

# Civil Engineering Big Data primer

A WCCE project

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# How many CE are necessary to manage sustainable development?

- A FIRST QUESTION:  
is there a shortage of engineers and decayed interest?
- A SECOND QUESTION:  
how many civil engineers are necessary to handle expected growth?
- IF CIVIL ENGINEERS ARE REQUIRED TO GROW, THEY MUST BE FORMED, A PROCESS THAT TAKES TIME
- NEW ENGINEERING CAREERS BASED ON CIVIL ENGINEERING SPECIALIZATIONS TAKE A PORTION OF POTENTIAL CIVIL ENGINEERS STUDENTS

# Scope of the study

- COMPARISON OF PARAMETERS FROM DIFFERENT COUNTRIES
- CORRELATIONSHIP AMONG THESE PARAMETERS
- PARAMETERS:
  - NUMBER OF CIVIL ENGINEERS IN DIFFERENT COUNTRIES
  - GDP OF EACH
  - POPULATION
  - GDP PER CAPITA
- IT IS AN ONGOING RESEARCH



THE WORLD BANK

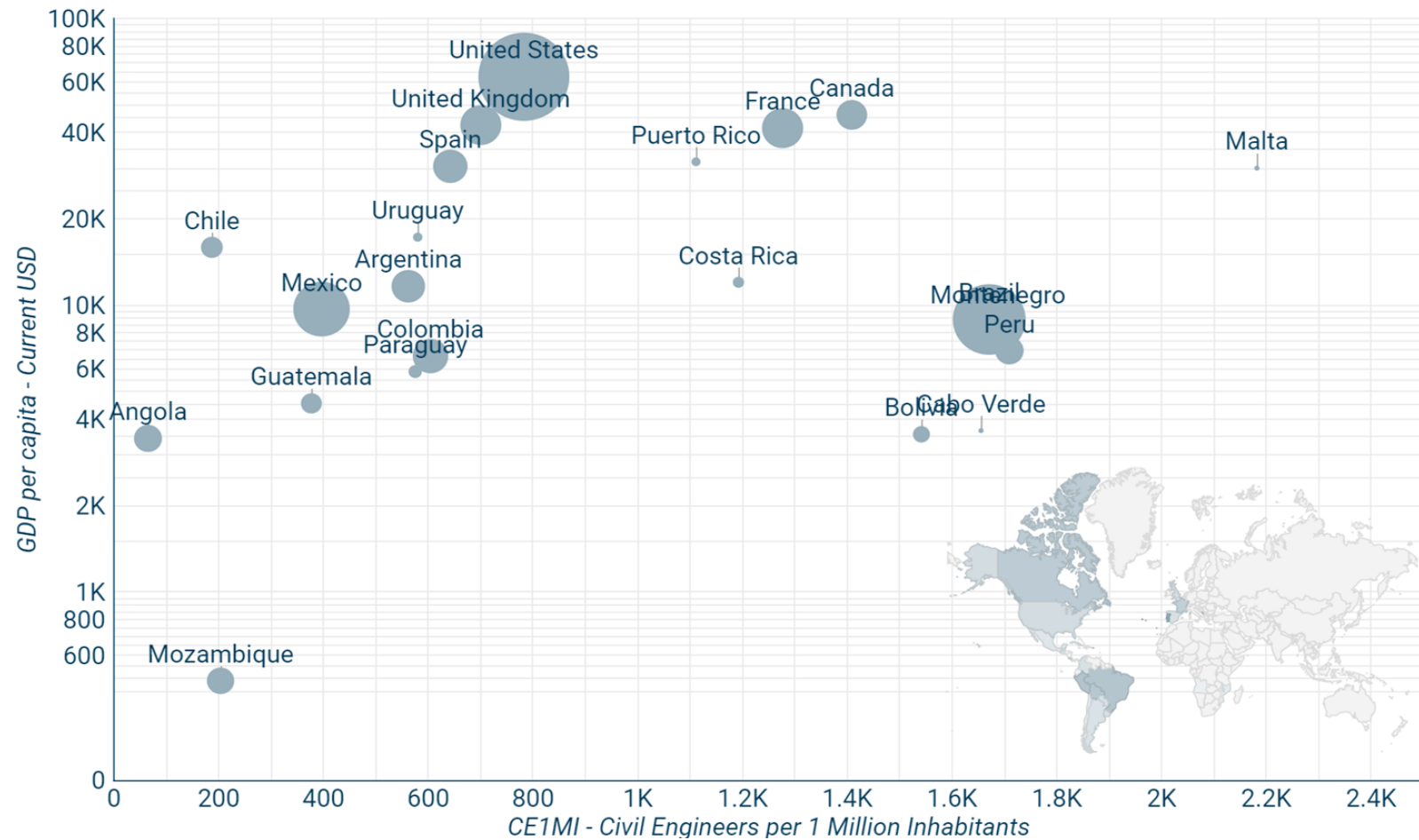
