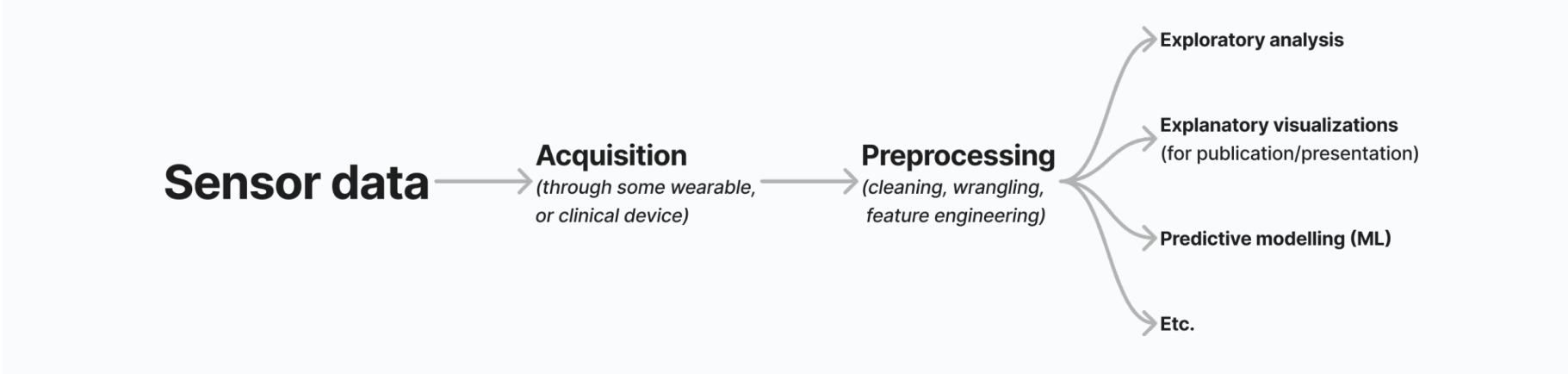
Implementation of a
Sensor Data Analytics Pipeline for Healthcare

Gabriela Morgenshtern, Prof. Viktor von Wyl, Prof. Jürgen Bernard



PROJECT UPDATES

but, really, *any time series data*

~~Sensor data~~ → **Acquisition** *(through some wearable, or clinical device)* → **Preprocessing** *(cleaning, wrangling, feature engineering)* →

- **Exploratory analysis**
- **Explanatory visualizations** (for publication/presentation)
- **Predictive modelling (ML)**
- **Etc.**

PROJECT UPDATES

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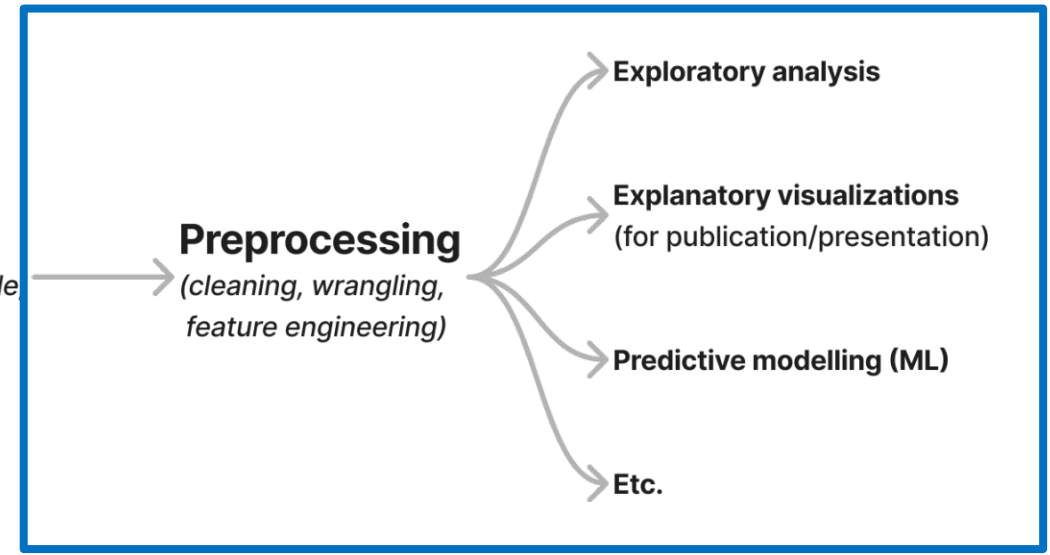
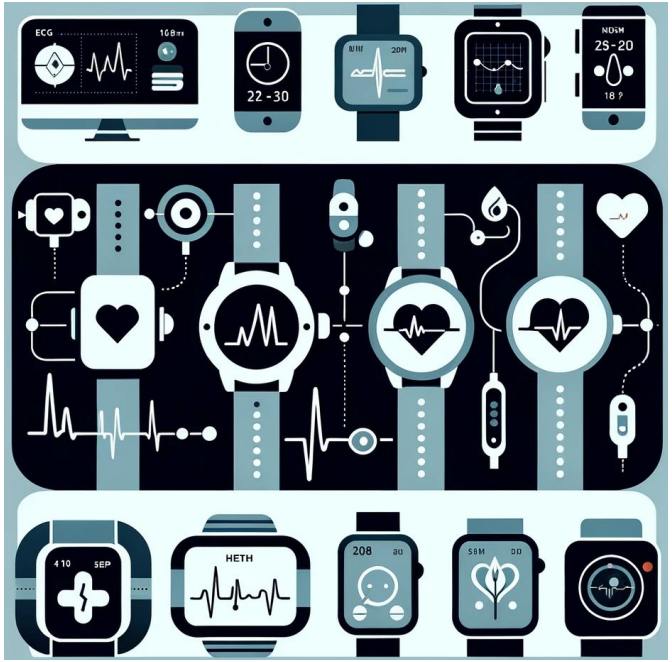
Project focus:



Project description

Main scope and goals:

- **Many at the DSI work on time series data projects**, hiring someone for analysis, or coding it themselves
- Much of that data needs **pre-processing and visualizing in similar ways**
- As a result, so much of the **workflow/code is repeated** throughout our community
- Thus, we need a **centrally accessible tool within the DSI**



Project description

Desired approach and results:

- A tool that supports us in our data-driven decision-making, creating and implementing analysis protocols, finding data relationships, etc., so we **don't rewrite the same data analysis code over and over again**
- **Collecting and characterizing use cases** for time series data analysis within the DSI
- **Identifying similarities** in analysis and visualization steps between cases
- **Mapping out a generalizable workflow** for our community
- Open sourced, and centrally accessible tool within the DSI

Progress report

Completed

This summer:

Jan	Feb	März	Apr	*May*	*June*	*July*	*Aug*	*Sept*	Oct	Nov+Dec
PLANNING: - Review of 2023 project data - Collect community cases - Priority setting - Structuring subgroups - **DSI Infrastructure Call application**			**MAIN WORKSHOP 1:** - Launch - Review case studies - Identify building blocks - Milestone planning - Subgroup organization	***SUBGROUP WORKSHOPS:*** *2-3 rounds of iterative work on identified building blocks within the subgroups*					**MAIN WORKSHOP 2:** Progress review	Reflection and preparation for future steps

