AuditCon

by ACUA

Louisville Kentucky | September 14-18, 2025

ACUA

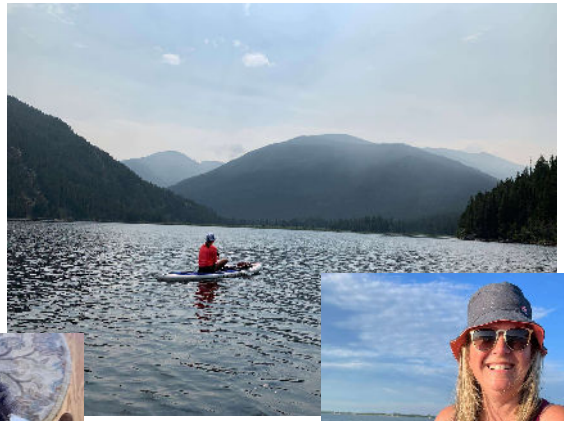
The Curious Case of Bianca James – and other Data Analytics Tips for Fraud Detection

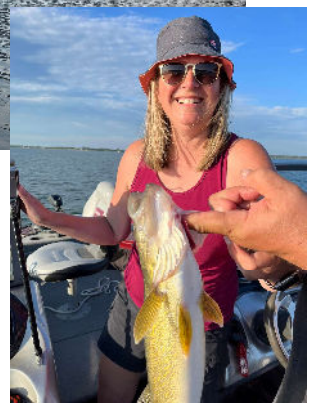
Brian Turner – IT Audit Director
Karisa McCulloch – Audit Director
University of Colorado

Meet Us…

Alisha Friedrichs

Karisa McCulloch

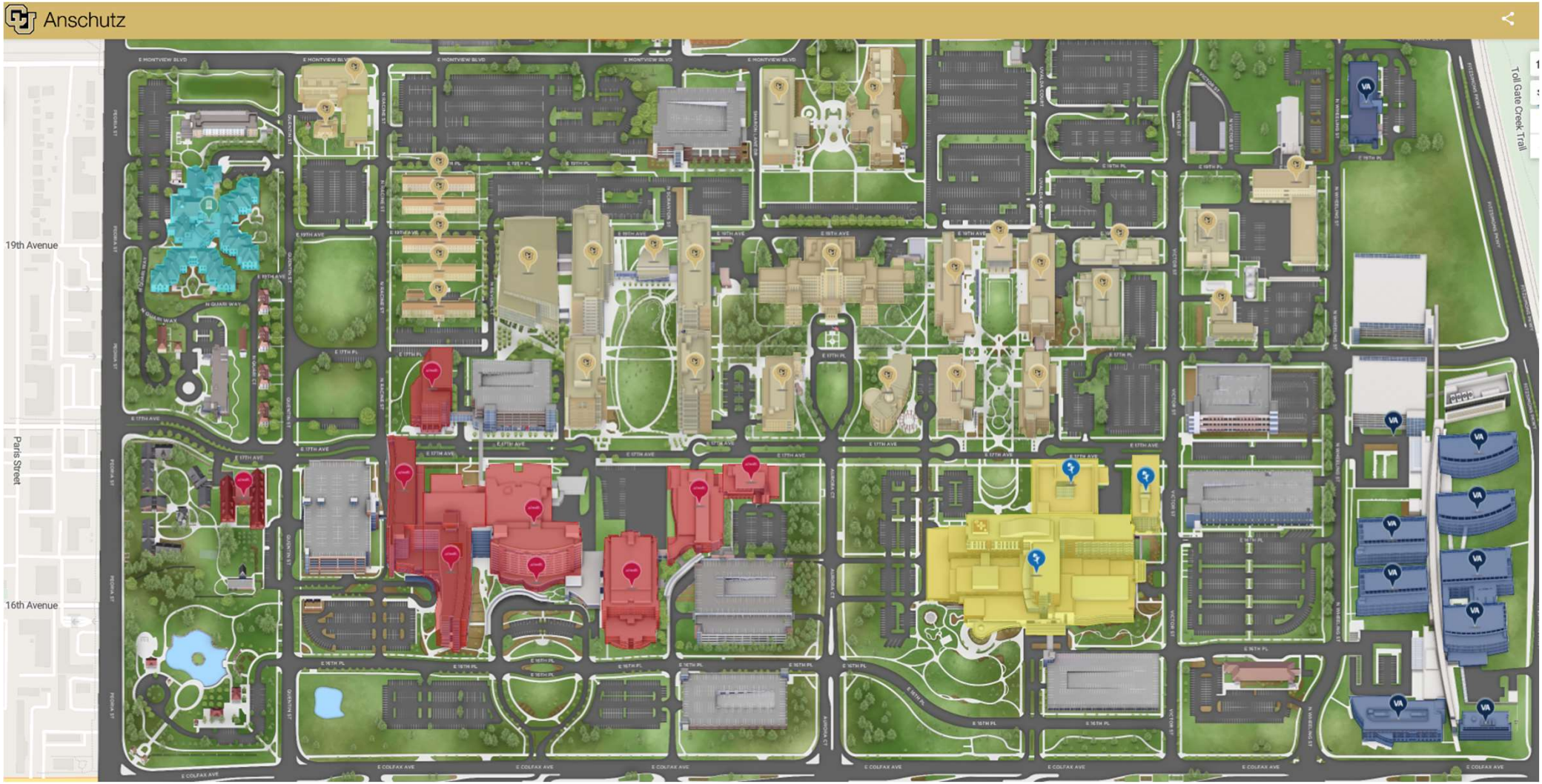




Brian Turner

University of Colorado Quick Facts

- Established in 1876
- Governed by the elected, nine-member Board of Regents
- A system of four public institutions
- 67,708 students; 27,056 faculty & staff
- $1.7B in sponsored research
- 17,805 degree recipients (2023-2024)
- Third-largest employer in the state
- $6.3 billion FY25 operating budget


Anschutz
19th Avenue
Paris Street
16th Avenue
Toll Gate Creek Trail
E MONTVIEW BLVD
E 19TH AVE
E 17TH AVE
E 16TH PL
E COLFAX AVE
N QUARI WAY
N MADISON ST
N VICTOR ST
N WILLIAMS ST
PEORIA ST
AURORA CT
PITKIN WAY
PITTSBURGH PKWY

Our Vision: Insight with Impact

We are trusted partners.

We deliver timely and relevant perspective on risks and opportunities.

We are committed to our core values, intellectual curiosity, and alignment with our stakeholders.

