The Fully Automated Ratemaking Process

March 2021

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Today's Speaker

Drew Lawyer
Head of Professional Services, the Americas

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I am a…

Accountant

Can't find a job? Browse the full list

Find out my automation risk > 88%
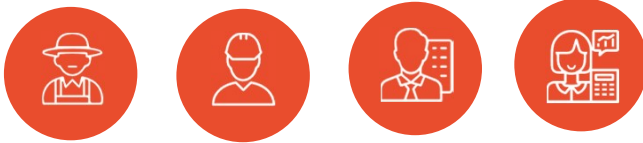
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Automation in Insurance

Straight Through
Underwriting

Customer Service
Chatbots

Image Based
Claim Settlement

But what about pricing?
What is our transformative breakthrough?

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Agenda

- ⚡ **Why now?**

- ⚡ **Which technology?**

- ⚡ **What process to automate?**

- ⚡ **Who does the work?**
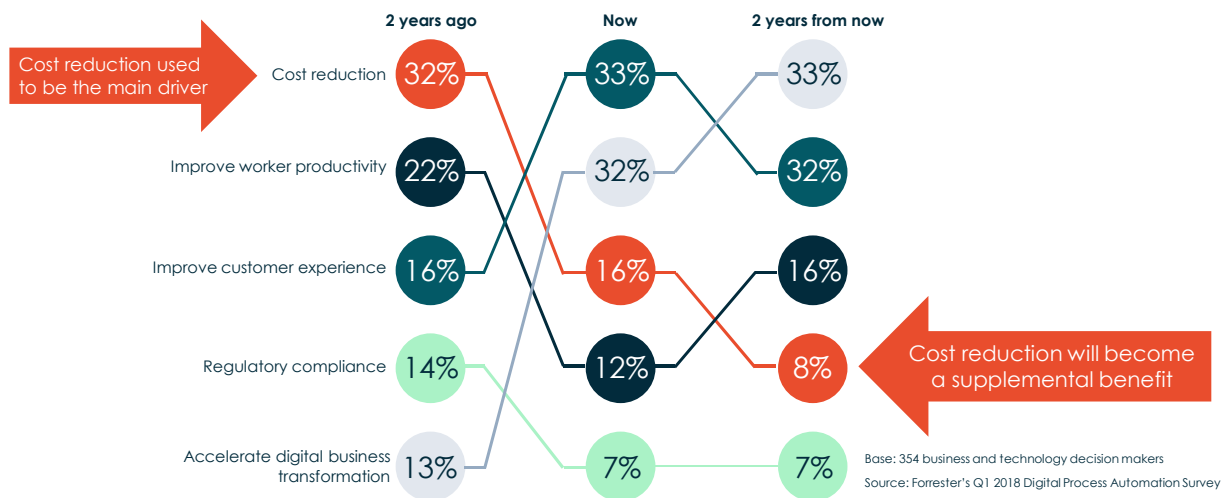
- ⚡ **How do I get past the roadblocks?**

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Automation is more than just "cost savings"

"What's the primary focus of process improvement efforts for the time periods below?"

	2 years ago	Now	2 years from now
Cost reduction	32%	33%	33%
Improve worker productivity	22%	32%	32%
Improve customer experience	16%	16%	16%
Regulatory compliance	14%	12%	8%
Accelerate digital business transformation	13%	7%	7%

Cost reduction used to be the main driver

Cost reduction will become a supplemental benefit

Base: 354 business and technology decision makers
Source: Forrester's Q1 2018 Digital Process Automation Survey

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Benefits of Automation

Reduce rating error

Stronger compliance and governance

Reduce manual processes

Create transparency and auditability

Increase process execution speed

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Why should we care about pricing automation?

Analytical Sophistication

😊 TOMORROW

☀ TODAY

⭕ YESTERDAY

Process Sophistication

Value

Diminishing returns

Analytical Advancement

"Automation will lead to competitive advantage"

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Technology

9

Tools & Technology

Tool	Description	Best Use	Longevity/ Scope	Price
VBA	Visual Basic for Applications (used for MS products)	Converting data in Excel to be ingested into a tool with a different format	Legacy technology	$
SAS	Full scope software suite with long history	Complex data transformations over large datasets	Persistent, but declining	$$$$
Python	Open source scripting language	General purpose coding outside of core operating systems	Rapid growth	$
RPA	Robotic process automation	Purely process automation to replace human "clicking". Good for legacy systems.	Good adoption, maturing quickly	$$
IPA	Intelligent process automation; combining RPA, NLP, and Machine Learning	Great at automating complex tasks that mimic human thought and have an automated feedback loop	Lot's of hype, not much adoption	$$$
Auto ML	Automated machine learning	Fitting statistical models	Slow growth	$$
NLP	Natural language processing	Transitioning between language and code	Losing momentum	$$

No one tool can do everything. You need the right tool for the right job.

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What technology is just hype?

