



# Gamify your Curriculum with Cortex

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Gamify your curriculum with low/no-code predictive analytics  
Online | March 31, 2022

**ERPsimLab**  
**HEC MONTRÉAL**

Serious games to learn enterprise  
systems and business analytics

# Your Speakers Today



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# Agenda

1. Introduction
2. What is Cortex?
3. The Scenarios
4. Demo and Get started
5. Teaching with Cortex
6. Q&A

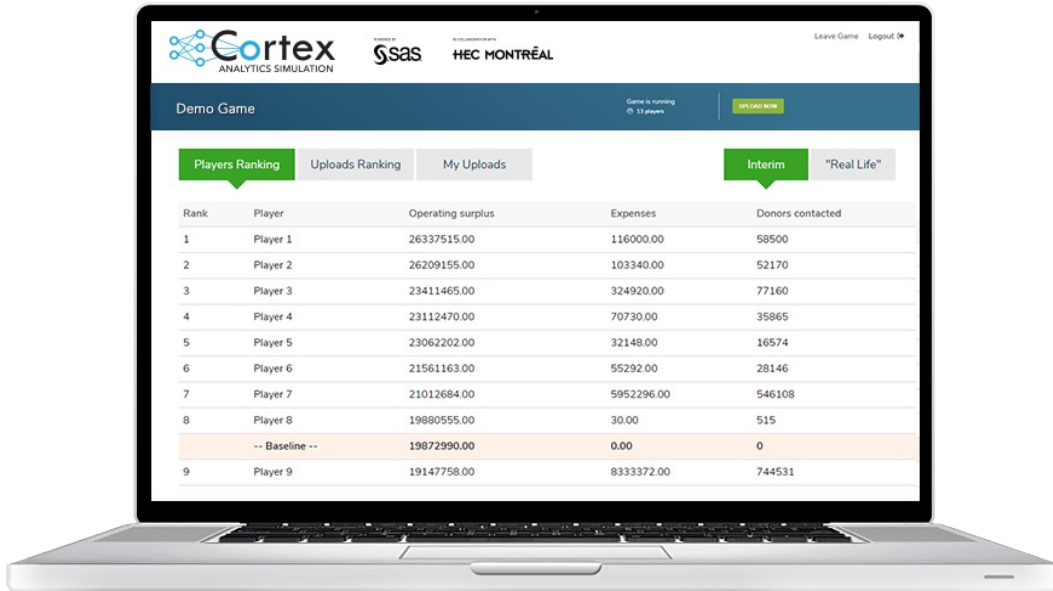
# What is Cortex?



Image reference: <https://referralcoach.com/bridge-the-referral-gap/>



# Cortex Analytics Simulation



Rank	Player	Operating surplus	Expenses	Donors contacted
1	Player 1	26337515.00	116000.00	58500
2	Player 2	26209155.00	103340.00	52170
3	Player 3	23411465.00	324920.00	77160
4	Player 4	23112470.00	70730.00	35865
5	Player 5	23062202.00	32148.00	16574
6	Player 6	21561163.00	55292.00	28146
7	Player 7	21012684.00	5952296.00	546108
8	Player 8	19880555.00	30.00	515
-- Baseline --		19872990.00	0.00	0
9	Player 9	19147758.00	8333372.00	744531

- Virtual or in-class instructor tool
- Turn-key solution, includes case study, dataset, online leaderboard, tutorials
- Teaches **predictive modeling** concepts in an exciting and **hands-on** environment.

POWERED BY  


IN COLLABORATION WITH  


# The Benefits of Gamification



# Observed Benefits

- Increased engagement
- Desire from students to know more
- A surge in the number of hours willingly spent by students for the course
- Risen awareness of students in the feedback session

# The Scenarios



# Scenarios Features

	Fundraising Scenario	Credit Risk Scenario	Retention Scenario
Level	Beginner	Intermediate	Advanced
Datasets	✓	✓	✓
Case study	✓	✓	✓
Instructional Videos	✓	✓	
Pre-built diagrams	✓		
Teaching notes	✓		
Software	EM, Studio, Python	EM	EM

# Fundraising: Turnkey Solution

## Fundraising Scenario

Foundation targeting potential donors

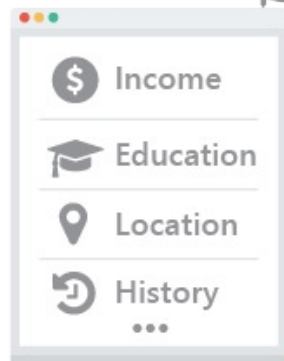
### GOAL

Maximize the net raised funds



CALLING COST

### DATA



### DECISIONS

How many?  
Who?  
...



