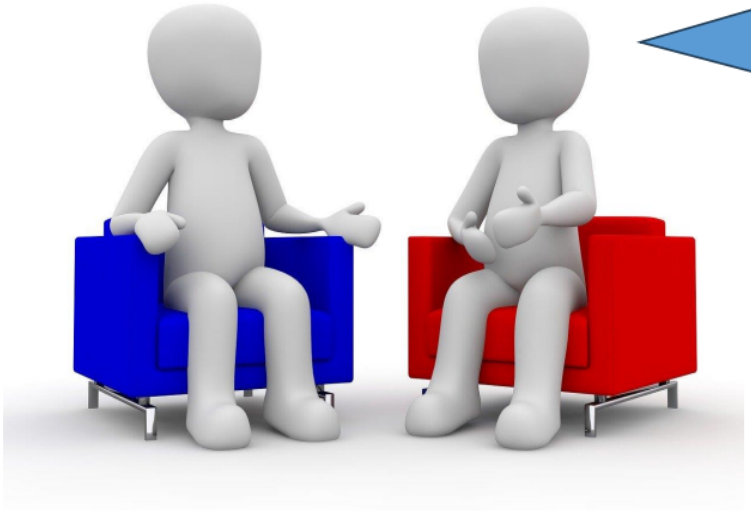
Teaching and Applying Statistical Engineering in Brazil

Webinar ISEA

Andressa Siroky & Carla Vivacqua

December 2023

Challenges


Thanks for the invitation, but I prefer to "collaborate" on my own!

Outline

1. Where we are and Who we are
2. What is Statistical Engineering (SE)
3. How we started teaching and applying SE
4. Our experiences with SE in Brazil
    - Building Capacity
    - Building Relationships
5. Final considerations

Federal University of Rio Grande do Norte

UFRN
UNIVERSIDADE FEDERAL DO RIO GRANDE DO NORTE

Where we are

https://no.wikipedia.org/wiki/Fil:A_large_blank_world_map_with_oceans_marked_in_blue.PNG

Who we are

Who we are

- Andressa Siroky
  - assistant professor in the Statistics department at UFRN, Brazil;
  - deputy coordinator of the Applied Statistics Laboratory;
  - coordinates the Statistical Engineering project;
  - B.S. and M.S. in Statistics from UFRN and Ph.D. in Statistics from University of São Paulo.
- Carla Vivacqua
  - full professor in the Statistics department at UFRN, Brazil;
  - sabbatical leave to work on a big data and climate change project in NORCE, Norway ;
  - main research areas: design of experiments and applied statistics;
  - Ph.D. in Industrial Engineering from the University of Wisconsin-Madison, USA.

What is Statistical Engineering?

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The International Statistical Engineering Association (ISEA) defines **Statistical Engineering** as:

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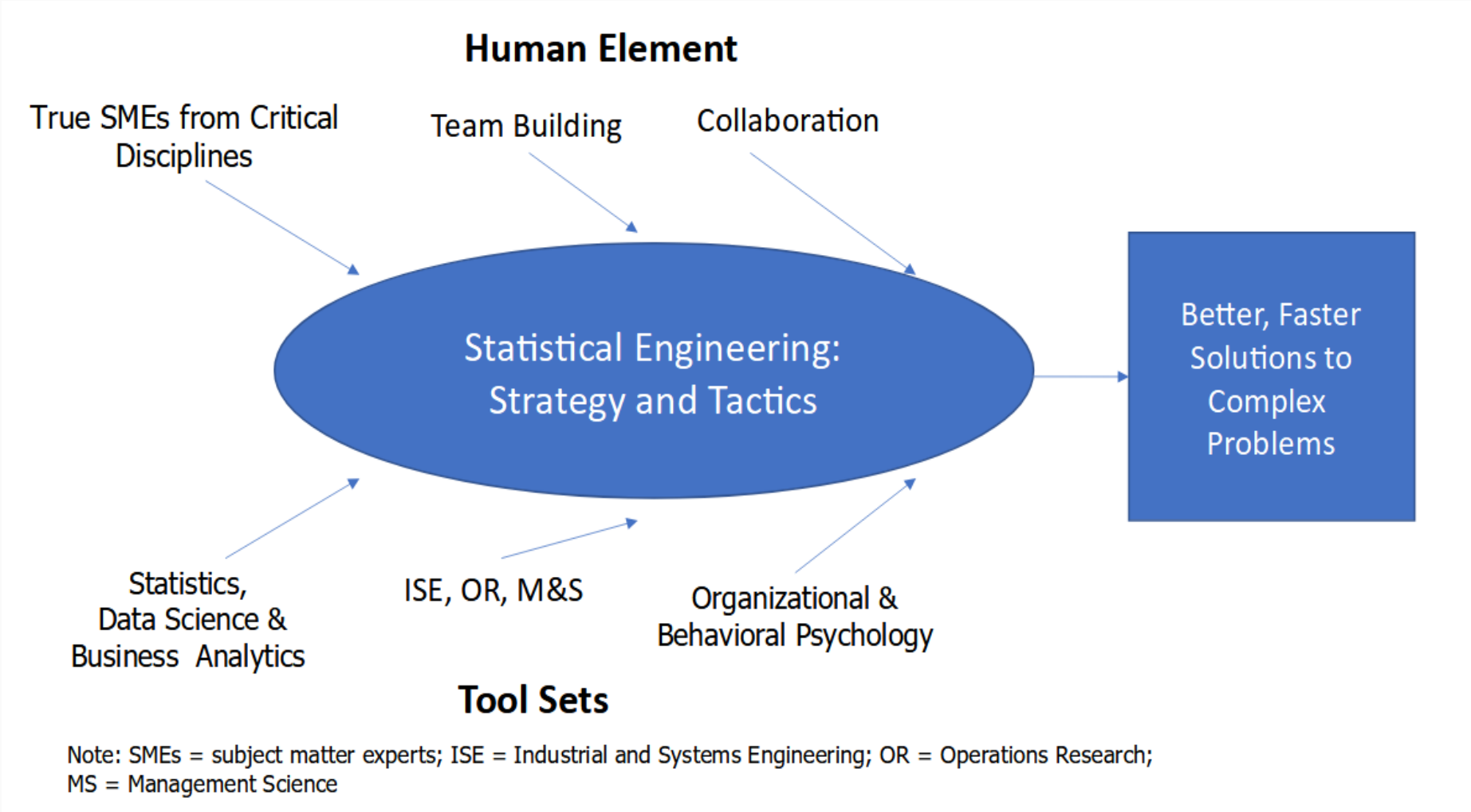
ISEA highlights about SE:

- it is a field of knowledge, a **discipline** and not a collection of tools;
- involves the systematic **integration** of multiple methods and areas;
- it is **not limited** to just statistics or engineering;
- **problem-oriented** and not tool-oriented;
- search for a **sustainable** solution.

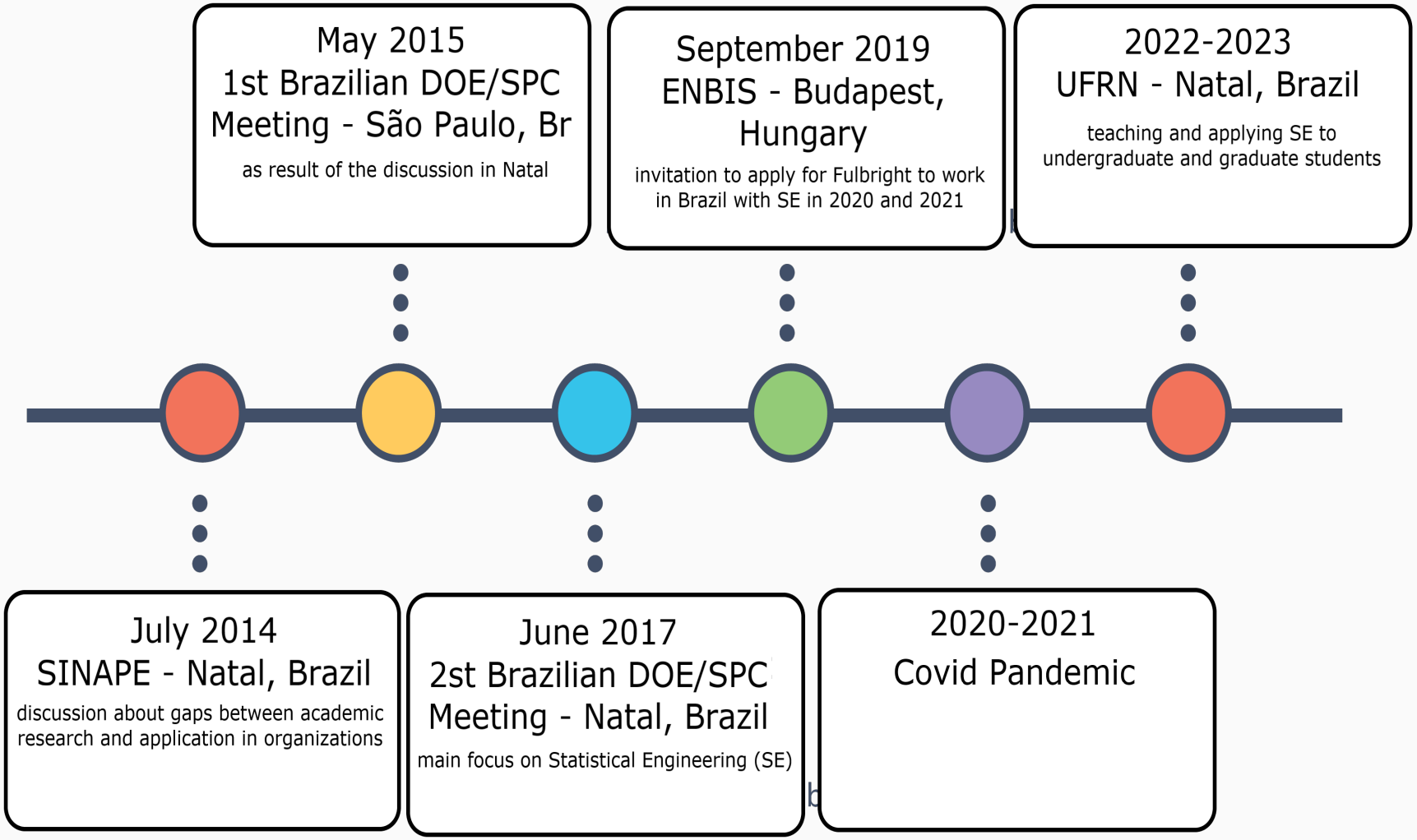
The Integrative Role of Statistical Engineering