Auto ML

Intelligent Process Automation

Natural Language Processing

Robotic Process Automation

Gartner Hype Cycle for Artificial Intelligence, 2019

gartner.com/SmarterWithGartner

Gartner

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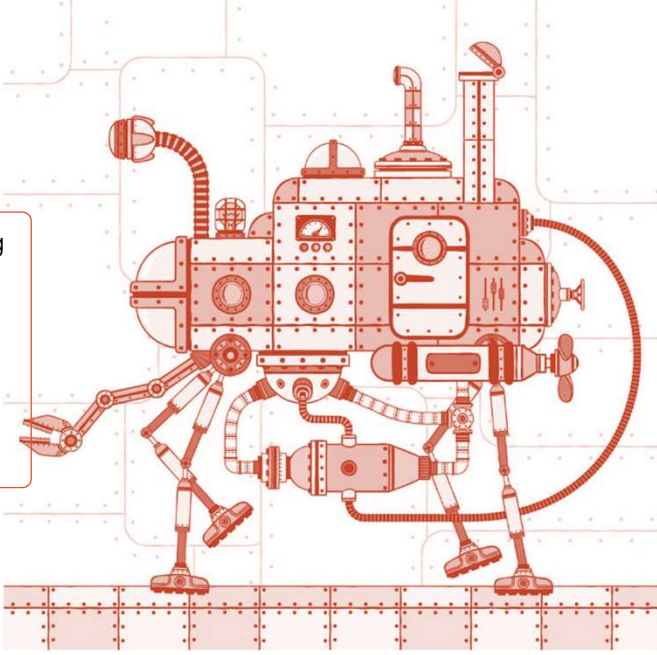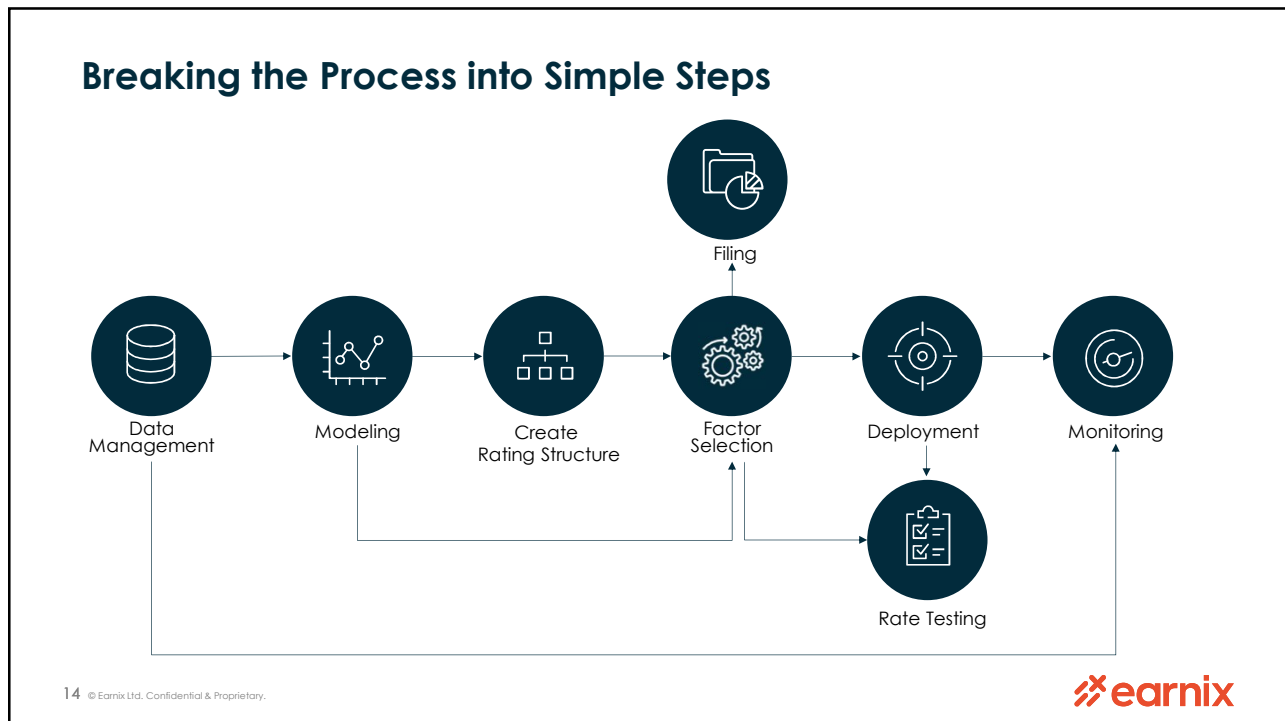
11
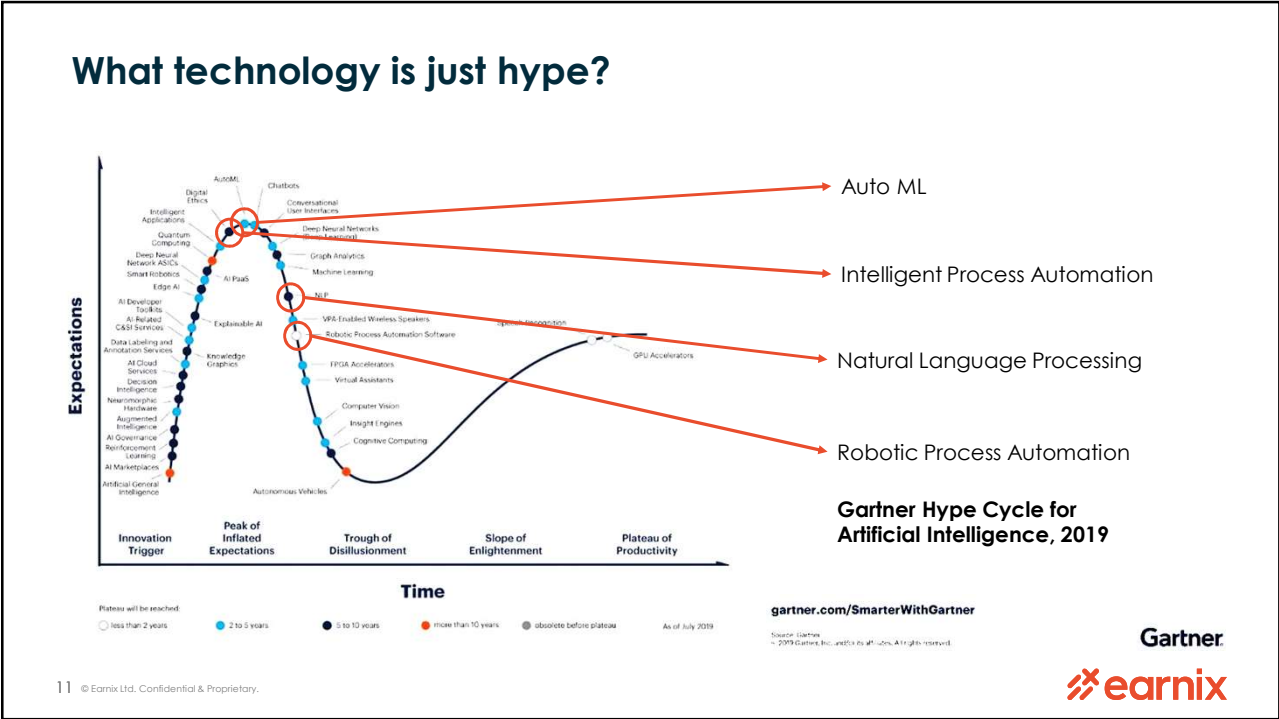
Process

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When you start automating your pricing process, will you like what you see?

If you don't love your process today, you are not going to love it tomorrow

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Breaking the Process into Simple Steps

Filing

Data Management → Modeling → Create Rating Structure → Factor Selection → Deployment → Monitoring
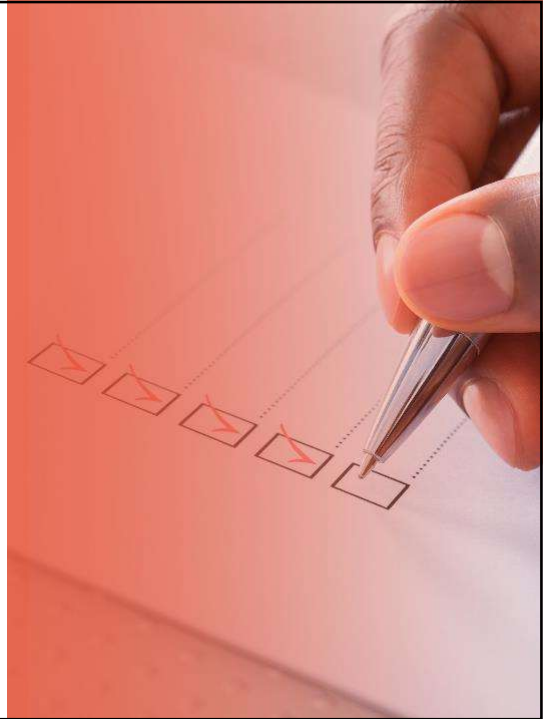
Rate Testing

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Poll Question

How would you classify your overall pricing process?

- ☐ Best in class; everything we want
- ☐ Great process, but could be modernized
- ☐ Very manual process; rates rebuilt multiple times
- ☐ Needs to be rebuild from the ground up

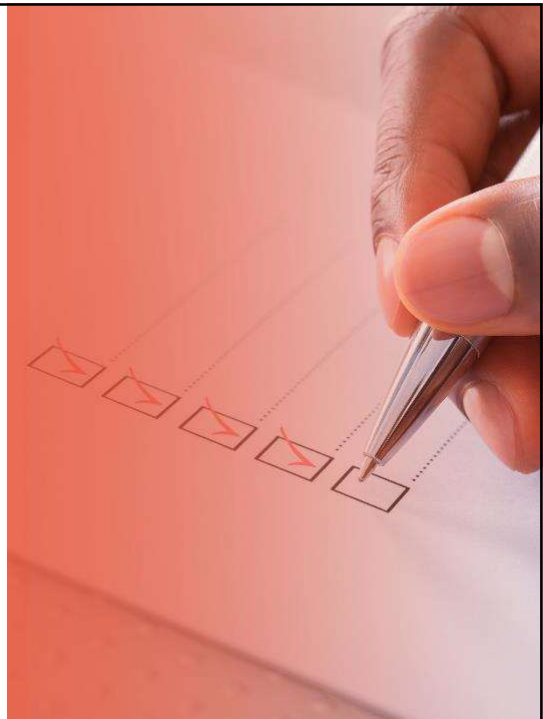15 © Earnix Ltd. Confidential & Proprietary.