1 million potential donors

# Credit Risk: Intermediate Level

## Credit Risk Scenario

Financial institution processing car loan applications

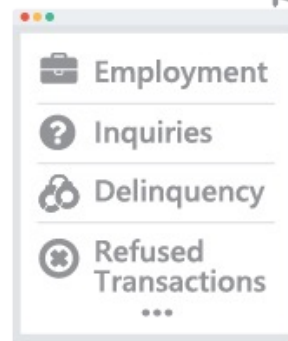
### GOAL

Maximize Net Profit  
after 2 years



**THE PLAYER**  
(Lender)

### DATA



### DECISIONS



How many to accept?



Who to accept?

...

1 million potential borrowers



# Retention: Advanced Level

## Retention Scenario

Telecom company looking to retain customers

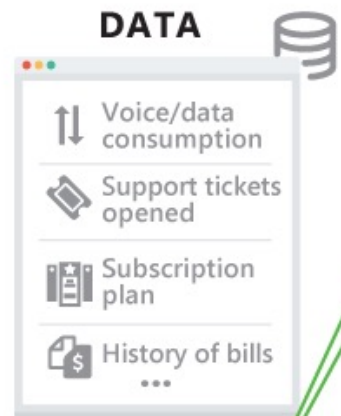
### GOAL

Maximize Net Profit after 2 years



### THE PLAYER

Customer Relationship



### DECISIONS



How many families and which ones to invite?

1 million existing subscribers



# A Closer Look at the Fundraising Scenario

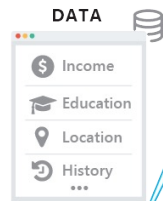
# Fundraising: Turnkey Solution

## Fundraising Scenario

Foundation targeting potential donors

### GOAL

Maximize the net raised funds



### DECISIONS

How many?  
Who?  
...

1 million potential donors



Predict how much they give

How?



PARTICIPANT



Assess Models



Create Output



Upload Decision

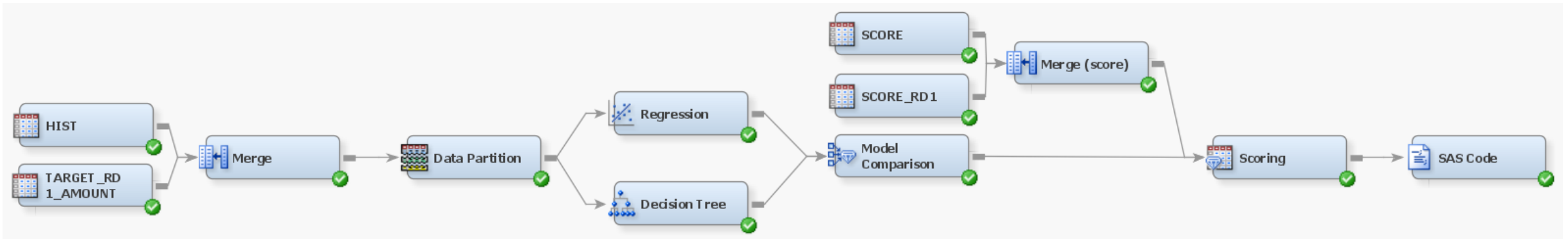


Leaderboard, discussions and feedback

Participants will design models and generate a list of donors that will be submitted for scoring, providing immediate feedback.

Variable Name	Description
ID	Member number (unique ID)
LastName	Last Name
FirstName	First Name
Woman	Sex (1=woman, 0=man)
Age	Age (years)
Salary	Annual salary in USD
Education	Highest education level
City	Type of neighborhood
SeniorList	Seniority for being on the VIP list
NbActivities	Number of participations to annual meeting
Referrals	Number of referrals
Recency	Number of years since last gift
Frequency	Number of donations
Seniority	Number of years since first donation
TotalGift	Total Donation since a member
MinGift	Minimum donation since a member
MaxGift	Maximum donation since on the VIP list
Contact	Direct sollicitaion this year
GaveLastYear	Did the individual give last year
AmtLastYear	Amount given last year
GaveThisYear	Did the individual give this year
AmtThisYear	Amount given this year

