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KNOWLEDGE FOR ACTION  
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# WCAI RESEARCH OPPORTUNITY

*Predicting Life Changes from Financial Activity*

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# Introductions

**Allen**

Assistant Vice President

**Robert**

Decision Scientist

**Tom**

Analytics Manager

**Ben Adams**

Research Director, WCAI

**Elea McDonnell Feit**

Executive Director, WCAI

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Assistant Research  
Director, WCAI



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# A Note on Press & Public

This webinar is intended for **researchers & scholars**. It should not be published or presented without permission from WCAI.

- Questions on program: [wcai-research@wharton.upenn.edu](mailto:wcai-research@wharton.upenn.edu)
- Press contacts: [wcai-press@wharton.upenn.edu](mailto:wcai-press@wharton.upenn.edu)



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# A Note on Process

**Today, we are going to describe a data set that the project sponsor is making available for research. To gain access to the data for your research, you must first submit a proposal to WCAI for approval.**

- Proposals are expected from academics and researchers, but non-academics are welcome to submit.
- The sponsor has some questions of interest, but also welcomes the topics that YOU want to research. Don't be limited to the sponsor's research areas.
- We strive to keep the proposal process as efficient as possible. Proposals should be submitted online, succinct, and follow the WCAI format (described at the end).



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# A Note on the Sponsor

This research opportunity is sponsored by a **Fortune 500 Financial Services Company**.

- Awarded research teams will be introduced directly to the company
- Sponsor must **not** be named in any publication or presentation
- Data will be de-identified



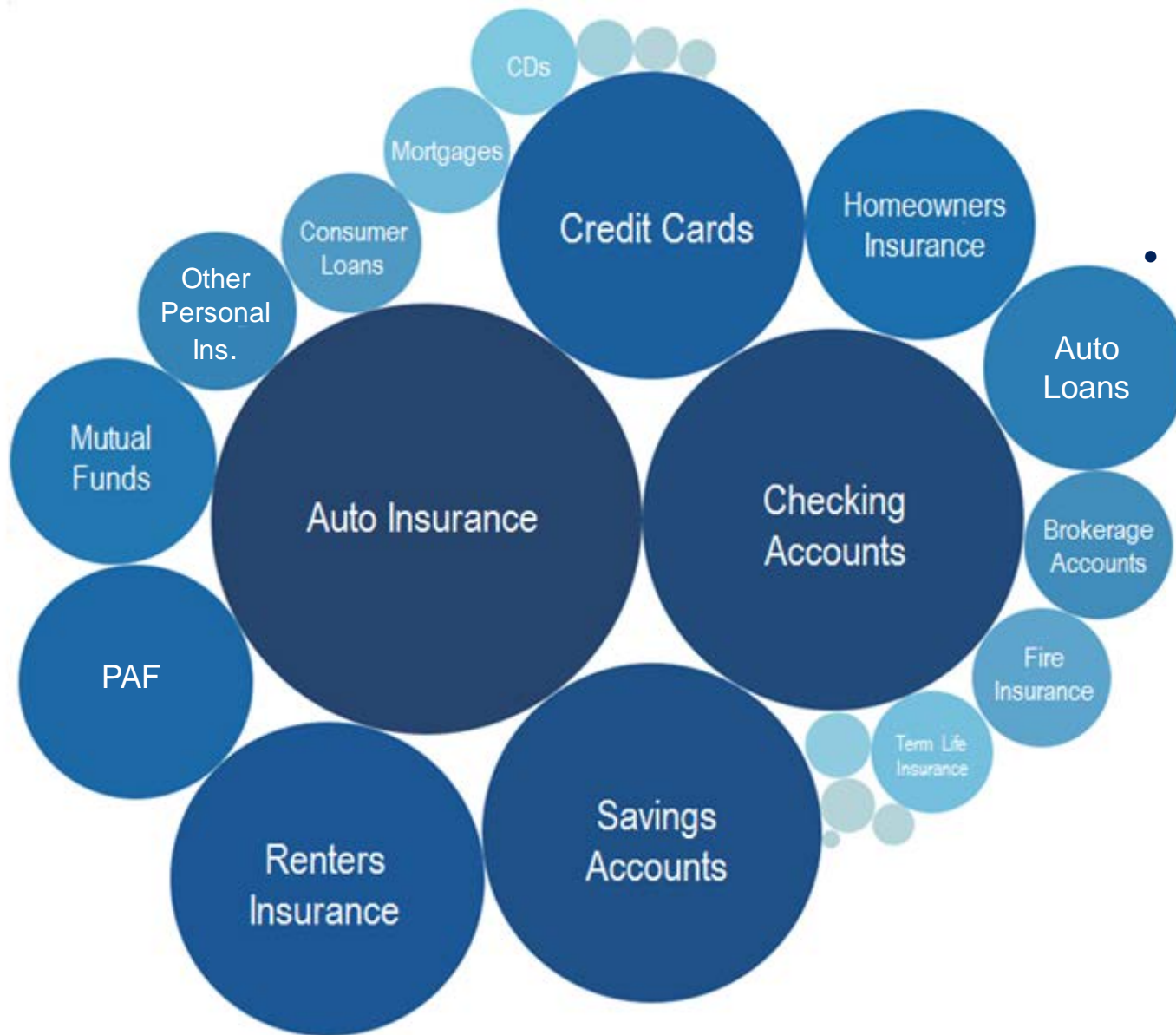
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# The Sponsor

- As a **direct-oriented** financial services company, the sponsor is much more **knowledgeable about** and **focused on its customers** than the average financial institution.
- Provides a wide array of financial products and services including, but not limited to:
  - **checking and savings accounts**
  - **money market funds**
  - **mutual funds**
  - **property & casualty, and life insurance**
  - **real estate and related services**

The company has **few physical store locations**, so most customer transactions occur online or through the call center. This ability to closely track customers has provided the opportunity for a **rich and unique** dataset.





## The Products

- There are a total of **25 product categories.**
- The majority of customers (86%) own products or services in **more than one category.**

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# Key Research Area:

## Life Event Changes





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# Key Research Area:

## Life Event Changes - Detecting

Anne purchases  
a product



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# Key Research Area:

## Life Event Changes - Detecting



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# Key Research Area:

## Life Event Changes - Detecting



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# Key Research Area:

## Life Event Changes - Detecting



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# Key Research Area:

## Life Event Changes - Detecting

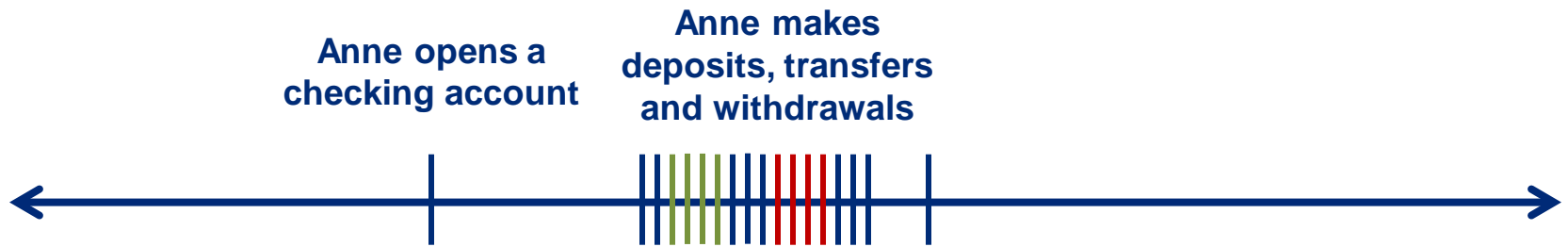


If Anne changes careers and does not notify us immediately, can we detect the life change has happened?

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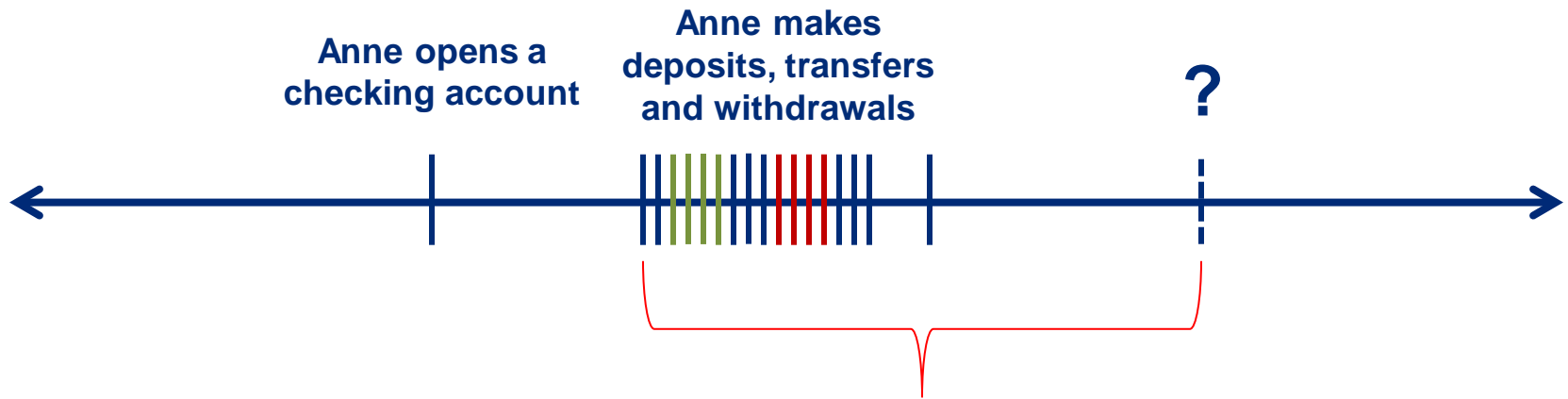
# Key Research Area:

## Life Event Changes - Predicting



# Key Research Area:

## Life Event Changes - Predicting



How can we use Anne's financial activity and account behavior to predict if and when she will make a major life transition?

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# The Research Questions

- **Key Questions from the Sponsor:**
  - **Accurately predicting life changes before they occur**
  - **Detecting life changes that have already happened**





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# The Data: An Overview

- All longitudinal touch-points for **100,000 customers over 17 months**
- Some customers have recorded “life changes”, such as a **career change, marriage, or home purchase**
- **Comprehensive customer, transaction, and contact data, including:**
  - **customer demographics**, including age, status, job title
  - **customer product portfolio**, including changes over time
  - **website/mobile contacts**, including transactions and device
  - **call center contacts**, including date, activity, purchase



