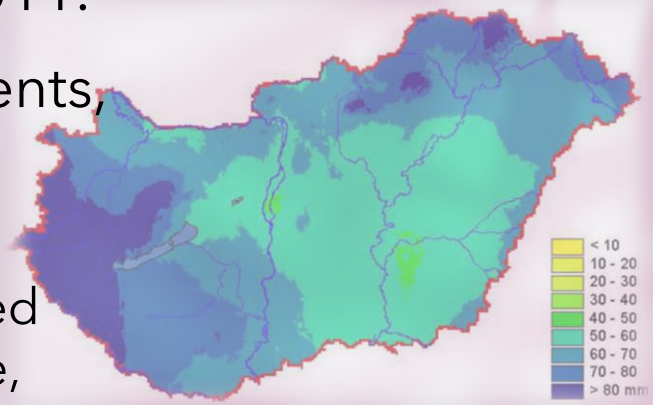
MACRO-FARM DIGITAL ADVISORY SYSTEM

Precise meteorological data and advising for plant protection

https://www.macrometeo.hu/

MACRO EXPERT LTD

- Macro Expert Kft started its cooperation with the Hungarian Meteorological Service (HongaroMet) at the beginning of 2011.
- The insurance companies operating in Hungary were our clients, so during the cooperation we evaluated their demand for accurate meteorological data.
  - There was no service available that could provide accurate archived data for the specific damage locations: was there a lightning strike, how strong was the wind, precipitation intensity, was there hail?
  - We knew that the OMSZ (predecessor of HungaroMet) and a Hungarian university developed an interpolation model (MISH system) by integrating registered meteorological data from the weather sensors, and which is mathematically generated for the intersection points of a grid covering the entire country.

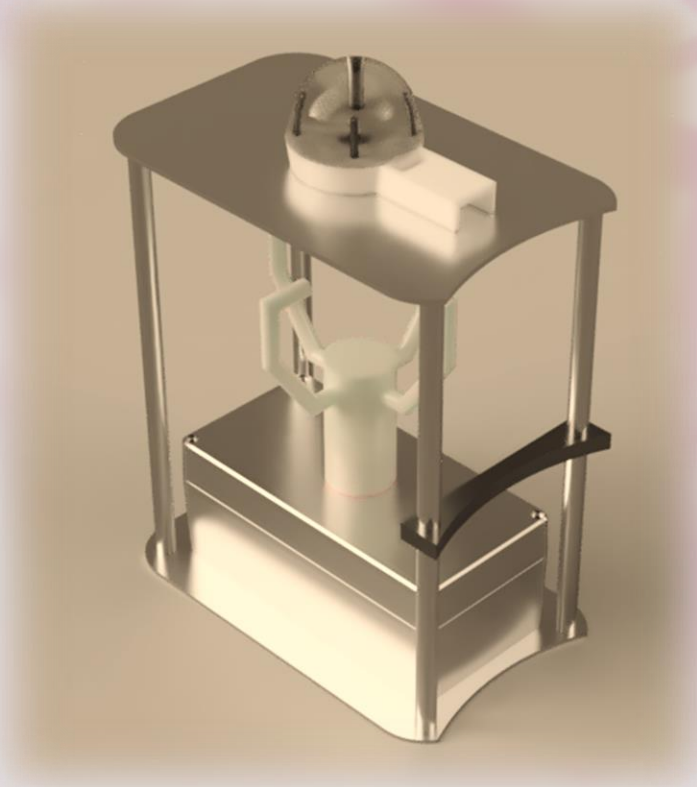


INSURANCE CLAIMS SETTELMENT

- We proposed to purchase these raw data from the National Meteorological Service, and then make them available to insurance companies, expert institutes, legal offices and anyone interested in, after software processing - in a way that can be queried online.
- After concluding the contract, we developed the MACRO-METEO WEB application: https://www.macrometeo.hu/
- We are constantly developing the application:
  - Thanks to continuous cooperation, we can integrate more and more accurate data
  - As part of a research and development project with domestic resources, we have also developed our own meteorological station that communicates via a cell phone network (GPRS), so in the future we will be able to register even more detailed and accurate local data