# Round 1 - SAS EM: Predict the amount given in the current year



Players Ranking

Uploads Ranking

My Uploads

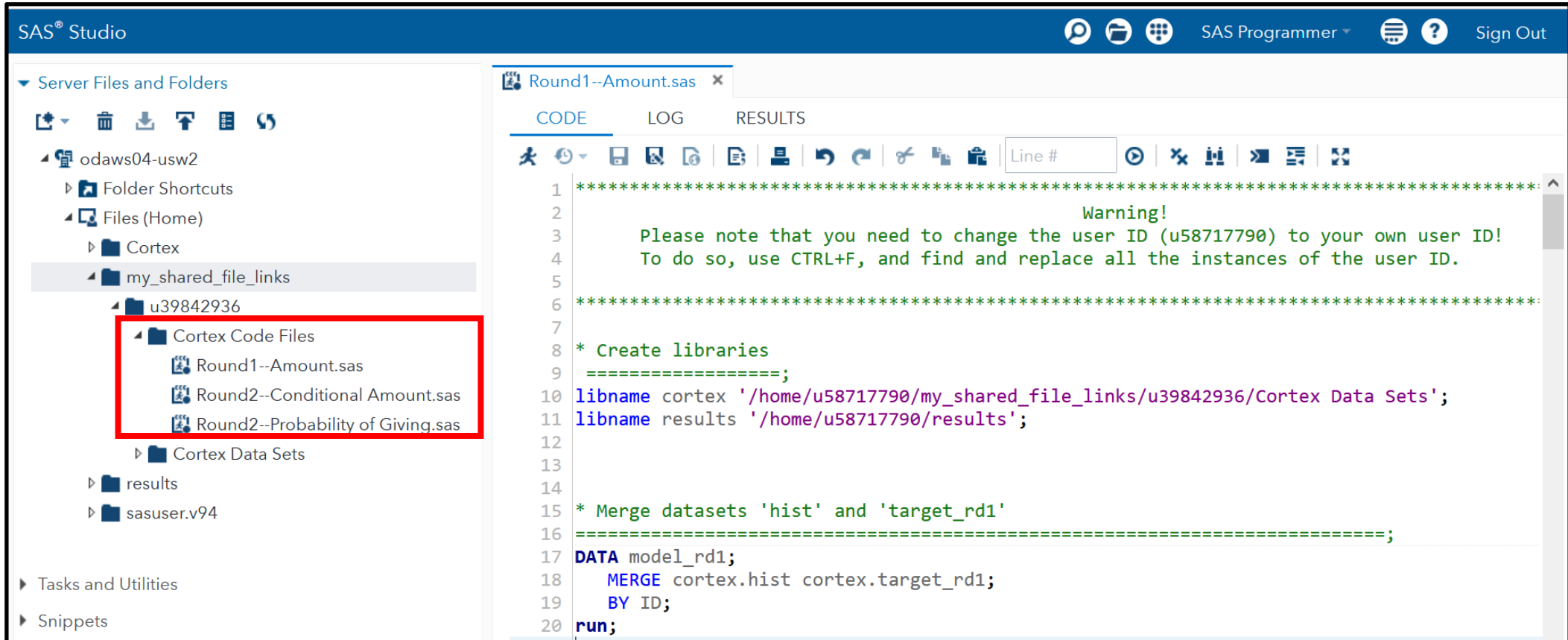
Interim

"Real Life"

Rank	Player	Operating surplus	Expenses	Donors contacted	Method	Uploads #	Selected
	-- Baseline --	\$7,602,655.00	\$0.00	0	-- Baseline --	0	Selected