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# The Data: Collection



Mobile/Smartphones



Call Center Logs



Website Visits



Direct Marketing



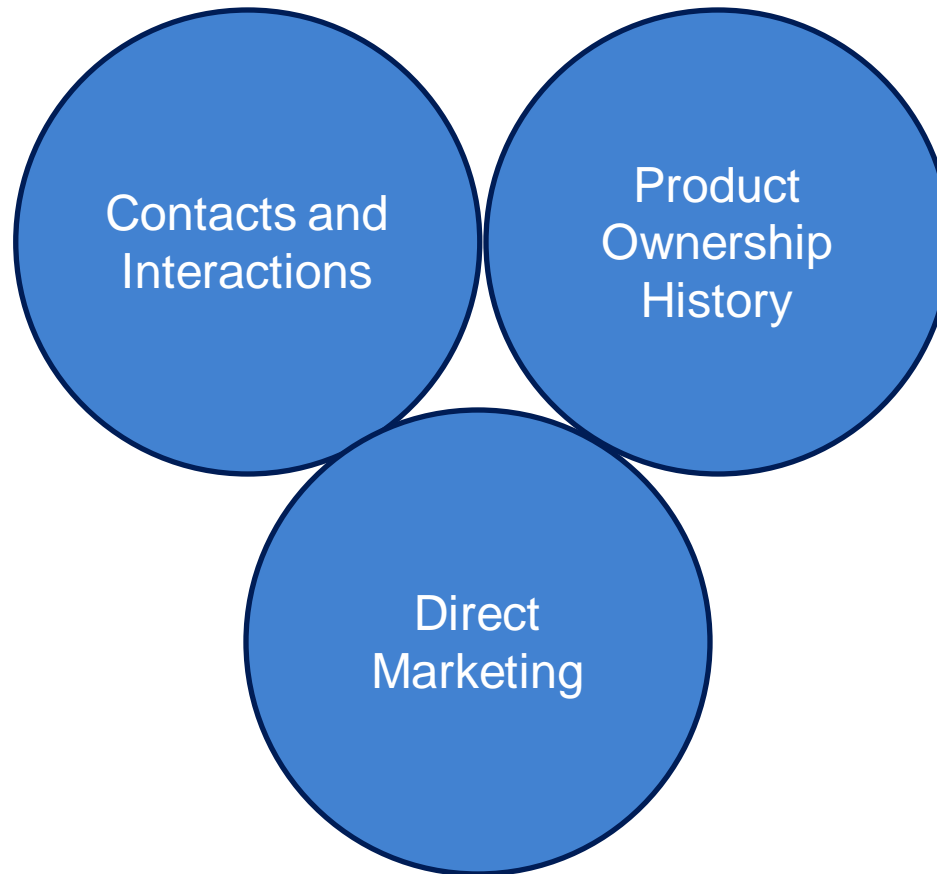
Interactive Voice  
Recording



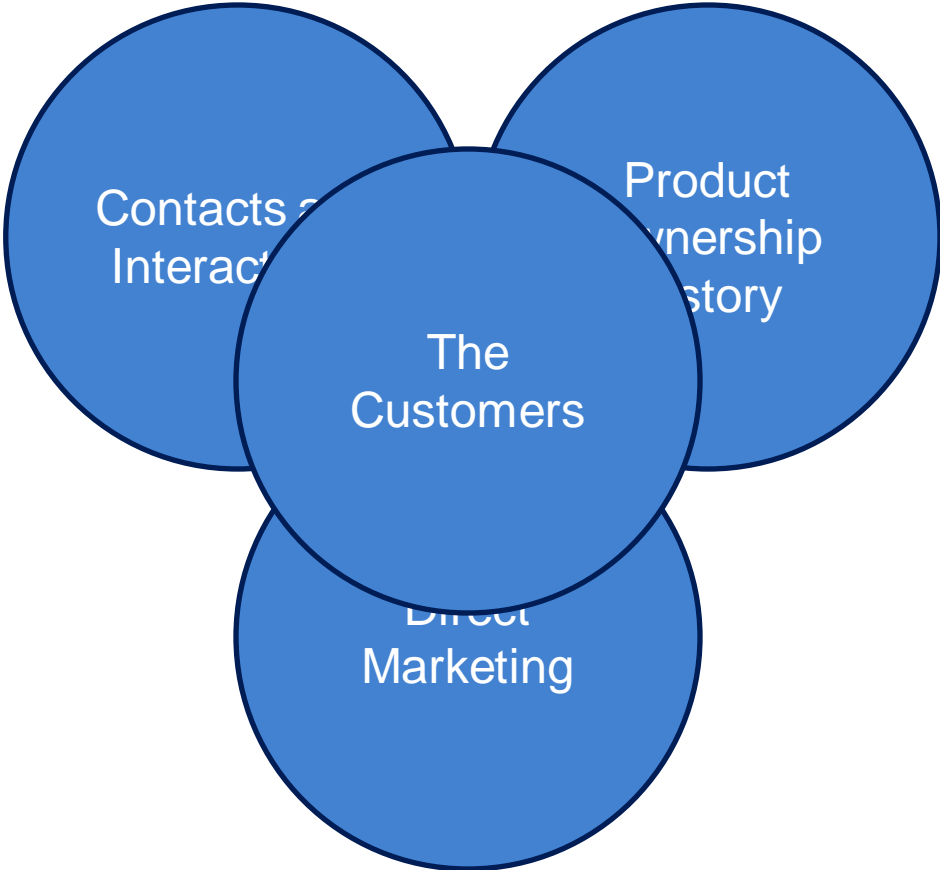
Tablets/iPads

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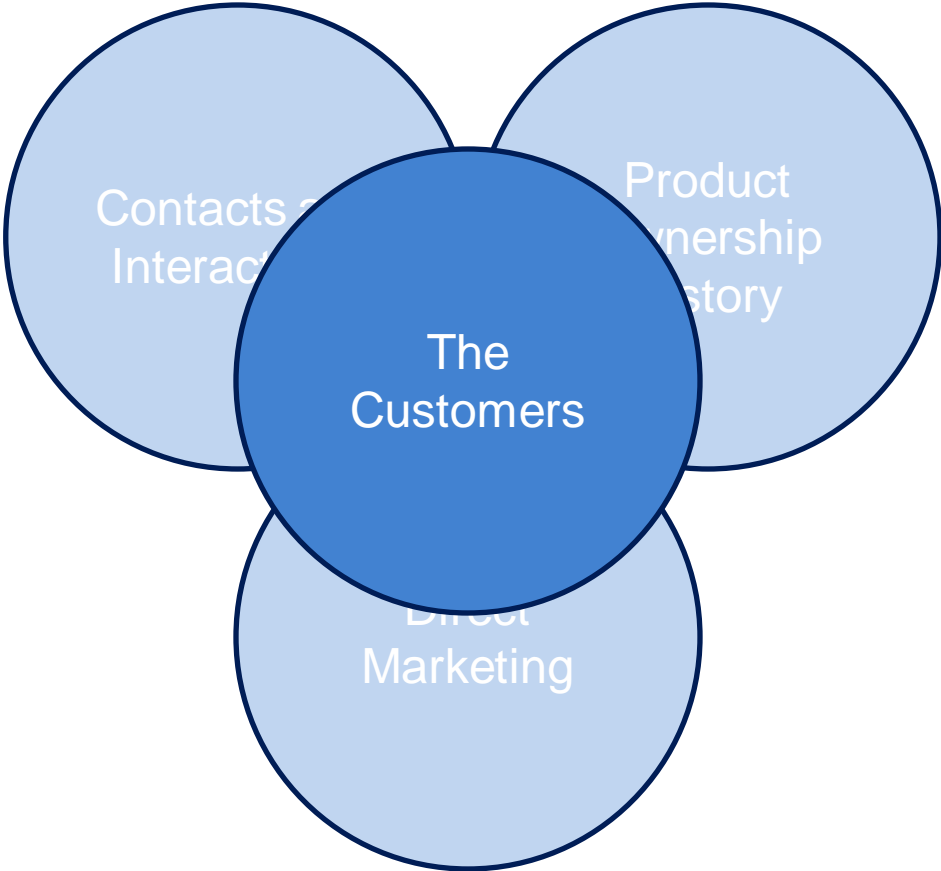
# The Data: The Components



# The Data: The Components



# The Data: The Components



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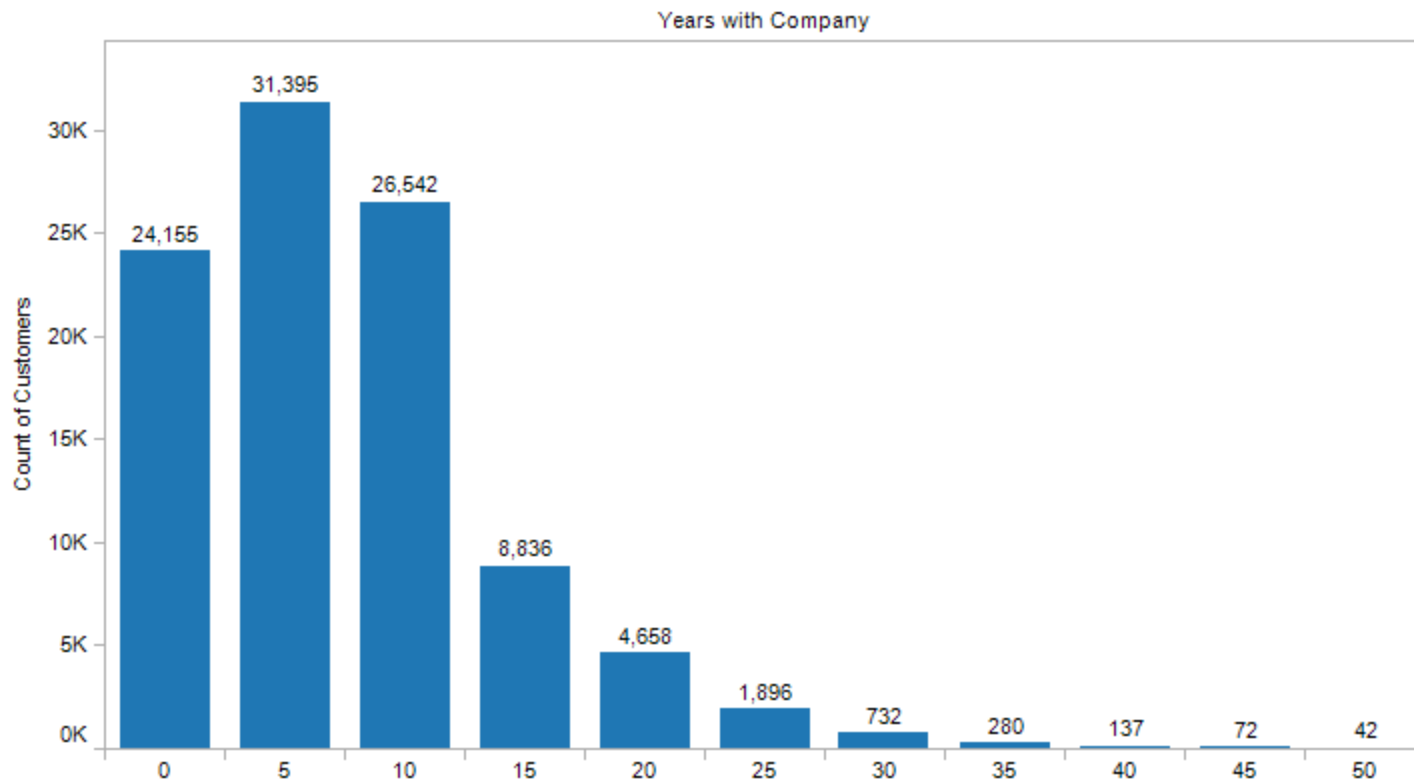


## The Customers

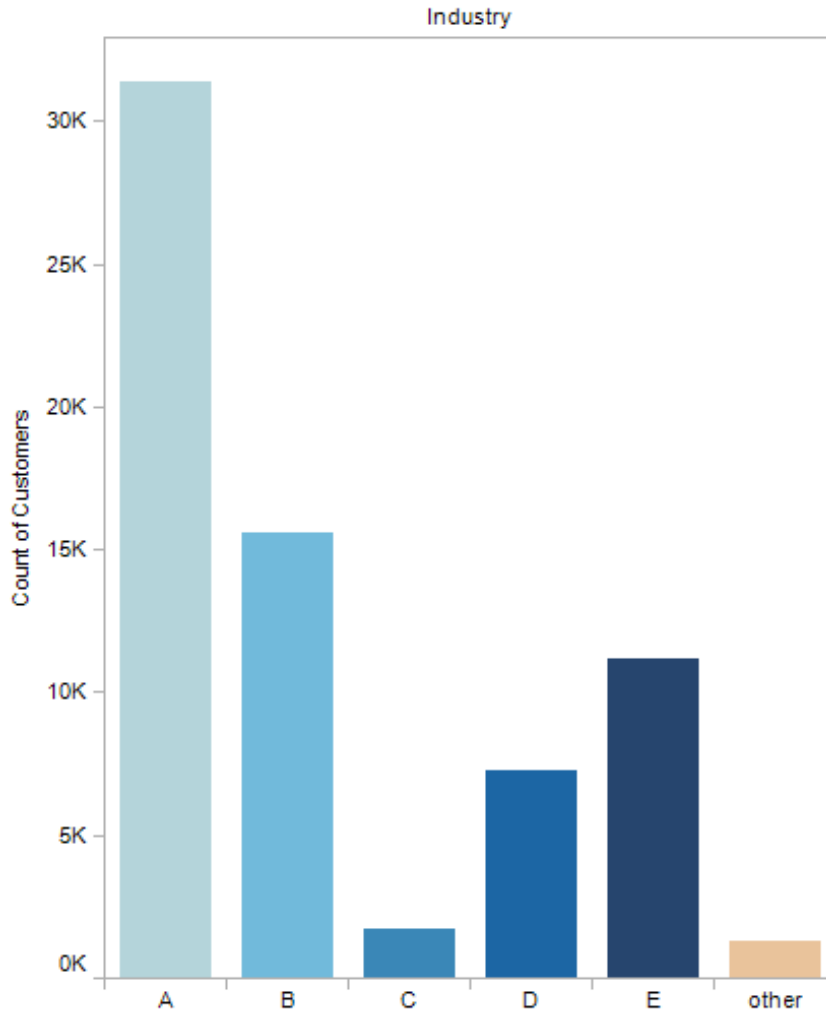
- Two random samples totaling **100,000** customers who were active as of **January 1, 2012**.
- **25,000** customers were selected because they made a **life transition** during the observed window that **is recorded in the data**.
- **75,000** customers:
  - May have made a life transition that was recorded in the data
  - May have made a life transition that was not recorded
  - May have not made a life transition at all

# The Customers

The **median** customer age is **32**, and  
the **median** tenure with the company is **8.75** years.



