OLIVER WYMAN

OW DATA CASE CHALLENGE
PARIS PARKING PRICING STRATEGY

OCTOBER, 19 2018

MARSH & McLENNAN
COMPANIES

Content

1 | Introduction

Who are we ?

Oliver Wyman is a strategic consulting firm…

STRATEGY
We help companies set their direction. . .

DESIGN
. . . push them to plan how to get there . . .

IMPLEMENTATION
. . . and provide the horsepower to make it happen…

WITH PROVEN ANALYTICAL EXPERTISE
. . . performing sophisticated analytics to solve the toughest real-world problems

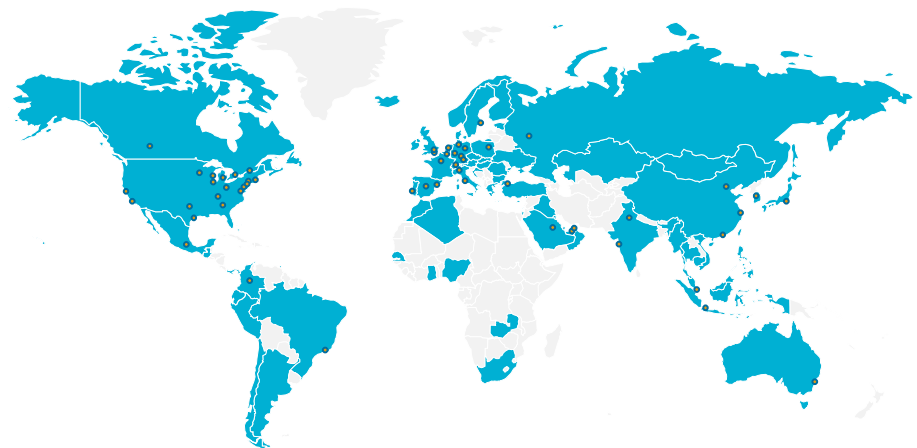## …that serves over half of the Fortune 500 companies

60+	30	4,700+
Offices in nearly	Countries	Professionals worldwide

■ Completed Oliver Wyman projects in 2017   ● Oliver Wyman offices

1st edition of the Oliver Wyman Data Challenge

A case study competition using real-world data, where participants will have to demonstrate:
- Problem solving capabilities to define a structured approach to the issue
- Data analytics to explore available data
- Business sense to discriminate potential solutions