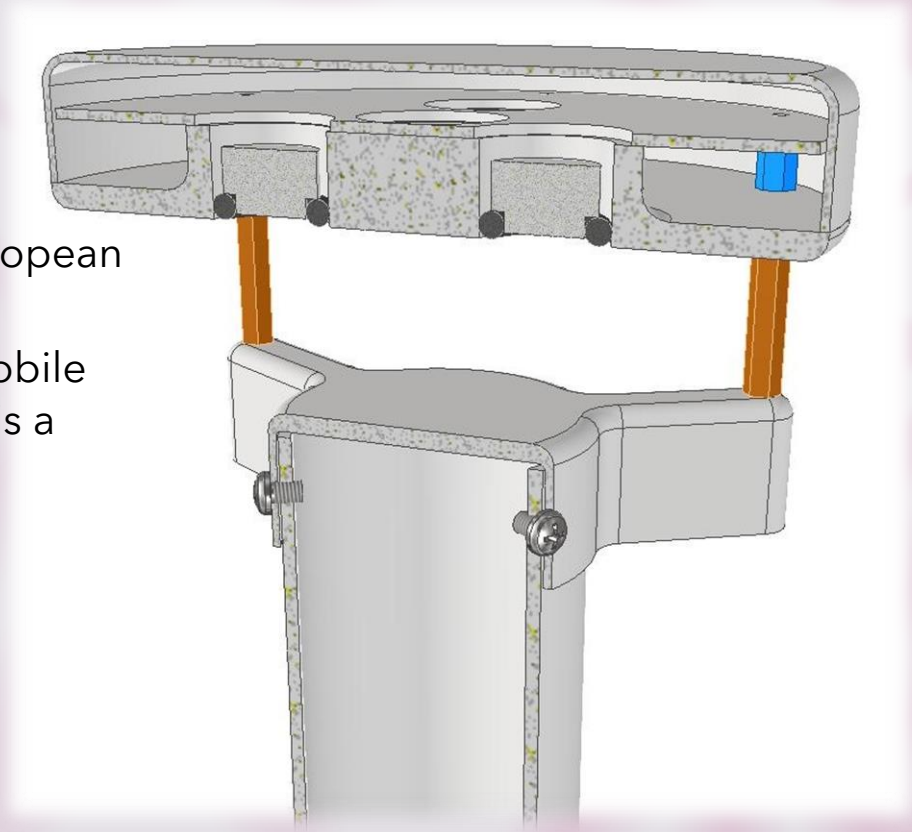
METEO STATION 2.0

- We are familiar with the difficulties of the currently available meteorological stations:
  - Electrical power supply,
  - Permanency issues , (dust, sunshine, insects in nature, accidental accidents,)
  - Moving parts are fragile,
  - GSM or GPRS network availability,
- A new model development has been started with the following components:
  - Ultrasonic anemometer (wind)
  - Infrared precipitation sensor (rain, snow)
  - UV-resistant plastic and aluminum casing
  - Better GPRS antenna
  - Integrated SIM-CHIP