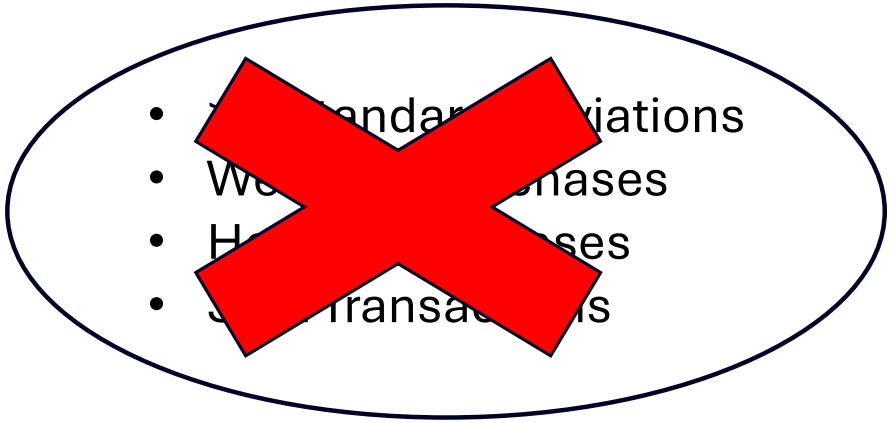
It all started with an audit…

- A procurement card (P-Card) audit at the University of Colorado Medical Campus (CU Anschutz).
- Six Schools/Colleges
- 76,914 transactions totaling $27.7 million
- 2,485 transactions totaling $2.6 million tested

Risk Ranking Transactions using Machine Learning

Goal: Identify the transactions that are most anomalous to assist auditors in targeted sampling of large data sets.

How:?



Focused on Categorical Attributes

- Position Title of Card Holder
  - ➢ Chancellor, Professor, IT Specialist
- Spend Category
  - ➢ Training, Software, Office Supplies
- Department
  - ➢ IT, Legal, HR

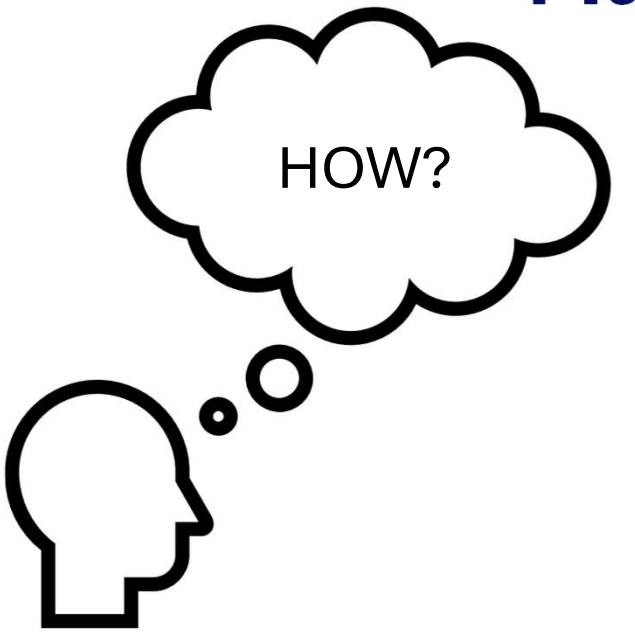
And one numerical value

- Transaction Amount

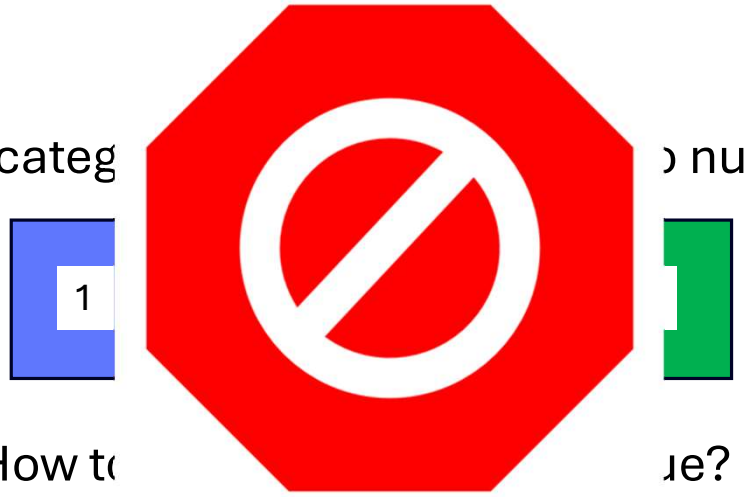
Risk Ranking Transactions using Machine Learning

In other words, we are asking the question: **Is it normal that a person with this position that works in this department made this purchase?**

Risk Ranking Transactions using Machine Learning



Convert categ ... numerical form...

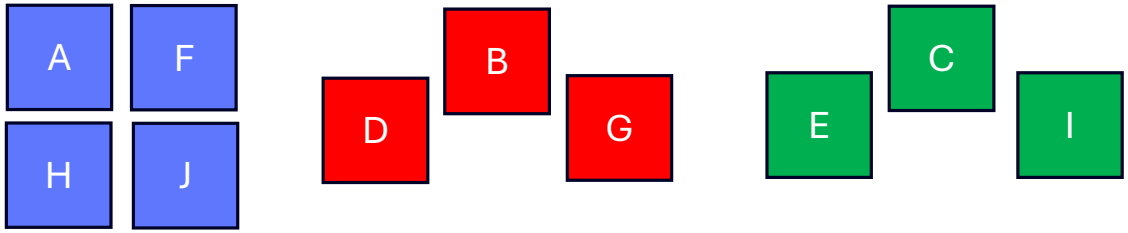


How t... ...ue?

Problem of Ordinality
1,2,3...
3 > 2 > 1.... So...
Green > Red > Blue

Risk Ranking Transactions using Machine Learning

Convert color category to numerical form



Using a special ON/OFF Code…that asks the questions, "**Is it**…..?" - Yes or No…1 or 0

BOX NAME	BLUE	RED	GREEN
A	1	0	0
B	0	1	0
C	0	0	1
D	0	1	0
E	0	0	1
F	1	0	0
G	0	1	0
H	1	0	0
I	0	0	1

Risk Ranking Transactions using Machine Learning

Be Aware of HIGH CARDINALITY

- 1 ATTRIBUTE HAS A LARGE # OF UNIQUE VALUES
- VENDOR FIELD
- LESS ACCURATE, MORE GUESSING
- TAKES A LONG TIME TO LEARN

Risk Ranking Transactions using Machine Learning

TRANSACTION #	IT	LEGAL	HR	CHANCELLOR	PROFESSOR	IT SPECIALIST	TRAINING	SOFTWARE	OFFICE SUPPLIES	AMOUNT	ALGO 1	ALGO 2	ALGO 3	ALGO 4	ALGO 5	TOTAL RANKING
1	0	1	0	0	0	1	1	0	0	$1,099.99	-1	-1	-1	0	-1	-4
2	1	0	0	1	0	0	0	0	1	$56.88	0	0	0	0	0	0
3	0	0	1	0	1	0	0	1	0	$89.95	0	0	-1	0	0	-1
4	0	0	1	1	0	0	1	0	0	$524.16	0	0	0	0	0	0
5	1	0	0	0	0	1	0	1	0	$99.99	0	0	-1	-1	-1	-3

Audit Results

- Ambiguous Policies & Procedures
- Non-compliance with Policies & Procedures
- Visibility of P-Card Issuance
- Non-CU Employees as Cardholders & Approving Officials

INVOICE

ABC, LLC

ABC_LLC@gmail.com

Invoice No#: 0155
Invoice Date: Feb 16, 2024
Due Date: Feb 16, 2024

PAID

$0.00
AMOUNT DUE

BILL TO
Jane Doe, PhD

#	ITEMS & DESCRIPTION	QTY/HRS	PRICE	AMOUNT($)
1	Brochures	100	$10.00	$1,000.00

Subtotal	$1,000.00
TOTAL	**$1,000.00 USD**
Amount paid	$1,000.00
AMOUNT DUE	**$0.00 USD**

INVOICE

ABC, LLC

ABC_LLC@gmail.com

Invoice No#: 0005

Invoice Date: Oct 26, 2022

PAID

$0.00

AMOUNT DUE

BILL TO

Allergy & Immunology dept

#	ITEMS & DESCRIPTION	QTY/HRS	PRICE	AMOUNT($)
1	Tumblers x50	1	$500.00	$500.00

Subtotal	$500.00
Tip	$0.00
TOTAL	$500.00 USD
Amount paid	$500.00
AMOUNT DUE	$0.00 USD

ABC, LLC

Catering Invoice

Client/Organization	Event Date	Booking Contact	Sales Rep	Event #
Affiliate Hospital	7/16/2022(Sat)	Bianca James	Buggs Bunny	E07050
Address		**City, St/Prov Post**		**Guests**
Box 200		Aurora, CO 80045		120 (Act)