# 24 COUNTRIES



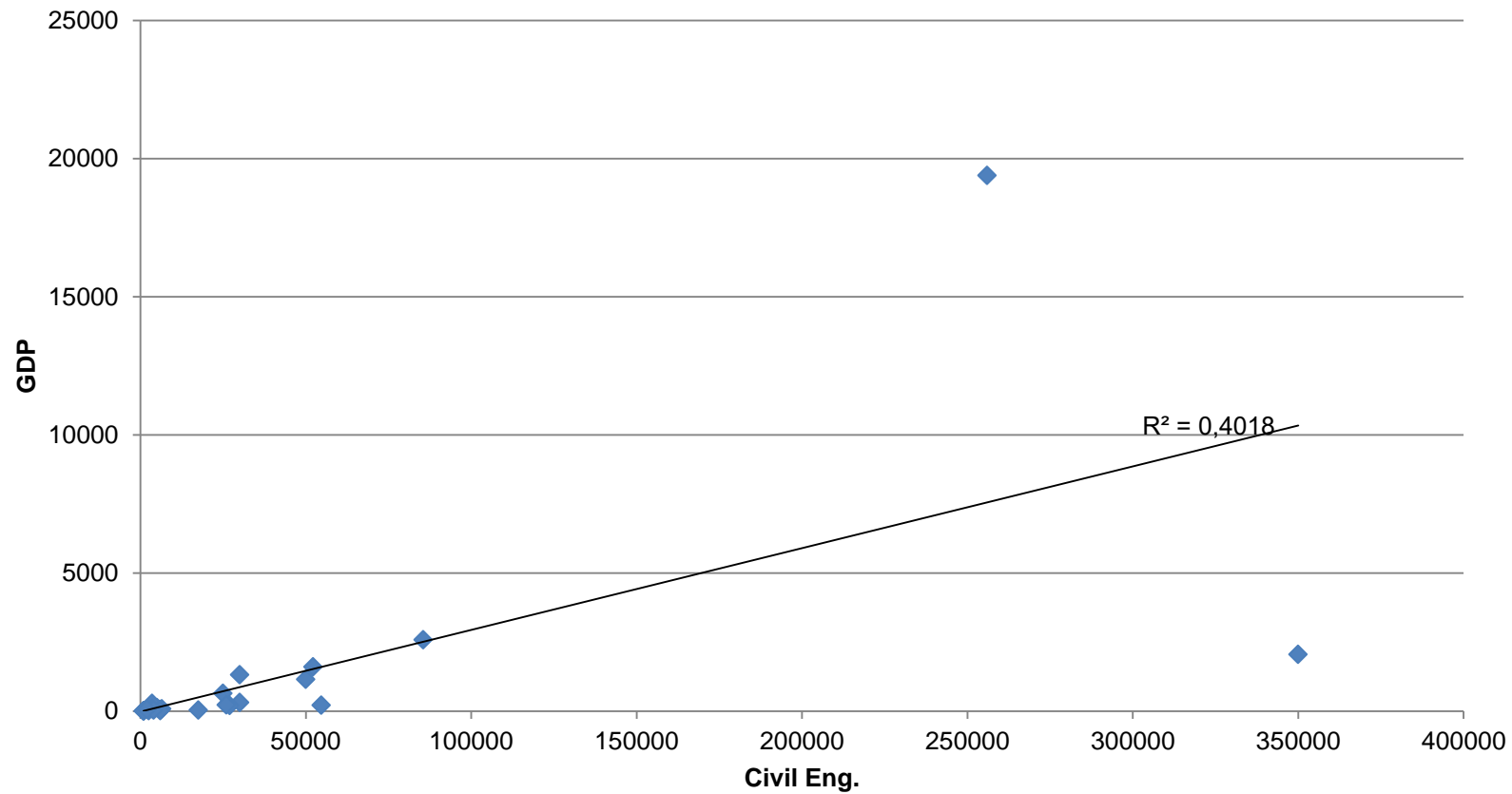
|            |        |       |
|------------|--------|-------|
| ANGOLA     | 5000   | 28,8  |
| ARGENTINA  | 25000  | 44,2  |
| BOLIVIA    | 17500  | 11    |
| BRASIL     | 350000 | 210   |
| CABO VERDE | 900    | 0,543 |
| CANADA     | 52200  | 37,06 |
| CHILE      | 3500   | 18    |
| COLOMBIA   | 30000  | 45,5  |
| COSTA RICA | 5960   | 4,9   |
| CUBA       | 3500   | 11,5  |
| ESPAÑA     | 30000  | 46,7  |
| FRANCE     | 85500  | 67,19 |
| GEORGIA    | 2550   | 3,9   |
| GRECIA     | 27000  | 10,4  |
| GUATEMALA  | 6500   | 16,9  |
| MALTA      | 1055   | 0,44  |
| MÉXICO     | 50000  | 131,4 |
| MONTENEGRO | 1050   | 0,62  |
| MOZAMBIQUE | 6000   | 29,6  |
| PARAGUAY   | 4000   | 6,8   |
| PERU       | 54680  | 32,17 |
| PORTUGAL   | 26000  | 10,2  |
| URUGUAY    | 2000   | 3,4   |
| USA        | 256000 | 327,2 |

