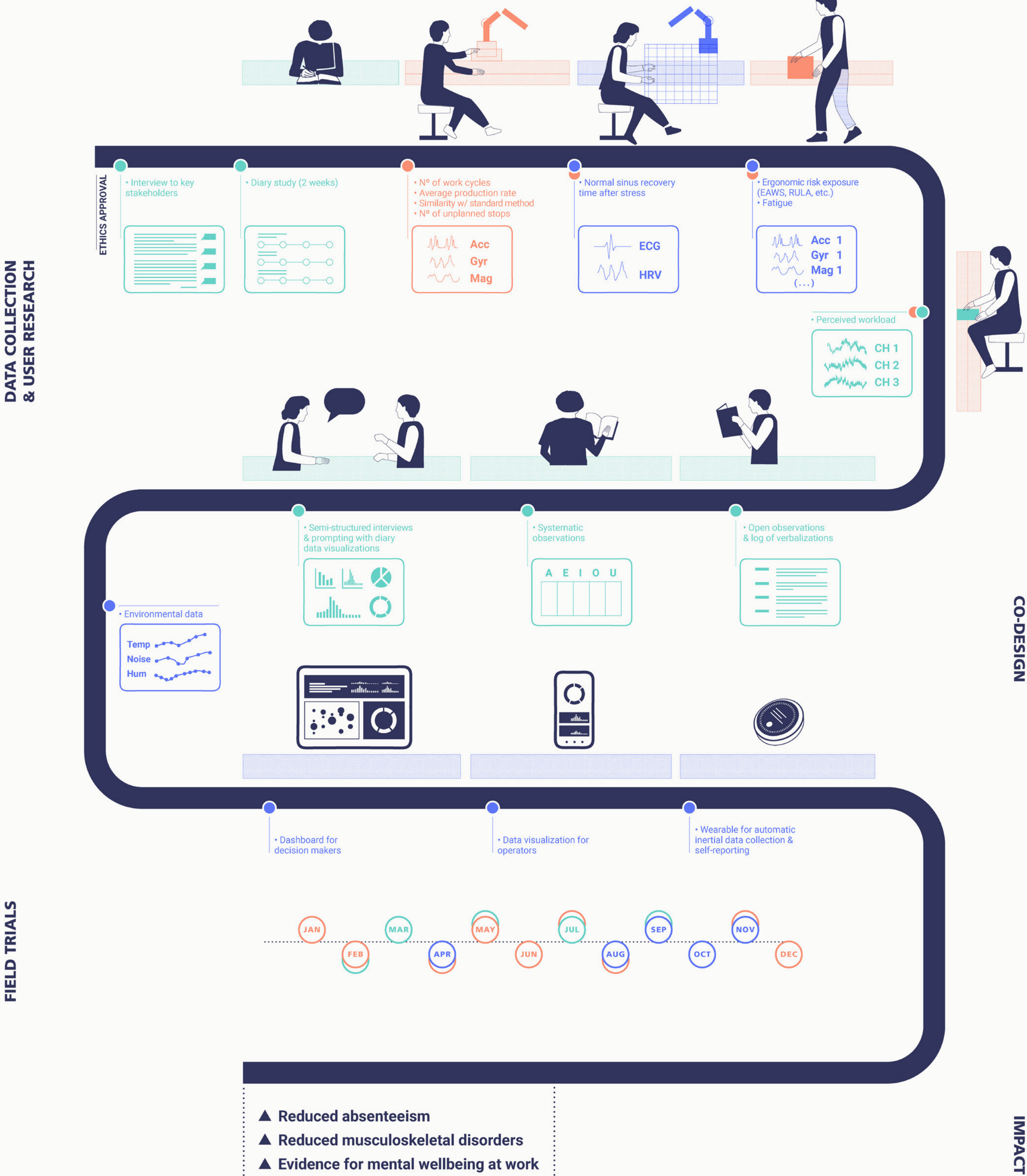


# Digital Transformation in Industry with a Focus on the Operator 4.0

▲ COGNITION - Self-Reporting - fNIRS  
 ▲ PRODUCTIVITY - IMU  
 ▲ ERGONOMICS - IMU - EMG - EEG

The prevalence of mental health disorders is very high in industrialised countries. It is expectable that this prevalence is even higher in demanding working environments, as is the example of industrial shopfloors.