Party Name	Theme	Booking Email	Booking Cell
CHCO Kids Day	Non Profit		

Summary of Services

Lunch - 7/16/2022 - 11:00 am

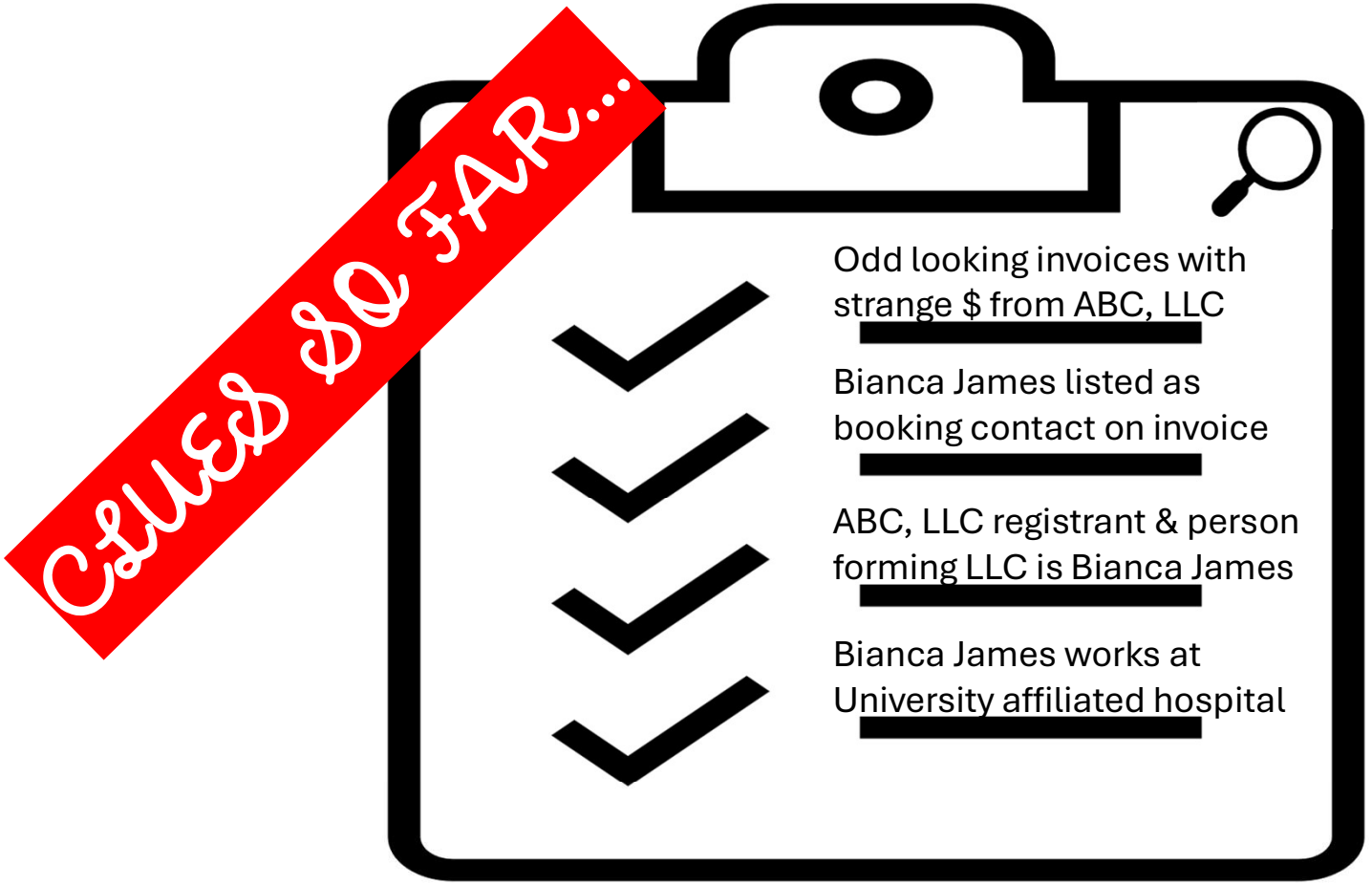
Event additional extended space set up

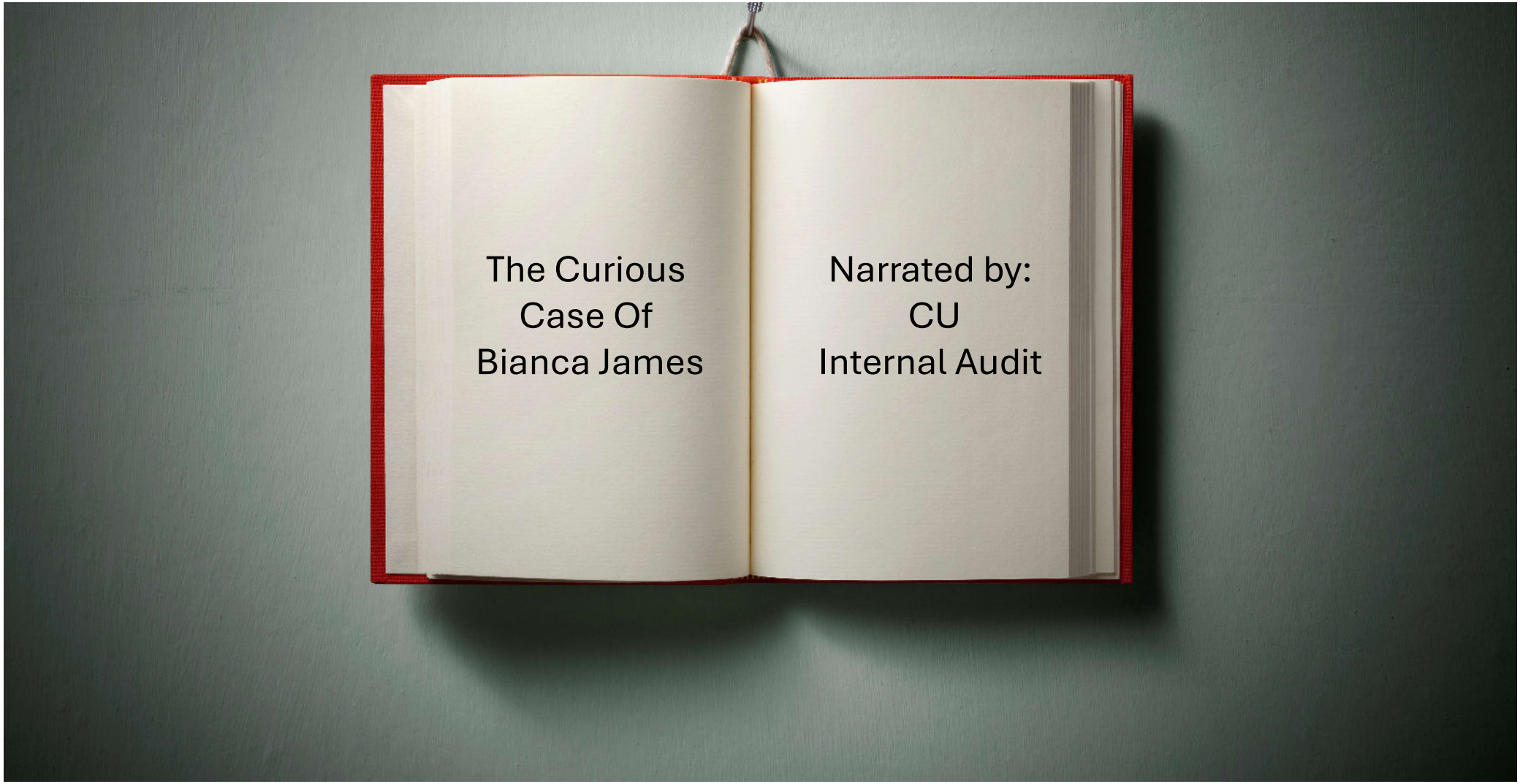
750.00 750.00

	Food	Cash Food	Liquor	Cash Bar	Equipment	Labor	At Cost	Misc.	Total
Subtotal	0.00	0.00	0.00	0.00	0.00	0.00	750.00	0.00	750.00
Service Charge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	750.00	0.00	750.00

Paid cc 4717 6/25/2022	750.00
Balance	0.00

Open-Source Data


CLUES SO FAR...
Odd looking invoices with strange $ from ABC, LLC
Bianca James listed as booking contact on invoice
ABC, LLC registrant & person forming LLC is Bianca James
Bianca James works at University affiliated hospital


The Curious
Case Of
Bianca James
Narrated by:
CU
Internal Audit

INVOICE NUMBER	INVOICE DATE	DUE DATE	ITEMS/DESCRIPTION	TOTAL	AMOUNT DUE	COMPANY CONTACT INFORMATION	PAYMENT SERVICE
219198	7/23/2021	8/29/2021	Tote Bags	$625	$0	Address & Phone Number	SHOPIFY
7050	7/16/2022		Lunch - Extended Space Setup	$750	$0		VENMO
7050	7/16/2022		Lunch	$1,200	$0		VENMO
7050	7/16/2022		Animal Experience	$1,750	$0		VENMO
7050	7/16/2022		Event Space Set Up	$650	$0		VENMO
7050	7/16/2022		Additional Servers	$750	$0		VENMO
7050	7/16/2022		Ice Cream & Event Tumblers	$1,000	$0		VENMO
7052	10/1/2022		Ice Cream and Train Tokens	$1,550	$0		VENMO
7052	10/1/2022		Animal Experience	$1,500	$0		VENMO
7052	10/1/2022		T-Shirts	$1,200	$0		VENMO
7052	10/1/2022		Ice Cream and Event Tumblers	$1,000	$0		VENMO
7052	10/1/2022		Event Servers	$750	$0		VENMO
7052	10/1/2022		Event Set Up	$750	$0		VENMO
5	10/26/2022		Tumblers	$500	$0	Gmail	PAYPAL
6	12/21/2022	12/21/2022	Room Office Signs & Customized Signage	$625	$0	Gmail	PAYPAL
7	12/23/2022	12/23/2022	Office Signs; Custom Signage	$625	$0		PAYPAL
7	12/23/2022	12/23/2022	Room Office Signs & Customized Signage	$625	$0	Gmail	PAYPAL
8	1/5/2023	1/5/2023	RentalSpace, Rental Chairs,Table, Supplies, Catering	$1,150	$0	Gmail	PAYPAL
9	1/8/2023	1/8/2023	T-Shirts Print and Design	$1,500	$0	Gmail	PAYPAL
57	1/18/2023	1/18/2023	RentalSpace, Rental Chairs,Table, Supplies, Catering	$1,200	$0	Gmail	PAYPAL
13	4/16/2023	4/17/2023	T-Shirts	$1,750	$0	Gmail	PAYPAL
14	4/29/2023	4/29/2023	T-Shirts & Print Color	$1,350	$0	Gmail	PAYPAL
16	5/24/2023	5/24/2023	T-Shirts/Bottles/Banners	$1,500	$0	Gmail	PAYPAL
17	5/30/2023	5/30/2023	Conference Set Up	$850	$0	Gmail	PAYPAL