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Poll Question

Over the next 5 years, what % of your current pricing process could be automated?

- ☐ 0 – 10%
- ☐ 10 – 25%
- ☐ 25 – 50%
- ☐ 50 – 75%
- ☐ 75%+

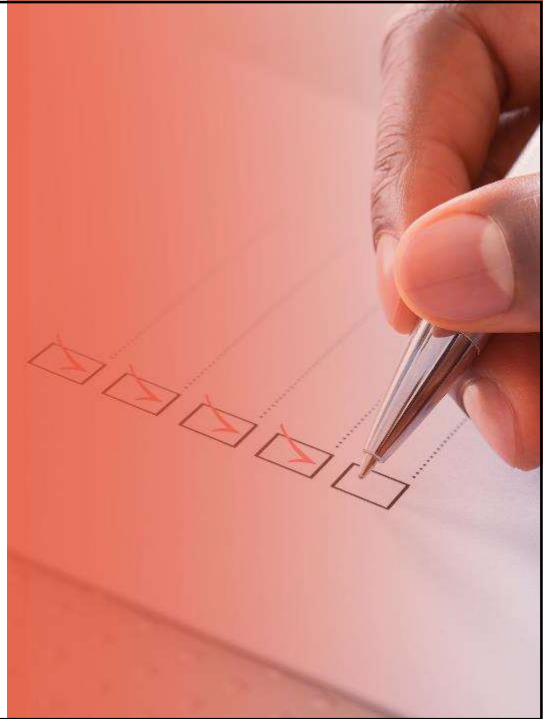16 © Earnix Ltd. Confidential & Proprietary.

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Poll Question

What is your number 1 challenge in the pricing process?
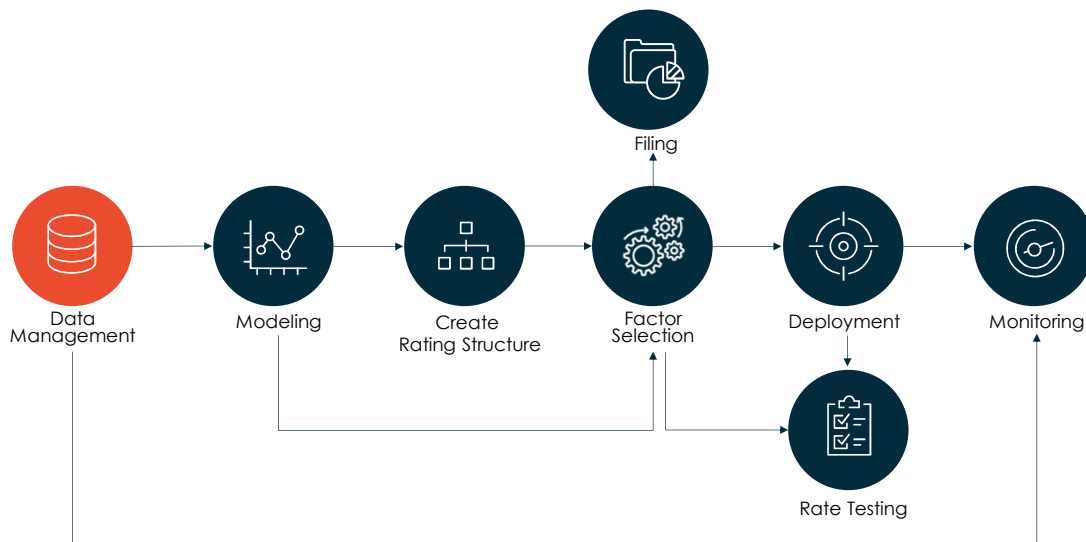
- Prone to rating <u>errors</u>
- Slow speed to market; <u>processes</u>
- <u>Technology</u> restrictions
- Translating <u>models</u> into rating structures
- Too many cooks in the kitchen; <u>management</u>

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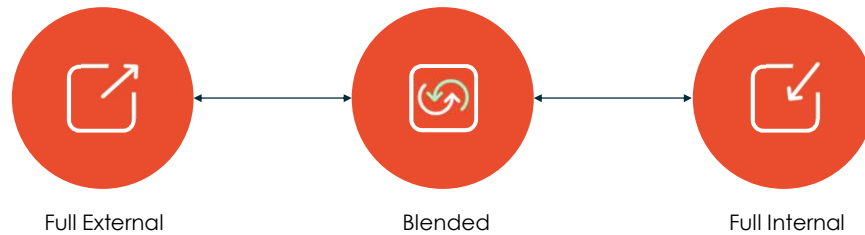## Breaking the Process into Simple Steps

Data Management → Modeling → Create Rating Structure → Factor Selection → Deployment → Monitoring

Filing

Rate Testing

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Internal vs. External Data

Full External ⟷ Blended ⟷ Full Internal

Is it easier to automate internal or external data?

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Working with Structured Data

- Bring analytical data closer to production data

- Data should be unified across the in force, quote, and testing datasets

- Many data processes are already automated, but there is much room for improvement

Policy

PH Age	Tenure	Postcode	Convertian Ind	Policy Number
41	5	5434561	1	1001

Vehicle

Type	Model	Sum-model	Year	Value	Pol Number	Veh Number
Toyota	Corolla	HB Hybrid	2019	21000	10001	20001
Ford	Explorer	Limited	2016	15000	10001	20002

Covers

Cover Name	Cover num	Deductible	Vehicle Number
Casco	202	500	20001
Legal	301	100	20001
NCD	305	-	20001
P Casco	203	250	20002
Breakdown	306	100	20002

Driver

Age	Gender	Convictions	Driver Number
41	F	0	1001
41	M	0	1002
45	F	1	1003

Claims

Type	Date	Amount	Driver Number
PD	05/08/2018	$2300	1003

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Automating Data Management

Actions to Automate

- Extraction | Standardization | Validation | Merge/append | Import/export

Technology

- Python | SAS | SQL | Other commercial data tools

Required Skills

- Data engineer

Technical Notes

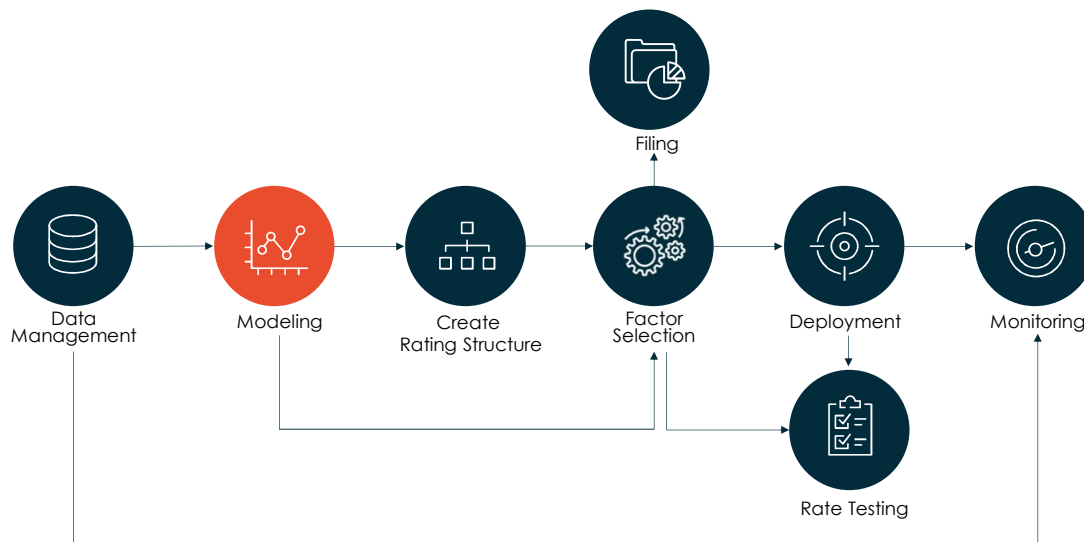- Most important step of the automated pricing process
- Consolidate automation processes as much as possible
- Unify (standardize) all data required in the pricing process
- Strong partnership between IT and Actuarial