# Round 1 - SAS Studio:

## Predict the amount given in the current year



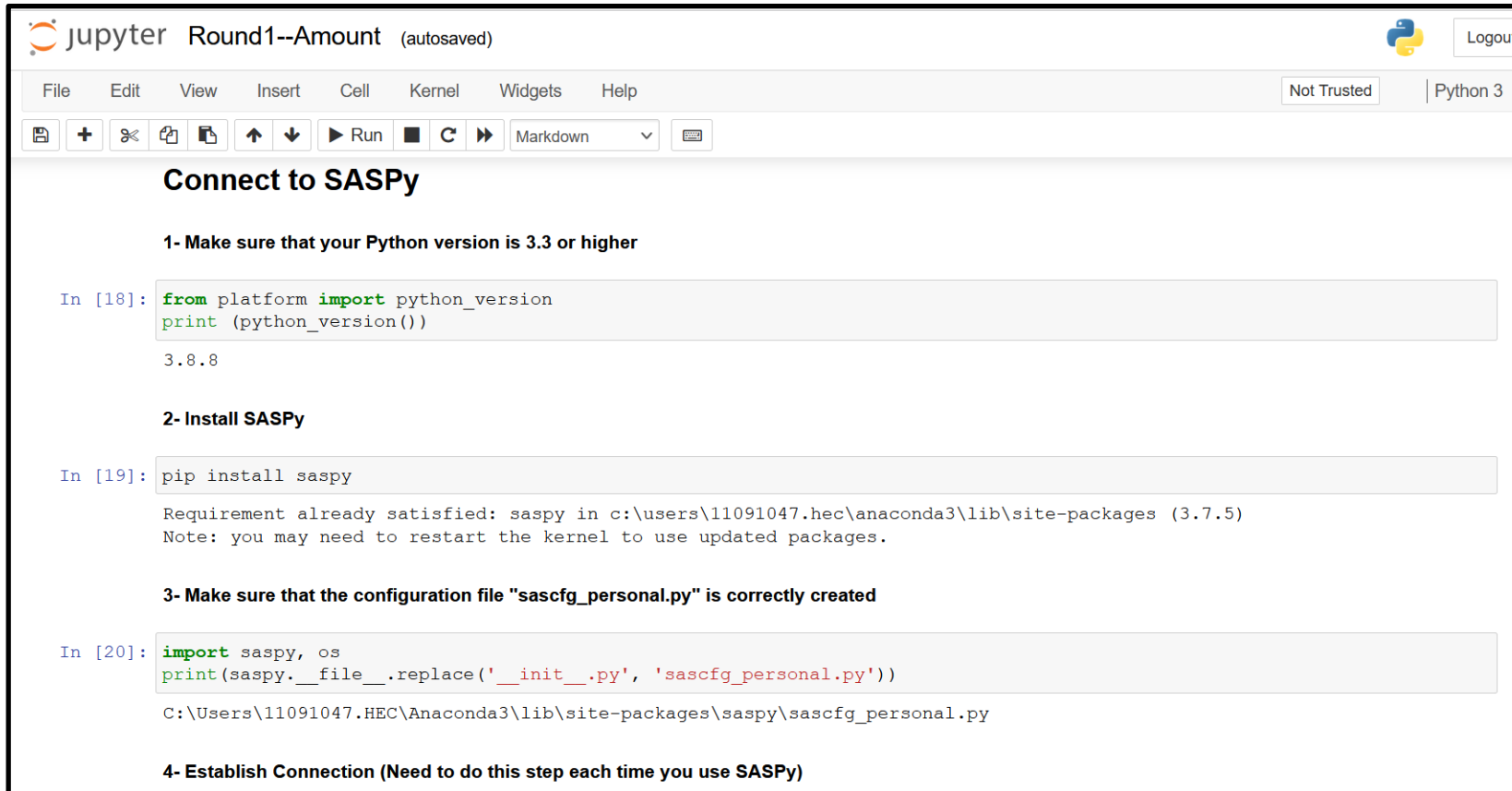
The screenshot displays the SAS Studio interface. On the left, the 'Server Files and Folders' pane shows a project structure. A red rectangle highlights the 'Cortex Code Files' folder, which contains three files: 'Round1--Amount.sas', 'Round2--Conditional Amount.sas', and 'Round2--Probability of Giving.sas'. The main editor window shows the 'CODE' tab for 'Round1--Amount.sas'. The code includes a warning message, library creation, and a merge operation.

```
1 *****  
2                                     Warning!  
3     Please note that you need to change the user ID (u58717790) to your own user ID!  
4     To do so, use CTRL+F, and find and replace all the instances of the user ID.  
5 *****  
6 *****  
7 *****  
8 * Create libraries  
9 =====  
10 libname cortex '/home/u58717790/my_shared_file_links/u39842936/Cortex Data Sets';  
11 libname results '/home/u58717790/results';  
12 *****  
13 *****  
14 *****  
15 * Merge datasets 'hist' and 'target_rd1'  
16 =====  
17 DATA model_rd1;  
18     MERGE cortex.hist cortex.target_rd1;  
19     BY ID;  
20 run;
```