From Statistical Engineering Handbook, ISEA member website.

How we started teaching and applying SE

A brief history of how we started teaching and applying SE



Nothing comes from nothing

Teaching and Applying SE at UFRN-Brazil

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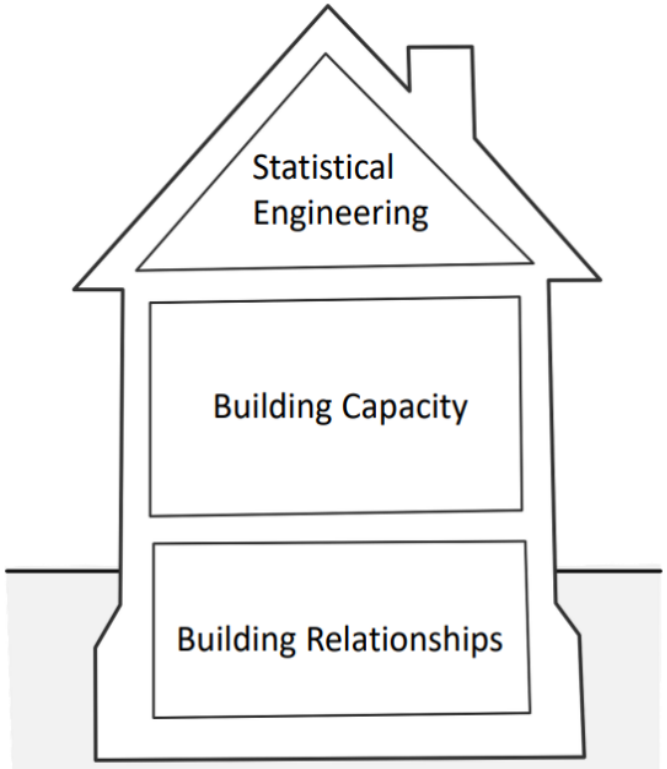


Building Capacity

Experience 2022

- Geoff Vinning came to Brazil;
- Geoff's Seminar: Shewhart, Statistical Engineering and Industry 4.0;
- SE training to graduate students for 2 months twice a week;
- Activities were developed within a master's discipline;
- Main focus on ISEA Handbook

Building Capacity

Experience 2023

- Geoff came to Brazil again;
- SE training to undergraduate and graduate students for 2 months twice a week;
- Activities were developed within a project;
- Main focus on **strategy**.
- Andressa's speech about SE in a local event.

Building Capacity

Contents studied

- Big Picture on the Strategy of Statistical Engineering
- Scientific Method
- Case Study: Peter Parker - NASA
- Techniques for generating ideas
- Understanding complexity in problem solving
- Soft Skills
- Organizational Strategy
- Leadership
- Team Charter

Teaching and Applying SE at UFRN-Brazil | Building Relationships

Building Relationships 2022

- SADIO - A local seasoning factory;
- We visited SADIO to learn about their process;
- Some opportunities were identified;
- SADIO decided which one we would work;
- We had full support from the owner;
- Unfortunately, we were prevented to continue by a broken machine and a change in the factory layout.

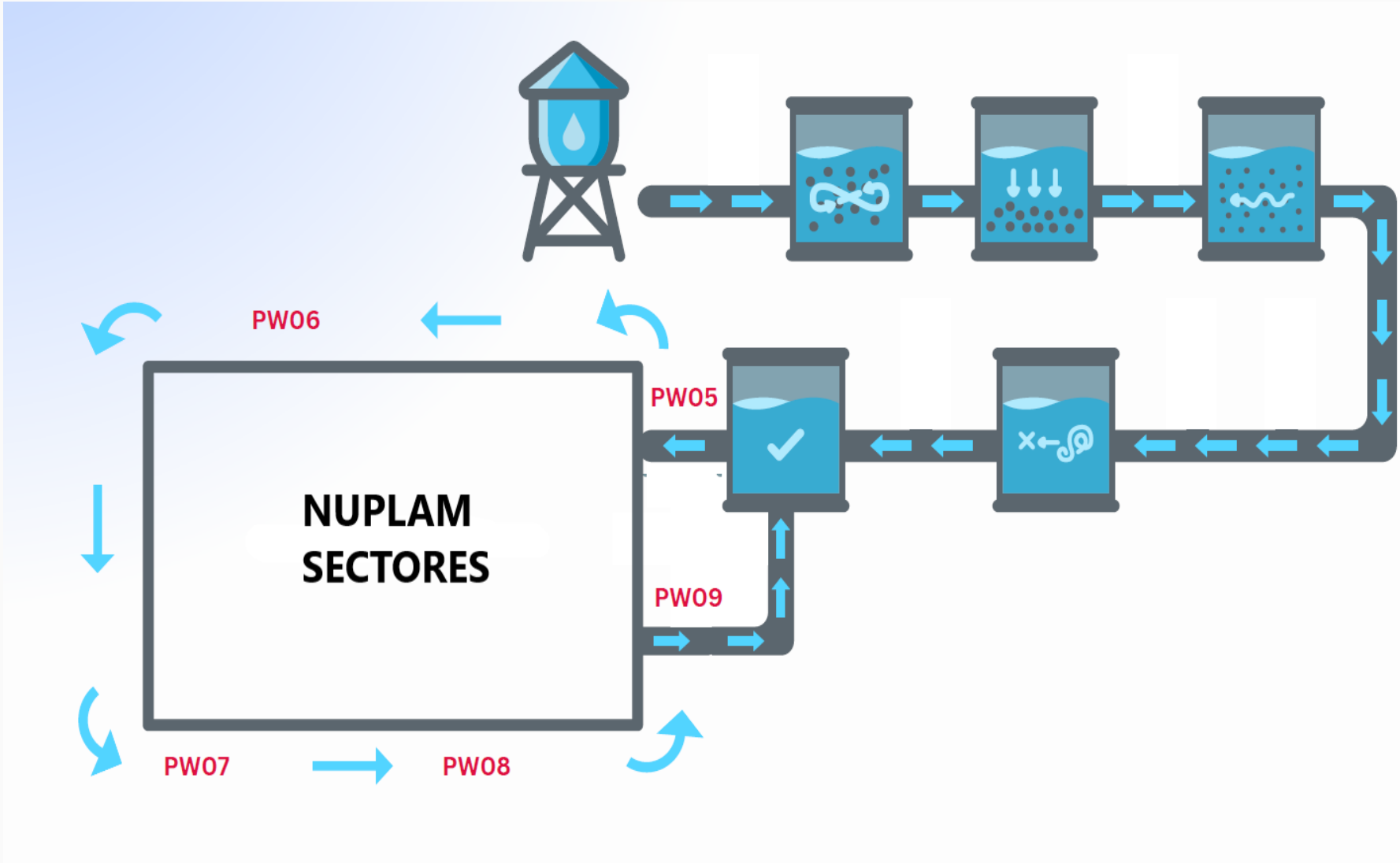
Building Relationships 2022

SADIO - Seasoning Factory

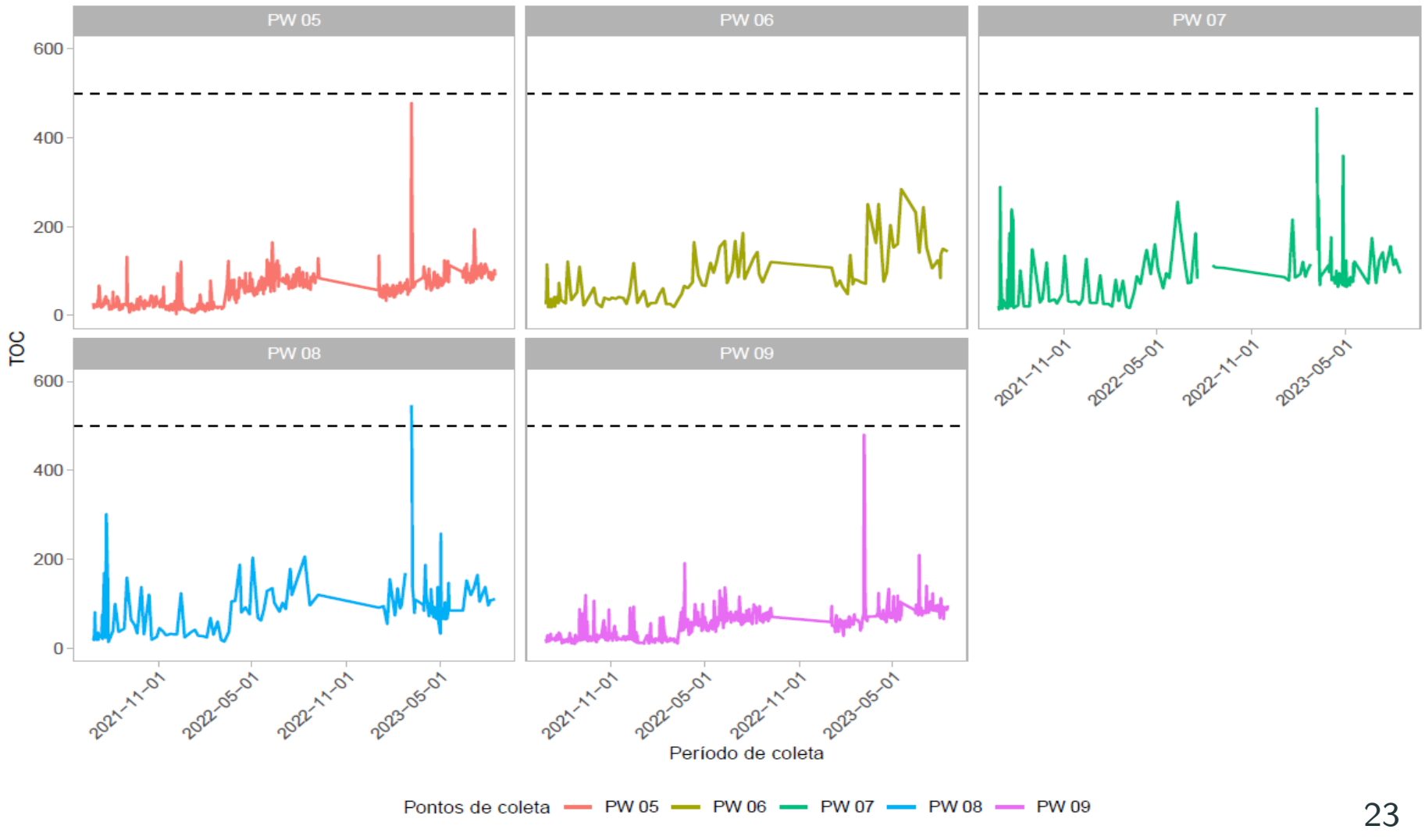
Building Relationships 2023

- NUPLAM - Food and Medicine Research Center
- NUPLAM produces medicines for the government;
- They need to monitor the quality of the water that is used;
- Data is collected from their water treatment system in two ways: offline and online;
- Regulator only accept offline data;
- They want to establish a correlation between online and offline data to monitor the entire system using online data.

NUPLAM - Understanding the problem



NUPLAM - Understanding the problem: initial analysis of offline data



Building Relationships 2023

NUPLAM - Food and Medicine Research Center

Final consideration

- For 2024 we intend to continue with the SE project and create a optative curriculum discipline.
- We expect to spread the use of SE for solving problems in a holistic way.
- We expect to contribute to improving the training of students on the UFRN Statistics course;
- And serve as an example of how universities can implement SE into their curricula.

Thanks!

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