# GDP Per CAP Vs CE

$R^2=0,10$

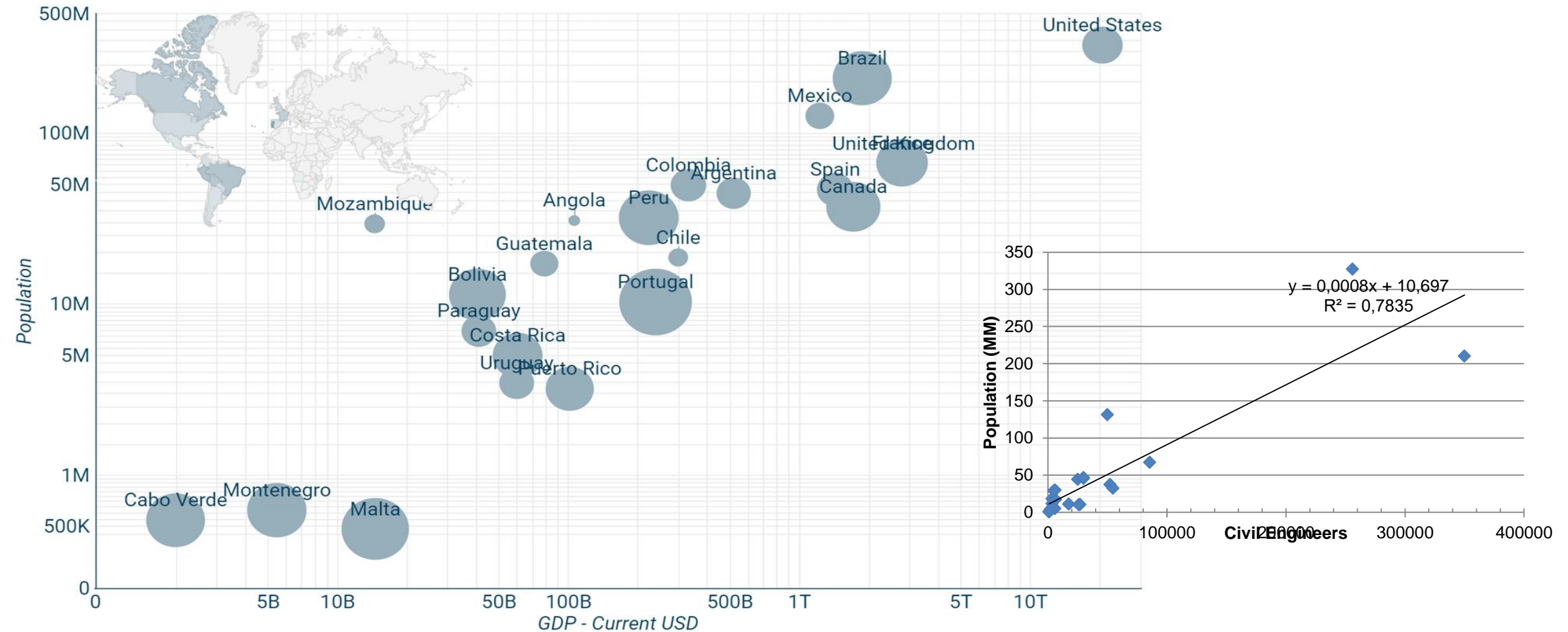


# GDP vrs CIVIL ENGINEERS





# POPulation Vs GDP



# Preliminary Conclusions

1. No relationship seems to exist between
  - Number of **C**ivil **E**ngineers Vs **GDP** or **GDP Per CAP**ita
2. **Meaningful correlation** between:
  - Number of **C**ivil **E**ngineers Vs **P**opulation
3. Average is 1.077 civil engineers/1.000.000 people
4. The ratio between “civil engineers” and “registered civil engineers” vary broadly



# Next steps

- Complete Dataset
  - Add Country data
  - Refine Country data
- Look into the movie instead of the picture
  - Better understanding on how demand and unemployment influences the attraction to the civil engineering profession
  - Relate the number of engineers to the 5-yr evolution of the GDP
- Relate claims of shortage of engineers and the number of CE
- Standardize the meaning of “Civil Engineer”

# Next steps

## Expand project's scope engaging relevant stakeholders



### Labour metrics

EMP\_TEMP\_SEX\_OCU\_NB\_A

Employment by sex and occupation



United Nations  
Educational, Scientific and  
Cultural Organization

### Higher Education metrics

ISCED 582, ISCO 08 - 2142 CIVIL ENGINEERS

- Incoming students
- Graduates



WORLD TRADE  
ORGANIZATION

### Trade flows metrics

FATS-IS4\_AGG - ARCHIENG - IN/OUT

- Engineering services
- Construction services

## Dataset completion



### Country data

- Europe
- America



### Time series (years)

- (5) - Regional Analysis
- (10) - Country Reports

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<https://datastudio.google.com/s/qgggtqj1Us>

***Thank you very much!***

***Muito obrigado!***

***¡Gracias!***

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