Meet our Team

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Camille Spaeth

Associate

Guillaume Jouffre

Consultant

Nisrine Brahim

Consultant

Sofia Allué

Recruiter

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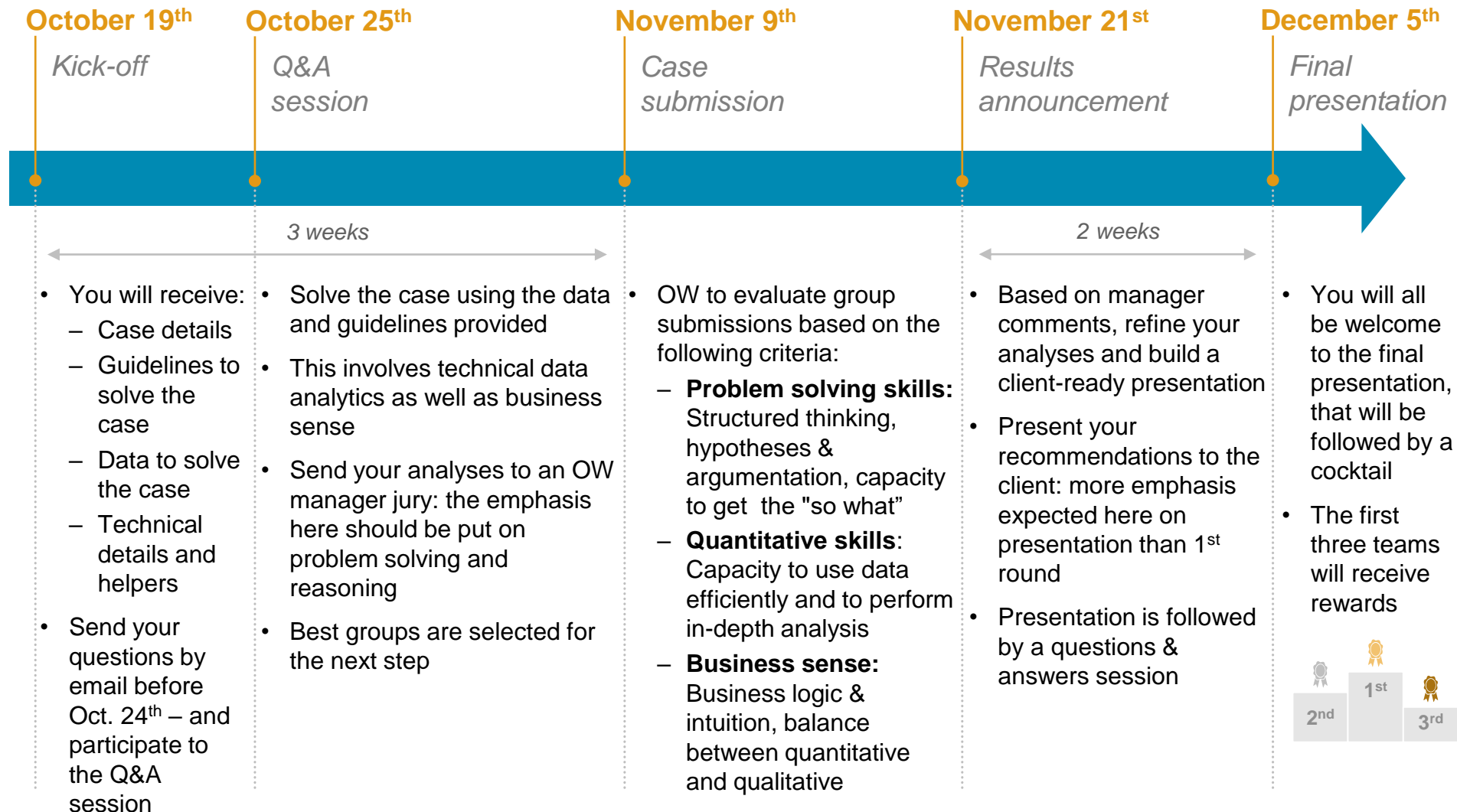*Consultant*

Charlotte Burgos

Recruiter

Chedli Khemakhem

Consultant

2 | Calendar

Data Challenge calendar
2 rounds: 1st for presenting to managers, final round for client presentation

October 19th
Kick-off

October 25th
Q&A session

November 9th
Case submission

November 21st
Results announcement

December 5th
Final presentation

3 weeks

2 weeks

- You will receive:
  - Case details
  - Guidelines to solve the case
  - Data to solve the case
  - Technical details and helpers
- Send your questions by email before Oct. 24th – and participate to the Q&A session

- Solve the case using the data and guidelines provided
- This involves technical data analytics as well as business sense
- Send your analyses to an OW manager jury: the emphasis here should be put on problem solving and reasoning
- Best groups are selected for the next step

- OW to evaluate group submissions based on the following criteria:
  - **Problem solving skills:** Structured thinking, hypotheses & argumentation, capacity to get the "so what"
  - **Quantitative skills**: Capacity to use data efficiently and to perform in-depth analysis
  - **Business sense:** Business logic & intuition, balance between quantitative and qualitative

- Based on manager comments, refine your analyses and build a client-ready presentation
- Present your recommendations to the client: more emphasis expected here on presentation than 1st round
- Presentation is followed by a questions & answers session

- You will all be welcome to the final presentation, that will be followed by a cocktail
- The first three teams will receive rewards

1st
2nd
3rd

3 | Your mission

Context
Paris city is asking for help for its car parking pricing strategy

Context of the mission

- In the years to come, **the French State will reduce its public funding to Paris city**, resulting in a significant and problematic revenue drop for the French capital

- To address this issue, **Paris mayor has to counterbalance this revenue loss** by cutting costs where possible, find new sources of revenues or increase existing ones

- **Paris officials would like to consider the opportunity of revamping its parking price strategy** to increase existing revenues

- Parking fees are an important source of revenues for the city, and after a discussion with OW experts, Paris city administration acknowledged that **significant revenue potential may be untapped**