However, it is currently difficult to understand how ergonomics, workplace environment and self-perception of wellbeing interact and influence one another, making it also difficult to understand occupational disease. In turn, this makes it hard to understand which aspects of the workplace need to be changed towards better physical and mental health at work.

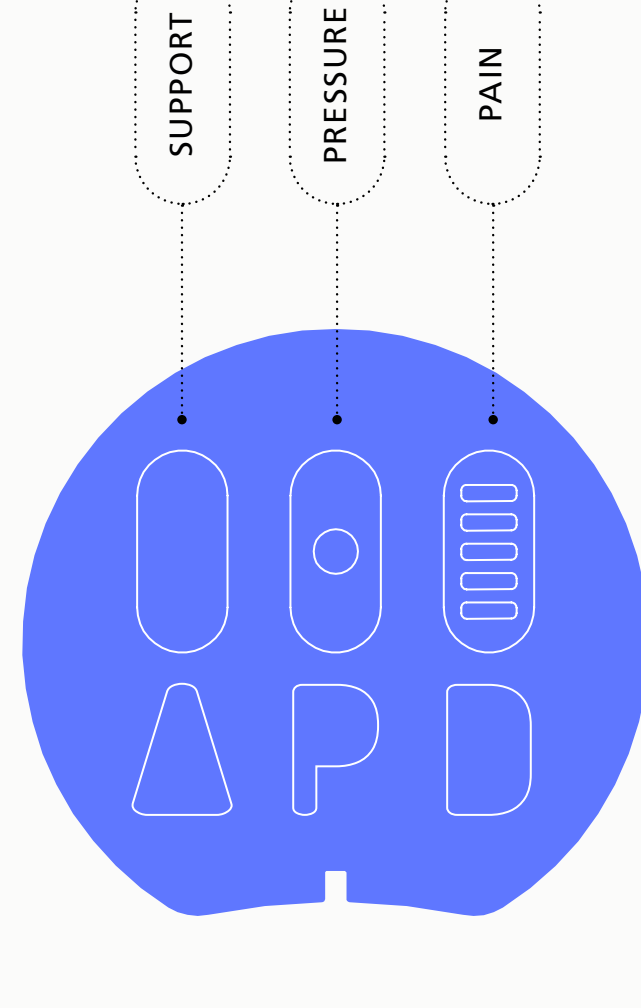


We set out to design a way to facilitate this understanding. The first challenge in doing so was to find ways of collecting reliable data without interfering with the workers' jobs. The second challenge related to information literacy, if we wanted, like we did, any operator to be able to read and interpret their own data.

## How could we collect reliable data about wellbeing at work and make it understandable for a wide variety of audiences?