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Breaking the Process into Simple Steps

Filing

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Models Used in Pricing

Models to automate:

- Retention & mid-term cancelation (semi-annual update)
- New business conversion (quarterly update)
- Expense allocation (annual update)
- **Loss cost** (annual update)
  - Constrained models (include market & regulatory constraints)
  - Unconstrained models (true best estimate of loss)

Can we use Machine Learning models for calculating premium?
Not a question of 'IF', but 'WHEN'

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Automating Model Development

Actions to Automate

- Refit with updated data | Identify new data elements | Adjust transformations Compare models

Technology

- Python | AutoML (DataRobot)

Required Skills

- Data scientist | Predictive modeler | Statistician

Technical Notes

- Models should be created manually first
- Machine Learning always beats traditional GLMs – statistically speaking
- Just because we can build more complex models, does not always mean that we should
- Building models is easy; deploying them into production is much more difficult

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Breaking the Process into Simple Steps

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Creating Rate Tables

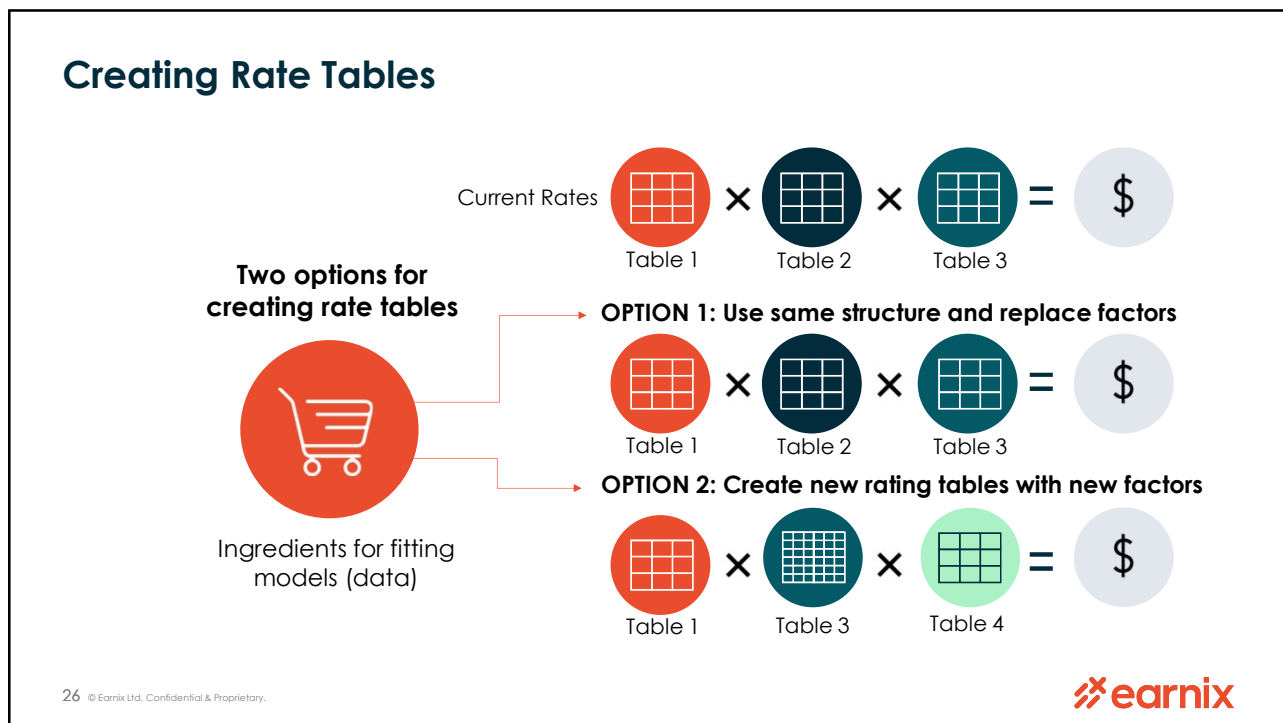Current Rates

Table 1 × Table 2 × Table 3 = $

Two options for creating rate tables

OPTION 1: Use same structure and replace factors

Table 1 × Table 2 × Table 3 = $

Ingredients for fitting models (data)

OPTION 2: Create new rating tables with new factors

Table 1 × Table 3 × Table 4 = $

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Automating Rating Structure Creation

Actions to Automate

- Transform loss cost models | Group factors | Add tables outside GLM | Rerate data as audit

Technology

- Python | AutoML | Specialized commercial software

Required Skills

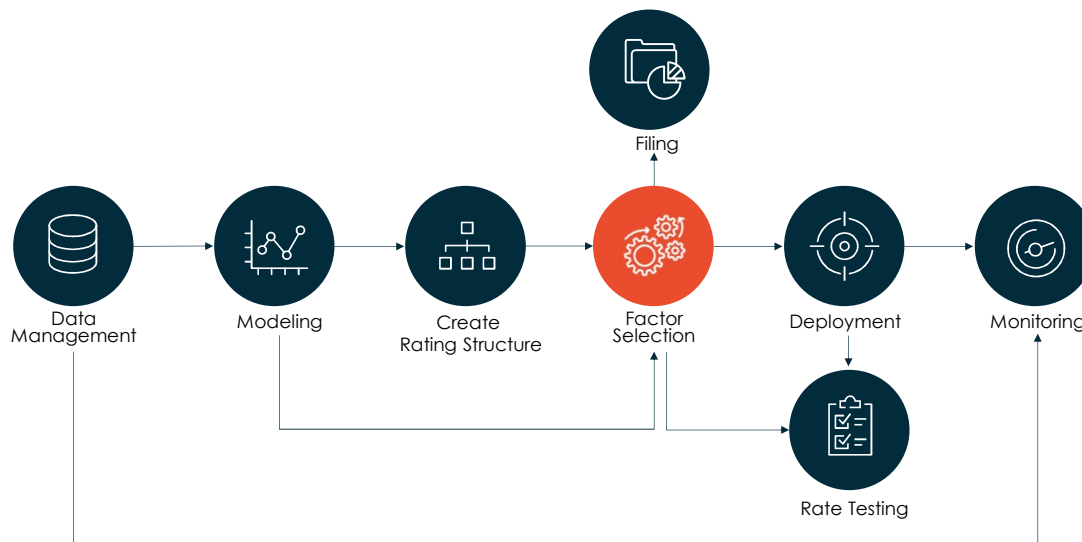- Data scientist | Actuary | Product management

Technical Notes

- The handoff today between R&D and pricing today is typically ugly
- Consider what steps in this process truly add value today
- Creating an overly complex rating structure to hide IP from competitors rarely works
- How the structure is created is a function of the rating engine flexibility

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Breaking the Process into Simple Steps

Data Management → Modeling → Create Rating Structure → Factor Selection → Filing

Factor Selection → Deployment → Monitoring

Factor Selection → Rate Testing

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Automated Factor Selection

State Product Filing

Var	Current	Indicated	Selected
L1	1.00	1.00	1.00
L2	1.10	1.21	1.15
L3	1.25	1.38	1.32
…	…	…	…

From current rate pages

From new loss models

The automated factor selection process

Leverages the expected profitability and underlying expectation of customer demand

1. Define the objection function (business goal to maximize)

2. Define the global constraint (anchor)

3. Define individual factor level constraints (selected factor should be between current and indicated)

4. Define relationships between rating cells (monotonicity constraint)

5. Run algorithm to compute optimal factors that are compliant with regulation

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Automating Factor Selections