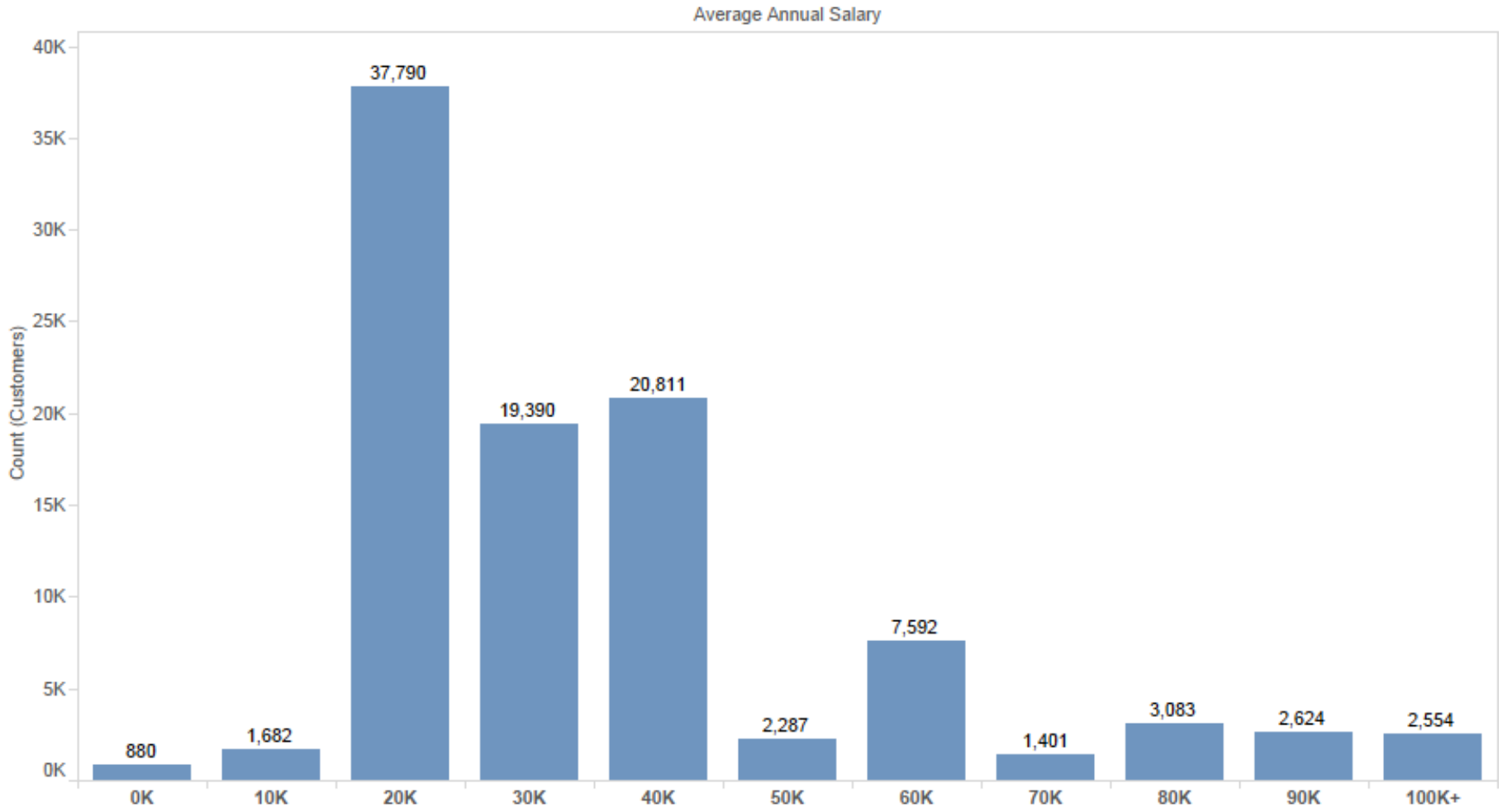
## The Customers



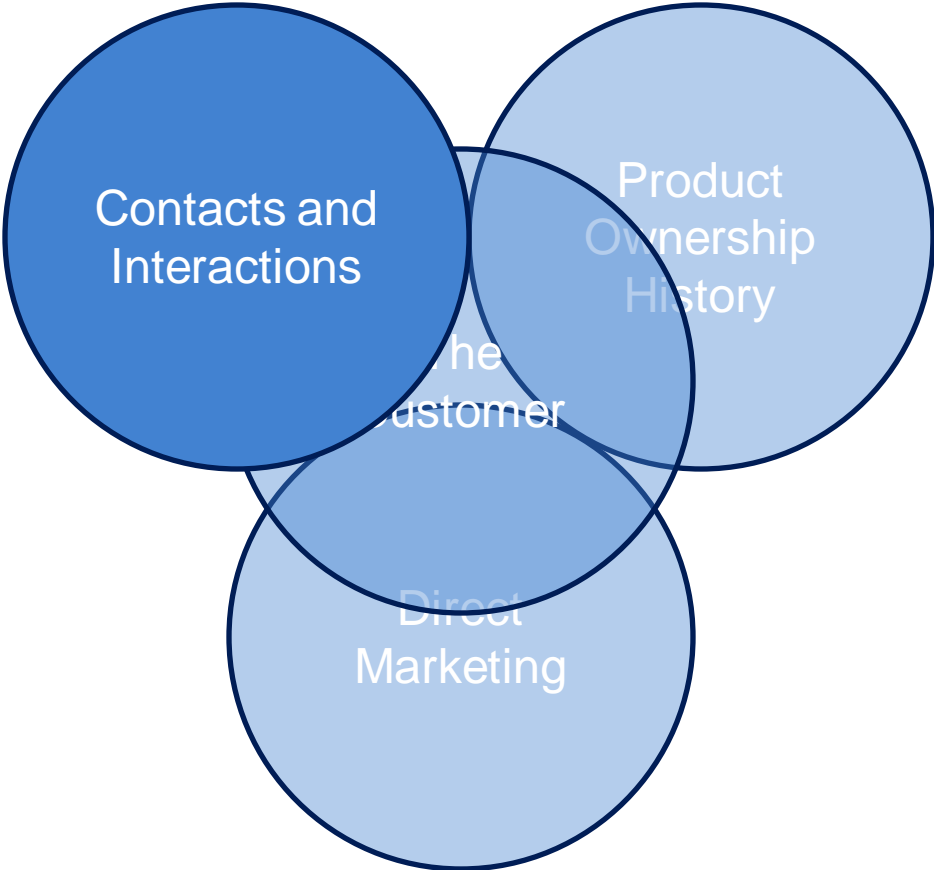
- The majority of customers work in **one of five** different industries.
- Data includes further details about employment, including **sub-category of industry, income level, and job title.**
- **Most customers work in Industry A**



# Range of average customer salary



# The Data: An Overview



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# Contacts and Interactions

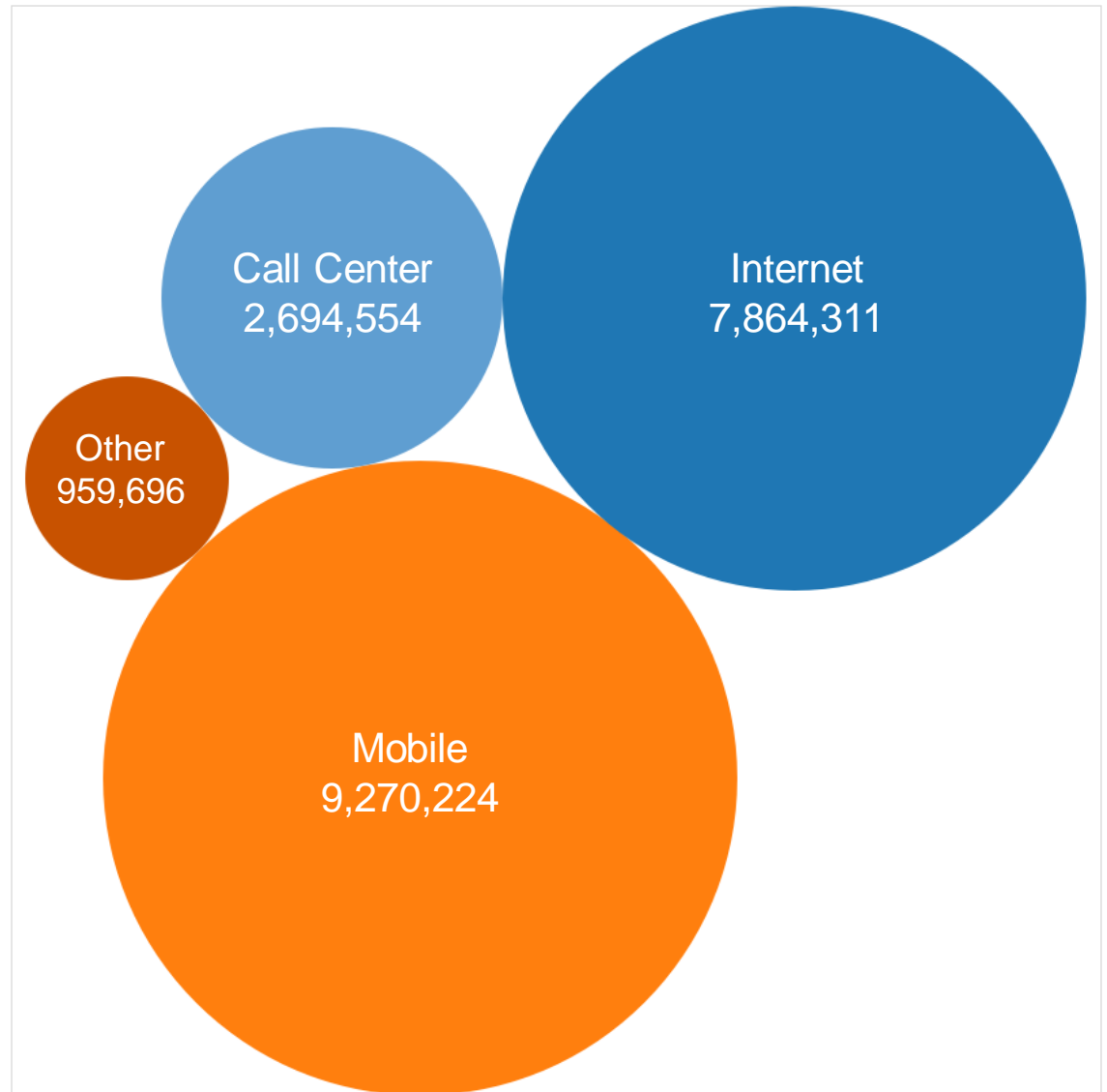
- Over 25 million interactions over 17 months
- Data includes:
  - date
  - time to the millisecond
  - direction of contact (inbound/outbound)
  - channel of activity
  - transaction/purpose (aka “Business Process”)
- Depending on channel, also:
  - device/browser used for session
  - initiating party (individual/spouse/agent/etc.)
  - text of interaction (SMS only)



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## Contacts by Interaction Channel

- There are 15 categories of interaction channels.
- These fall into three broad “umbrella” categories and “other”.



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# What Customers are Doing – Business Processes

- Checking account balances
- Transferring funds to and from an account
- Submitting a mortgage application
- Paying internal and external bills
- Getting an insurance quote
- Requesting an auto ID card
- Searching for properties for rent/sale
- Monitoring home value
- Making mobile deposits
- Updating personal information



# Business Process Categories

## Top 5 by Count of Interactions

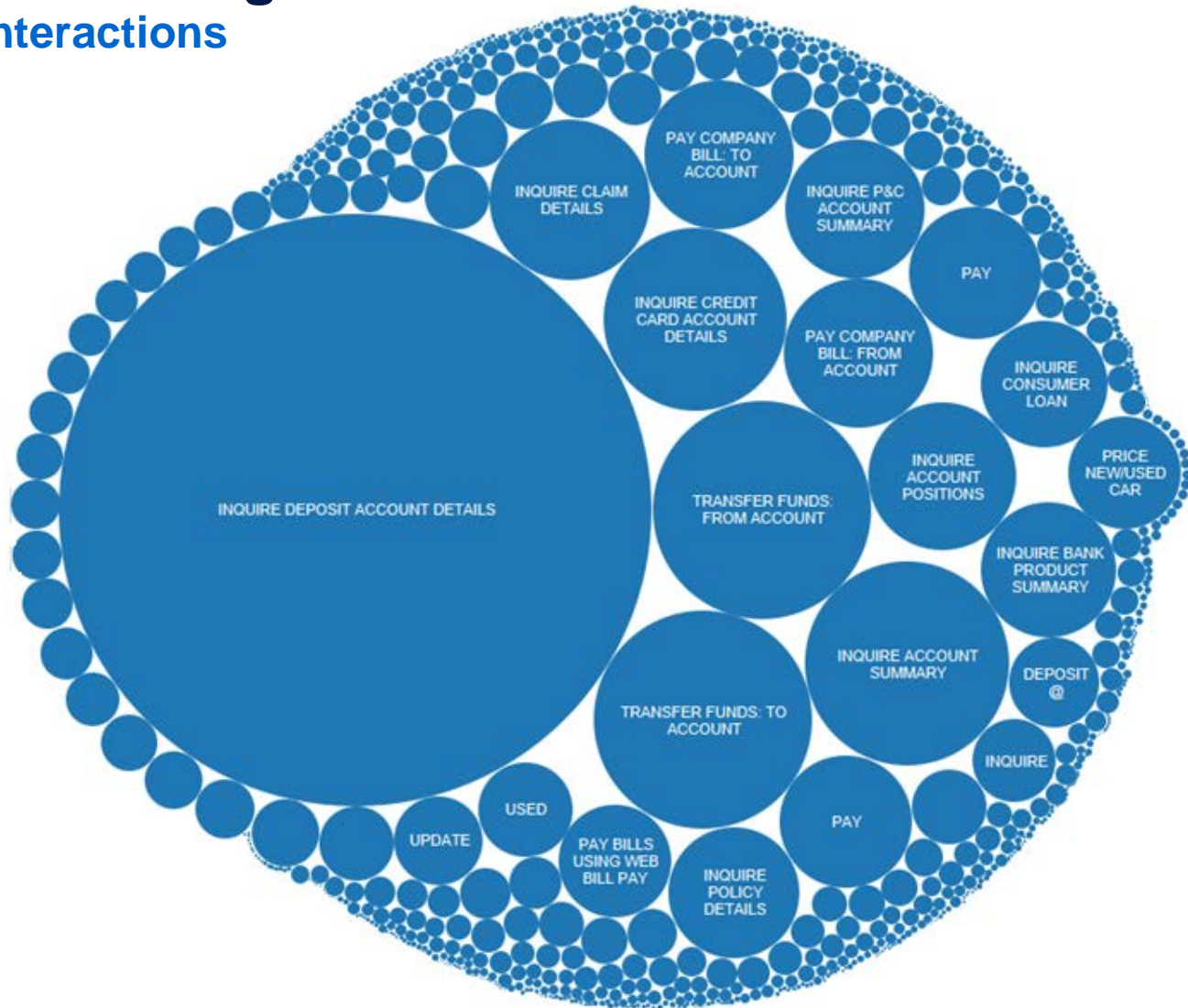
**INQUIRE DEPOSIT  
ACCOUNT DETAILS**  
10,714,347