18	5/31/2023	5/31/2023	Faculty Event Set Up	$1,000	$0	Gmail	PAYPAL
19	6/9/2023	6/9/2023	Totes & Medication	$750	$0	Gmail	PAYPAL
21	6/21/2023	6/21/2023	Drawstring Bags & Fanny packs	$850	$0	Gmail	PAYPAL
124	7/12/2023	7/12/2023	Tumblers	$1,125	$0	Gmail	PAYPAL
125	7/24/2023	7/24/2023	Set Up & Labor; Linens and Décor	$1,750	$0	Gmail	PAYPAL
226	7/26/2023	7/26/2023	Retreat Conference Set Up & T-Shirts	$2,625	$0	Gmail	PAYPAL
227	8/4/2023	8/4/2023	Event Set Up	$1,500	$0	Gmail	PAYPAL
128	8/18/2023	8/18/2023	Training Session	$1,500	$0	Gmail	PAYPAL
129	8/18/2023	8/18/2023	Training Session	$2,250	$0	Gmail	PAYPAL
130	9/1/2023	9/1/2023	Training Course Set Up	$1,500	$0	Gmail	PAYPAL
131	9/6/2023	9/6/2023	Event Set Up & T-Shirts	$2,625	$0	Gmail	PAYPAL
132	9/7/2023	9/7/2023	Set Up Retreat with Tech Support	$1,875	$0	Gmail	PAYPAL
133	9/24/2023	9/24/2023	Retreat Set Up & Tote Bags	$2,100	$0	Gmail	PAYPAL
134	9/27/2023	9/27/2023	Event Set Up	$1,750	$0	Gmail	PAYPAL
135	9/30/2023	9/30/2023	Event Set Up	$1,750	$0	Gmail	PAYPAL
137	10/11/2023	10/11/2023	Training Set Up & Packet Printouts	$2,250	$0	Gmail	PAYPAL
138	10/14/2023	10/14/2023	Set Up	$1,000	$0	Gmail	PAYPAL
140	10/17/2023	10/17/2023	Training Set Up	$1,500	$0	Gmail	PAYPAL
141	10/25/2023	10/25/2023	Research Conference Set Up	$1,500	$0	Gmail	PAYPAL
42	10/25/2023	10/25/2023	Event Bags & T-Shirts	$1,550	$0	Gmail	PAYPAL
143	11/21/2023	11/21/2023	Retreat Set UP & Training Program Set Up	$2,500	$0	Gmail	PAYPAL
144	11/27/2023	11/27/2023	Training Set Up	$850	$0	Gmail	PAYPAL
145	12/9/2023	12/9/2023	Retreat Set Up & Technology Package	$1,350	$0	Gmail	PAYPAL
146	12/11/2023	12/11/2023	Retreat	$1,500	$0	Gmail	PAYPAL
147	12/21/2023	12/21/2023	Training Session	$1,500	$0	Gmail	PAYPAL
148	12/23/2023	12/23/2023	Training Session	$1,000	$0	Gmail	PAYPAL
149	1/18/2024	1/18/2024	Training Meeting	$1,750	$0	Gmail	PAYPAL
150	1/18/2024	1/18/2024	Event Training	$1,000	$0	Gmail	PAYPAL
151	1/19/2024	1/19/2024	Training	$1,750	$0	Gmail	PAYPAL
152	1/22/2024	1/22/2024	Synopsis	$1,500	$0	Gmail	PAYPAL
153	1/23/2024	1/23/2024	Training Set Up & Packet Printouts	$850	$0	Gmail	PAYPAL
154	2/15/2024	2/15/2024	Training Set Up	$1,500	$0	Gmail	PAYPAL
154	2/15/2024	2/15/2024	Training Set Up	$1,500	$0	Gmail	PAYPAL
155	2/16/2024	2/16/2024	Brochures	$1,000	$0	Gmail	PAYPAL
156	3/2/2024	3/2/2024	Training	$1,000	$0	Gmail	PAYPAL
157	3/6/2024	3/6/2024	Training Event	$1,500	$0	Gmail	PAYPAL