- **The price structure has been kept very simple until today** with a fixed rate per hour, no matter the time spent, the moment of the day, and with very basic spatial variation:
  - 4€ / hour fee in 1st-11th district
  - 2.4€ / hour fee in 12th -20th district
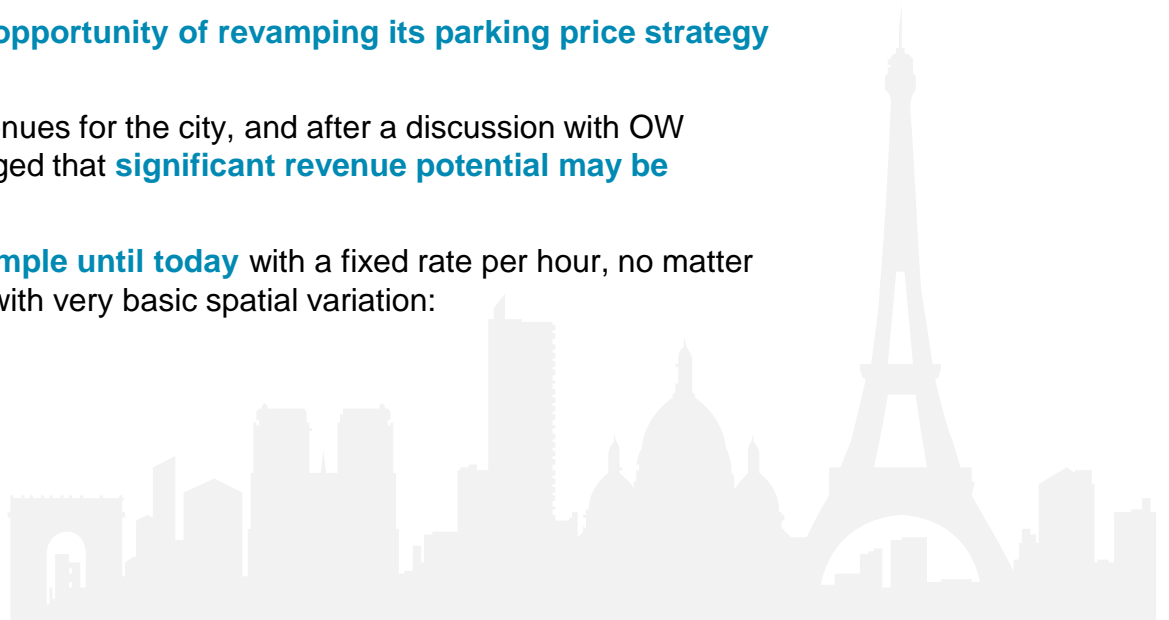
As Oliver Wyman consultants, you have been hired by Paris city to assess the revenue potential of implementing a new pricing strategy

Your mission – Round 1
Delivering a presentation to your manager presenting your approach, analyses and recommendations regarding the pricing strategy to adopt

Your mission

- Your final objective is to assess the potential revenue benefits for Paris to change its parking pricing strategy (potential strategies to be defined), and provide recommendations.

- For this assessment, you will be given a set of data and 3 weeks to perform analysis. PowerPoint presentations are the expected deliveries for each round. 2 different deliveries are expected for each round.

1   **Expected delivery for 1st round**

- PowerPoint presentation of 7 to 12 slides[1], presenting your case resolution **to a manager** (+ code / excels used for analyses)

- The structure and content of the presentation is free, but should be focused on (non exhaustively):
  - Reasoning and logic
  - Different steps and work performed
  - Main results
  - Qualitative and business arguments

- The focus of this presentation is more about your logic and reasoning to solve the case

- Your presentation will be reviewed by a jury of managers, who will select best teams for the second round, and provide individual guidelines on what to refine for the second round

1.   Appendix can be added on top of this 7-12 slide presentation if necessary. Although, code should be sent to OW teams (by email or shared through github)

Your mission – Round 2
Delivering a client-ready presentation to Paris mayor advising which parking pricing strategy Paris should adopt

2   **Expected delivery for 2nd round**

- PowerPoint presentation of max 10 slides**,** presenting your analysis and results **to the client**

- Again, the structure and content of the presentation is free, but should be as thorough as possible, and contain at least the following elements (non exhaustive):
  - Diagnosis of the current situation
  - Pricing Strategies proposed and hypothesis
  - Qualitative analysis (e.g. fraud, competition, etc.)
  - Revenue impact assessment
  - Recommendations for Paris city

- You will present your results to a jury acting as a client, so particular attention should be put on the presentation in itself (structure, layout, flow, etc.) and on communication (clarity, conviction, professional attitude, etc.)

