CARPE DATA

Next Generation
Data for Insurance

1st Annual UCSB InsurTech Summit

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Overview of ML Systems and Products at Carpe Data

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Contents

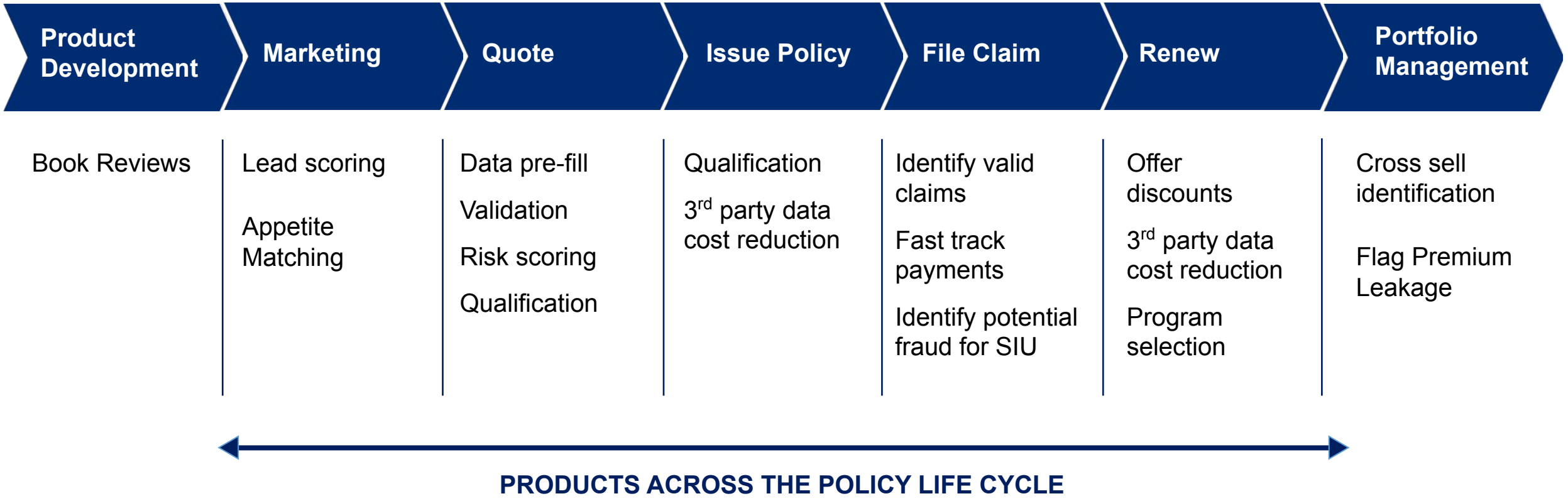
It Started with Background Checks

Mission: Map Emerging Data to Impactful Products

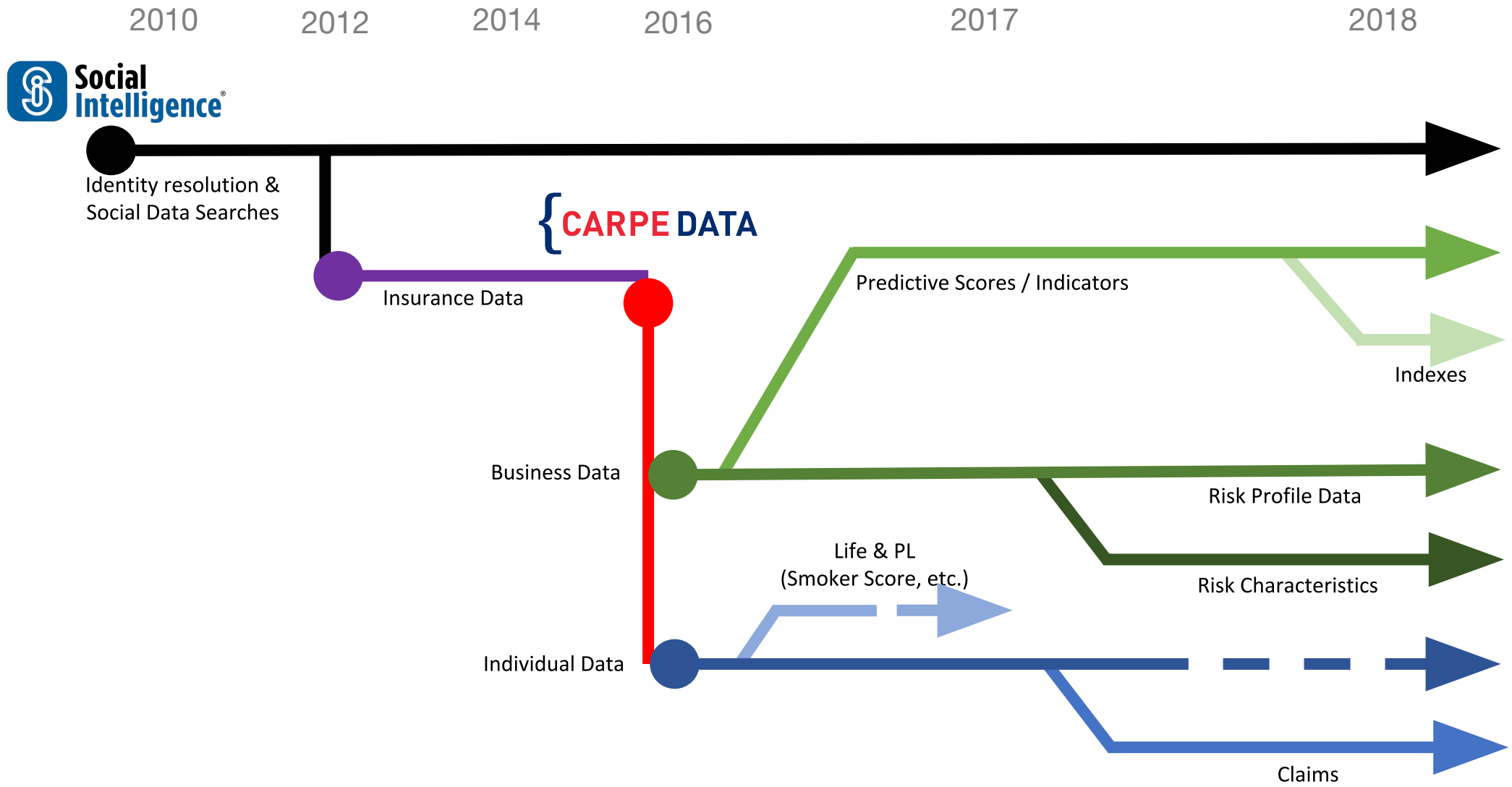
SCORES | INDEXES | RISK CHARACTERISTICS

INSURANCE CARRIER

The Insurance Policy Continuum



Capabilities Timeline



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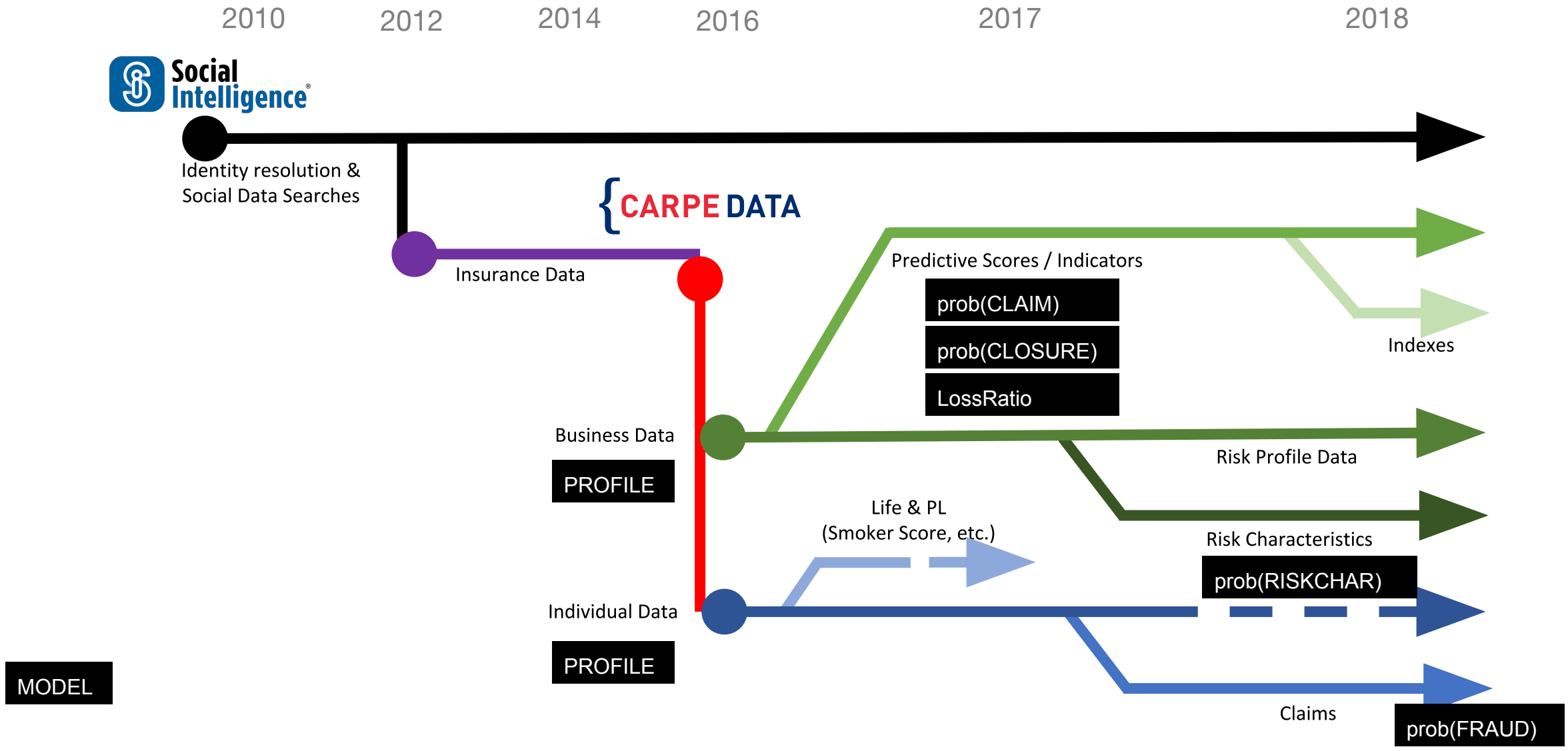

Commercial Data Store: Process Overview

1	Entity Resolution at **business location** level
2	Profile data collection: location, contact information, hours of operation, social data, ...
3	Business type classification (NAICS code)
4a	Given NAICS, collect relevant **risk characteristics** full-service restaurant → {serves alcohol? open late? delivery?}
4b	Risk characteristics inference from various methods: 1) regular expressions 2) text classifiers 3) image classifiers
5	Compute indexes, which are composites of data elements (e.g., customer review index)
6	Compute risk scores (probability of claim, loss ratio, …)

{ Risk Characteristic Extraction

Multiple methods considered for retrieval. Sometimes methods can corroborate (images with captions).

	Regular Expressions	Text Classifier	Image Classifier
RECALL	generally **LOW** - regexes don't learn	**HIGH** given sufficient data	**HIGH** given sufficient data
PRECISION	generally **HIGH** if developer carefully tests	can be **LOW** (high false positives)	can be **LOW** (high false positives)
DATA VOLUME REQUIRED	**LOW** since developed from a priori knowledge	**HIGH**	**HIGH**
DEV TIME	**HIGH** since all patterns must be enumerated	**LOW** (collect data, train, save model)	**HIGH** due to complex models, large set of hyperparams, large set of training data
NOTE			can produce embarrassing errors

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Building Better Text Classifiers

1. **Carefully think through each step of preprocessing**
   Use case: Does the business offer 3D printing services?
   Better not strip numeric!

2. **Feature engineering**
   Several ways to quantitatively represent text including n-gram count, n-gram presence, TF-IDF

3. **Word embeddings can be powerful (Word2Vec, GloVe)**
   In essence, words are combined with their context to generate representations useful for semantic and syntactic similarity

   Particularly in web data, the dictionary can be much larger than a proper dictionary (slang, misspellings)
   Hard to control for these characteristics, but word embeddings can help

4. **Class Balancing**
   In particular for rare classes, balancing can offer drastic improvement

Building Better Image Classifiers

1. **Class Selection** When building datasets, include from three areas:

Class	Example
contains label	swimming pool
does not contain label	people, cars, logos, ...
edge cases	beach, lake

2. **Augmentation**
   Include perturbed images in training set (rotations, translations, cropping).
   Be sure these transformations preserve the label

3. **Image Selection**
   Train on “challenging” images. Many Google Images are simplistic with subject against a monochrome background.

4. **Transfer Learning**
   Load a model trained on a massive dataset, repurpose the intermediate features, and add customized layers

5. **Dropout** This is a powerful regularization method which randomly drops neurons during training.

Carpe Data Indexes

A suite of indexes targeting dimensions of risk to insurance carriers

- Targeted low correlation between indexes
- Tuned by segment & geography

Indexes Provide Scalable Data Integration

Our collected data elements are in the thousands, and **rapidly** growing

Counting business presence on websites, we collect **millions** of data elements

Indexes Provide Scalable Data Integration contd.

Given entity, pull from data store

Cafe ABC

Data aggregation*

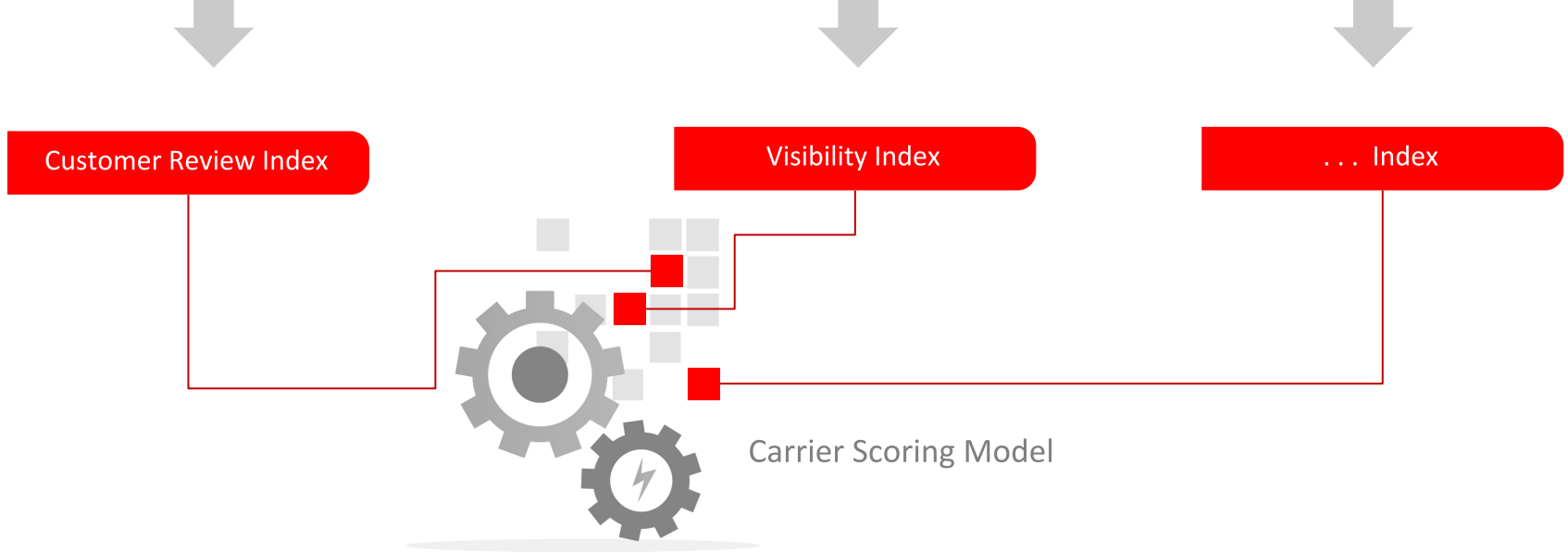

*Illustration purposes only

{ Q&A

{ Thank you!