# Round 1 - SAS Python:

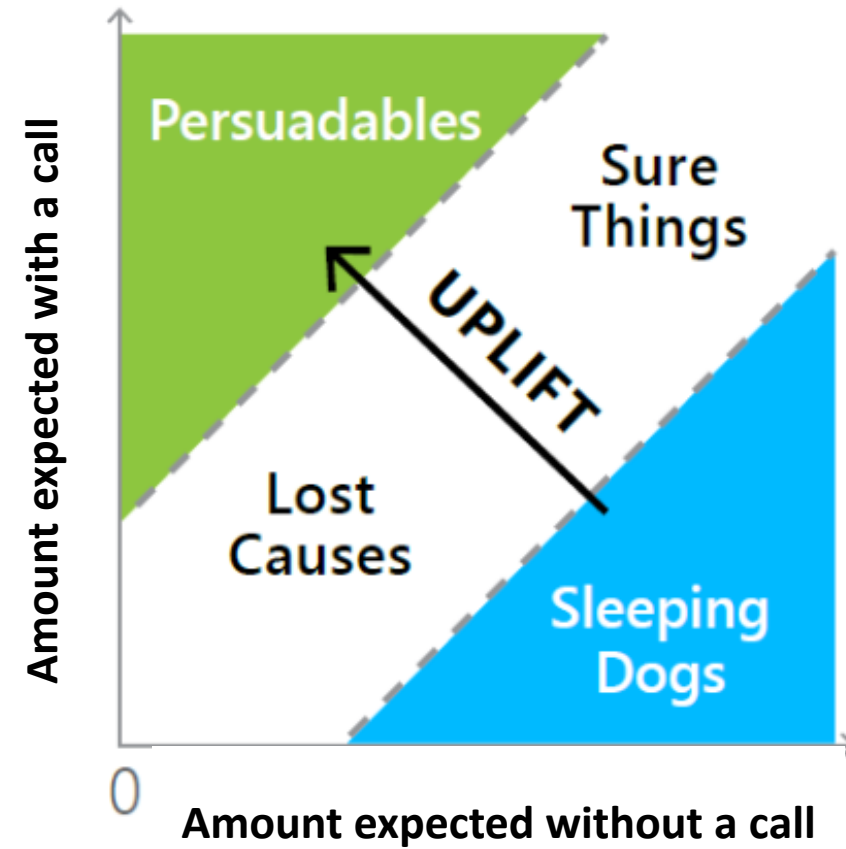
## Predict the amount given in the current year



The image shows a Jupyter Notebook window titled "Round1--Amount (autosaved)". The interface includes a menu bar (File, Edit, View, Insert, Cell, Kernel, Widgets, Help) and a toolbar with icons for saving, running, and other actions. The notebook content is divided into four steps for connecting to SASPy:

- Connect to SASPy**
  - 1- Make sure that your Python version is 3.3 or higher**  
In [18]: `from platform import python_version`  
`print (python_version())`  
3.8.8
  - 2- Install SASPy**  
In [19]: `pip install saspy`  
Requirement already satisfied: saspy in c:\users\11091047.hec\anaconda3\lib\site-packages (3.7.5)  
Note: you may need to restart the kernel to use updated packages.
  - 3- Make sure that the configuration file "sascfg\_personal.py" is correctly created**  
In [20]: `import saspy, os`  
`print(saspy.__file__.replace('__init__.py', 'sascfg_personal.py'))`  
C:\Users\11091047.HEC\Anaconda3\lib\site-packages\saspy\sascfg\_personal.py
  - 4- Establish Connection (Need to do this step each time you use SASPy)**