Actions to Automate

- Adjust factors by considering market position, regulatory constraints, and customer demand

Technology

- Python | Specialized commercial software (optimizer)
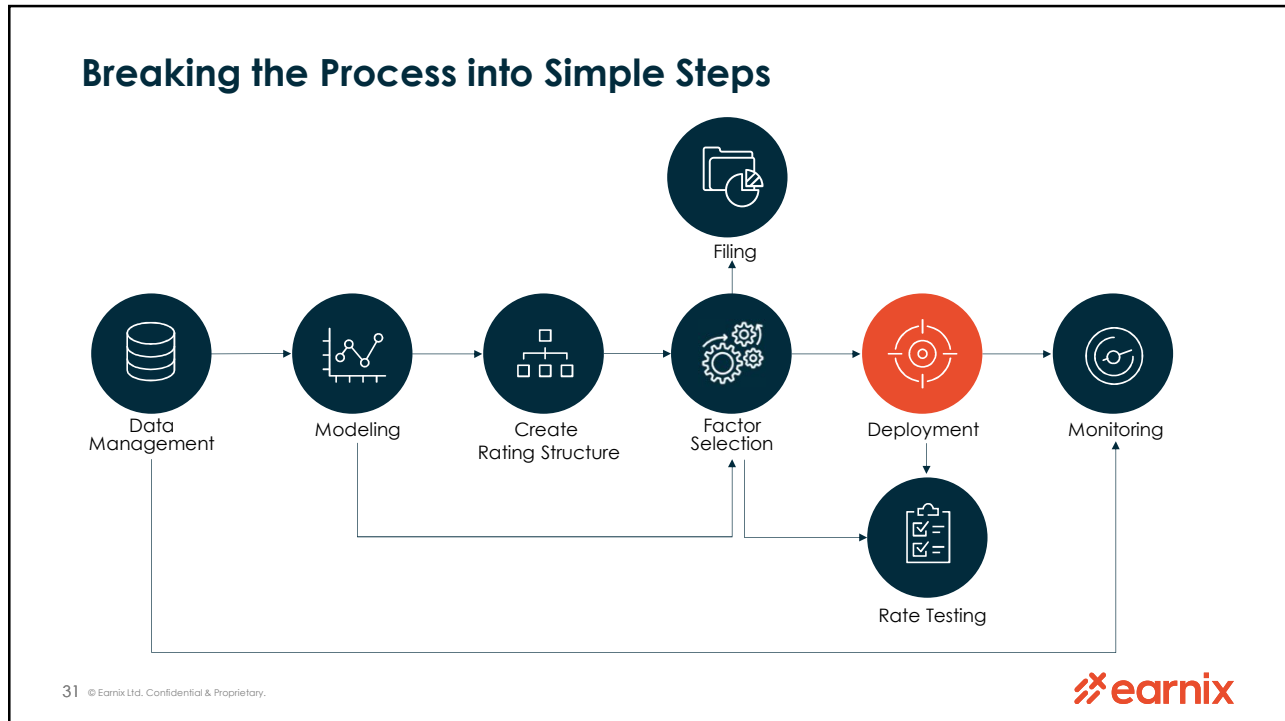
Required Skills

- Actuarial | Product management

Technical Notes

- Within predefined criteria, algorithm finds a factor combination that satisfies all constraints
- In practice, suggested factors are the starting point for human adjustment
- Selected factors should always be accompanied by KPI projections
- In the perfect process, the only input needed is the business objective (growth vs. profit)
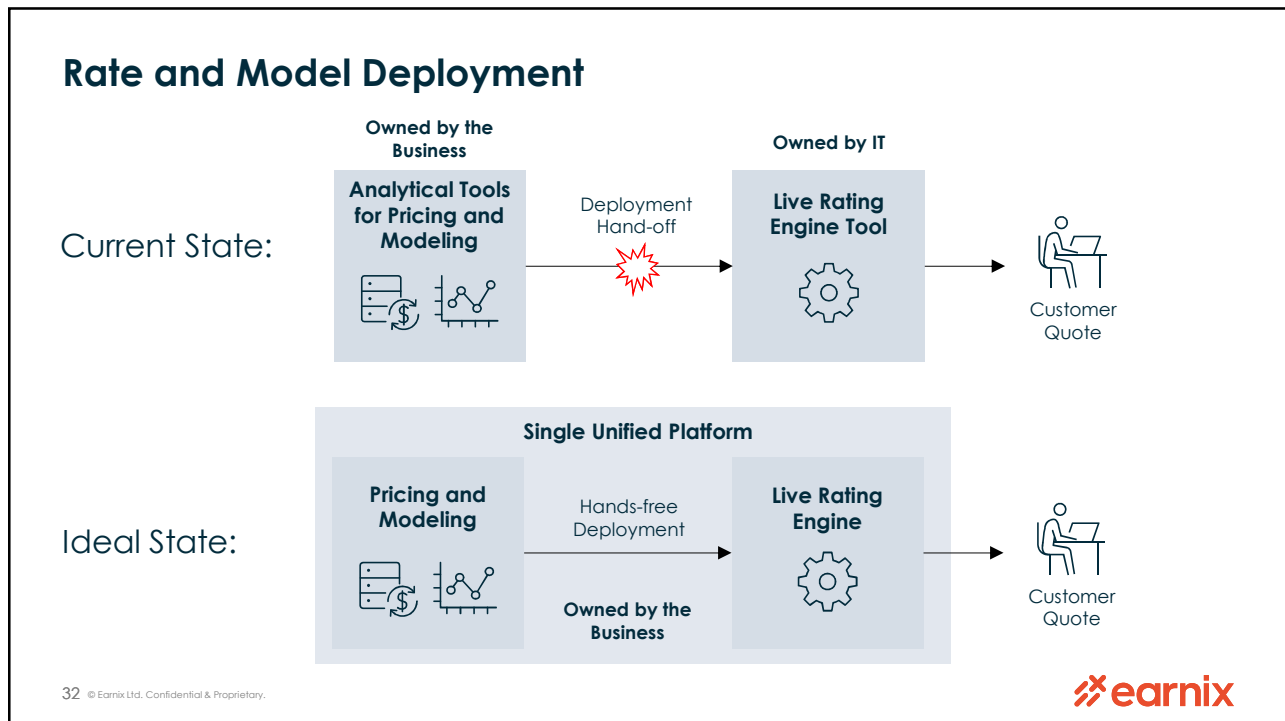
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Breaking the Process into Simple Steps

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Rate and Model Deployment

Current State:

Owned by the Business

Analytical Tools for Pricing and Modeling

Deployment Hand-off

Owned by IT

Live Rating Engine Tool

Customer Quote

Ideal State:

Single Unified Platform

Pricing and Modeling

Hands-free Deployment

Live Rating Engine

Owned by the Business

Customer Quote

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Automating Rate Deployment

Actions to Automate

- Perform system checks | Request permissions | Implement rates into rating engine