**TRANSFER FUNDS:  
FROM ACCOUNT**  
1,452,362

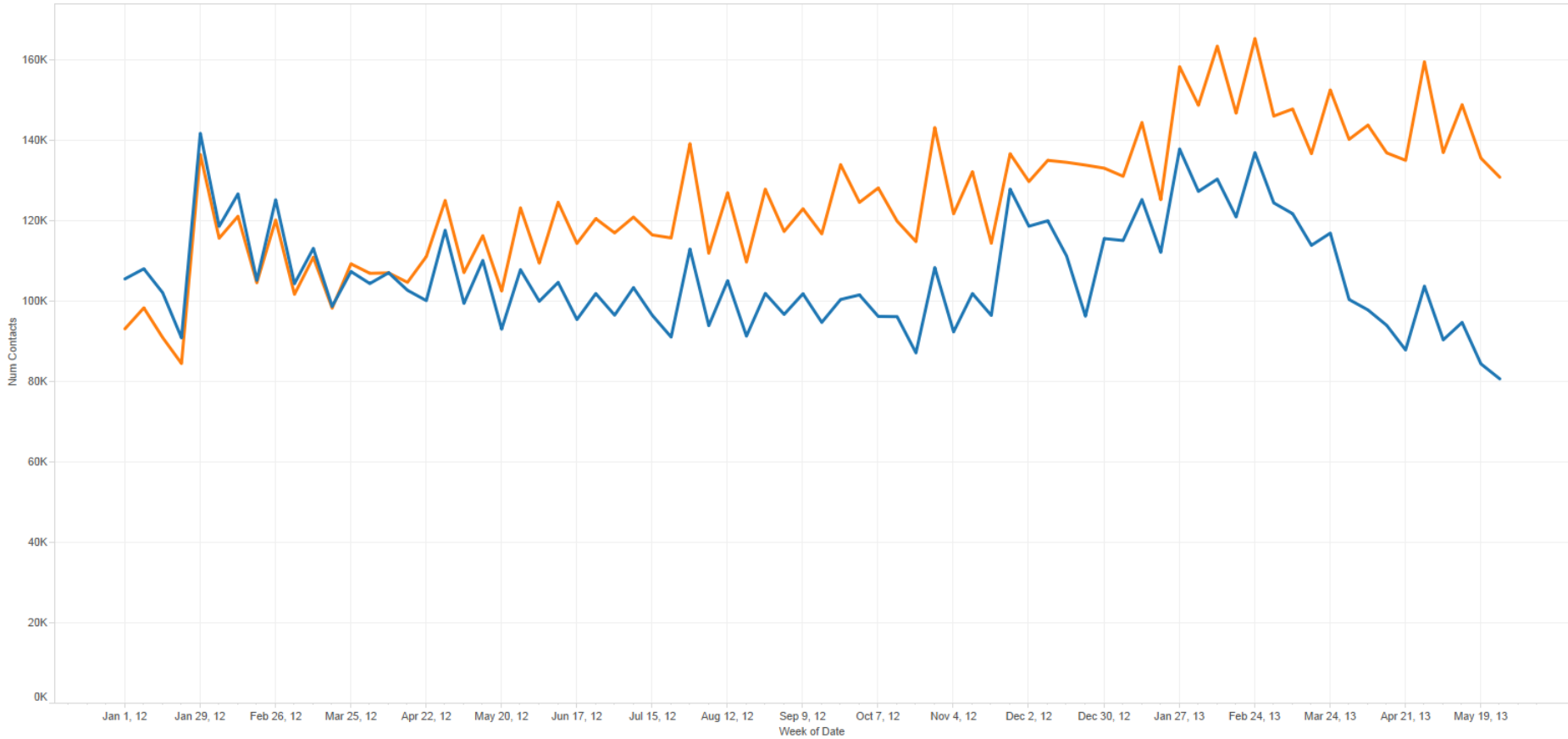
**TRANSFER FUNDS:  
TO ACCOUNT**  
1,451,771

**INQUIRE ACCOUNT  
SUMMARY**  
1,285,252

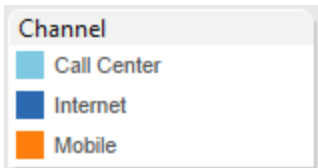
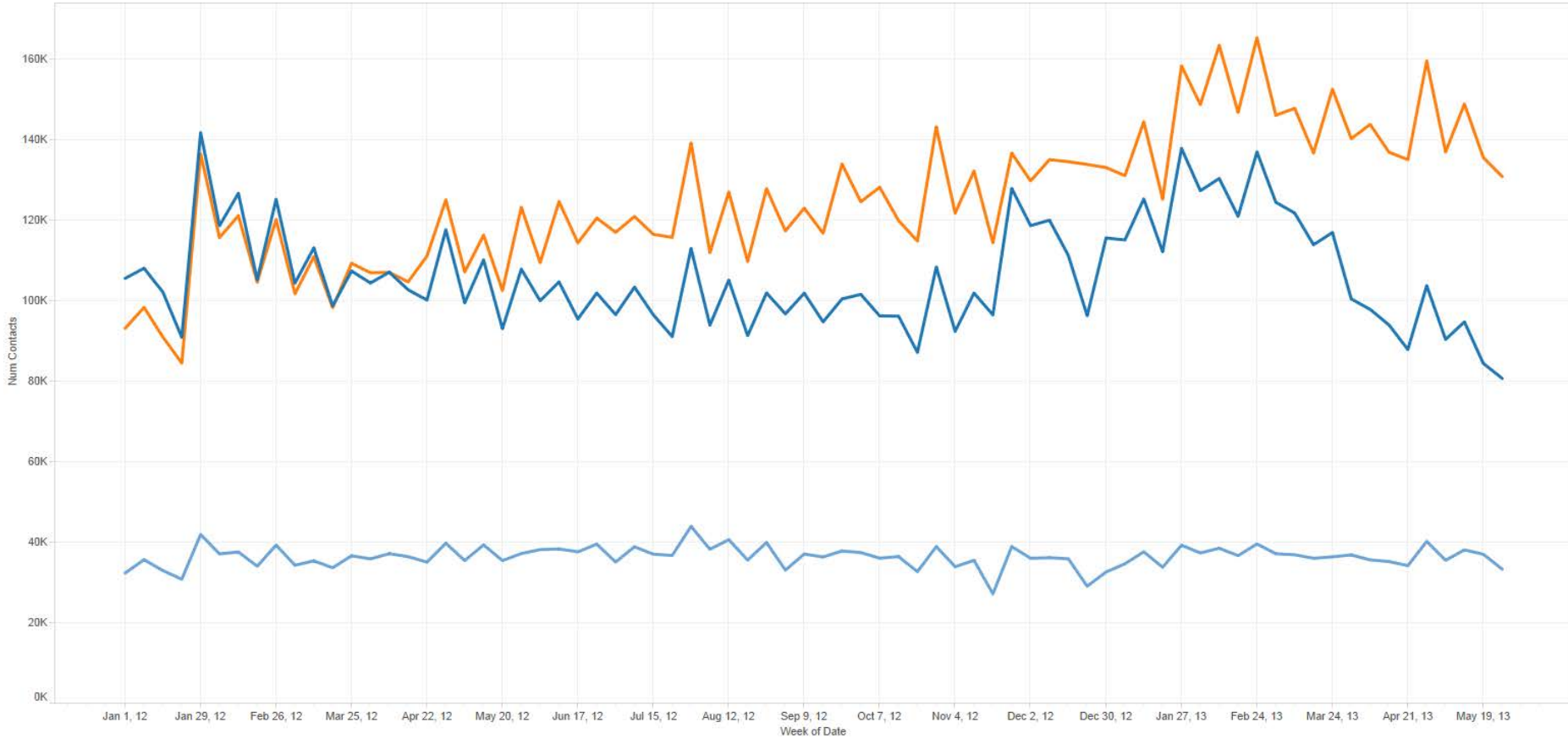
**INQUIRE CREDIT  
CARD ACCOUNT  
DETAILS**  
1,033,110



# Count of Digital Contacts by Week



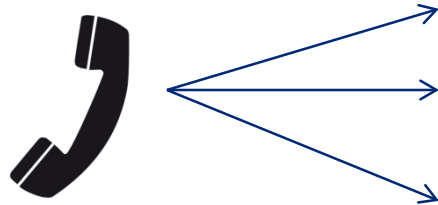
# Count of Digital and Call Center Contacts by Week





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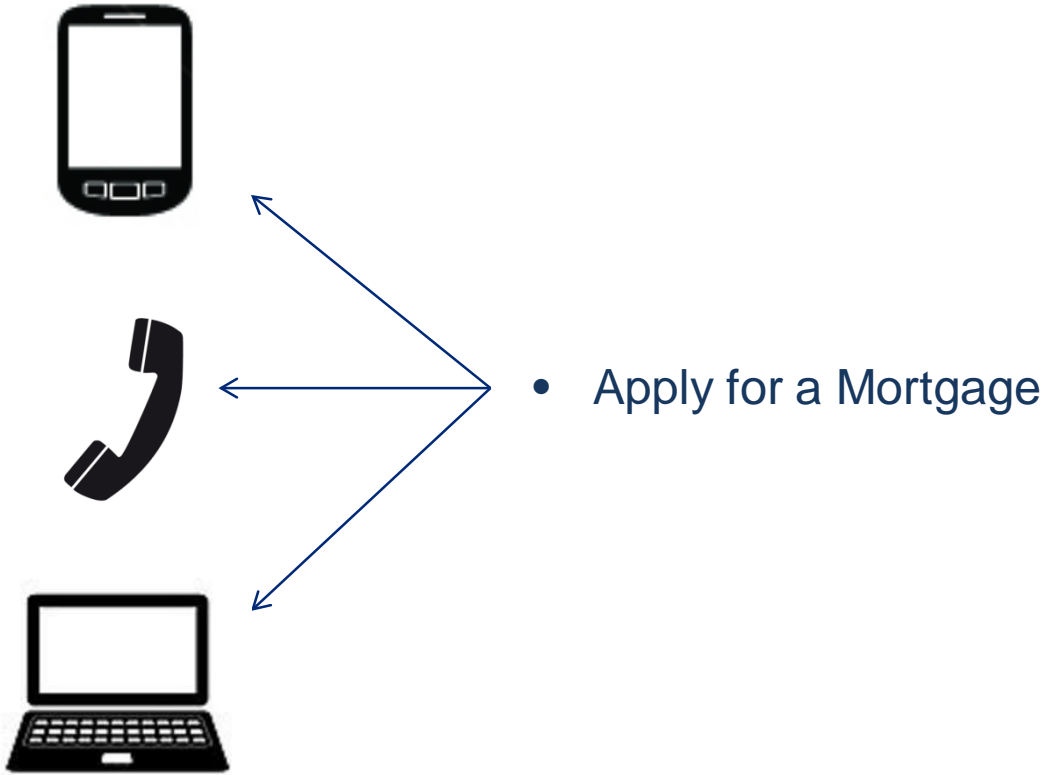
## A single **Contact** can involve multiple **Business Processes**



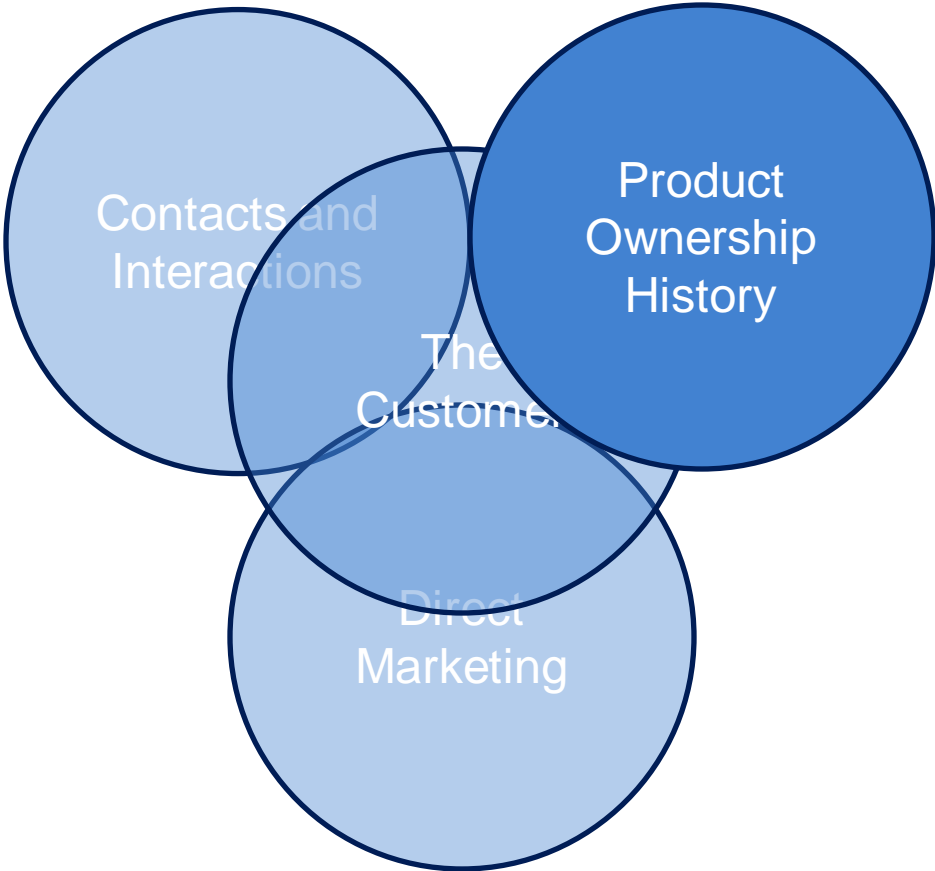
- Check Balance
- Transfer Funds
- Pay Bill