ALL TRANSACTIONS MADE BY ABC, LLC

INVOICE NUMBER	INVOICE DATE	DUE DATE	ITEMS/DESCRIPTION	TOTAL	AMOUNT DUE	COMPANY CONTACT INFORMATION	PAYMENT SERVICE
7052	10/1/2022		Ice Cream and Train Tokens	$1,550	$0		VENMO
7052	10/1/2022		Animal Experience	$1,500	$0		VENMO
7052	10/1/2022		T-Shirts	$1,200	$0		VENMO
7052	10/1/2022		Ice Cream and Event Tumblers	$1,000	$0		VENMO
7052	10/1/2022		Event Servers	$750	$0		VENMO
7052	10/1/2022		Event Set Up	$750	$0		VENMO
9	1/8/2023	1/8/2023	T-Shirts Print and Design	$1,500	$0	Gmail	PAYPAL
57	1/18/2023	1/18/2023	RentalSpace, Rental Chairs,Table, Supplies, Catering	$1,200	$0	Gmail	PAYPAL
13	4/16/2023	4/17/2023	T-Shirts	$1,750	$0	Gmail	PAYPAL
125	7/24/2023	7/24/2023	Set Up & Labor; Linens and Décor	$1,750	$0	Gmail	PAYPAL
226	7/26/2023	7/26/2023	Retreat Conference Set Up & T-Shirts	$2,625	$0	Gmail	PAYPAL
227	8/4/2023	8/4/2023	Event Set Up	$1,500	$0	Gmail	PAYPAL
128	8/18/2023	8/18/2023	Training Session	$1,500	$0	Gmail	PAYPAL
141	10/25/2023	10/25/2023	Research Conference Set Up	$1,500	$0	Gmail	PAYPAL
42	10/25/2023	10/25/2023	Event Bags & T-Shirts	$1,550	$0	Gmail	PAYPAL
143	11/21/2023	11/21/2023	Retreat Set UP & Training Program Set Up	$2,500	$0	Gmail	PAYPAL
152	1/22/2024	1/22/2024	Synopsis	$1,500	$0	Gmail	PAYPAL

Investigation Interviews

- P-Card Holders
- Travel Card Holders
- Faculty Members
- Campus Controllers
- Procurement Service Center (PSC) P-Card Program Manager
- Professors
- Vendors

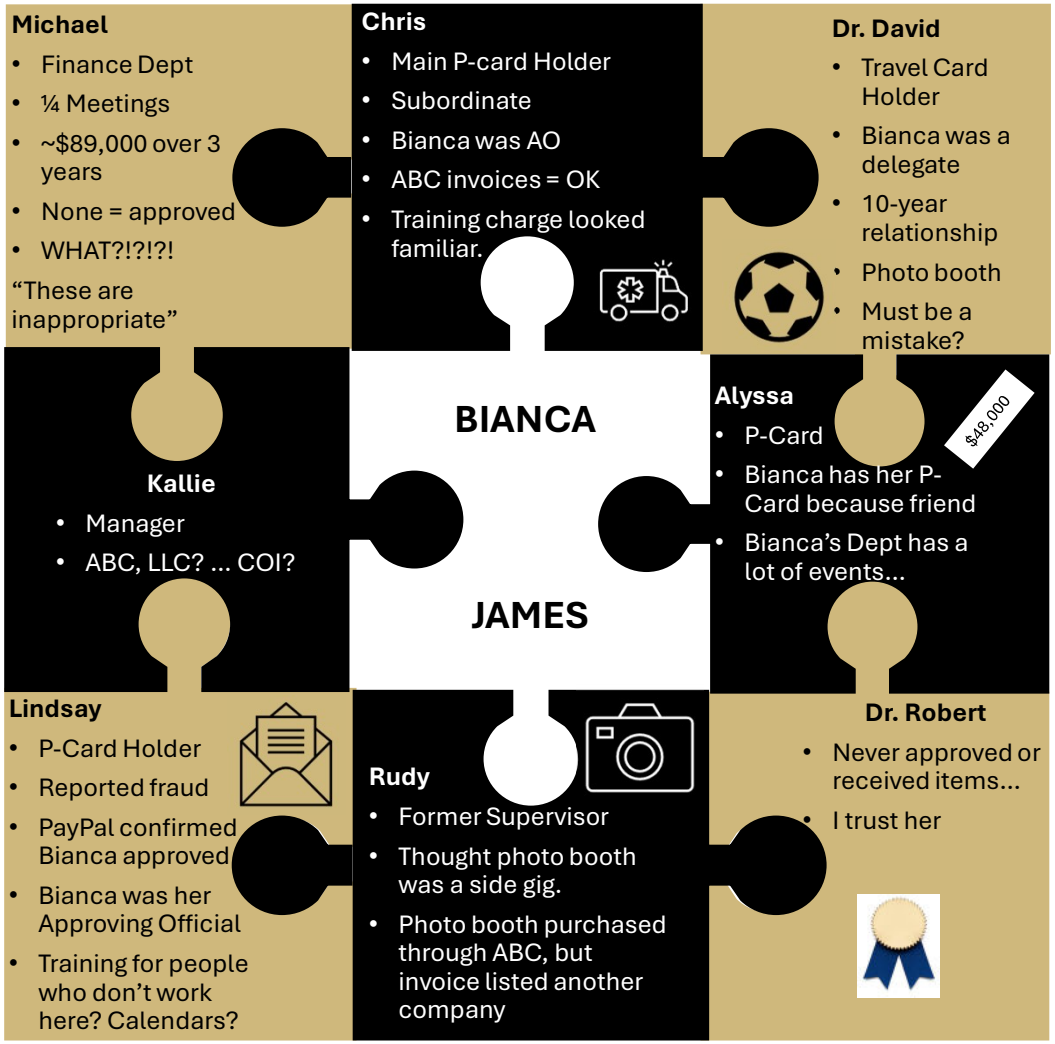
Key:

CU Employees

Affiliate Hospital Employees

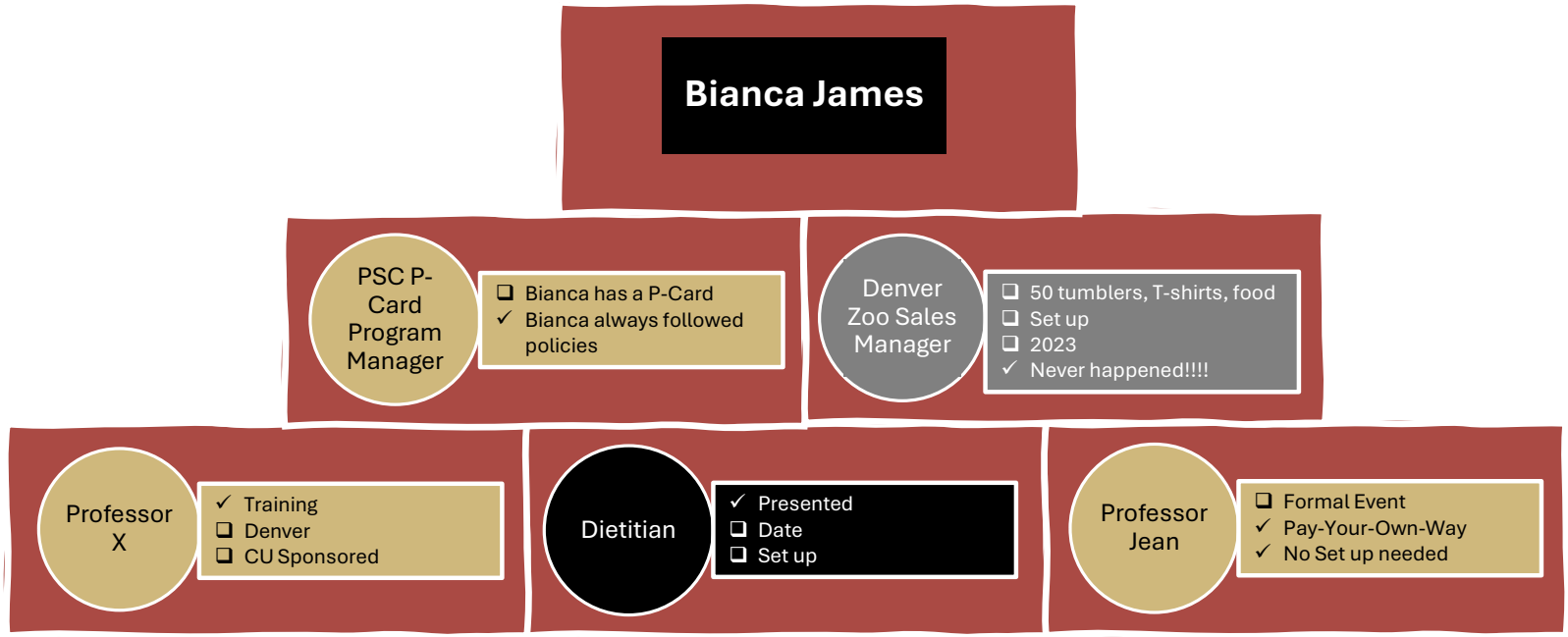
INTERVIEWS

The pieces come together…



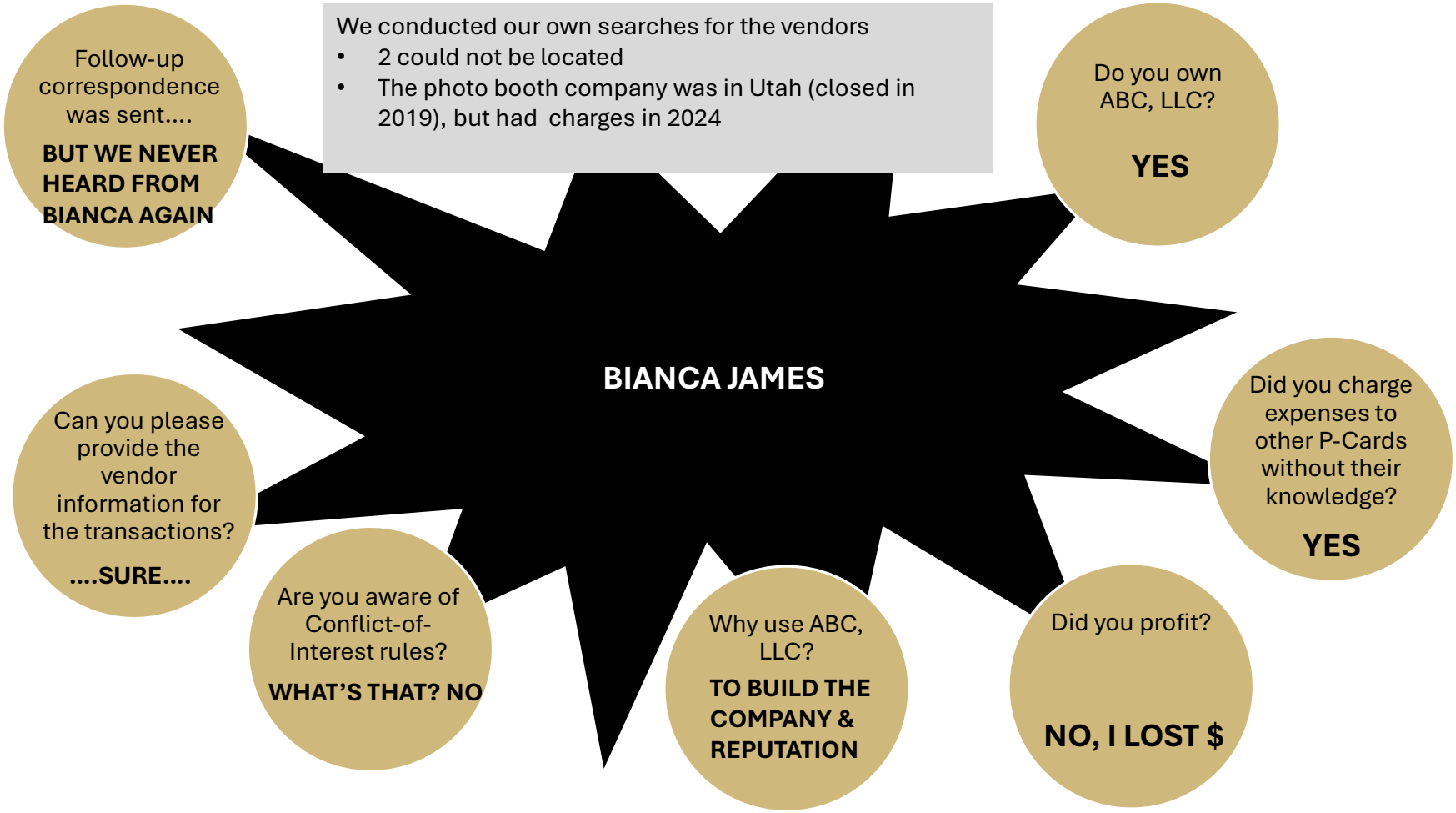
EVENT FOLLOW-UP

Key:
CU Employees
Affiliate Hospital Employees
Outside Employees



THE HARD CONVERSATION

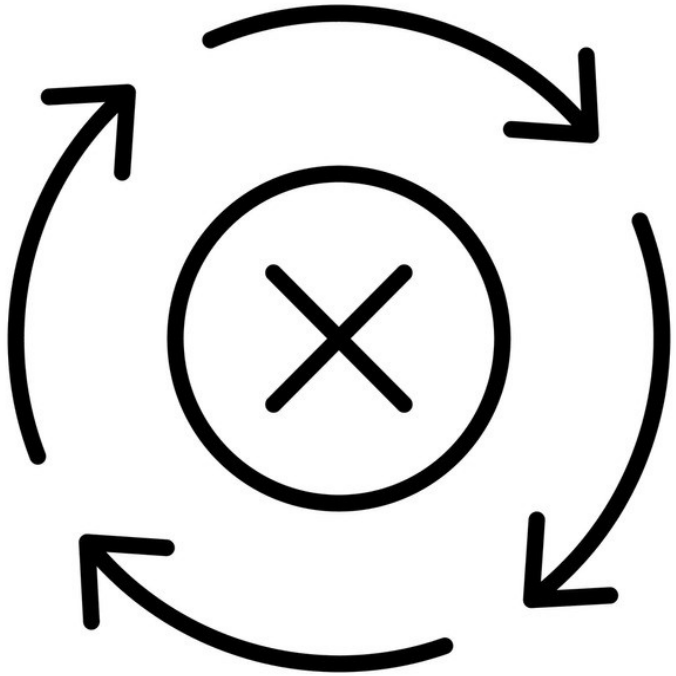
We conducted our own searches for the vendors
- 2 could not be located
- The photo booth company was in Utah (closed in 2019), but had charges in 2024



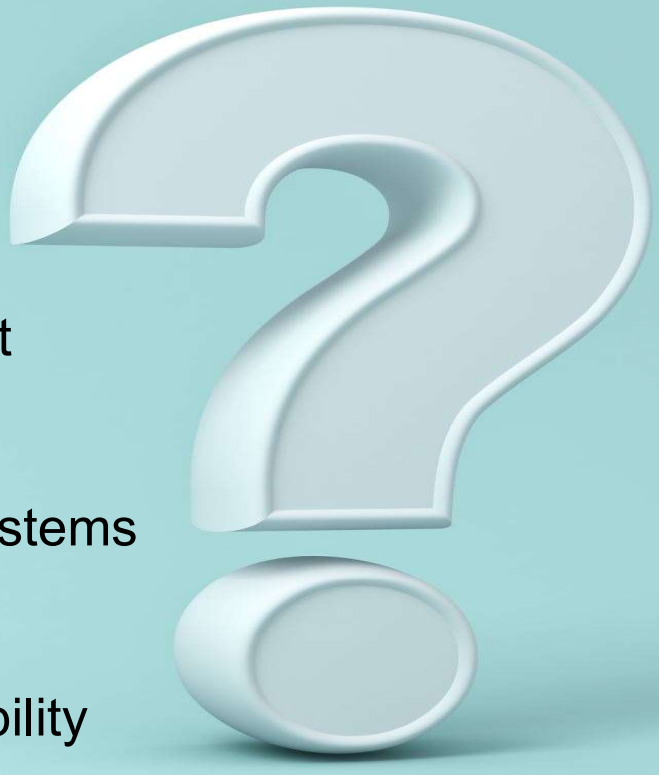
CLOSING THE LOOP

- Charges across multiple P-Cards
- Events never took place
- Vendors didn’t exist
- Conflict of interest was never disclosed

- ~ $89,000 stolen from the university



How did Bianca get away with it for so long?



- Leveraging Personal Relationships & Trust
- Exploiting Gaps in Oversight
- Controlling Subordinates and Financial Systems
- Manipulating Documentation & Timing
- Relying on Professional & Personal Credibility

Creating a Fake Company

Outcome

Lessons Learned… What now?

1. Modified our initial data model for a more apples to apples comparison:
   Grouped transactions by type:
   - ➢ Mobile Pay (Venmo, PayPal, Square)
   - ➢ Toast
   - ➢ Amazon
   - ➢ Everything else
2. Added a second anomaly detection model that focuses on the vendor and looks for the following:

- ➢ Mobile payments (Venmo, PayPal, Square)
- ➢ Transactions that are whole numbers and divisible by 5 (For example: $125, $1100)
- ➢ Price range per service rendered
- ➢ Four or more different services (training, catering, marketing, cleaning)

Lessons Learned… What now?

Developed automated analysis of invoices in PDF format…

- Does the invoice have the following?
  - Address
  - Phone number
  - Square link
  - Indication the invoice was already paid
- Exports EXIF data to Excel file with above information