Technology

- Python | RPA

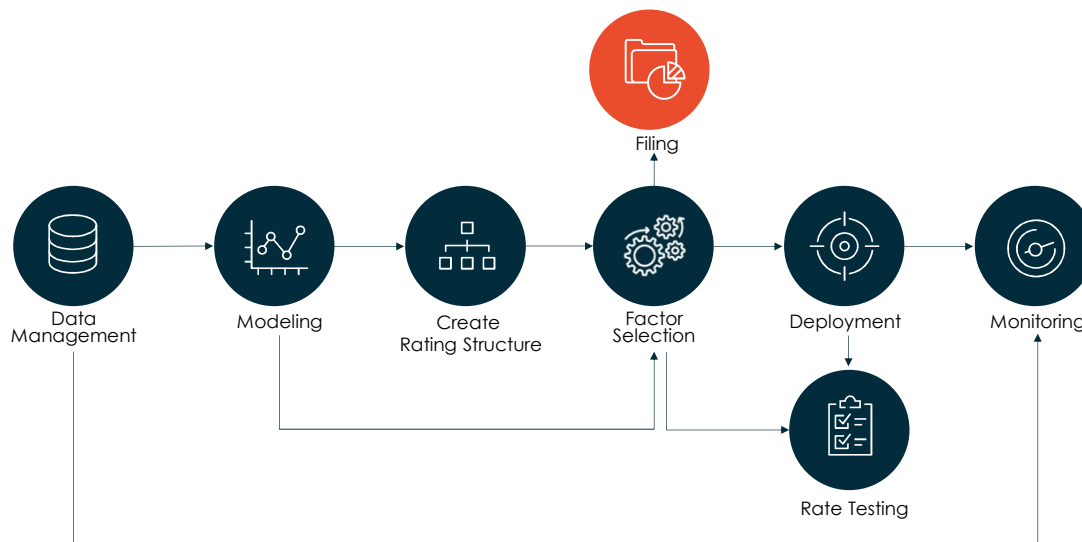**Required Skills**

- IT | Actuarial

Technical Notes

- This is handoff is currently one of the largest bottlenecks in the pricing process
- Shifts responsibility from IT to business and allows greater speed to market (proactive vs reactive)
- Reduces deployment time from months or weeks to days or hours
- This is mission critical – no mistakes here

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Breaking the Process into Simple Steps

Filing

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Automating Rate Filing

Actions to Automate

- Compile rate pages | document changes | Output current/indicated/selected factors | Submit filing

Technology

- Python | NLP | VBA | RPA | IPA

Required Skills

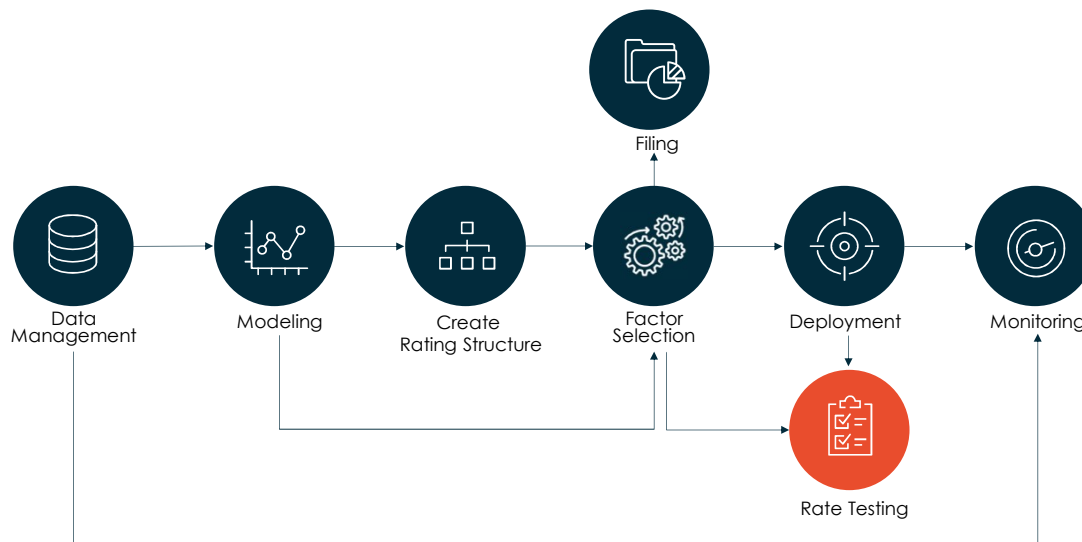- Actuarial | Product management

Technical Notes

- Like all filings, it is a balance of how much vs. little to share – for automation, share more
- Be open with the regulators that you are focusing on automation; include them in the process
- Different states will have different templates (that's ok)
- How comfortable would you be to let IPA (using NLP) attempt to answer objections?

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Filing

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End-to-End Rate Testing

Front-line premium validation in Analytical Environment

Automated testing module using production rates and models

Premium (and breakdown) returned from production automatically fed back into Analytical Environment

Analytical Environment

Selected Rates and Models

Testing Environment

Selected Rates and Models

Production Environment

Deployed Rates and Models

Capture Quote Data

Data preparation

Data Simulation

Production Data

Data for Analysis

Data for testing

Request Profile from Policy Admin System

Automated Feedback Loop

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Automating Rate Testing

Actions to Automate

•Validate premiums | Check system performance | Identify discrepancies | Notify stakeholders

Technology

•Python | RPA | IPA

Required Skills

•Actuarial | IT

Technical Notes

•At most companies, this piece of the process needs to be reinvented
•Rate tables and pricing rules should be programmed once and deployed everywhere required
•Testing data should be – in force, new business quotes, synthetic extreme cases
•The most important test is looking at average premium levels and distribution

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Automating Monitoring

Actions to Automate
- Rebalance data | Check predictive model accuracy | Notify stakeholders | Trigger corrective action

Technology
- Python | SAS | SQL | IPA

Required Skills
- Data engineering | Data science

Technical Notes
- Overlooked step in many business processes – lots of talk with little action
- The first step is to create automated output for reporting
- Most challenging part of the process – lots of if/then scenarios
- Very few business processes are able to close the loop through complete process automation

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Implementation
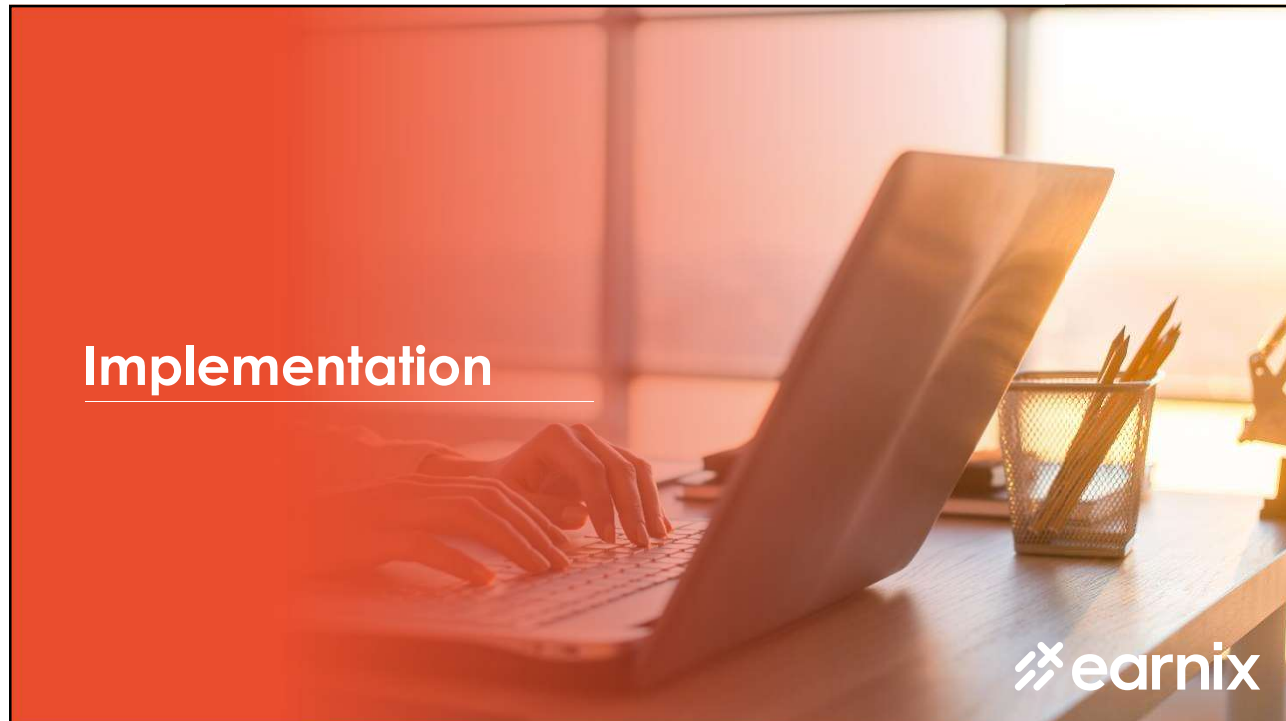
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Roles & Responsibilities