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# A single Business Process can involve multiple Contacts



# The Data: An Overview



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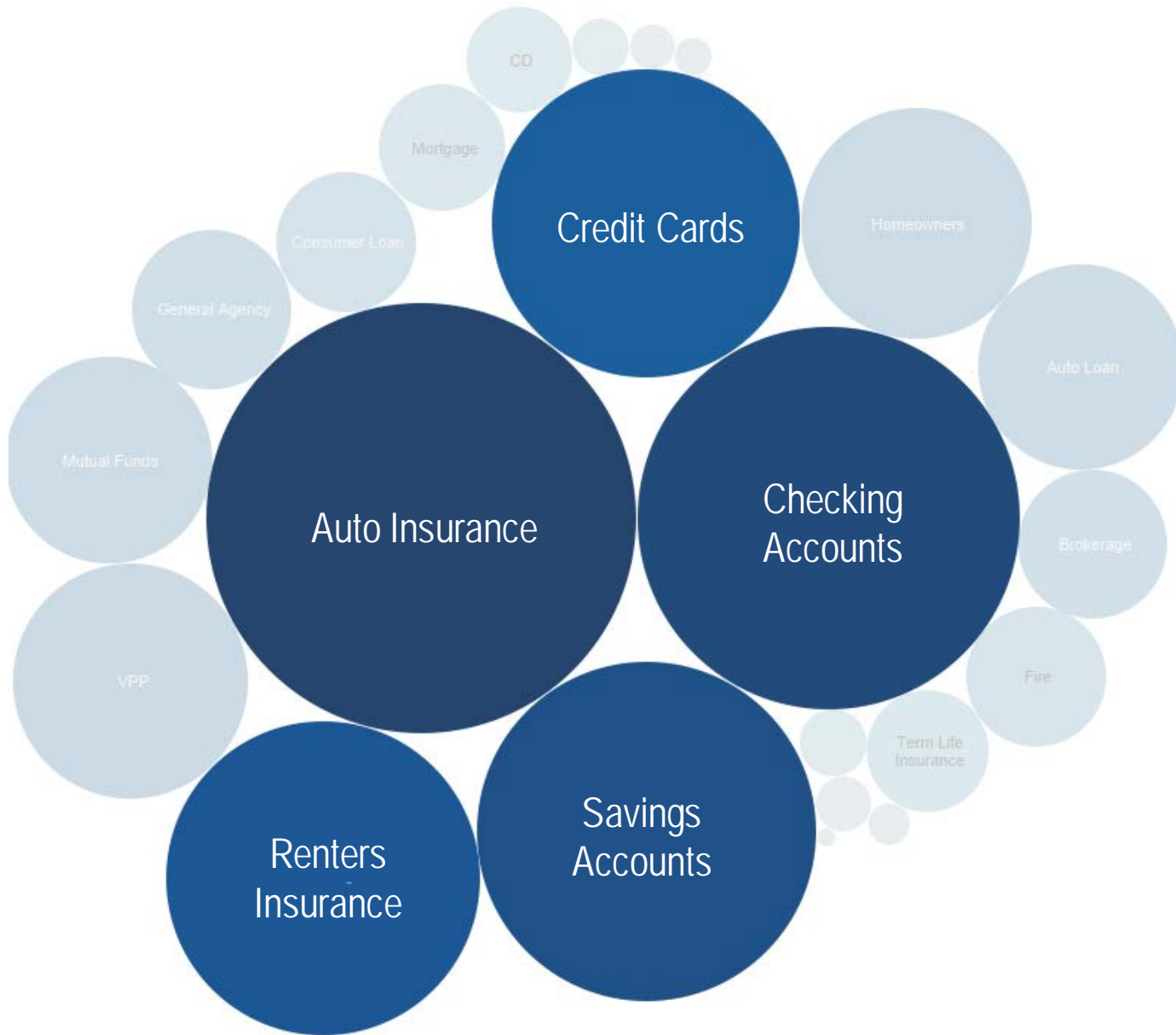
# Product Ownership History

Consists of a complete picture of each customer's product portfolio over the 17-month window

- The customers own an average of 4.23 products each
- Products have 10,000 customers on average (within the sample)

**Note:** We know that a customer **has** a product, but not the **detail** of that product. For example, we know a customer has a credit card, but not the credit limit.





## Product Popularity

Top 5 by Customer Count

**Auto Insurance**  
**54,920**

**Checking Accounts**  
**53,322**

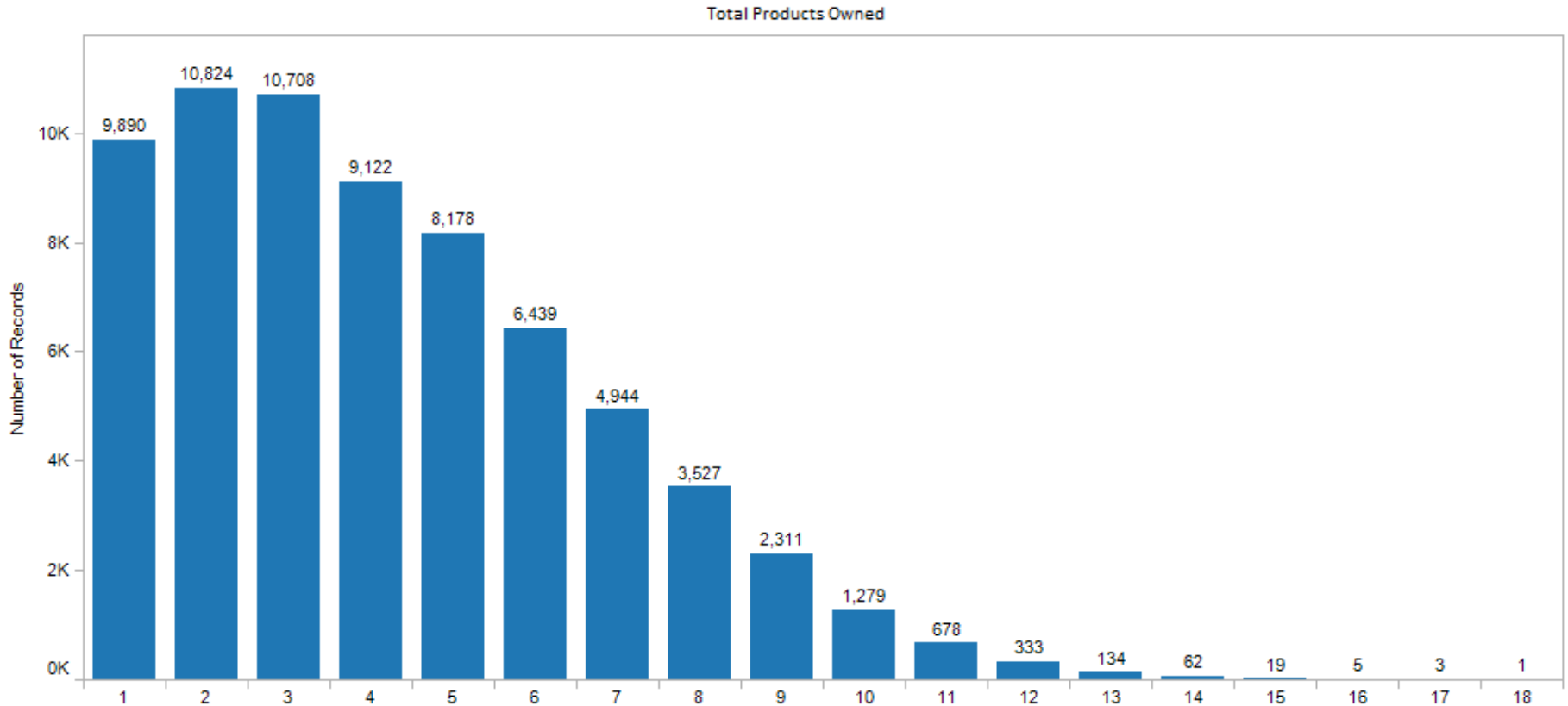
**Savings Accounts**  
**34,247**

**Renters Insurance**  
**29,359**

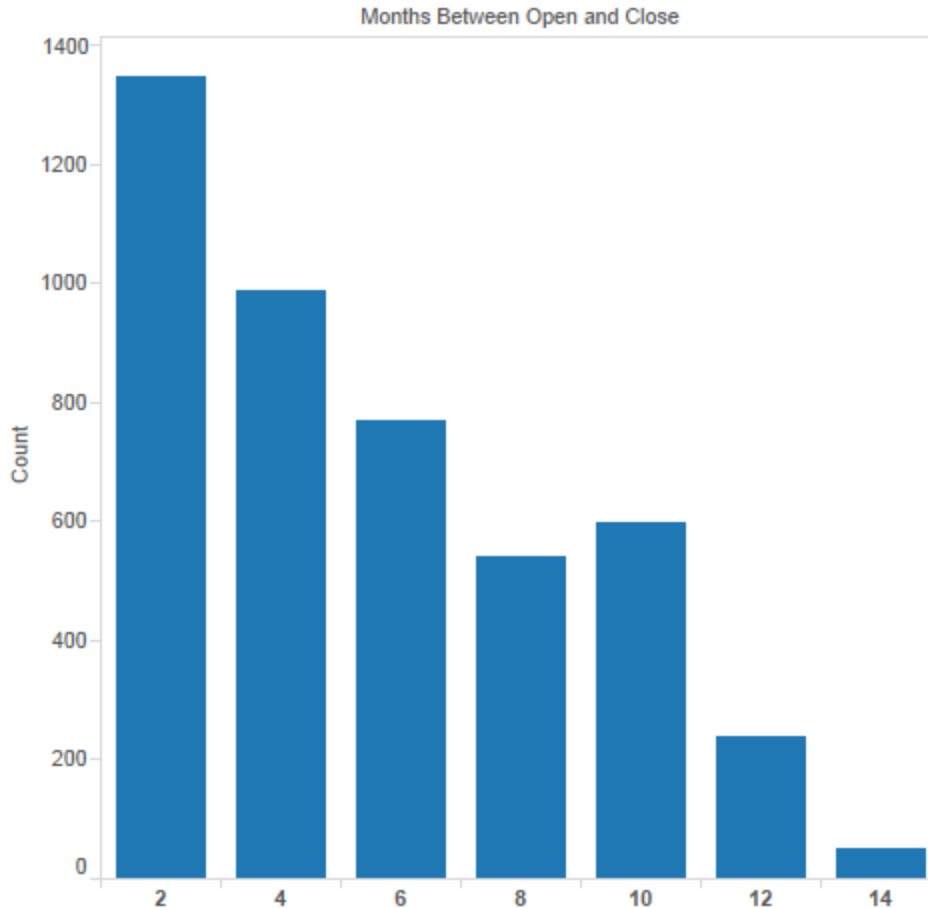
**Credit Cards**  
**28,125**

# Product Ownership History

Most customers (86%) own products in two or more categories.



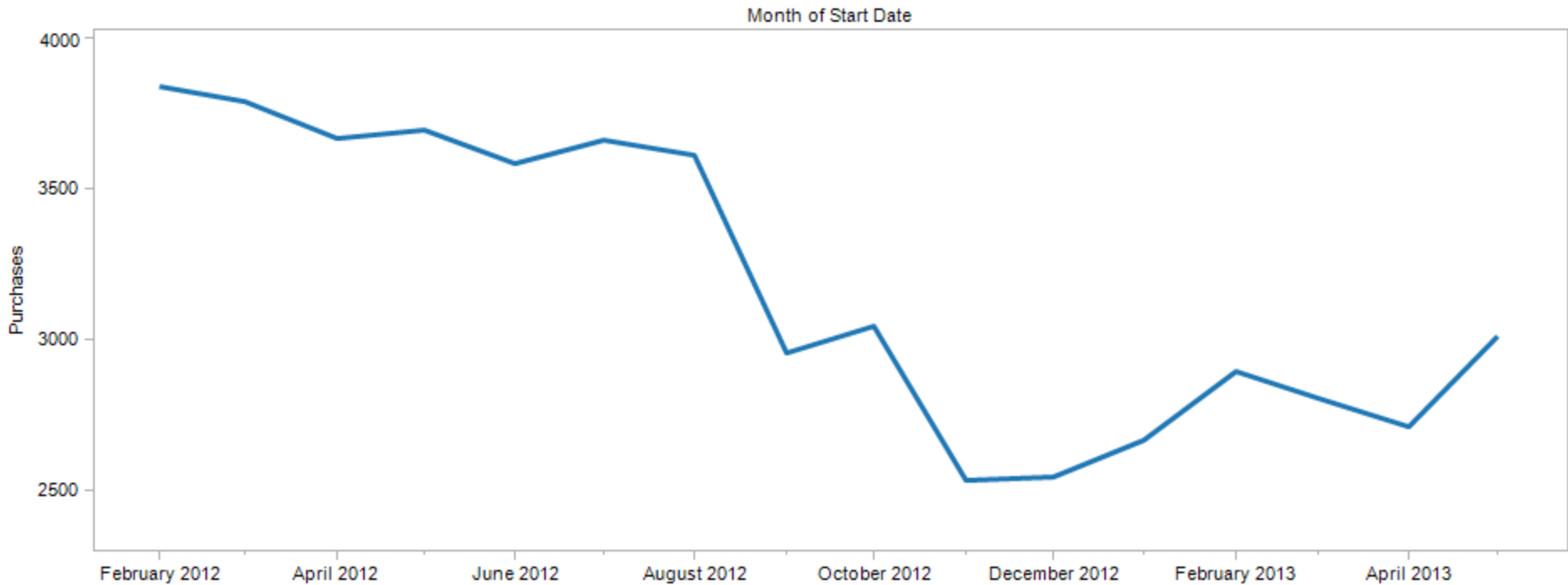
# Product Portfolio Changes



- The majority of customers (69.3%) have products during the entire observation window.
- Some customers opened and closed products within the observed window. These customers are shown in the chart to the left.
- However, some customers opened outside of the window and closed during, and vice versa.