Filename	Address	Phone	Paid	Square	Objects	Title	Creation_Date	Mod_Date	Never Modified	Creator	Producer	Author
A.pdf	0	0	0	0	28		D:20230614111105-07'00'	D:20230620154306-06'00'	FALSE		Adobe XML Form Module Library	
B.pdf	0	0	0	0	555		D:20230131155159-07'00'	D:20230131155159-07'00'	TRUE	Adobe LiveCycle Designer 11.0	Adobe XML Form Module Library	
C.pdf	0	0	0	0	22	Sales invoice	D:20231003115451-06'00'	D:20231018150915-06'00'	FALSE	PDF-Tools v4.0	PDF-XChange (xcpro40.dll v4.0.0190.0000) (Windows)	Ralphie
D.pdf	0	1	0	0	42	Payment invoice - Dropbox	D:20220720173824Z	D:20220720165513-06'00'	FALSE	Firefox	macOS Version 12.4 (Build 21F79) Quartz PDFContext	Buffalo
E.pdf	0	0	0	0	28	ABC Services May27-June10	D:20150707190954Z00'00'	D:20150707190954Z00'00'	TRUE	Numbers	Mac OS X 10.10.4 Quartz PDFContext	
F.pdf	0	0	0	0	399		D:20240910092929-06'00'	D:20240910093001-06'00'	FALSE	Acrobat PDFMaker 24 for Excel	Adobe PDF Library 24.3.86	mjones
G.pdf	0	0	0	0	271		D:20241116102339-06'00'	D:20241119093537-07'00'	FALSE	Microsoft® Excel® for Microsoft 365	Microsoft® Excel® for Microsoft 365	mjones
H.pdf	0	0	0	0	44	Invoice&quotation.xlsx	D:20240618234236+08'00'	D:20240627123246-06'00'	FALSE	PScript5.dll Version 5.2.2	Acrobat Distiller 10.1.1 (Windows)	john
I.pdf	1	1	0	0	10	Invoice Number: 2024-08-01	D:20240826164507Z00'00'	D:20240826164507Z00'00'	TRUE	Notes	iOS Version 17.5.1 (Build 21F90) Quartz PDFContext	
J.pdf	0	0	0	0	25		D:20230719140911		FALSE	PDFium	PDFium	
K.pdf	0	0	1	0	20		D:20230829222748-07'00'	D:20230829222749-07'00'	FALSE		Adobe XML Form Module Library	
L.pdf	1	1	0	0	15	AB_C454e-20170915111446	D:20170915111446-06'00'	D:20170915111407-06'00'	FALSE	AB_C454e	KONICA MINOLTA bizhub C454e	
M.pdf	0	0	0	0	44	Invoice Template	D:20241202093631-07'00'	D:20241202093631-07'00'	TRUE		Skia/PDF m132 Google Docs Renderer	
N.pdf	0	1	0	0	23	Invoice - Google Docs	D:20250117173236Z00'00'	D:20250117173236Z00'00'	TRUE	Firefox	macOS Version 14.5 (Build 23F79) Quartz PDFContext	
O.pdf	0	0	0	0	149		D:20231019005317+00'00'	D:20231019005317+00'00'	TRUE	Microsoft® Word 2010	Microsoft® Word 2010	

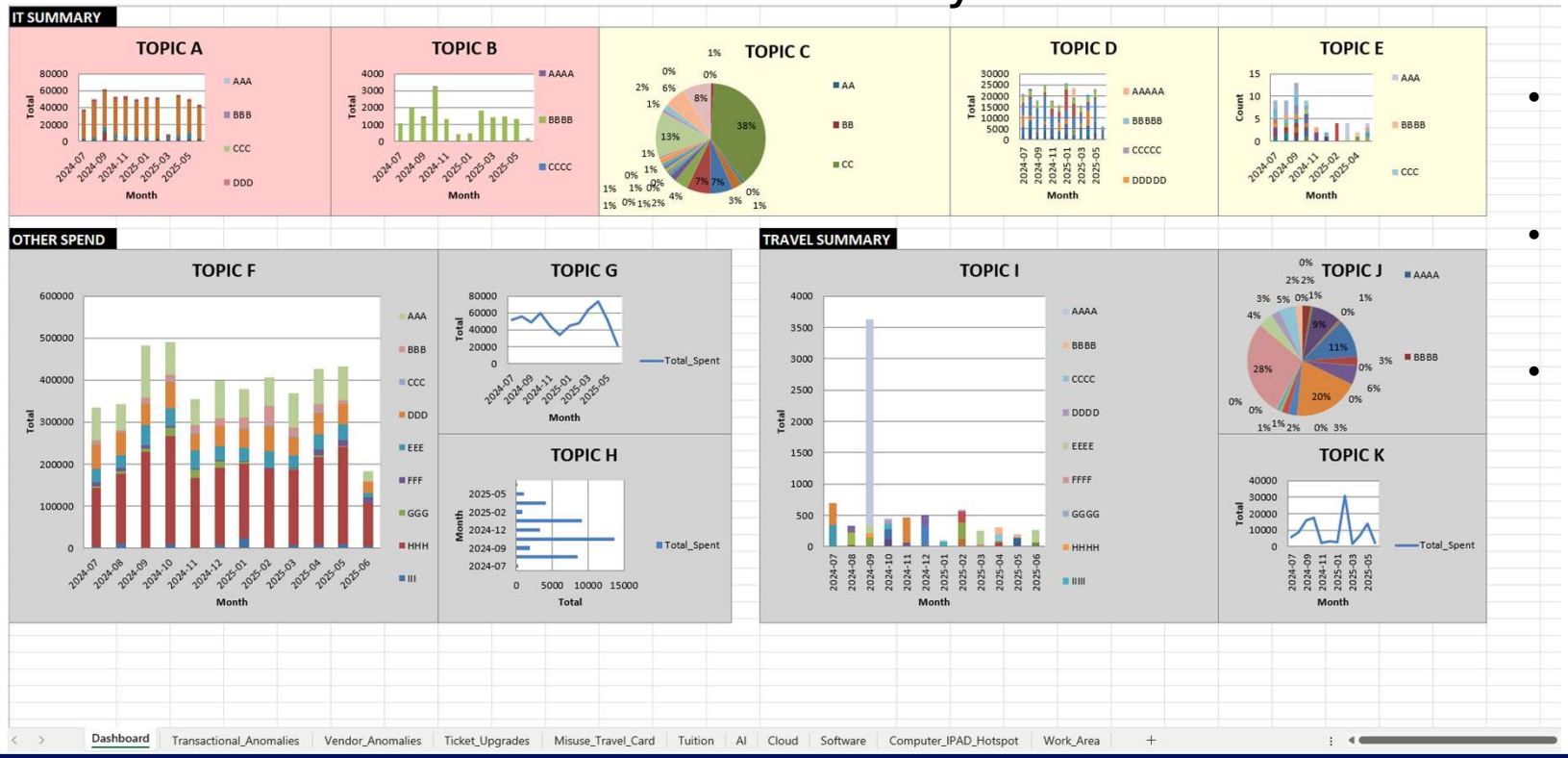
Lessons Learned… What now?

Machine Learning to compare appearance to known fraudulent invoices and scores a similarity threshold

Invoice Filename	Likely Legitimate Invoice	Similarity Score
L.jpg	TRUE	0.641253463
B.jpg	TRUE	0.655101946
C.jpg	TRUE	0.685122357
I.jpg	TRUE	0.706666239
H.jpg	TRUE	0.707514295
J.jpg	TRUE	0.711588159
O.jpg	TRUE	0.713067477
E.jpg	TRUE	0.717096014
G.jpg	TRUE	0.740853497
F.jpg	TRUE	0.742815194
K.jpg	TRUE	0.743229368
M.jpg	TRUE	0.748235143
A.jpg	FALSE	0.763932822
N.jpg	FALSE	0.795476269
D.jpg	FALSE	0.833100828

Lessons Learned… What now?

Automated Purchase Card Analysis:



- Interactive Query
- Data Cleansing
- Isolates Areas of Risk

What's Next....

QUESTIONS?