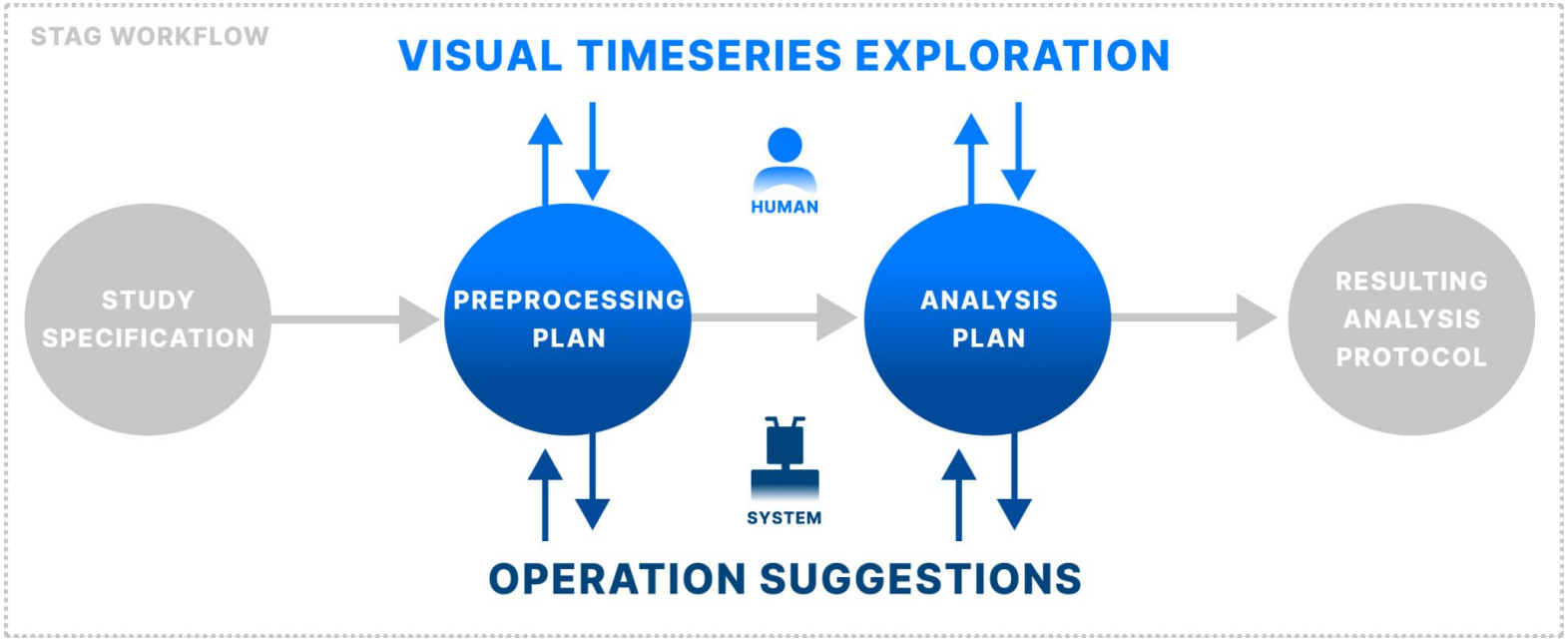
DSI Infrastructure Grant

(Awaiting results)

https://bitly.cx/dlQgM

STAG: Statistical Time Series Analysis Guide

Prof. Dr. Jürgen Bernard (Interactive Visual Data Analysis Group, Department of Informatics),
Prof. Dr. Viktor von Wyl (Digital and Mobile Health Group, Institute for Implementation Science in Health Care)



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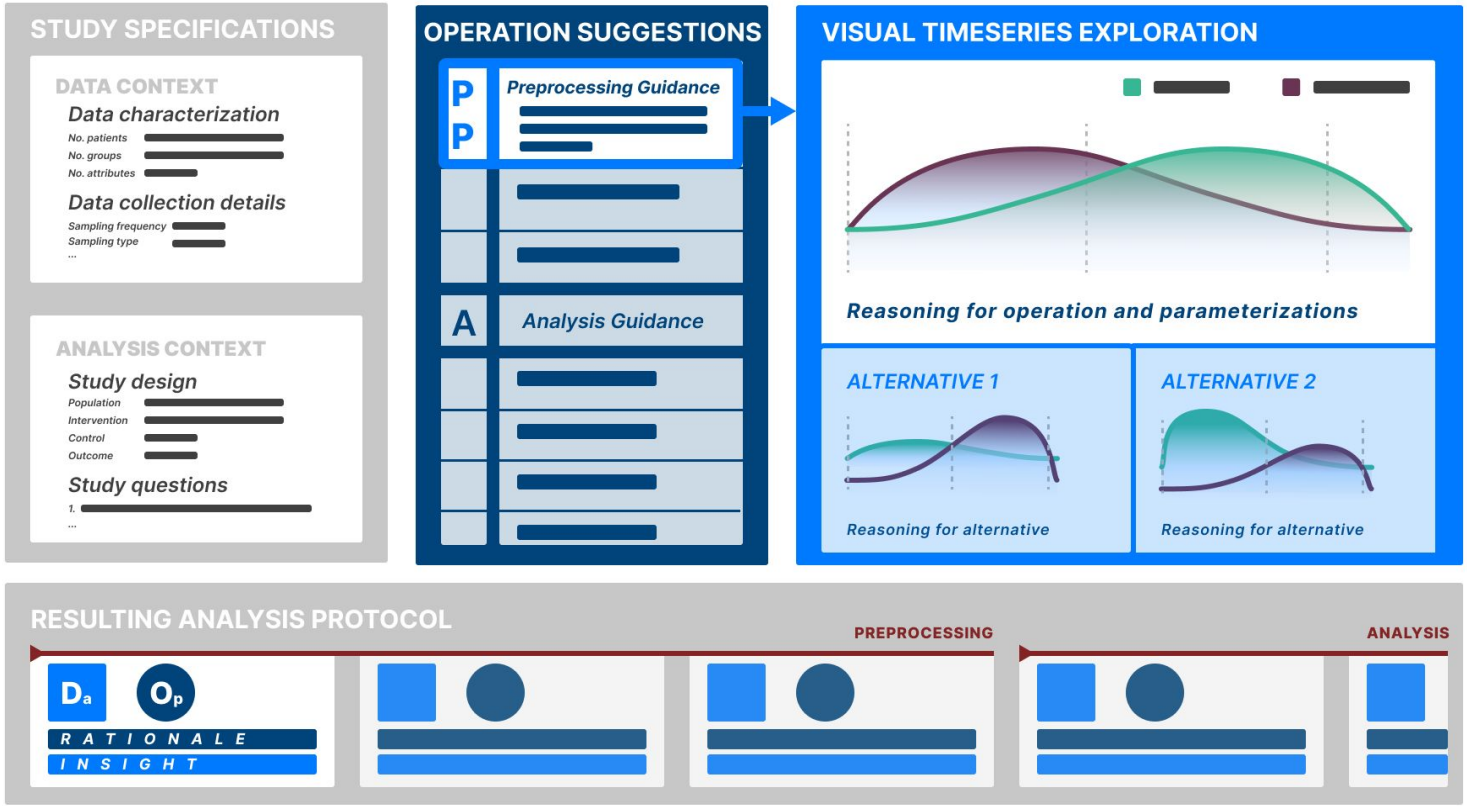

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Interdisciplinary Cases:

- Prof. Dr. **Tobias Kowatsch** (UZH, Institute for Implementation Science in Health Care: physiology of women throughout the menstrual cycle),
- Prof. **Thomas Fritz** (UZH, Department of Informatics: wearable sensor data for exploratory analysis),
- Prof. **Mike Martin** (UZH/HLC, Department of Psychology: multimodal and longitudinal time series exploration),
- cand. Dr. **Jana Sedlakova** (UZH, Institute of Biomedical Ethics and History of Medicine: ensuring data quality and alignment with project descriptions and ethical challenges),
- Dr. **Milan Scheidegger** (UZH, Department of Adult Psychiatry and Psychotherapy: ecological momentary assessment and wearables data for digital mental health and precision psychiatry),
- Dr. **Vera Colombo** (UZH, Center for Dental Medicine: medical sensor data for sleep study analysis), and
- PD Dr. **Martina Kleiber** and **Andreas Baumer** (USZ, Klinik Hirslanden: wearables for delirium detection in elderly inpatients)

DSI-Health Workshop 1

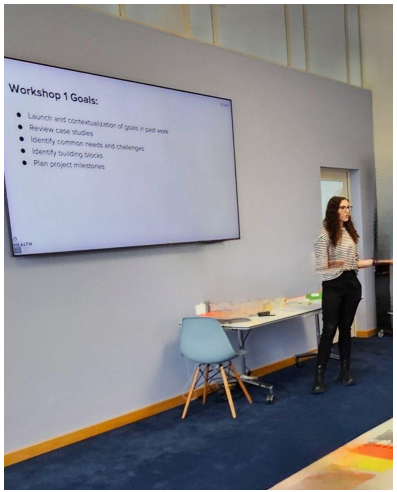
https://bitly.cx/kDKO

DSI COMMUNITY HEALTH IVDA INTERACTIVE VISUAL DATA ANALYSIS

Workshop 1 Coverage:

- Launch and contextualization of goals in past work
- Identify common needs and challenges
- Identify building blocks
- Via 3 case studies from the community:
    - Dr. Vera Colombo and Barbara Schläpfer, **case:** BruxIT
    - André Böni, **case:** Gait analysis
    - Dr. Elisa Donati, **case:** Finger movement mapping
- 10 participants in total

Workshop 1 - The Process



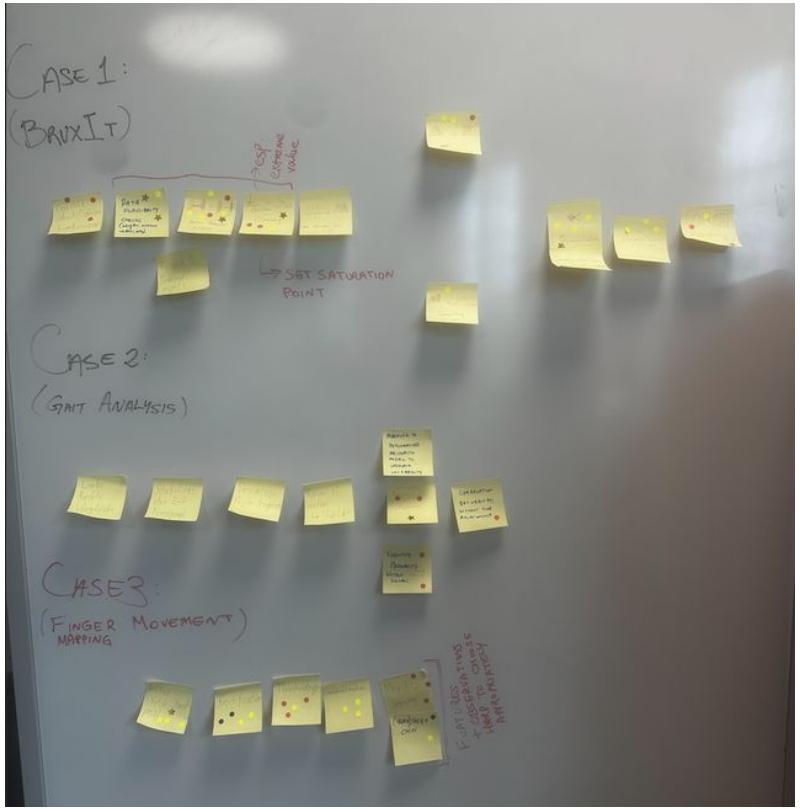
Workshop 1 - The Process

Barbara Schläpfer

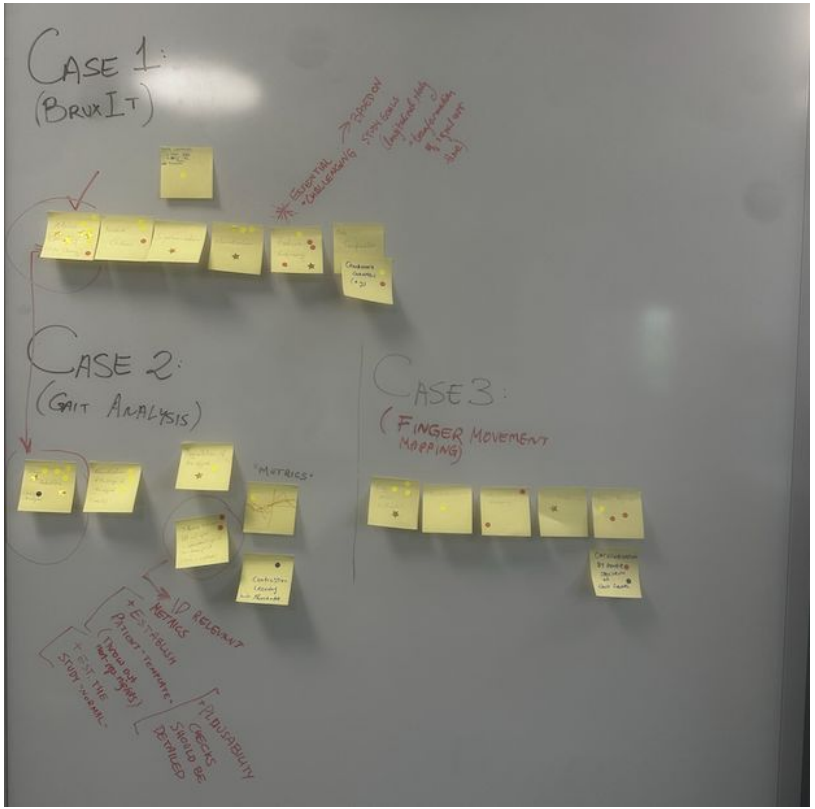
André Böni

Elisa Donati

Workshop 1 - The Process

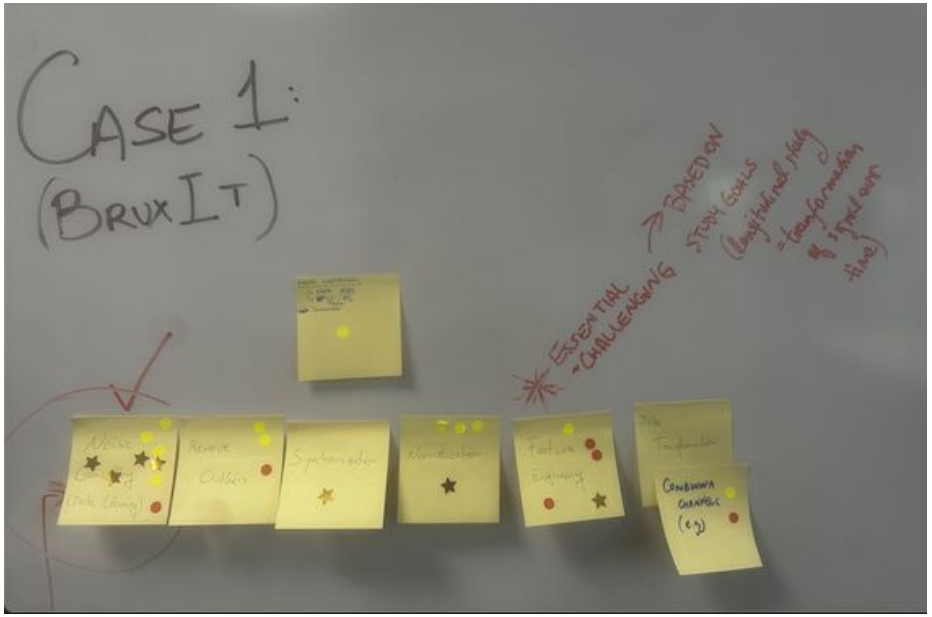


Group 1

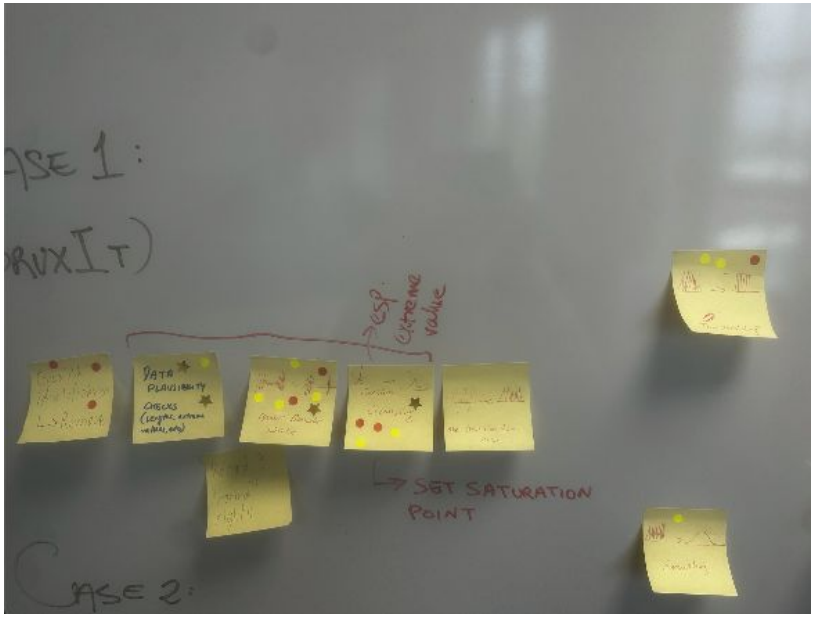


Group 2

Workshop 1 - The Process



Group 1



Group 2

Workshop 1 - Preliminary Results:

- High degree of overlap in data preprocessing workflows across cases
  - Specific repetition of some common challenges
  - Specific repetition of some analysis steps
    - e.g., denoising methods, saturation point specification
- **Next steps:** pipeline building blocks
  - Made from observations and collected pipelines
  - Great opportunity for member involvement!
  - Collaboration with an IfI Masters Project for implementation

In what ways can you still get involved?

Member participation opportunities:

- Workshop participation
- Use case analysis and **workflow planning**
- Conceptualization of a unified workflow
- **Tool development**

https://forms.gle/c1pYwsg9tjtrxsxz7

Thanks for your attention!

Questions? Follow ups?

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