# Product Ownership History

## Products Purchased\* During 17-Month Observation Window



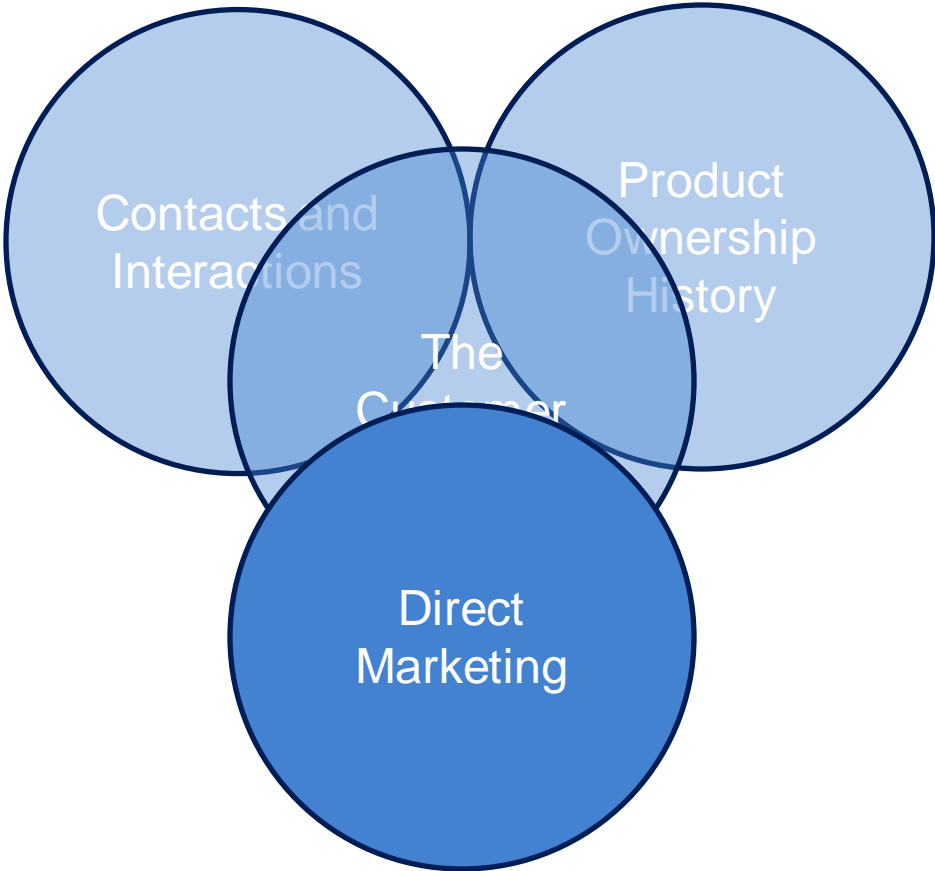
\*\*"Purchased" can also mean "enrolled in" or "started", depending on the product category.

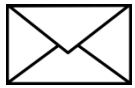




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# The Data: An Overview





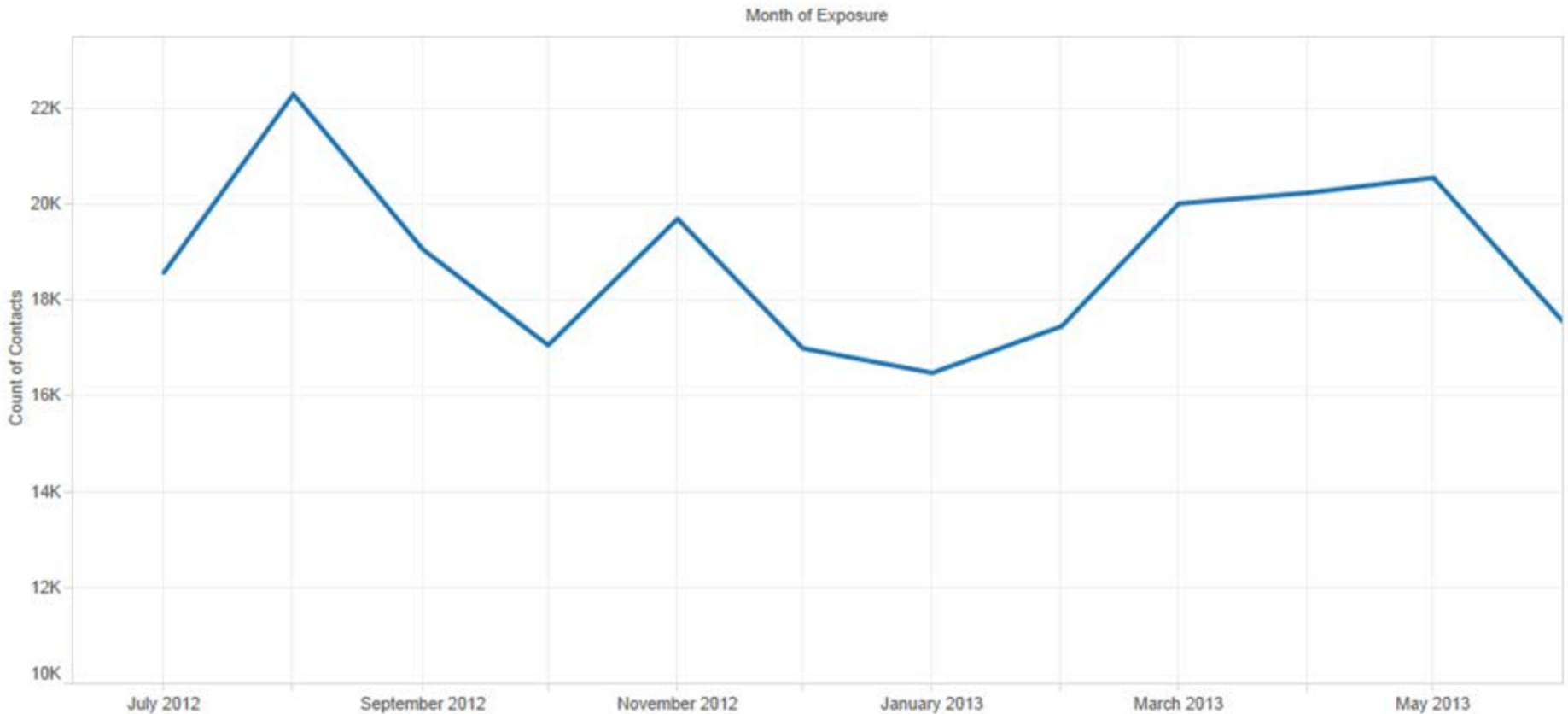
## Inbound/Outbound Marketing

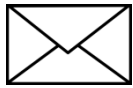
- Marketing is entirely **addressable** – the company knows each person’s name, address, and information. Outbound marketing materials are **targeted to specific customers** rather than being sent out at random.
  - **Note: selection criteria is NOT included in dataset**
- There are **36 marketing vehicle categories**.
- Within the 17-month observation window, the average **customer had 2.01 marketing exposures per month**.



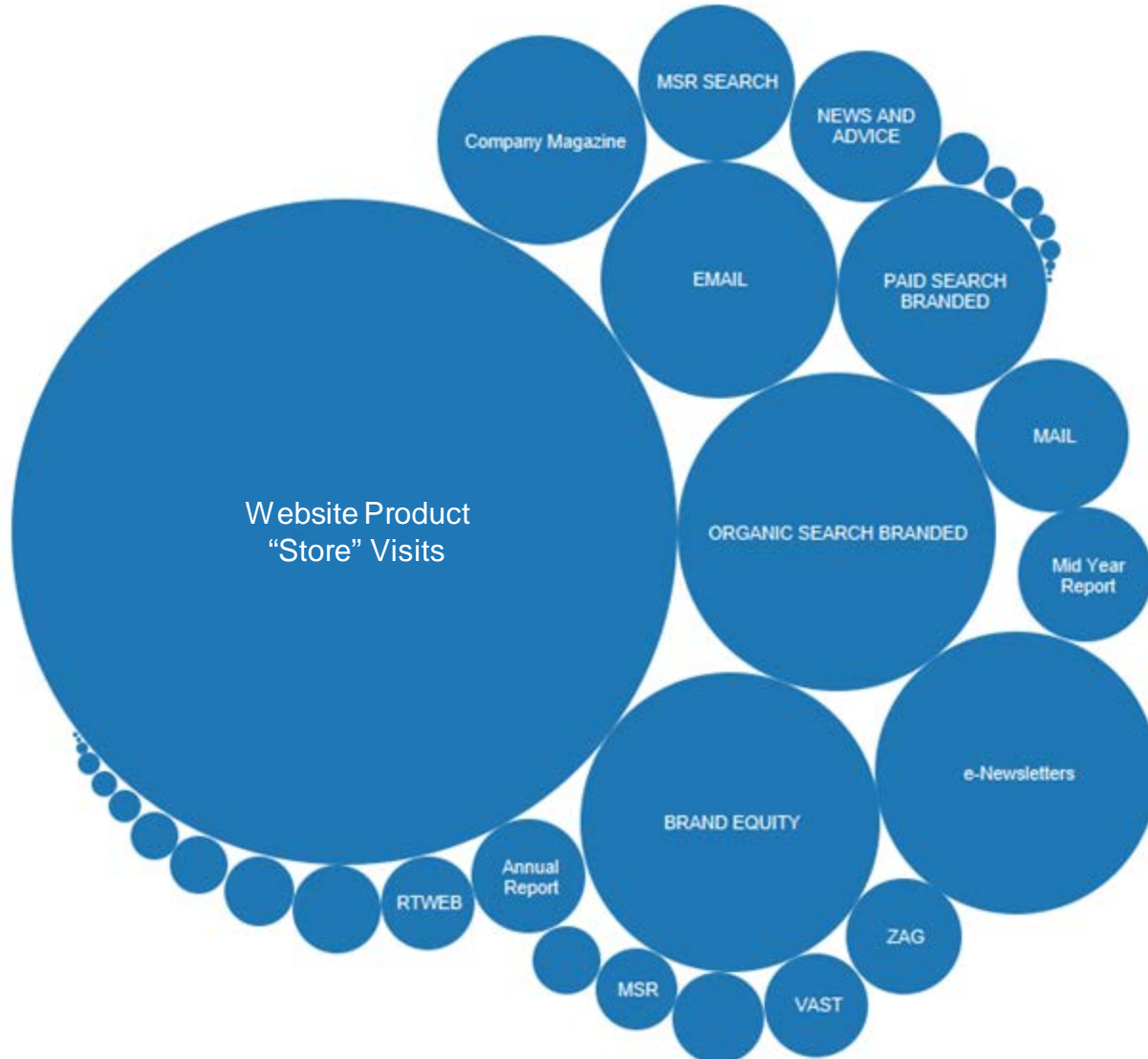


# Marketing Exposures by Month

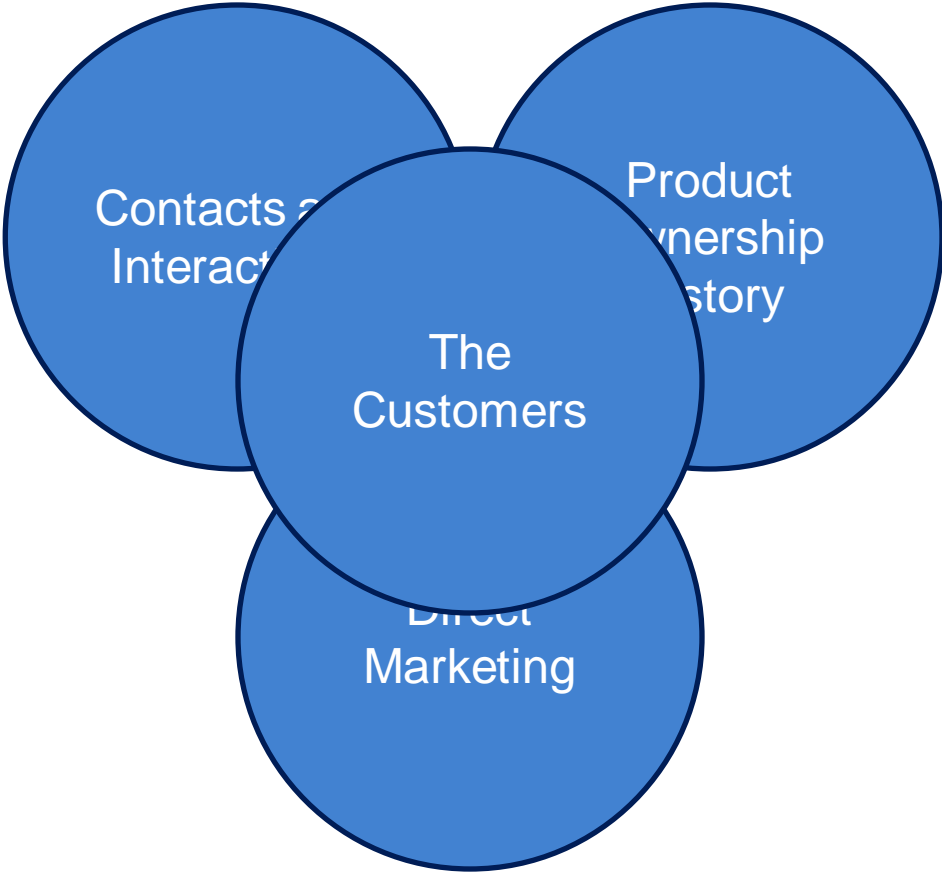




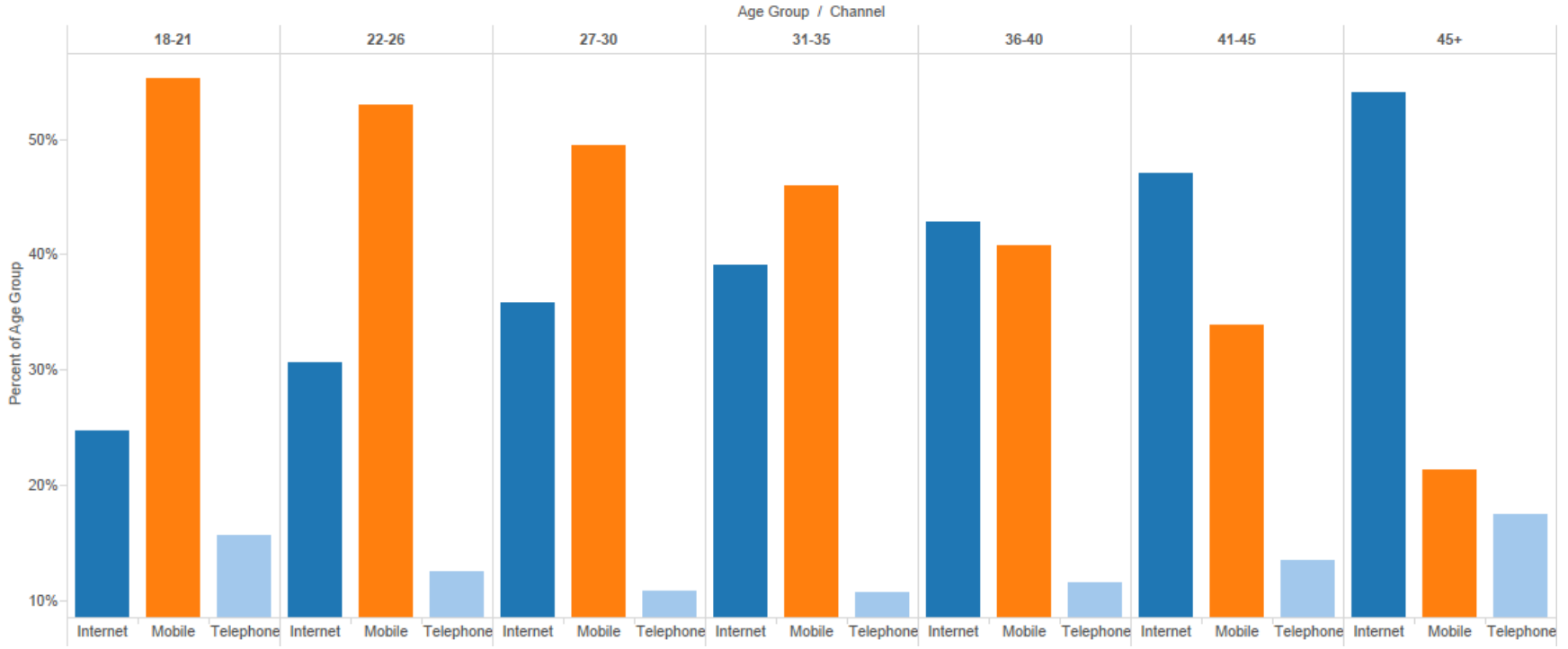
## Marketing Contacts by Category



# The Data: Relationships



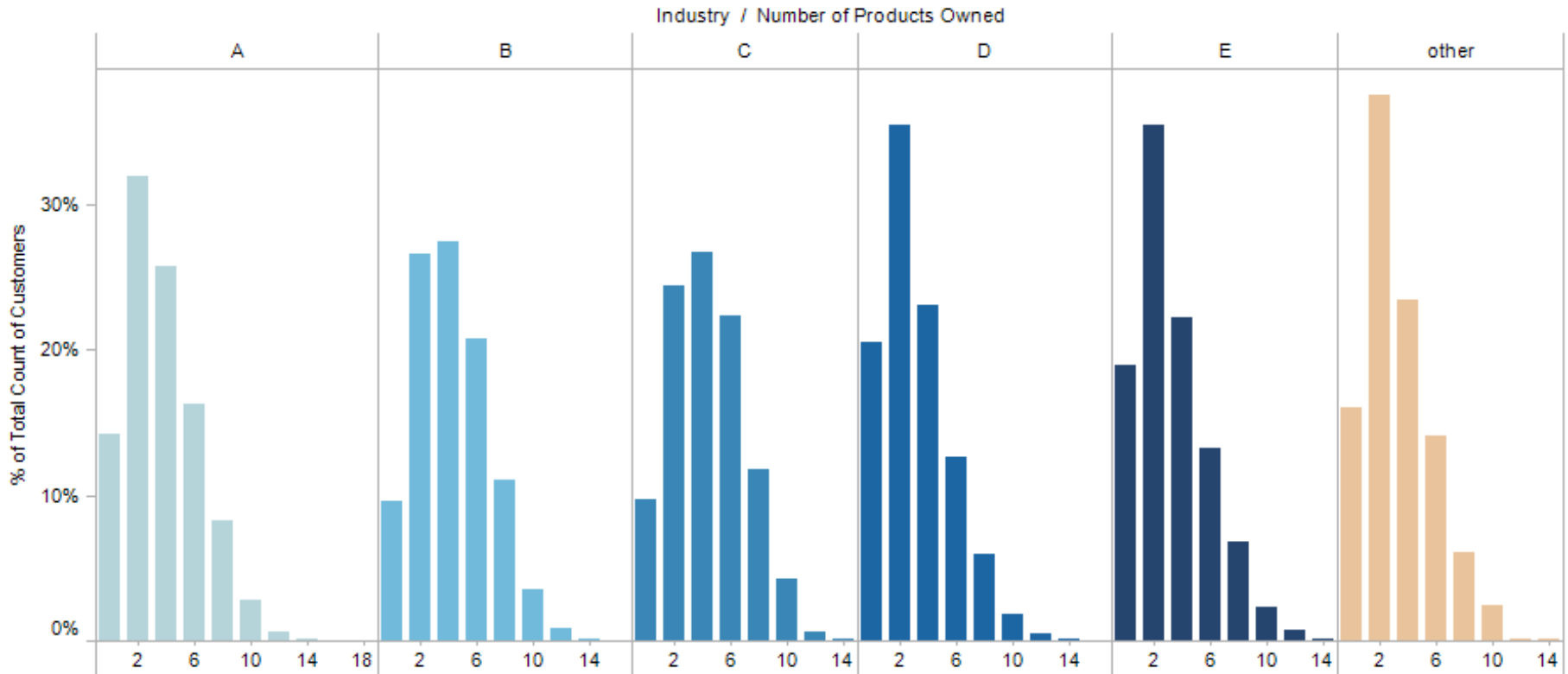
# Customer Age vs. Contact Channel



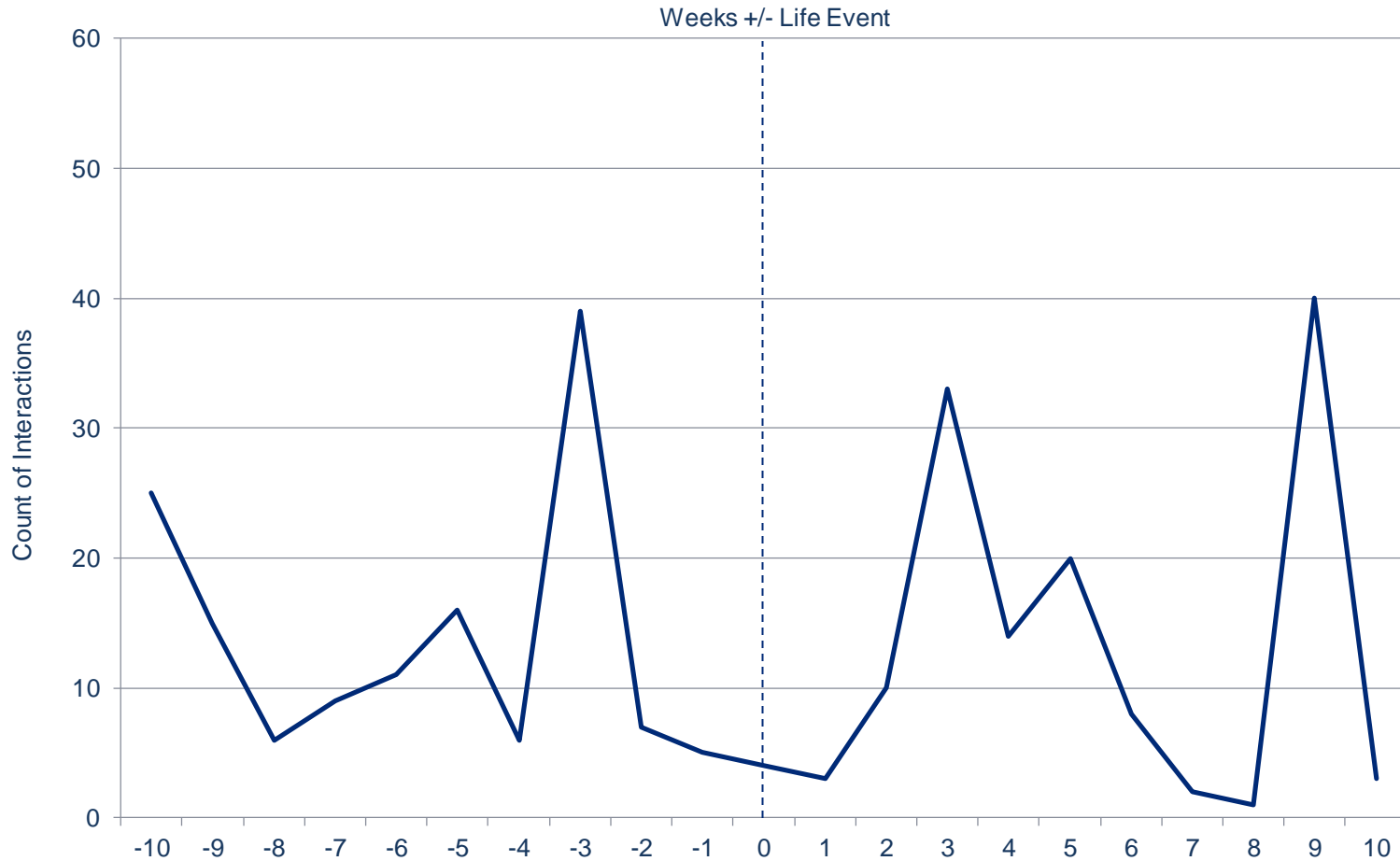
Channel	18-21	22-26	27-30	31-35	36-40	41-45	45+
Internet	28,968	860,922	1,067,742	1,158,548	854,763	645,997	523,564
Mobile	64,615	1,486,861	1,475,620	1,363,478	814,908	465,335	207,072
Telephone	18,286	351,458	324,536	319,701	231,377	184,529	169,207