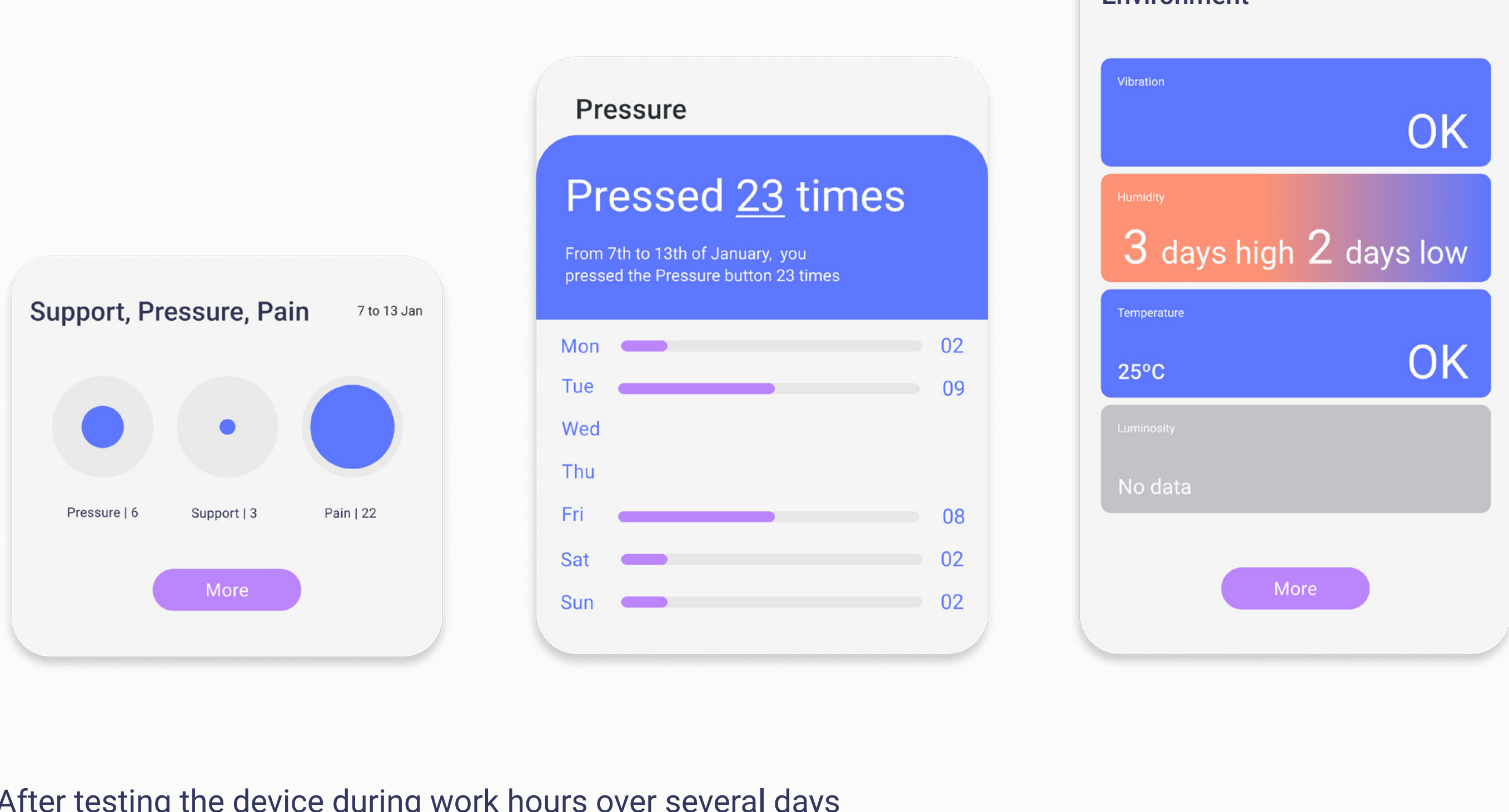
To answer the question above, we design Operator. Operator is a personal kit for the assessment of wellbeing at work with four components:

- an inertial sensor which assesses ergonomic risk;
- an environmental sensor which assesses environmental risk exposure;
- a self-report device through which the person can report body and mental states (Pain, Pressure, Social support);
- a mobile application through which the person can privately see their own data collected by the devices above.



The design was based on ethnographic work in which we identified key dimensions of wellbeing that would be important for workers to assess in their self-reports, as well as for interactions with specialists in occupational health. The design of the kit involved considerations of inclusive design. For instance, the self-report device can be used in multiple positions (including out of sight for unobtrusive use), and it contains buttons with different textures so that they can be easily recognised.

Another example is the way in which the data are conveyed to users. We have used a scaffolding approach to information visualisation: with each click, the user can find more details about that data entry. The information visualisation designs were iterated upon with representative users for optimised usability and understandability.



After testing the device during work over several days with two groups of operators in a garment factory, we found that the devices were usable, non-intrusive and the data meaningful. Operators found the personal kit to be useful.

## User Research Insights

See video here:

