

Game Design: From data-driven to data-informed

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GAME DEVELOPERS CONFERENCE™ EUROPE
CONGRESS-CENTRUM OST KOELNMESSE · COLOGNE, GERMANY
AUGUST 3-4, 2015

104167

Fun needs maths.

Level 18



Required



Select Boosters



Play

Top List

 Connect!



1



ling2200030143

200000



2



99

200000



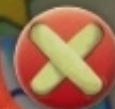
3



Krzysztof Jusik

200000

Join the Club



Duck



Cow



Ostrich



Continue



Moves

8



6 / 6



49 / 18



26 / 18





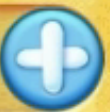
19:47:53



12270



7323



49



48



47



46



45



44



43



42



41



1

Data Scientist

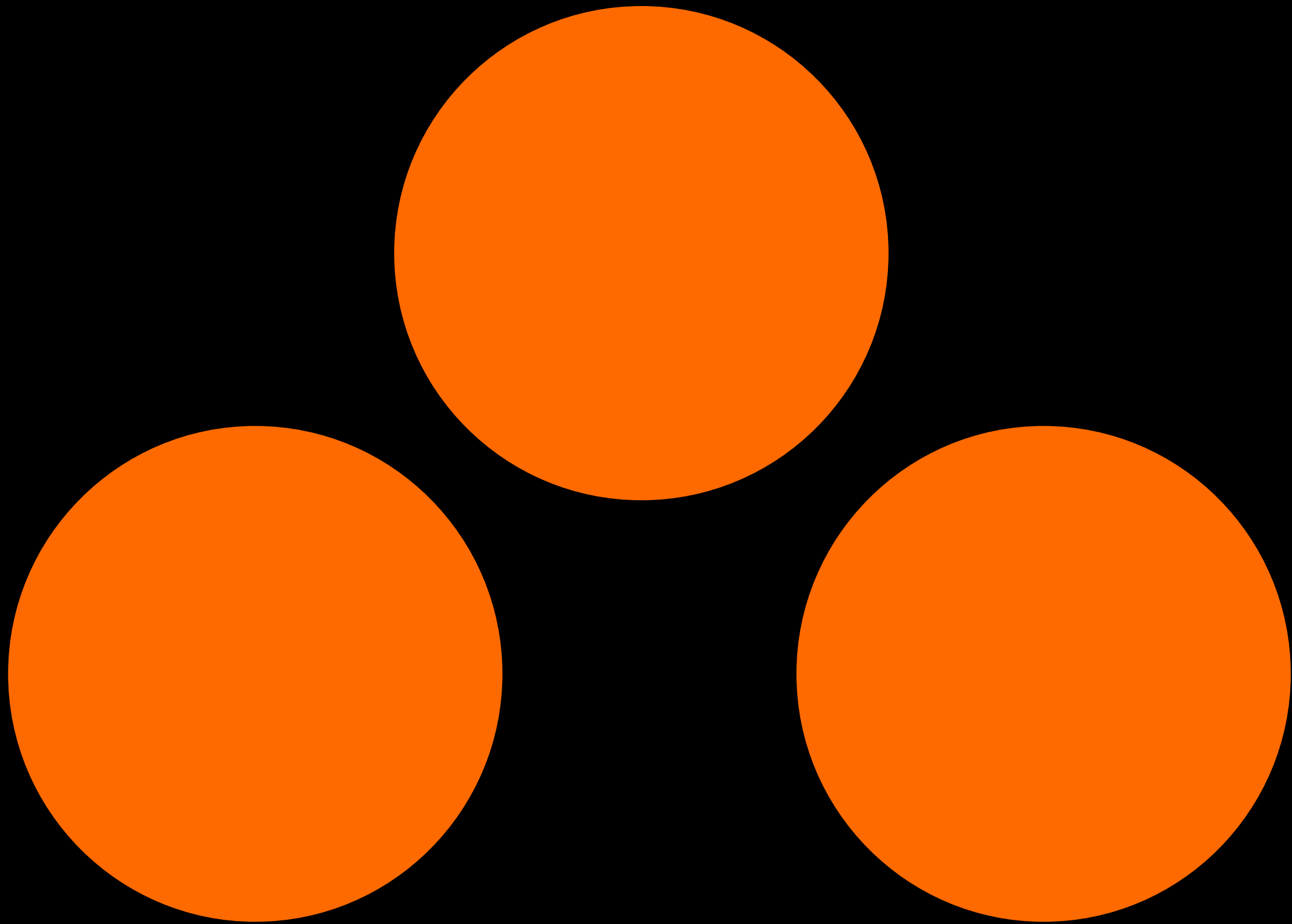
Exploration

Implementation

Launch

Data Science



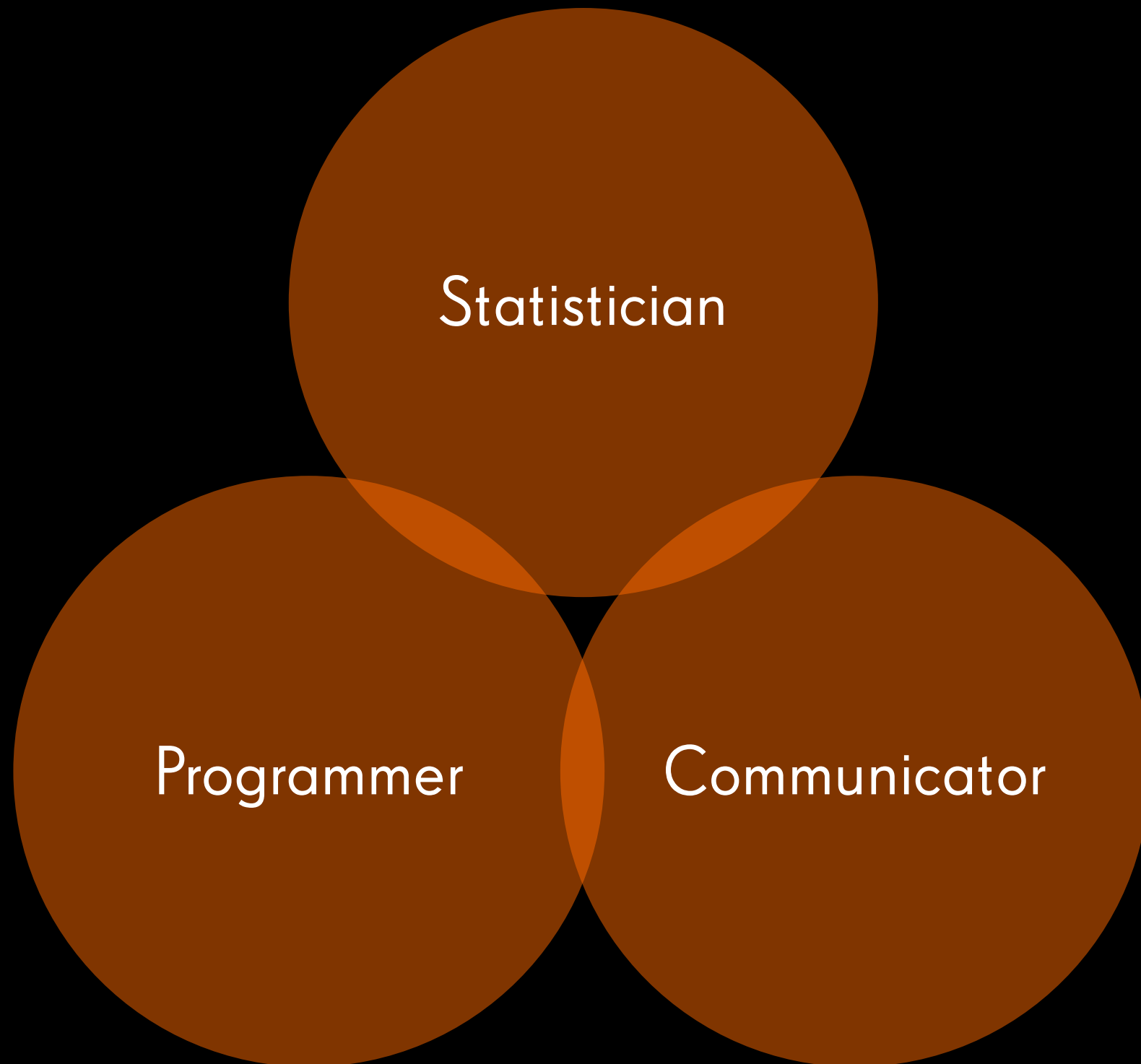




Statistician

Programmer

Communicator



Exploration

Exploration





Y_i = number of collections to get i^{th} new coupon

$$Y_n = \sum_{i=0}^{n-1} X_i \quad \text{where} \quad X_i = Y_{i+1} - Y_i$$

$$X_i \sim Geo\left(\frac{n-i}{n}\right)$$

$$E(X_i) = n \frac{1}{n-i}$$

$$E(Y_n) = E\left(\sum_{i=0}^{n-1} X_i\right) = \sum_{i=0}^{n-1} E(X_i) = n \sum_{i=0}^{n-1} \frac{1}{n-i} = n \sum_{i=1}^n \frac{1}{i}$$

Y_i = number of collections to get i^{th} new **animal**

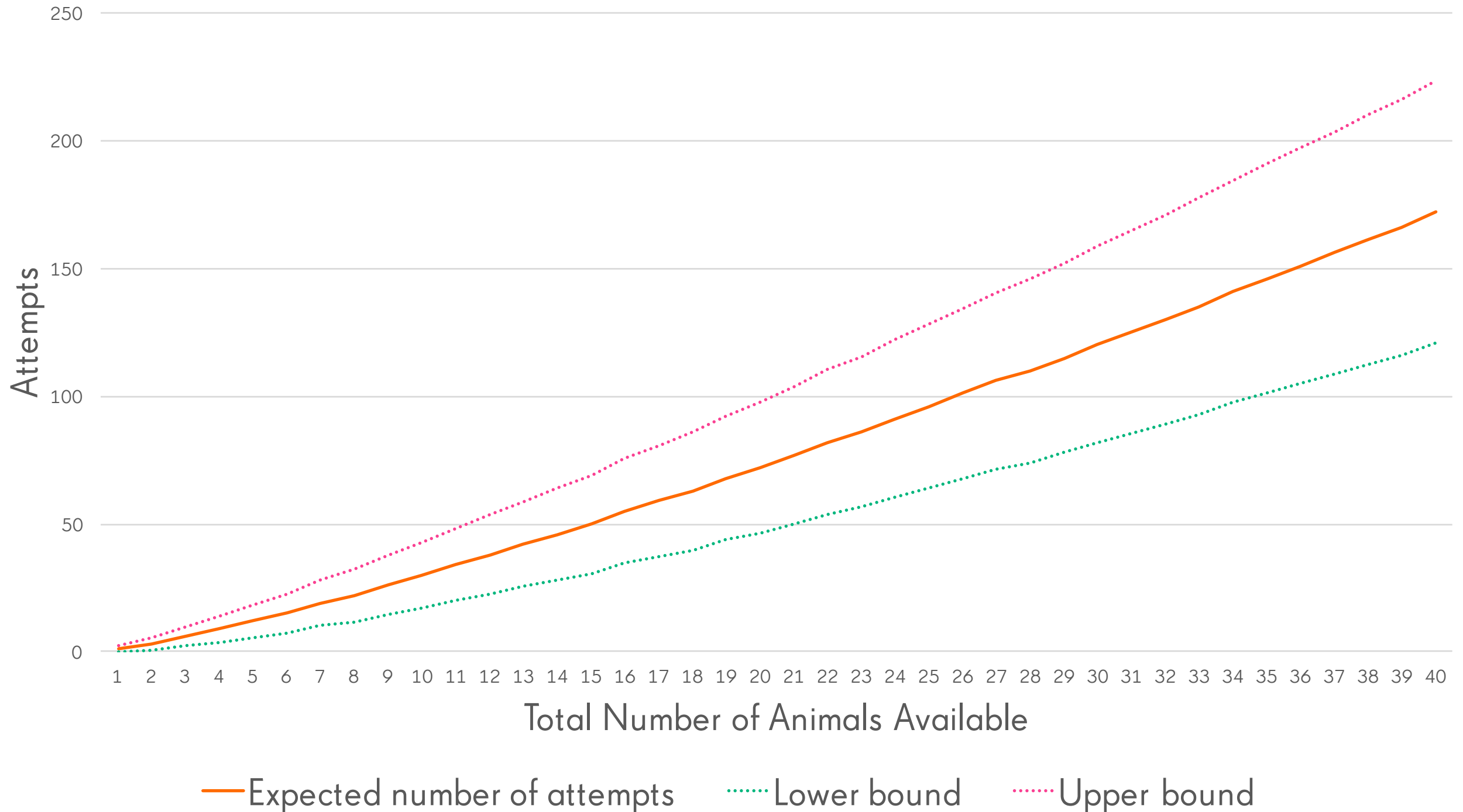
$$Y_n = \sum_{i=0}^{n-1} X_i \quad \text{where} \quad X_i = Y_{i+1} - Y_i$$

$$X_i \sim \text{Geo} \left(\frac{n-i}{n} \right)$$

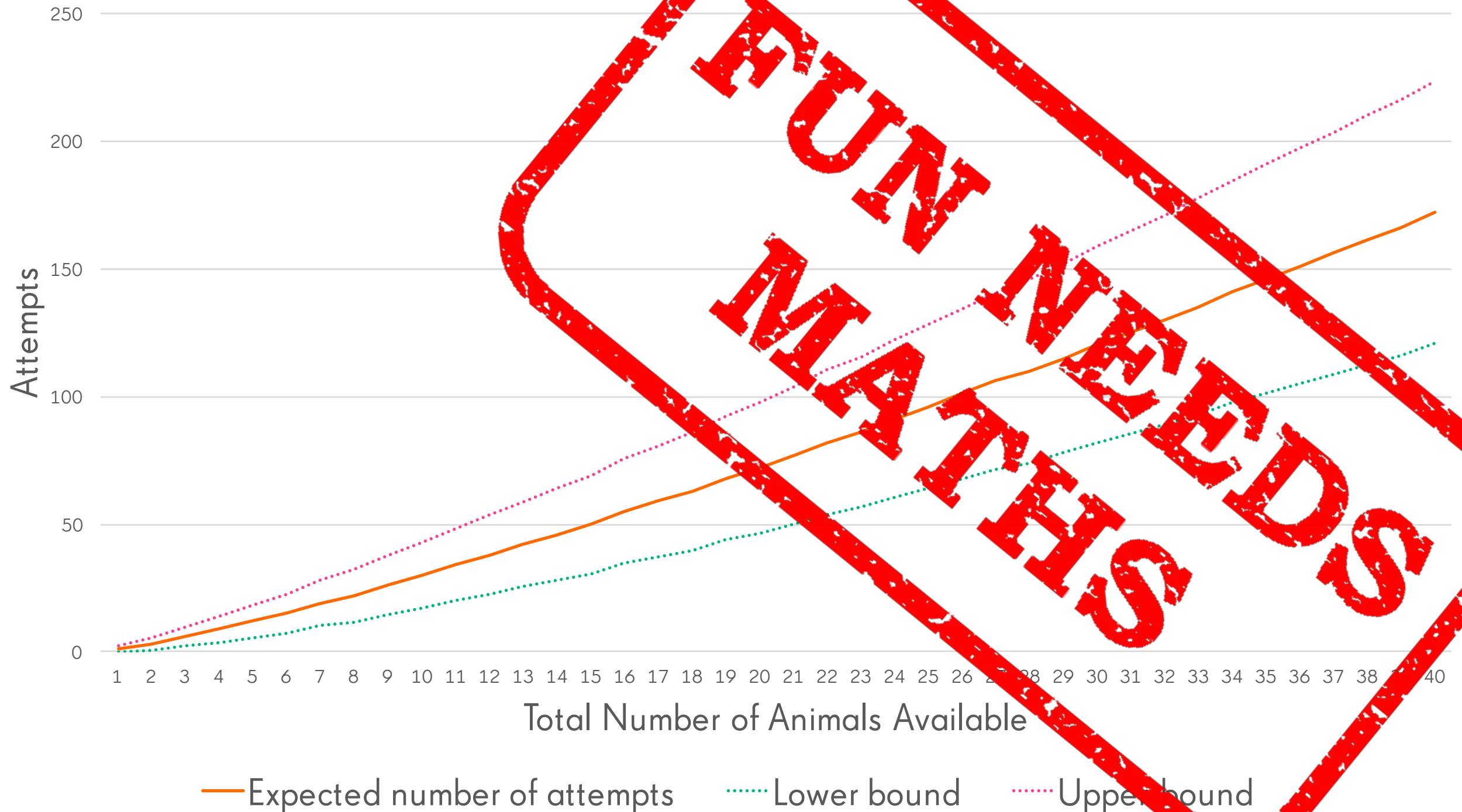
$$E(X_i) = n \frac{1}{n-i}$$

$$E(Y_n) = E \left(\sum_{i=0}^{n-1} X_i \right) = \sum_{i=0}^{n-1} E(X_i) = n \sum_{i=0}^{n-1} \frac{1}{n-i} = n \sum_{i=0}^n \frac{1}{i}$$

How many attempts to collect N animals?



How many attempts to collect N animals?





The Goals

1. Design the new Animals
2. Make sure they're useful
3. But not game-breaking!

100

$C(100, 3)$

$C(100, 3)800$

104167

10

4167

4167



ViewerText

JSON

id : 531

level

suggestedBooster : "Hunter"

contextualBooster : "None"

gameMode : "farm_king_collection"

gameModeConfiguration

starlevel

0 : 100

1 : 150

2 : 200

spawnableItems

0

1

minOnBoard : 0

type : 4

weight : 100

maxOnBoard : 0

2

3

itemTargets


boardState

stealType : "none"

tunnels

numberOfTurns : 15

version : 19

A detailed action figure of Jason Voorhees from the Friday the 13th franchise. He is wearing his signature brown leather jacket, a dark t-shirt, and a brown leather mask with a white face and red markings. He is holding a large, dark machete in his right hand. The figure is standing in a slightly crouched, ready stance.

Name	Value
maxOnBoard	0
minOnBoard	0
type	6
weight	100

Search:

GO!

Next

Previous

JSON

Level 50

Goals


8


22


22

Select Companion

Chicken


Producer

50

Duck


Producer

50

Crocodile


Unlock at Level 38
Go

Select Boosters


+


7


+


+


+

Play

Top List

1


Andreea
986,000


2


Jeffrey
482,000


3


Christian
342,000


4


Mike
338,000


5


Hugo
315,000



Invite Kirsty




Send to all

Level 50

Goals

8

22

22

Select Companion

Chicken

Producer

50

Duck

Collect 12

Produces 3x

50

Crocodile

Unlock at Level 38

Go

Select Boosters

7

Play

Top List

1		Andreea 986,000	
2		Jeffrey 482,000	
3		Christian 342,000	
4		Mike 338,000	
5		Hugo 315,000	

Invite Kirsty

Send to all

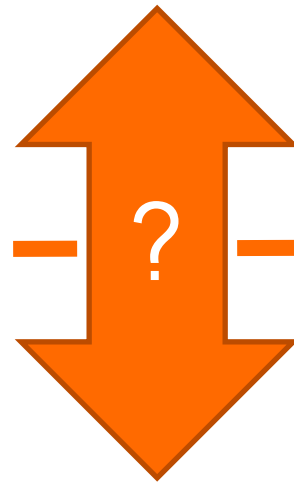
Page 31

Implementation

Implementation



design



data



Python

```
[ level for level in level_list  
    if level.is_boss() ]
```




Django

Site administration

127.0.0.1:8000/admin/

hugoc

»

≡

Django administration

Welcome, **hugoc**. [Change password](#) / [Log out](#)

Site administration

Auth

Groups

Users

+ Add

✎ Change

+ Add

✎ Change

Polls

Ability items

Abilitys

Animal levels

Animal outputs

Animals

Items

Level boards

Level targets

Levels

Spawnable itemss

+ Add

✎ Change

+ Add

✎ Change

+ Add

✎ Change

+ Add

✎ Change

+ Add

✎ Change

+ Add

✎ Change

+ Add

✎ Change

+ Add

✎ Change

Recent Actions

My Actions

✖ 45.3: None ->

Animal

✖ 45.2: None ->

Animal

✖ 45.1: None ->

Animal

✖ Level745

Level

✖ Level744

Level

✖ Level743

Level

✖ Level742

Level

✖ Level741

Level

✖ Level740

Level

✖ Level739

Level

Select Animal

1.1: ONION -> PRODUCE_ONION

▼

Fetch Data

Select Input

▼

Select First Output

▼

Select Second Output

▼

Update Outputs

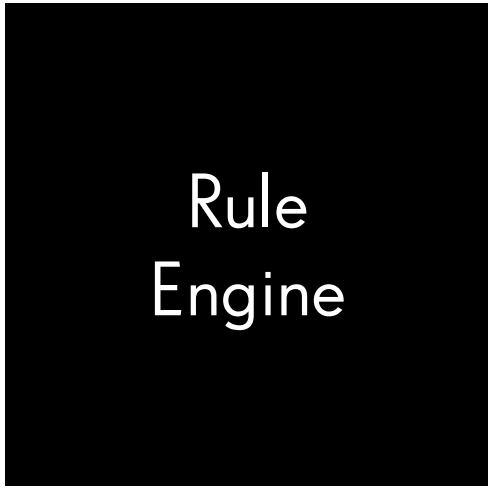
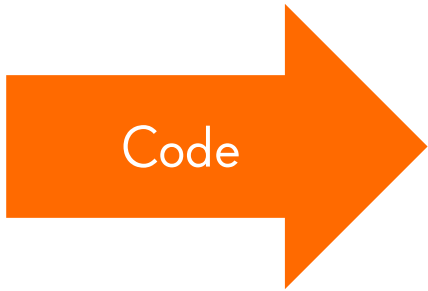
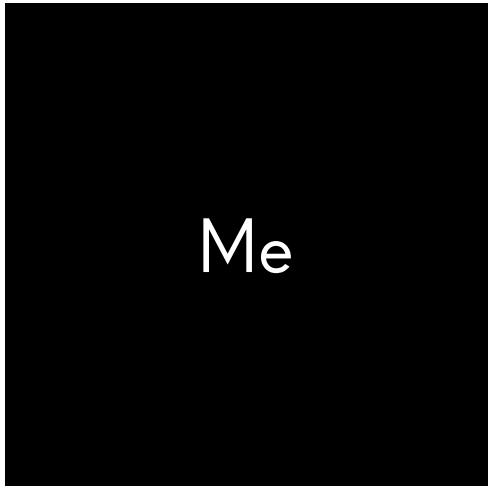
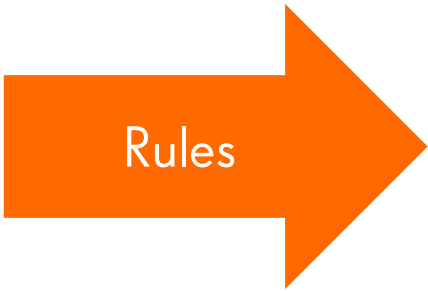
Target and Spawn Data for levels in between collections

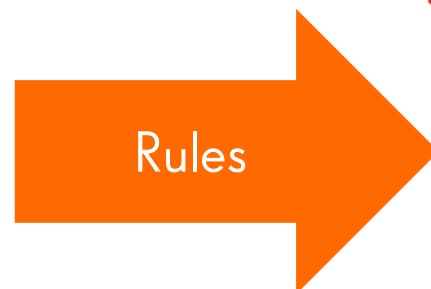
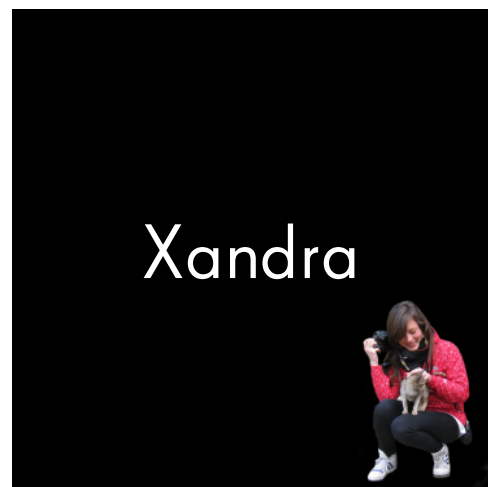
Target items from level 28 to level 38

NAMES	SPAWNABLE	TARGET
APPLE	8	5
CARROT	6	2
ONION	6	5
STRAWBERRY	8	2
SUN	7	2
WATER	7	2

Ability summary from level 28 to level 38

NAMES	COUNT	S_APPLE	S_CARROT	S_ONION	S_STRAWBERRY	S_SUN	S_WATER	APPLE	CARROT	ONION	STRAWBERRY	SUN	WATER
BREAK	6	5	4	5	6	5	4	3	1	4	1	2	0
CRACK	6	5	3	3	5	4	4	3	1	2	2	2	3
GROW	1	1	0	1	1	1	1	1	0	1	0	0	0
PRODUCE_APPLE	6	6	3	5	4	4	5	6	2	4	0	1	2
PRODUCE_CARROT	2	2	2	2	1	1	1	2	2	2	0	0	0
PRODUCE_ONION	5	4	4	5	4	4	4	4	2	5	1	0	0
PRODUCE_STRAWBERRY	2	1	2	1	2	2	2	0	0	1	2	0	1





ViewerText

JSON

0

collectionLevel : 7

outputs

PRODUCE_ONION : 3

stars : 1

companionId : 6501

input

ONION : 12

1

collectionLevel : 7

outputs

CRACK : 1

stars : 2

companionId : 6514

input

STRAWBERRY : 20

2

3

4

5

Search:

GO!

Next

Previous

Name	Value
78	...
79	...
8	...
80	...

ViewerText

30

0 : 6501

31

0 : 6514

32

0 : 6501

1 : 6514

33

0 : 6504

1 : 6502

34

0 : 6514

1 : 6500

2 : 6502

35

0 : 6514

1 : 6500

2 : 6502

36

0 : 6514

1 : 6504

2 : 6502

Search:

GO!

Next

Previous

Name	Value
0	6514
1	6504
2	6502

Level 50

Goals

8
 22
 22

Select Companion

Chicken

Producer

50

Duck

Producer

50

Crocodile

Unlock at Level 38

Select Boosters

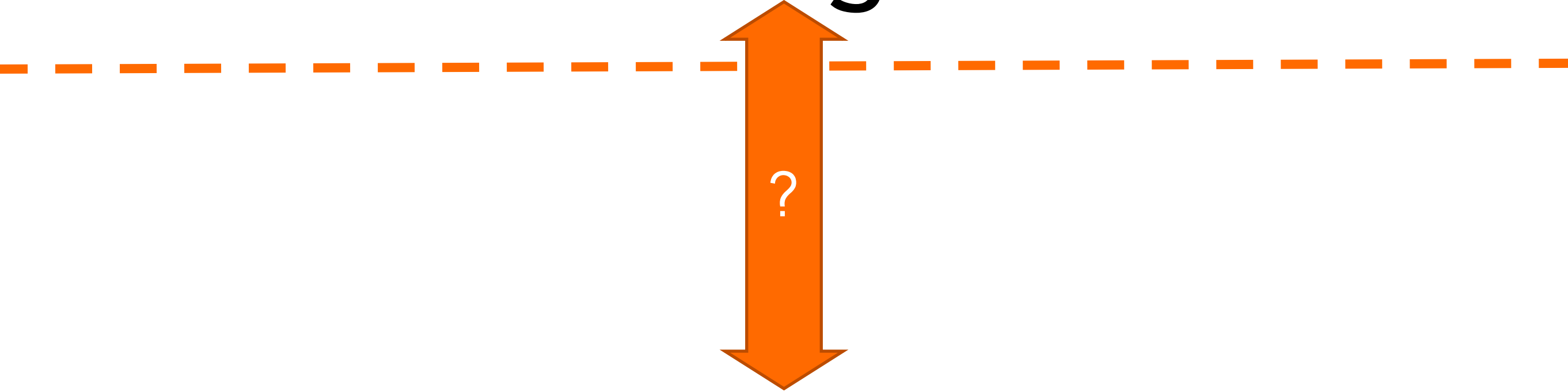
7

Top List

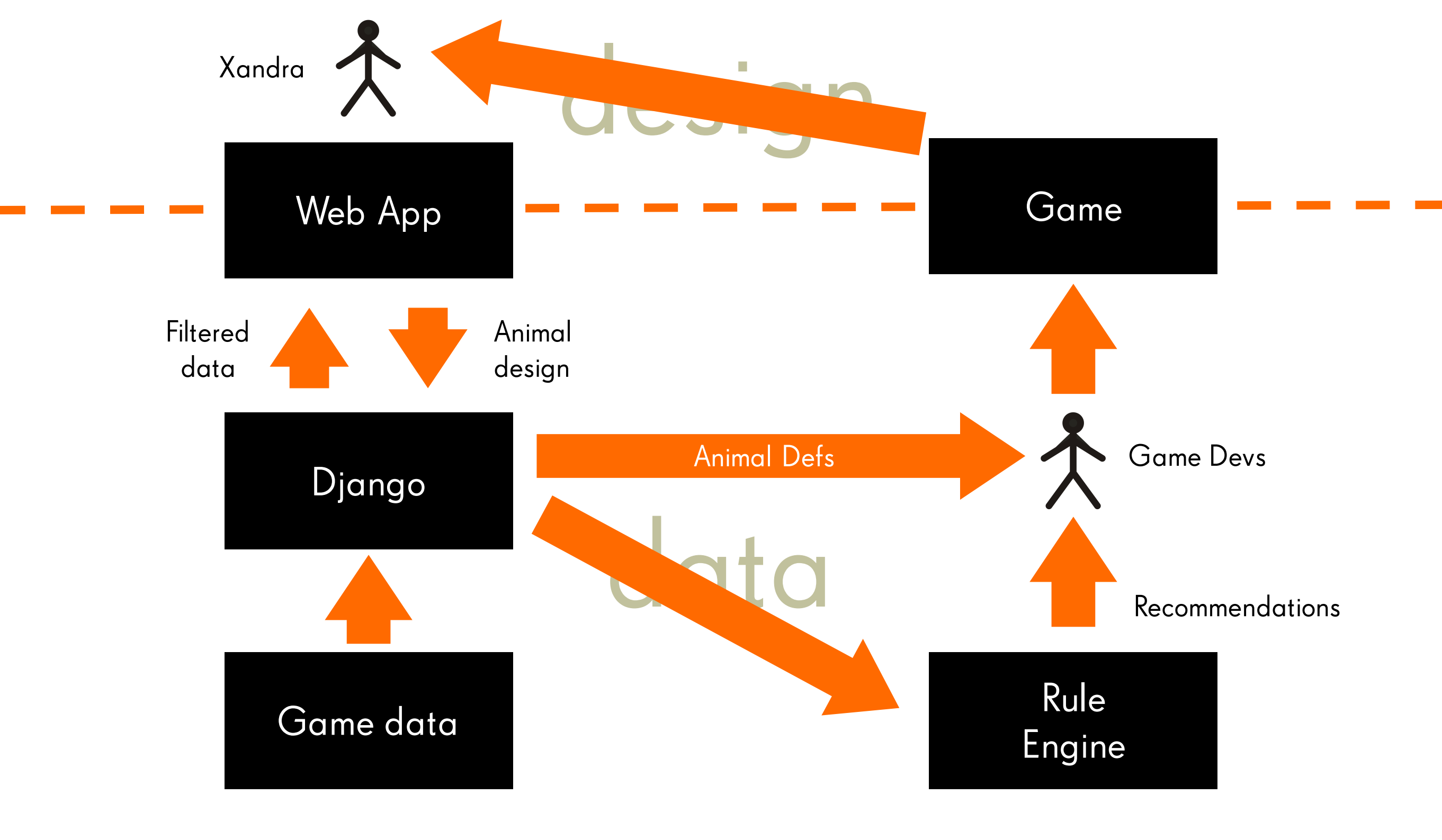
1		Andreea 986,000	
2		Jeffrey 482,000	
3		Christian 342,000	
4		Mike 338,000	
5		Hugo 315,000	

Invite Kirsty

design



data



Job Done?

Launch

Launch





?? ??

1. Is everything broken?

2. Are people using it?

3. Do people 'like' it?

4. What is working well?

5. What could be working better?

1. Is everything broken?

2. Are people using it?

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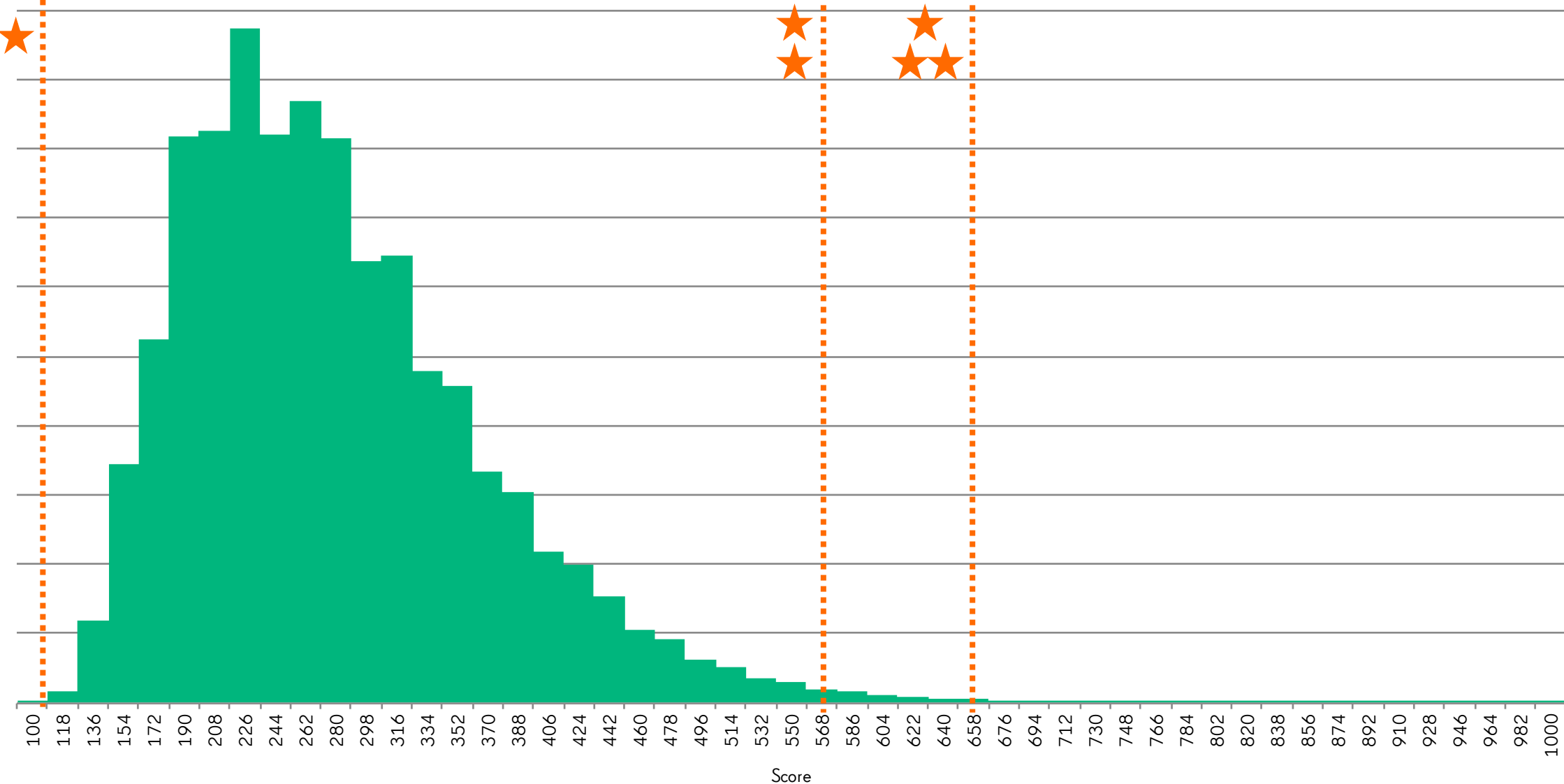
1) You're not helping.



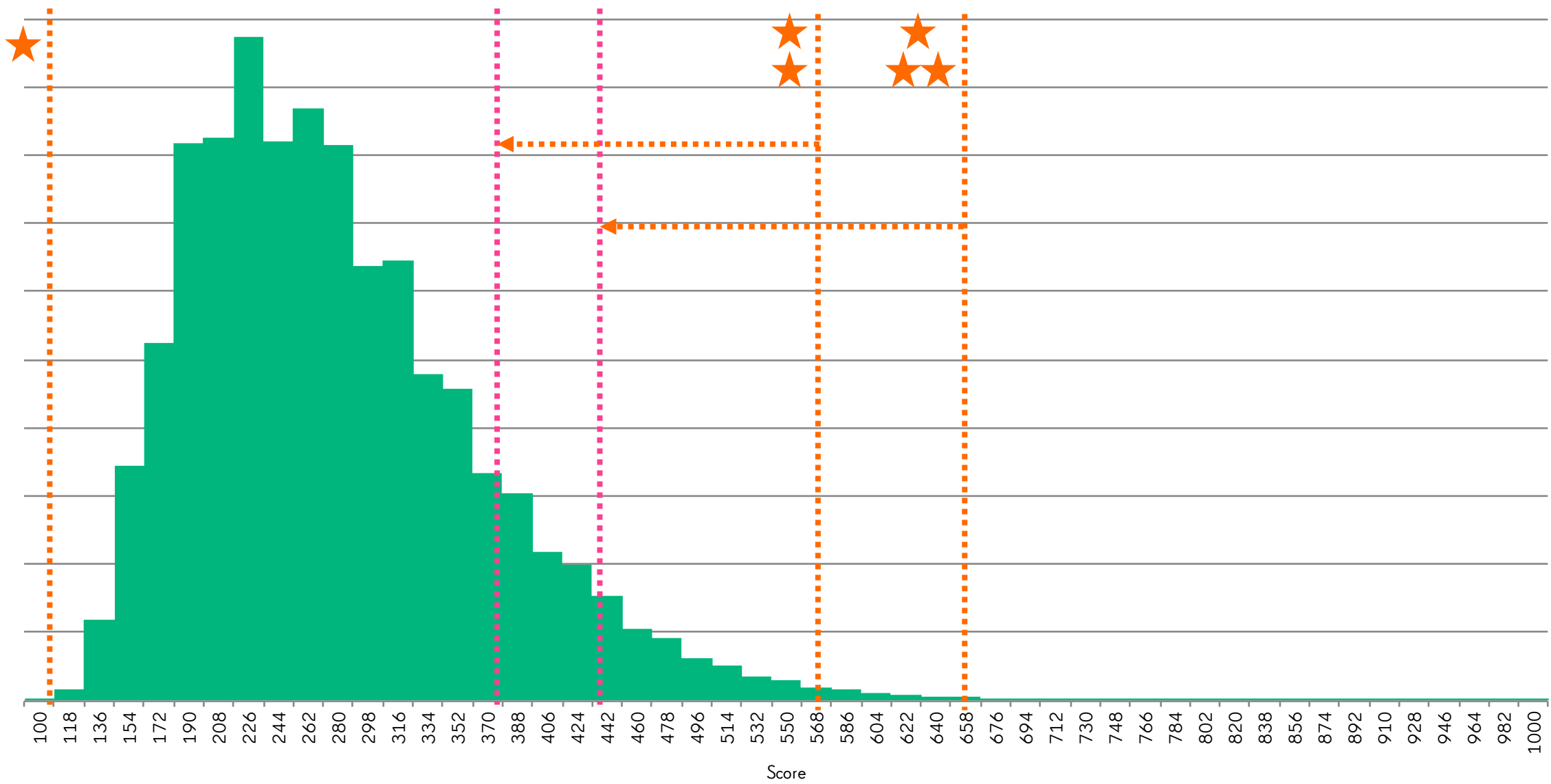
2) Insignificant!

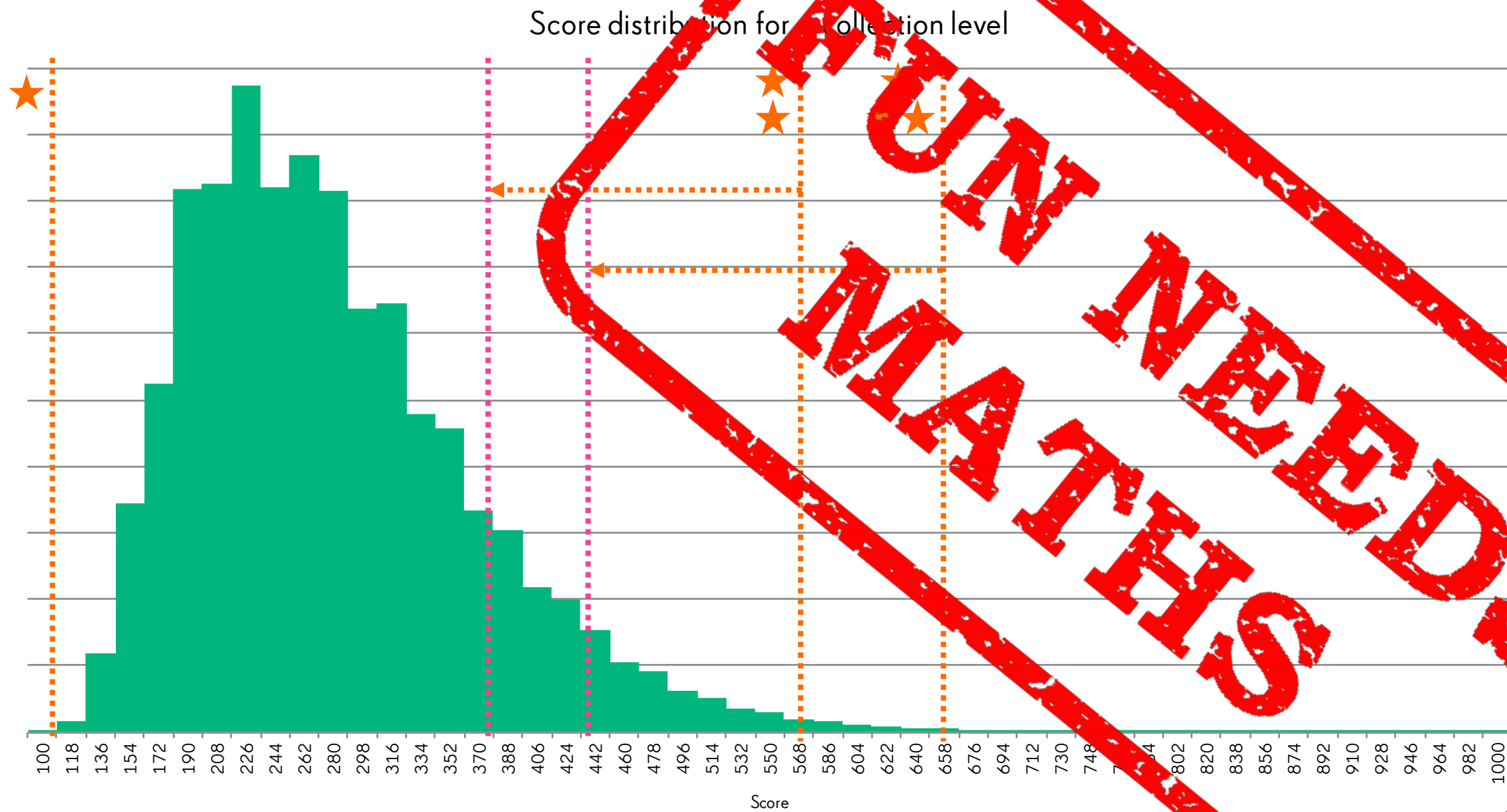
3) Where are all the
animals?

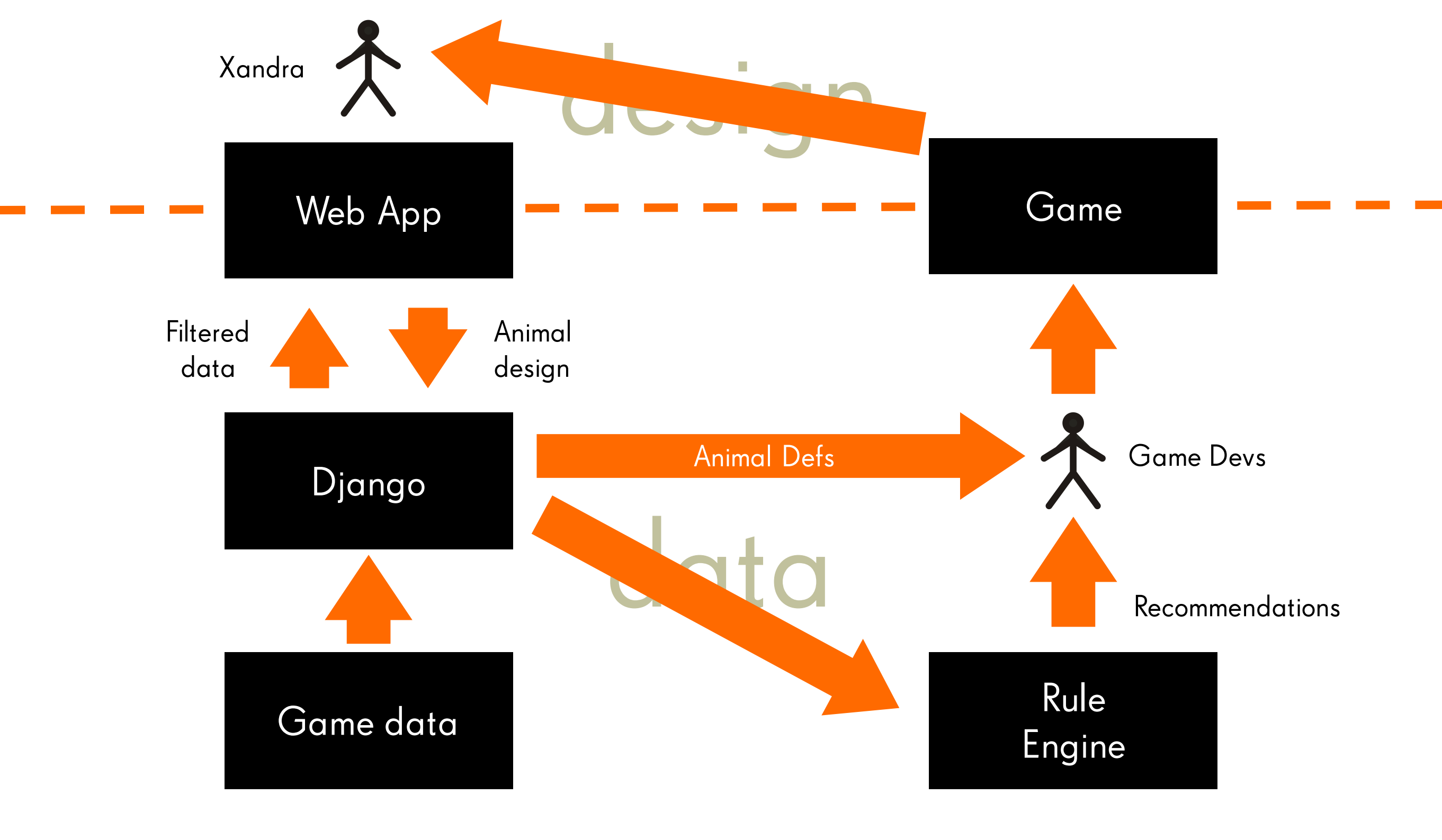
Score distribution for a collection level



Score distribution for a collection level









Now what?

Fun needs maths.

104167