- **Management sponsor:** executive level setting the course
- **Process owner:** line of sight over the end-to-end pricing process
- **Project manager:** orchestrator keeping track of deliverables, resources, and timeline
- **Technical experts:**
  - **Business experts** – actuaries intimately familiar with the pricing process
  - **Data experts** – data engineers who know how to find the right data
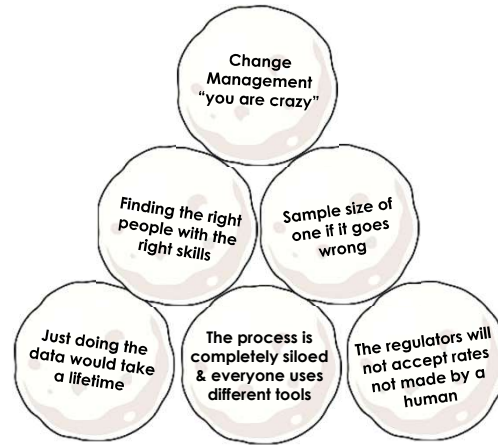 - **Technology experts** – know how to use automation tools

Process automation ownership?

Business ⟷ IT
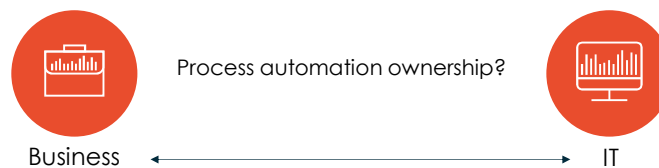
Ideally you have more people doing the work than managing the work

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Navigating the Challenges

"When there are boulders, we can either chip away, go around, or blow them up!"

Change Management "you are crazy"

Finding the right people with the right skills

Sample size of one if it goes wrong

Just doing the data would take a lifetime

The process is completely siloed & everyone uses different tools

The regulators will not accept rates not made by a human

TODAY ⟶ TOMORROW

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Key takeaways

Love the process before you automate it

Break the process down into bitesize pieces

Increase process execution speed

Stronger compliance and governance

Create transparency and auditability

Most importantly...

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I am a…

Actuary

Can't find a job? Browse the full list

Find out my automation risk > **21%**

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Process automation is a journey

Leap!

Run

Walk
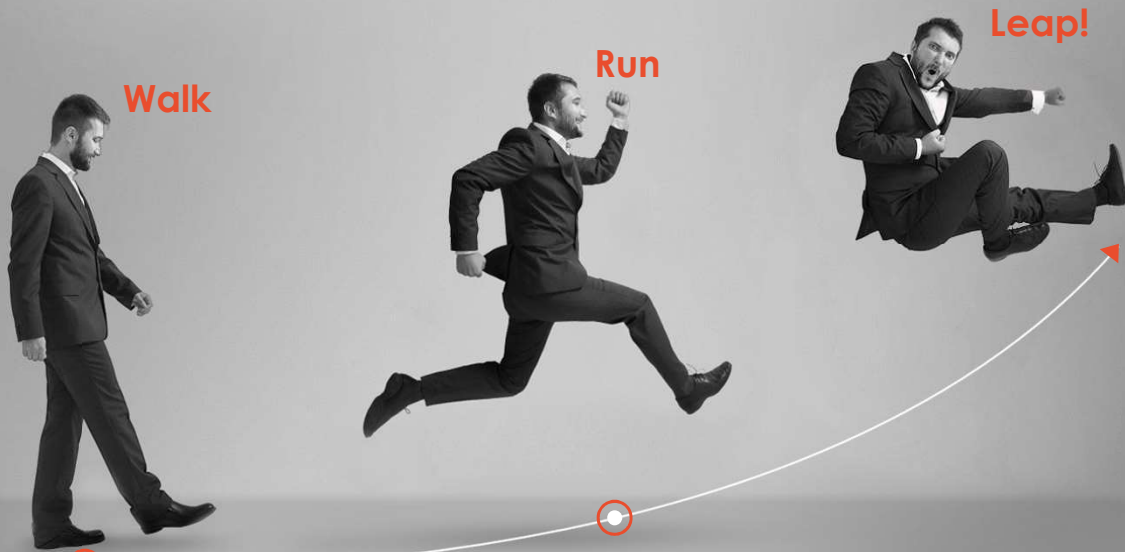
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Questions?

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Thank You

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Transforming Culture & Operational Technologies

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Agenda

Introduction

DigitaLab

- About Us
- Desired Skillsets
- Automation Projects

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Julia Hart

- Site Director, DigitaLab (3 years)
- Adjunct Faculty, University of Illinois School of Information Sciences
- University of Illinois Alumni (Masters & Doctorate)
- Previously Director of IT and Institutional Research
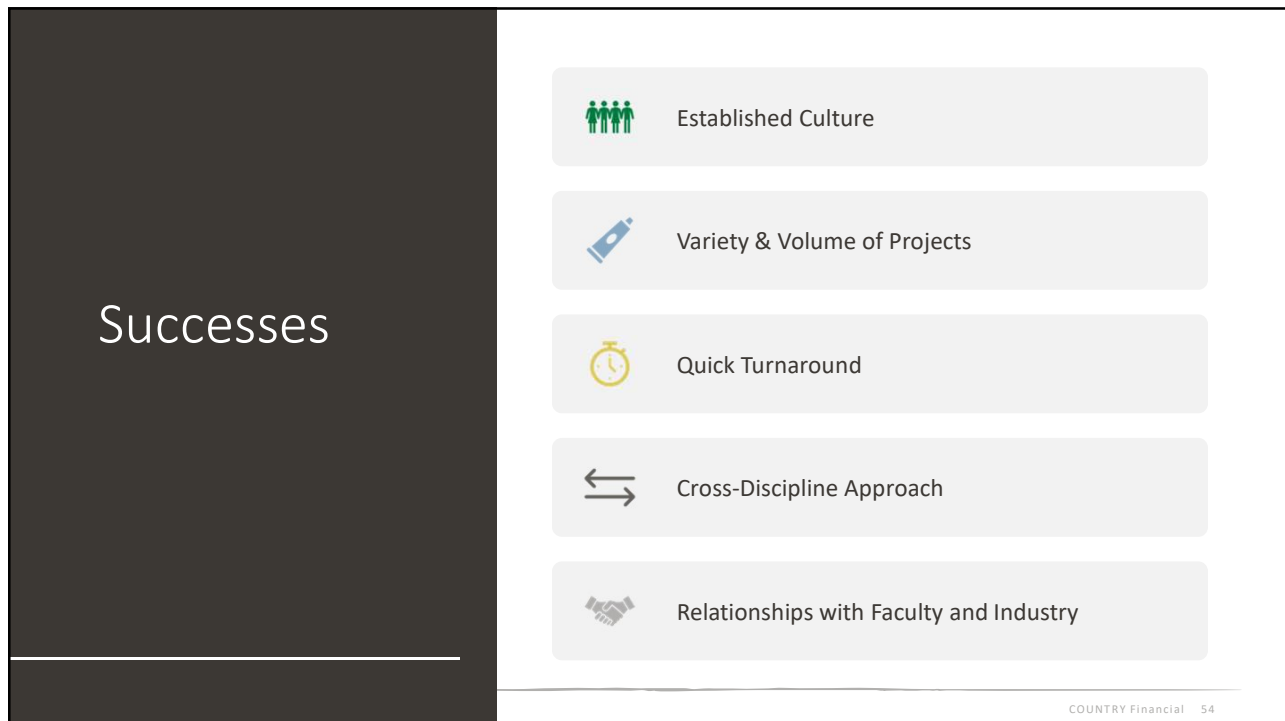- Lived in Champaign, IL for 34 years!