# Fundraising Round 2



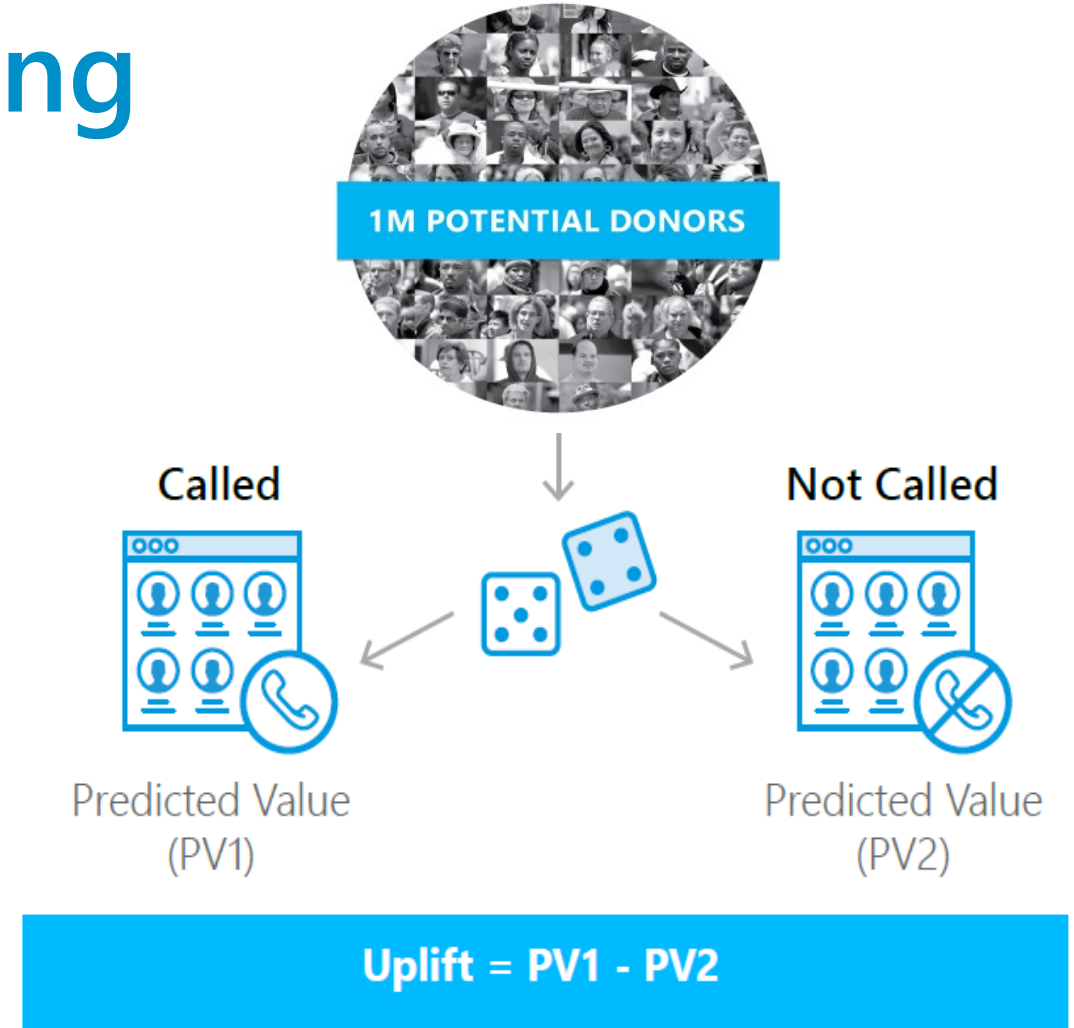
Task: Calculate the incremental value of a call

## Round 2: Uplift modeling

*There are many approaches to 2-stage modeling, but in most cases these steps are required:*

- 1 Predict the value if a person receives a treatment (here called or contacted)
- 2 Predict the value if a person does not receive a treatment (here not called or not contacted)
- 3 Compute the difference between both (i.e. the uplift generated by the treatment or targeted action: here the call)

*The Idea is to contact people who yield higher uplift (value) when called.*



Task: Calculate the incremental value of a call

## Round 2: Two-stage modeling

*One way to improve your predictions is to adopt a two-stage modeling approach*

To do so:

- 1 Fit a model to determine the probability **P** that an individual will give
- 2 Keeping only the data of those who gave, fit a model for **M** (the amount gave)
- 3 Use both models to make predictions on the population
- 4 Compute **P\*M** to determine the 'expected donation' of each individual

**MODEL**



Probability of giving

**P**

**MODEL**



Conditional amount if they give

**M**

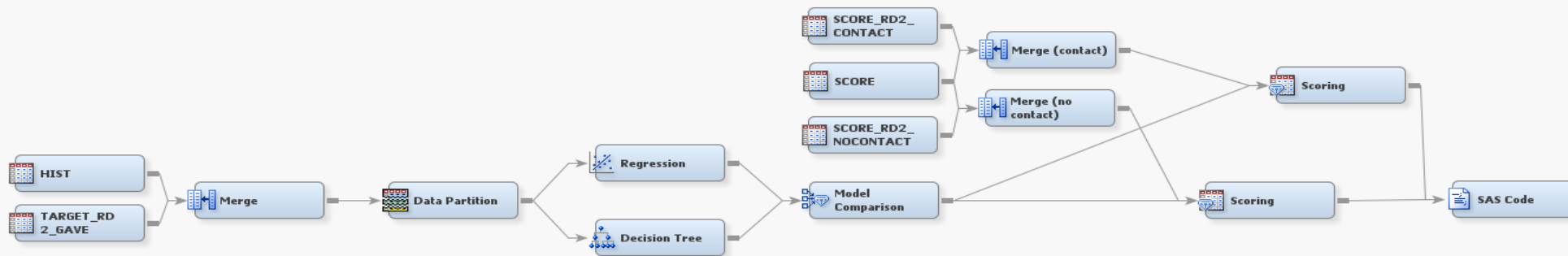
**Expected Donation =  $P * M$**



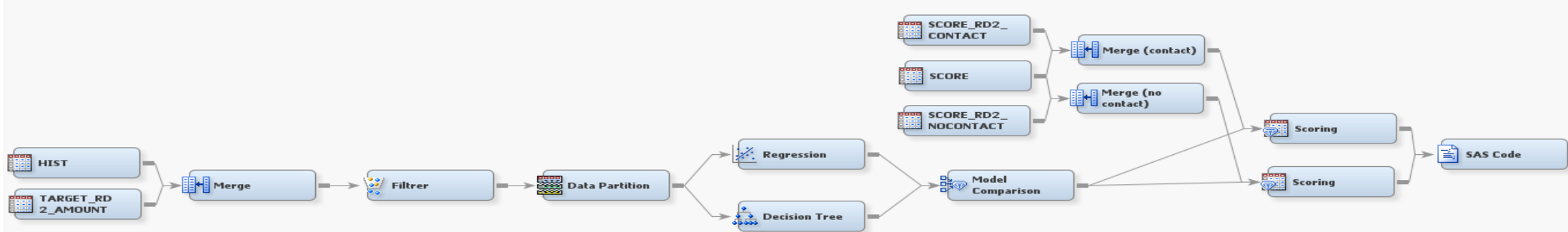
Tasks: Predict the Probability and Conditional Amount

## Round 2: Uplift Modeling

Stage 1: predict the probability of giving



Stage 2: predict the conditional amount



# Game Demonstration

# How to get started with Cortex

# Get Started with Cortex

Discover what Cortex has to offer, learn how to play the game, know how to manage the game for your students and get ideas on how to incorporate Cortex into your curriculum.

Register at  
[erpsim.hec.ca/cortex/training](https://erpsim.hec.ca/cortex/training)

## Online Course

Complete the  
Online Course  
in self-study mode



## Session with our team

Register for a  
one-on-one session with our  
team. We'll answer all your  
questions!



Receive your instructor digital  
badge and start using Cortex  
right away!



# Purchase Options

	Cortex using SAS <sup>®</sup> Enterprise Miner	Cortex Desktop	Cortex using SAS and Python
Game Materials and Leaderboard	✓	✓	✓
Available Scenarios	Fundraising, Credit Risk, Customer Retention	Fundraising, Credit Risk, Customer Retention	Fundraising
Software Access	20 hours of software in the cloud	Bring your own install of SAS Enterprise Miner	SAS OnDemand for Academics and Python
Price	<b>\$100</b>	<b>\$50</b>	<b>\$35</b>

[https://www.sas.com/en\\_us/learn/academic-programs/resources/cortex-analytics-simulation-game.html](https://www.sas.com/en_us/learn/academic-programs/resources/cortex-analytics-simulation-game.html)

# Teaching with Cortex

# Active Learning

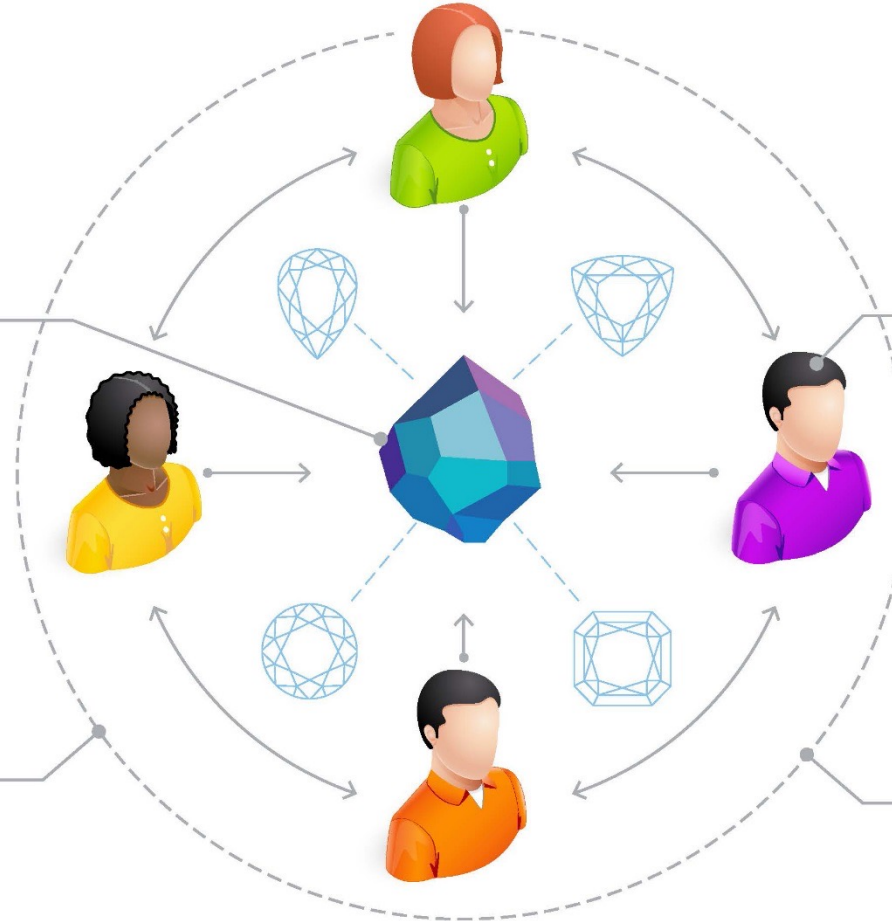
## Problem Based Learning Approach

Léger, P. M., Cronan, P., Charland, P., Pellerin, R., Babin, G., & Robert, J. (2012). Authentic OM problem solving in an ERP context. *International Journal of Operations & Production Management*, 32(12), 1375-1394.

**AUTHENTICITY**  
Realistic situations



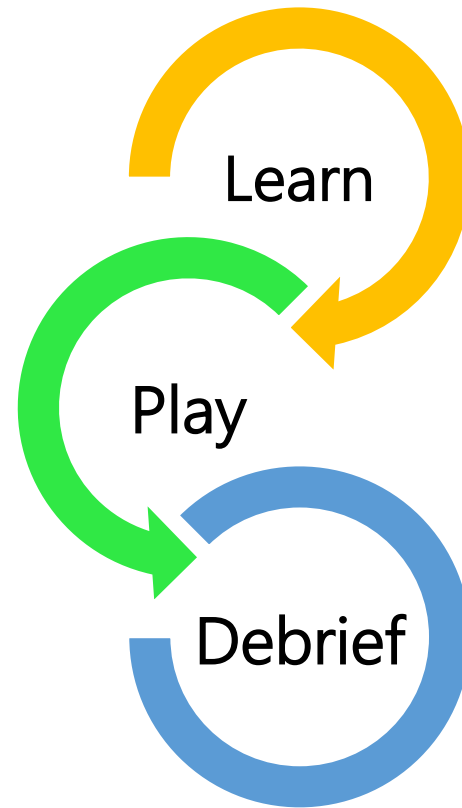
**TEACHER**  
acts as facilitator  
or tutor



**STUDENT CENTERED  
APPROACH**

**COMPETITIVE  
ENVIRONMENT**

# How to play the game?



# Thank You!

Website: [erpsim.hec.ca/cortex](https://erpsim.hec.ca/cortex)

Email: [cortex@hec.ca](mailto:cortex@hec.ca)



# Questions