# No. Products Owned vs. Industry

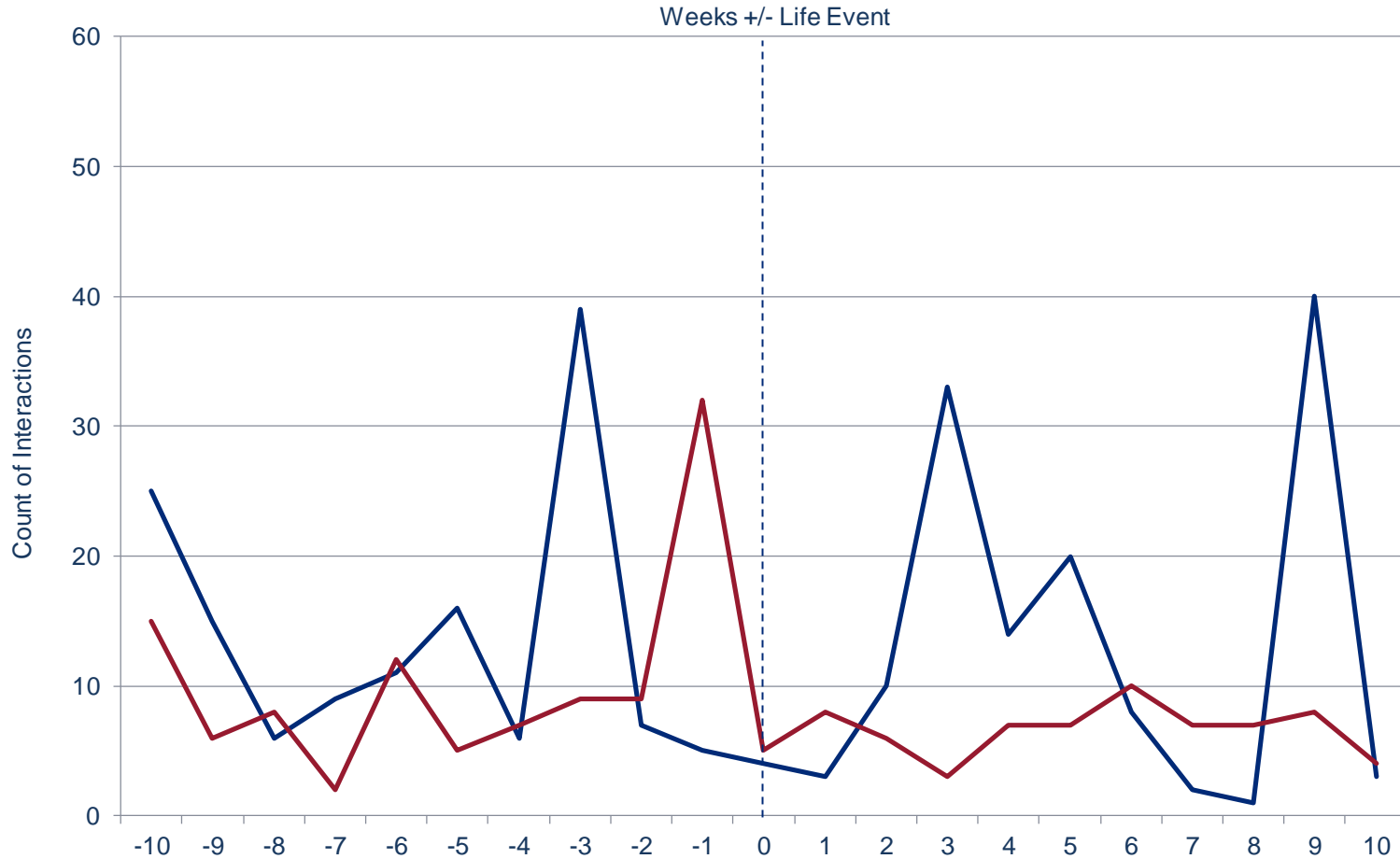


# Count of Interactions in 10 Weeks +/- Life Event

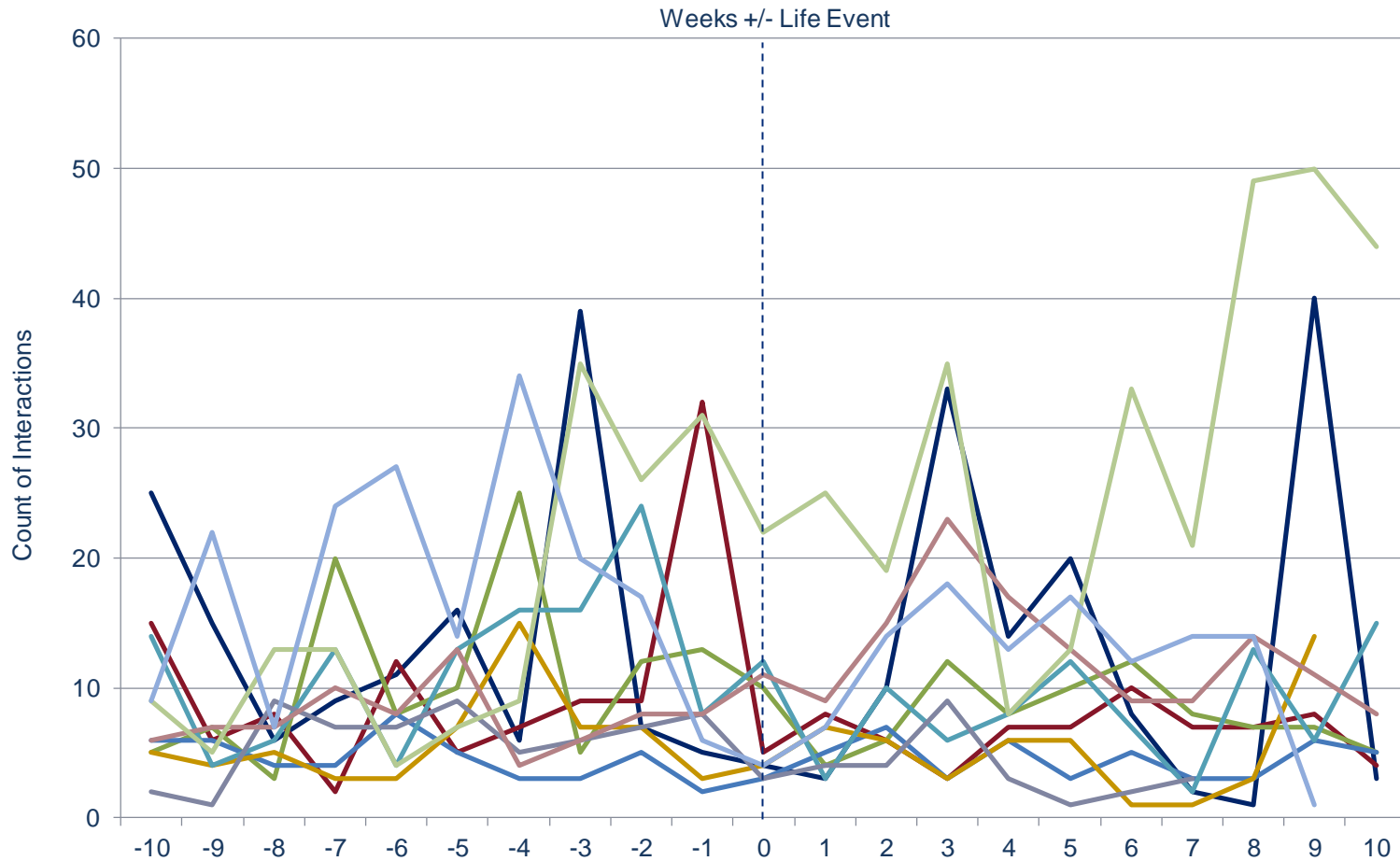




# Count of Interactions in 10 Weeks +/- Life Event



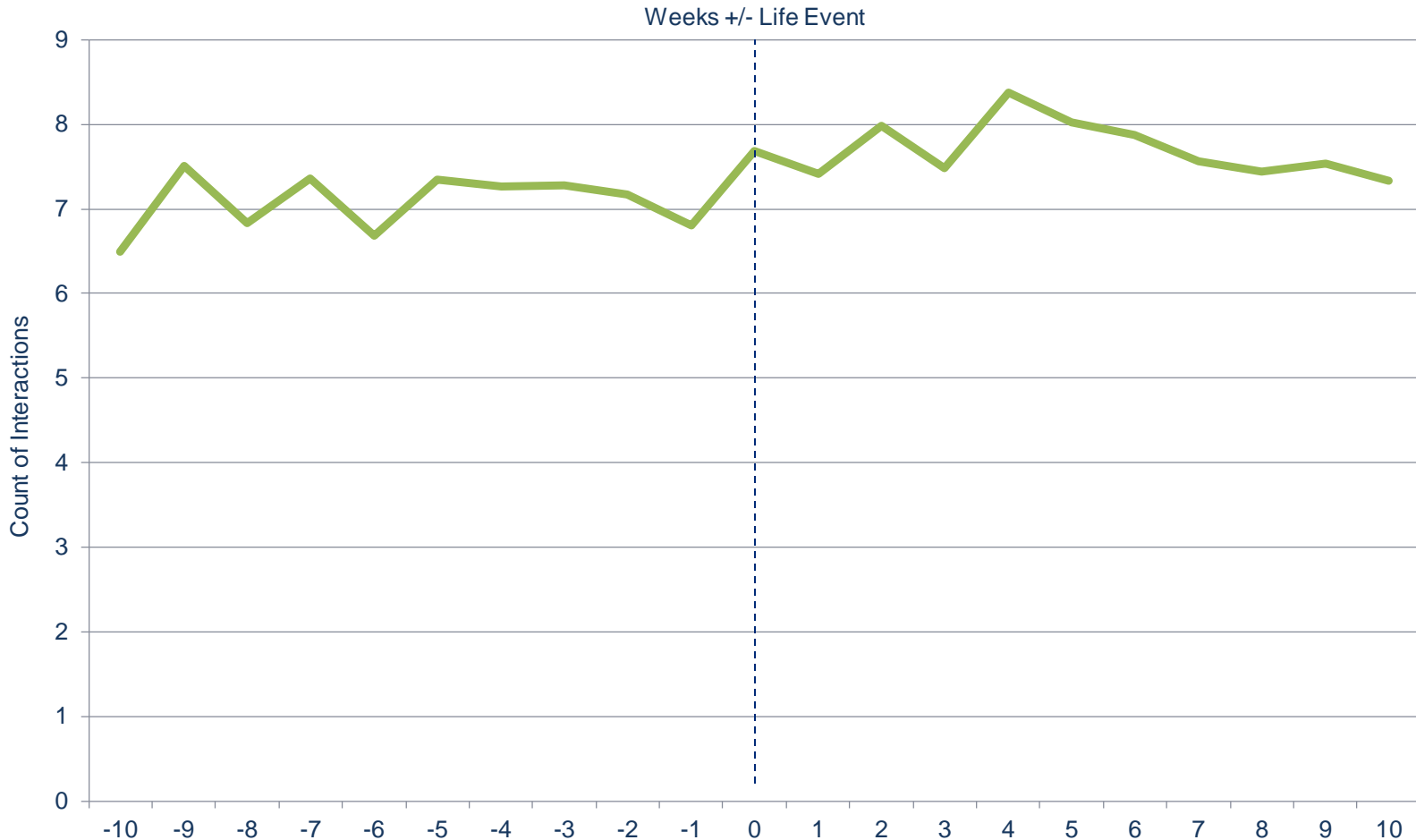
# Count of Interactions in 10 Weeks +/- Life Event



WHARTON  
CUSTOMER  
ANALYTICS  
INITIATIVE



# Average Interactions in 10 Weeks +/- Life Event



# DATA Q&A

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# The Research Questions

- **Key Questions from the Sponsor:**
  - **Accurately predicting life changes before they occur**
  - **Detecting life changes that have already happened**



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# The Research Questions

- **Key Questions from the Sponsor:**
  - **Accurately predicting life changes before they occur**
  - **Detecting life changes that have already happened**
  
- **What questions would you answer?**



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# Benefits of Participating in a WCAI Research Opportunity

- Access to **unique data**
- Assistance with data cleaning, preparation, and processing **at any point during the Research Opportunity**
- Teleconference Q&A sessions **with the research sponsor**
- Opportunity to **present findings to the Corporate Sponsor at the closing symposium, to be held at Wharton one year from now**  
(note: attendance by at least one member from each team required)
- Potential for **additional PR for your research**
- **Promotion of your research paper through the WCAI SSRN Research Paper Series**



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# Proposal Format

Proposals should be no more than 2,000 words and include the following:

- **Title**
- **Author(s) name, title, affiliation and e-mail address:** Please designate a corresponding author.
- **Summary information:** a single “slide” that visually summarizes team & project.
- **Abstract**
- **Introduction:** Describe expected contribution(s), covering both the academic and practical aspects. Please keep it concise, and cite relevant work as necessary to explain your academic contribution. There is no need to include a lengthy literature review.
- **Detailed project proposal:** Please include enough detail that we can assess the feasibility & merit of the proposed approach. For example, modeling projects should include at least a sketch of the model. In addition, include a rough estimate of how long the project will take. Also include the business relevance of your research and the impact for the sponsor as well.
- **Biographies:** Include up to a paragraph-long biography highlighting what each team member will contribute to the project.

PDFs ONLY PLEASE!





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# Proposal Submission Process

- Read more about the proposal format at <http://www.wharton.upenn.edu/wcai/Proposals.cfm>
- Submit proposals at <http://www.wharton.upenn.edu/wcai/proposalform.cfm> no later than Monday, December 9, 2013 12 noon US Eastern.
  - Proposals will only be accepted online.
  - A single PDF combining the written portion and the single slide.
- Proposals will be evaluated both on academic contribution and potential to significantly improve the research sponsor's marketing practice.
  - Oded Netzer (Columbia), David Schweidel (Emory), Eric Bradlow (WCAI), Pete Fader (WCAI), Elea Feit (WCAI), and representatives from the Research Sponsor.
- Contact [wcai-research@wharton.upenn.edu](mailto:wcai-research@wharton.upenn.edu), if you have questions prior to submitting your proposal.



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# Other WCAI Opportunities for Researchers

If you registered for this webinar, you will receive regular announcements regarding:

- **Research Opportunities like this one**
  - **E-WOM and Product Reviews for a Major Specialty Retailer**
  - **Matching Players in Online Games**
  - **Social TV**
- **Conferences**
  - **State of the Industry for Analytics: May 1, 2014**

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<http://www.ssrn.com/link/Wharton-Cust-Analytics-Initiative-RES.html>
- **Announcements:** <http://wcai.wharton.upenn.edu>





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