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Create – Elevate - Integrate

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Delivering Working Solutions

AppDev & Technology Enablers

Business App Design & Development

Utilizing Emerging Technologies

Modeling & Insights
Automation
Self-Service

Data & Analytics

Research & Innovation

POCs & Prototypes

Collaboration Opportunities

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Successes

Established Culture

Variety & Volume of Projects

Quick Turnaround

Cross-Discipline Approach

Relationships with Faculty and Industry

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Challenges

RESOURCES (FTE)

TECHNOLOGY STACKS

OPERATIONALIZING

ACCESS TO DATA & TOOLS

DELAY IN TIMELINES

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University of Illinois Talent

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Skillsets

 Out-of-the-box thinking

 Emerging technologies

 Agile methodologies

 Ambition & Initiative

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Out-of-the Box Thinking

- Ability to learn domain-specific knowledge
  - At least have an interest
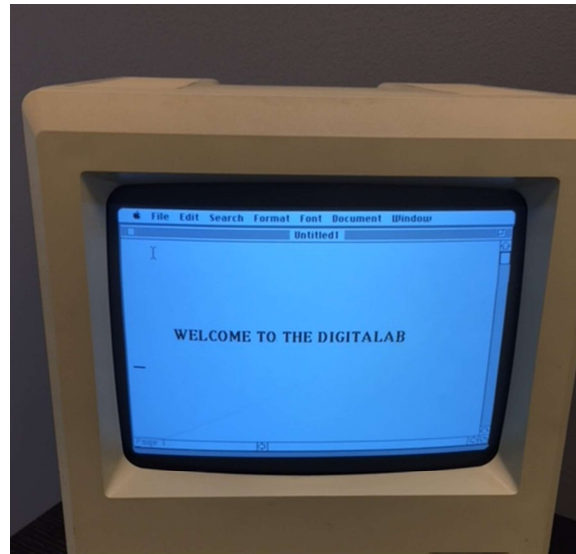- Non-prescriptive
- Be creative!

PRODUCT INNOVATION DEPT.

"I assume all this playing will lead to innovation."

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Latest Tech

- Data Science specific:
- Computational Skills
  - Programming Languages
  - Databases
  - Machine Learning
- Data Visualization
  - Storytelling
  - Interactive Dashboards
  - Analytical Reports
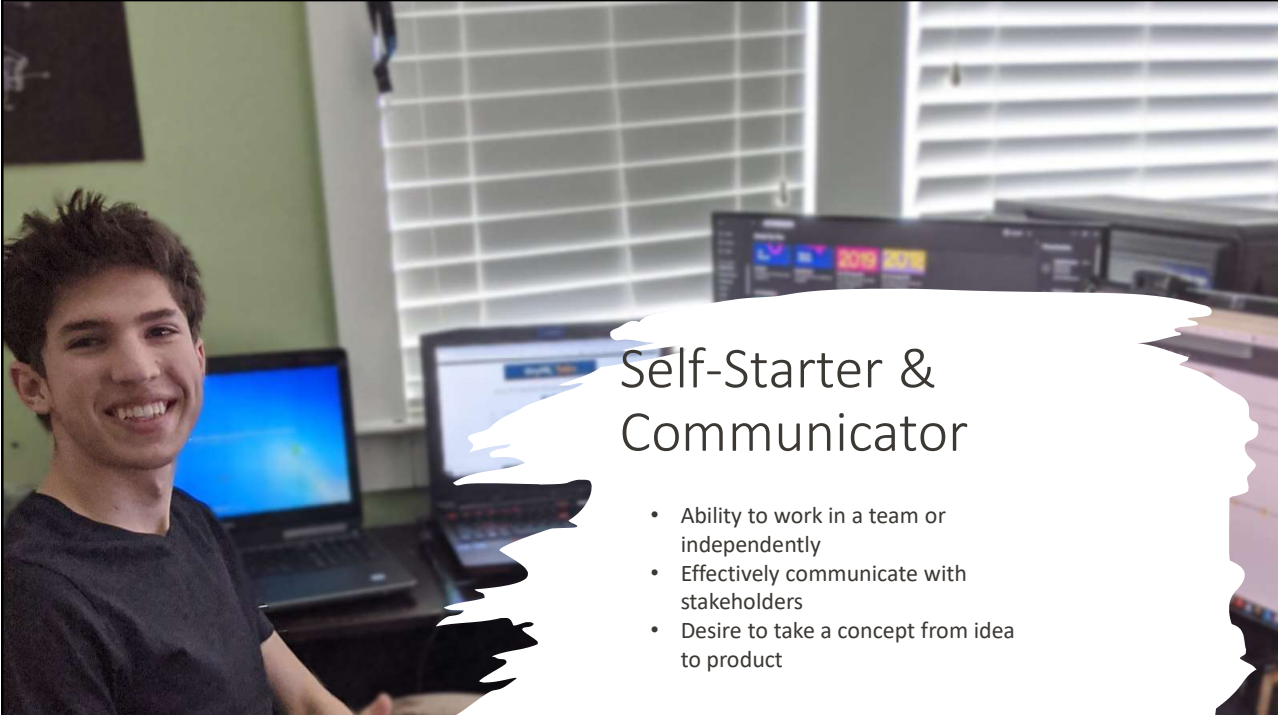
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Agile Approach

- Understanding various project management methods
  - Agile vs. Waterfall
  - Sprints
  - Tracking User Stories
- Adaptable to change

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Self-Starter & Communicator

- Ability to work in a team or independently
- Effectively communicate with stakeholders
- Desire to take a concept from idea to product

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" DigitaLab is a place of diversity, where we can fully utilize our creativity & what we've learned in classes to create some real value. It's happy to see the tools we developed to be deployed in the production environment and used by COUNTRY. This feeling of being needed makes me love DigitaLab even more. "

DigitaLab Intern, 2020

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Project Results

- Property Image Recognition
- Sentiment for Data Analysts
- Claims VOC App
- NLP to Query

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Property Image Recognition 2.0

- Google Cloud Vision API vs. Azure Cognitive Services
- Created an **automated** solution using historical images and claims data to assess risk of insuring a house
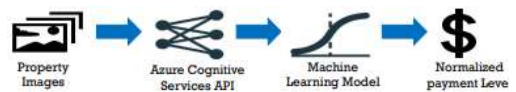
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Sentiment for Data Analysts

No Data Science Background Needed!

Easy-to-Use Web App

Generates Predictive Model

Predicts Text Sentiment (Specific Context)

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Claims VOC App

CLAIMS APPLICATION WAS AIMED AT **AUTOMATING** THE EVALUATION OF A CUSTOMER'S CLAIM EXPERIENCE

MACHINE LEARNING TECHNIQUE RANDOM FOREST WAS USED TO RANK FEATURES AFFECTING LOW EASE SCORES

INCLUSION OF REPORTS UNCOVERING DETAILS ABOUT CRUCIAL METRICS ENABLED QUICK EVALUATION AND ANALYSIS OF CLAIMS DATA

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NLP to Query

- Country Financial currently utilizes skilled employees having knowledge of Query Languages to answer basic questions asked by Business Users
- This project aims to create a robust system that is responsible for **automating** the process of answering questions by converting English sentences to SQL Queries
- The successful implementation of this project will make this entire process more efficient, less time-consuming and inexpensive.

Our Vision: To Enrich Lives in the Communities We Serve

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Thank you

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