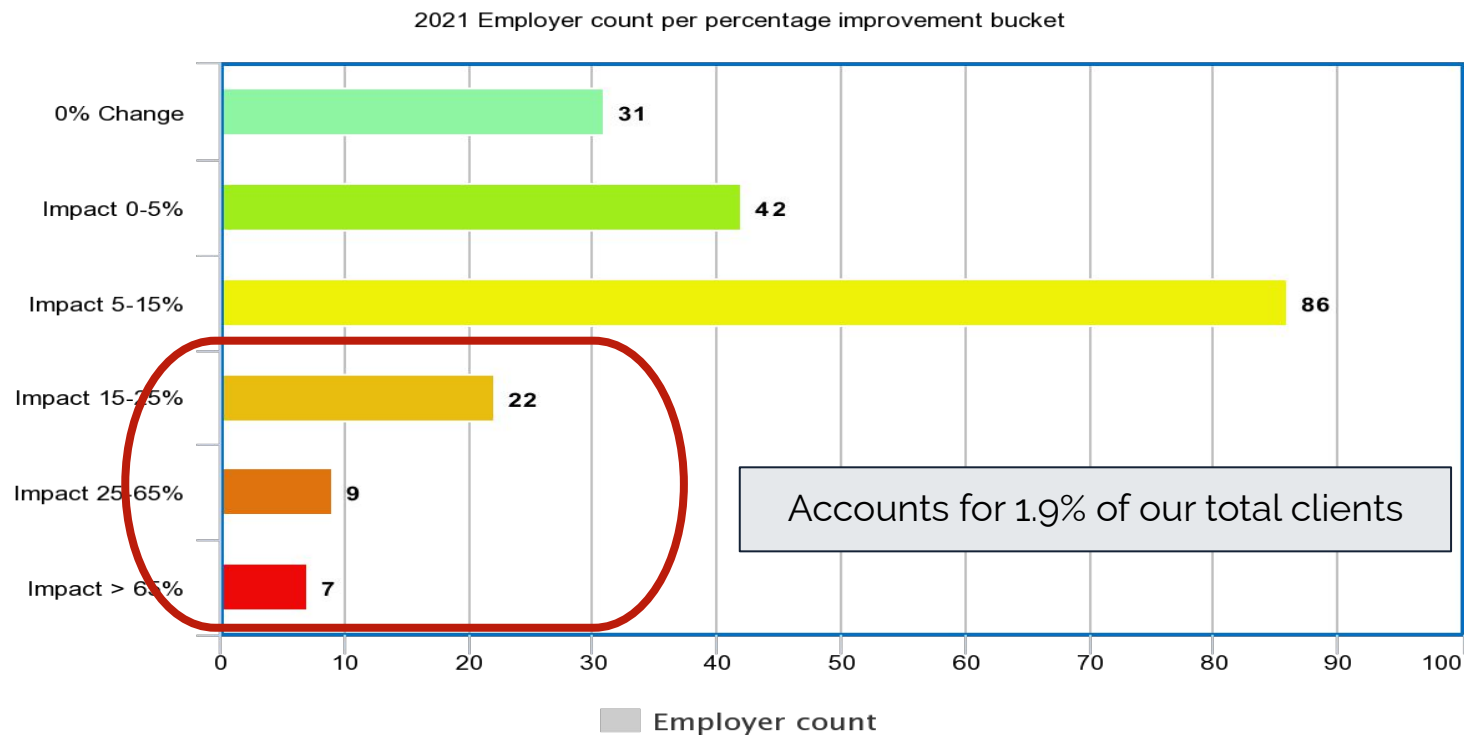
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Zombie Impact 5-15%	Hedgehog Holdings	101	89	12	13.5%
Zombie Impact > 65%	Spongebob Ocean Imports	390	182	208	114.3%

Count of employers per percentile **2021 eligibility decrease**



Count of employers per percentile 2021 eligibility decrease



197 employers total

meta-chart.com

Significance

Health data expects no more than 15% discrepancy between reported enrollment counts and control reports

Employers reported with > 15% eligibility count reduction in 2021 is reported to internal account managers for follow-up with client

Future Applications

Health Data:

- Similar inflated eligibility count issues have been observed that will benefit from this project

Other Industries:

- Solution framework to remove duplicate database entries when you cannot delete before blacklisting



**"Oh, I do it to blend in. You know.
Zombies don't mess with other
zombies."**

–Bill Murray, *Zombieland*

The zombie treadmill defense



Thanks!

Questions?

Let's connect on GitHub or caminerich@gmail.com

END