Potential approach to the case resolution
Some questions you might ask yourselves to solve the case

Key questions you can follow to solve the case

DIAGNOSIS
What are the key dimensions and key figures ?

- How many parking spot are there in Paris? What are the revenues per spot and the occupancy rate?
- What are the different client segments?
  – What are the revenues for each segment?
  – What is the occupation of parking spot for each segment?
- Is parking spot occupation variable along the year ? (Seasonality)

POSSIBLE STRATEGIES
What are the potential pricing strategies?

- What could be the city's overarching objectives?
- What are the market dynamics ?
- On which dimensions should the prices vary and how?

IMPACT
Which strategy do you recommend and what would be the revenue impact for Paris city?
How would users and competition react to this strategy ?

More advanced questions regarding pricing strategy

- Space variations: how demand varies per residential area?
- Time variations:
  – How demand varies within days, weeks, months?
  – How demand varies along parking time?

Tips
5 pieces of advice to make your work a success

1	**Structure your approach**	• The mandate given by the client is broad, and dataset is vast: don't start blindly analysing data before having asked yourselves what are your objectives, and what will you be looking for
2	**Understand market dynamics and choose your method**	• Think of the problem first from a business perspective and use your creativity and market trends to guide you in what you should look for • You are free to leverage the code language or tool of your choice, no advanced technical skills are required and you can leverage online resources for learning
3	**Make assumptions when needed**	• Even if there is some data to help you crack the case, you will find some missing pieces to build accurate pricing models and revenue projections • To address this, don't hesitate to take hypothesis when needed to help you build your models. When presenting, just remember to clearly highlight the hypothesis and the source (can be an arbitrary hypothesis or rely on an online source)
4	**Balance quantitative with qualitative analysis**	• Quantitative analytics will play a very important role in the case resolution • However, qualitative reasoning and business thinking shouldn't be neglected: it is as important as analytics and will strengthen a lot the quality and the logic of your presentation
5	**Take a step back, a clear presentation is important**	• As data analytics can be complex and time consuming, you might find yourself a bit lost or overwhelmed by data work • Don't forget to take a step back when building your presentations: remember the context, the big picture, the objectives and put yourselves in the jury's shoes

Next steps

- We will send out a **starting pack** including:
  - **This presentation**, that will also contain two additional sections:
    - A brief presentation of available data
    - Some recommendations to get you started
  - The **available data**
  - A detailed **tutorial** to access the data

- You will have a week to send out your questions (if relevant) to datachallenge@oliverwyman.com:
  - When sending a question, please:
    - Put "Team X – Questions" as the subject
    - CC your team referent (cf. next slide)
  - We will organize a new **video-conference session at 6pm on October 25th** to answer all questions – **please send out questions before Wednesday 24th – noon**

Referents
Each team will have a referent that you can contact: write to datachallenge@oliverwyman.com for questions, with your contact in cc

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1. For all questions, please write an email to datachallenge@oliverwyman.com and put your team referent in copy of the email

4 | Data available

Data overview
Parking count data (1/3)

Data available

- To help you solve the case, Paris data officials provides 2 sets of data available in the database:
    1. *Parking count data*: providing information on the average number of cars parked near a parking meter, for a given day and on a given 5 minutes slot
    2. *Parking meter transaction data:* all transactions of Paris parking meters, with amount paid, duration hours, date, etc.
- Moreover, one of your colleague created *parkmeters_zones_12_12*: a table meshing Paris in 144 zones, containing the location of each parking meter
- Additional tables are provided in the pack for eventual additional analysis

Parking counts
Table name: *parking_counts*

Variable name	Definition	Comments
Parkmeter	Parking meter ID	This ID is unique for each parking meter
Weekday	Day of the week	Monday to Sunday
Hour	Hour of the day	Ranges from 9 to 9
Minute	Minute of the hour (5 minutes slots)	Ranges from 0 to 55 by 5 min increments. For instance, "9 hour 0 minutes" refers to the 9h – 9h05 slot
count	Average number of cars parked per parking meter, per weekday, per hour, per 5 minutes slots. (only during the paid period – 9h-20h)	This is the yearly average[1] number of cars for which a fee has been paid for this specific 5 min slot, and for this specific parking meter

1. If we take the Monday 9h – 9h05 slot for instance, an average has been done on all "Monday 9h – 9h05" slots across the year

Data overview
## Parking meter transaction data (2/3)

Parking meters transactions
Table name: *transactions_and_locations*

Variable name	Definition	Comments
parkmeter_id	Parkmeter ID	This ID is unique for each parking meter
user_type	Resident or Rotative	Resident may benefit from different fee rates
payment_method	CB = Debit card Paris Carte = Paris Residential Card	
Amount	Amount paid (in euros)	Duration paid x hourly rate
duration_hours	Duration paid for (in hours)	
parking_start	Starting date and time	Datetime format
parking_end	Ending date and time	Datetime format
parkmeter_address	Street format address	
system	Parking type: mix or rotative	MIX: for resident & rotative parking (parking with resident specific prices), ROT: for rotative parking only
residential_area	Area code	This code refers to Paris parking residential areas[1]. This code correspond to a meshing of Paris in 160 zones.
hourly_rate	Theoretical parking fee hourly rate	Theoretical data. *Amount* / *duration_hours* should be used instead of *hourly_rate* for actual data
parkmeter_coordinates	Parking meter GPS coordinates	

1. See this link to visualize zones on a map: Link

Data overview
Paris meshing (3/3)
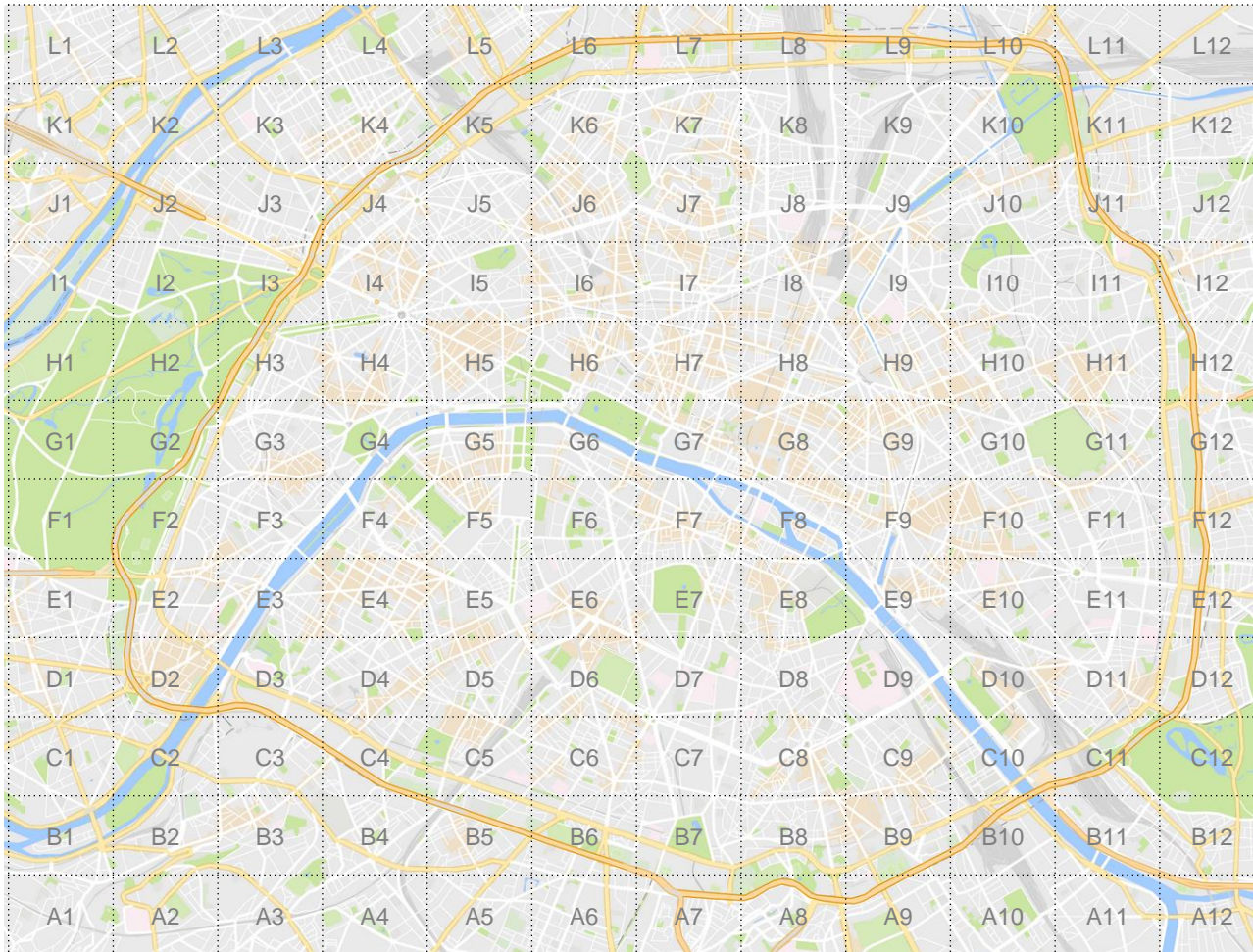
Zone assignment data
Table name:
parkmeters_zones_12_12

Variable name	Definition
Parkmeter_id	Parking meter id
Zone	Parking meter zone in a simple format: e.g. 'A4' for row A and column 4

5 | **Get started**

Getting started
Set-up your environment

Requirements to access the data

- Data is provided to you in .h5 format (As parking meters transactions table has ~ 25M, it exceeds Excel limits)

- To access this data and further manipulate it, you will need to set-up an IDE on your computer (Integrated Development Environment), and you will need to use a coding language

- Data reading and crunching can be performed by any means (compatible with .h5 reading), and the **method is left free to the candidate. For beginners, we recommend using Python language and Spyder IDE** (alternatively MySQL)

- We provide here some details and help for getting started, allowing to start without coding background.

Set-up your environment

- To set-up Spyder and Python on your computer:
  - Click this link to install Anaconda: Link
    - Select the right platform on the website (e.g. Window, OSX, Linux)
    - This will install both Python (language) and Spyder (IDE) on your computer
  - Once installation is complete, you should be able to find Spyder in your applications
  - Moreover, a text editor may be helpful to read .py files notably
    - You can download for instance Sublime Text following this link

- For a quick introduction, you can get help with the following tutorials:
  - **Spyder:** a short video introduction: Link
  - **Python:** Example tutorials to get started (plenty of tutorials on the internet): LearnPython.org / CodeAcademy

- Details to read the data are provided in the next page

Getting started
Reading the data

- **We provide here a small code example tutorial**, allowing you to read the data with Spyder and to get you started

- **Open Spyder application.** In Spyder iPython console, run the commands below
  - You can find the code in text format, in the Data_access_tuto.py file supplied to you

```
In [1]:  ## This is a tutorial for reading the data
         print("This is a basic tutorial for reading the data")

         This is a basic tutorial for reading the data

In [2]:  ## Step 1
         ## This import pandas functions and library, useful to read and manipulate hd5 format data
         ## Pandas library will be used in next fonction (see pd. prefix)
         import pandas as pd

In [3]:  ## Step 2
         ## Putting the path of the data file into a variable (more convenient for next steps)
         ## Replace the path below by the path of your personal computer (where you stored the data)
         ## Note: '\' won't be recognised on windows computers, use '//' instead
         data_case_storage='C://Users//guillaume.jouffre//Desktop//stored_data_case.h5'

In [ ]:  ## Step 3
         ## Definition of a function listing all tables in the datafile
         def list_HDF_file(file_name):
             with pd.HDFStore(file_name, complevel=9, complib='blosc') as store:
                     result = store.keys()
             return result

         ## Calling example
         list_HDF_file(data_case_storage)

In [ ]:  ## Step 4
         ## Definition of a function reading a table
         def read_HDF_file(file_name, table):
             with pd.HDFStore(file_name, complevel=9, complib='blosc') as store:
                     return store[table]

         ## Calling example: this should print the full table /transactions_and_locations(column labels and data)
         read_HDF_file(data_case_storage,"/transactions_and_locations")
```

Now you are ready to start, it is your turn to play and to crack the case !