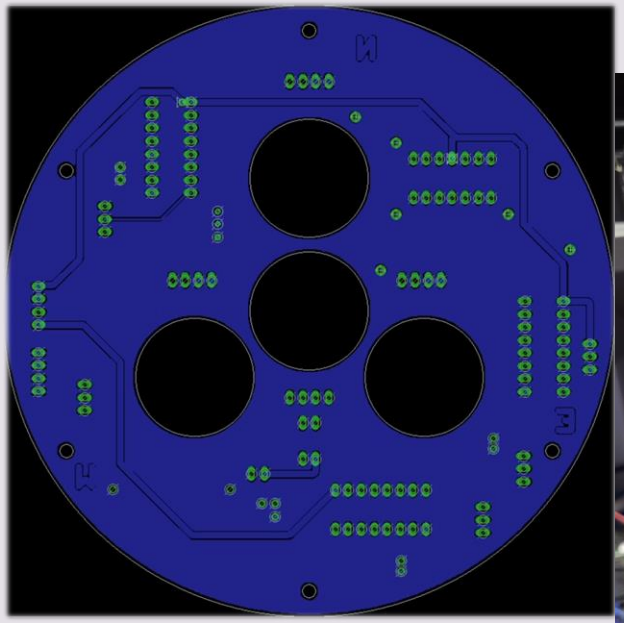


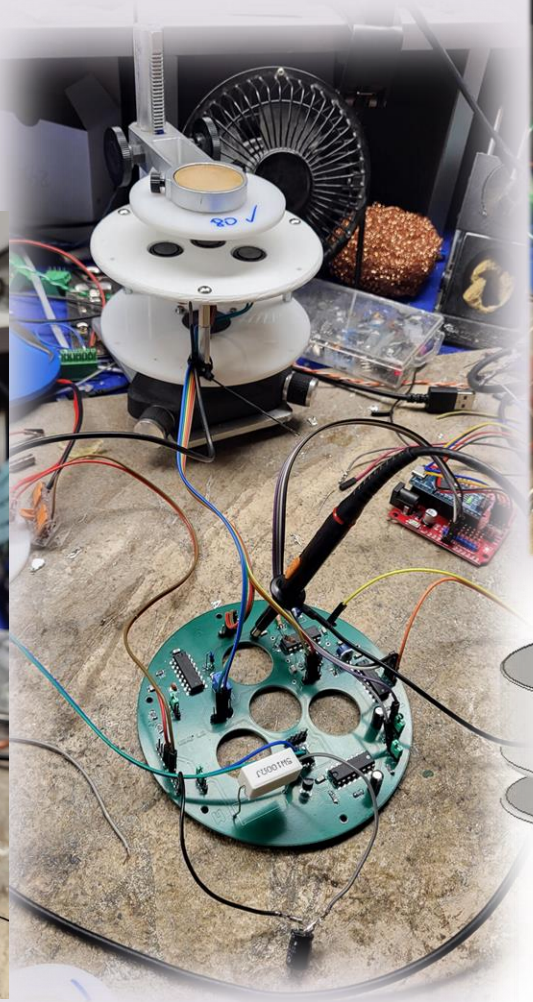
METEO STATION 2.0

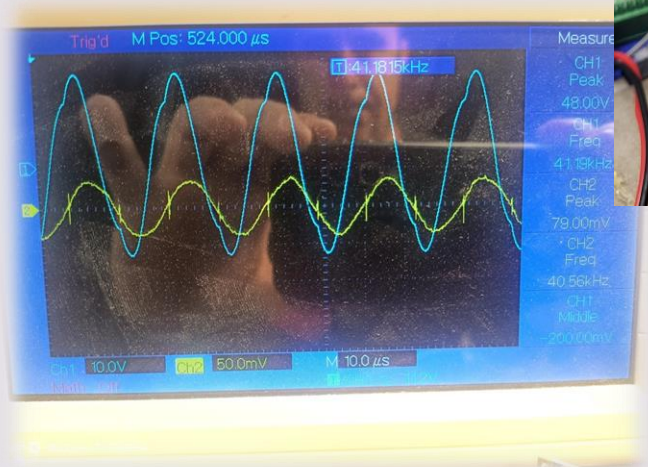
- Evolution in the development
  - There are many different request from the Hungarian and European agricultural farmer companies
  - Also, there is a high interest in the building industry to use mobile meteorological stations in different constructing places (This is a Hungarian legal requirement to report the local environment circumstances)
  - Therefore, in the meantime, we involved new development engineers
  - We intend to accelerate the development
- What is in the focus right now:
  - Own developed sonic anemometer (cheaper solution)
  - Device that can be built in blocks
  - Parallel development of different data transfer solutions

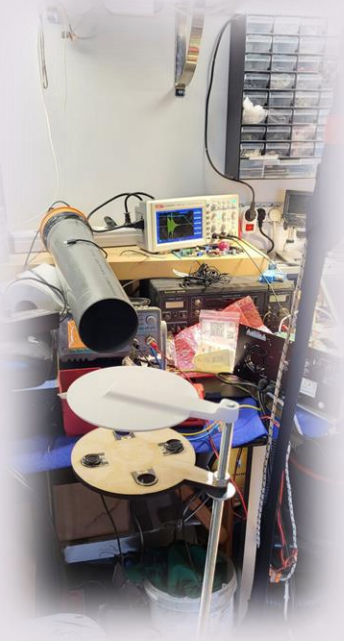


METEO STATION 2.0









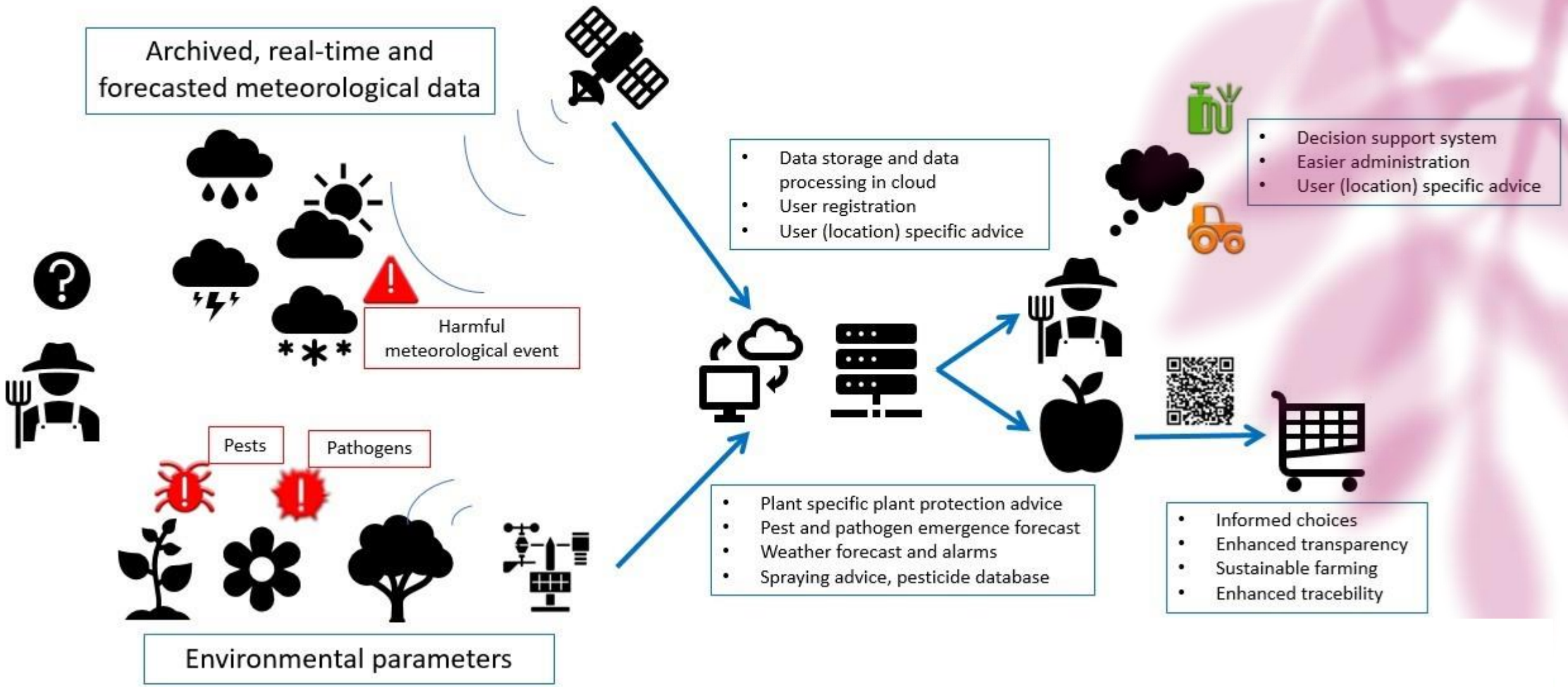
INTERNATIONAL COLLABORATION OPPORTUNITIES

- We are also looking for cooperation with other member states of the European Union.
- The Hungarian-developed MISH interpolation model is being tested in several countries but has not yet been officially introduced anywhere.
- However, our self-developed mobile meteorological station creates an opportunity to introduce our service elsewhere.
- We are constantly analyzing the economic areas in which our acquired knowledge can be utilized
- Weather events greatly affect outdoor economic activities:
  - Construction industry, road and railway construction
  - Plant cultivation, food industry

INTERNATIONAL COLLABORATION OPPORTUNITIES

- **As we can see now**: there is interest in the results and utilization of the developments in two economic sectors.
- **Agricultural insurances**: There is no digital support application that helps estimate agricultural damages
  - Windstorm damage, Hail, Drought and Frost damage
  - Flash floods
  - Fraud prevention
- We are trying to find EU calls for tenders where we can submit our project ideas with the participation of several countries.
- We are looking for partners who are experienced in processing satellite, rain radar and drone recordings
- We want to develop a unified digital platform where all meteorological information about a specific damage event is available, and processable

MACRO-FARM DIGITAL ADVISORY SYSTEM (MDAS)



Meteorological data

- Meteo data:
  - Location specific (GPS ((EOV)) - interpolation)
  - Time specific:
    - Forecasted (for 1 week 4 times/day)
    - Archived (hourly)
  - Pest/pathogen specific:
    - Temperature (soil, air)
    - RH%
    - Precipitation

Plant data

- Plant data
  - Geolocation
  - Species and cultivars
  - Phenological stages (damaged parts: fruits? leaves? flowers?)
  - Resistance, tolerance

Pest-pathogen database

- Pest-pathogen data:
  - Insects, fungi, bacteria
  - Basic biology (where is it lives? Overwintering? Infection sources? Infection/development cycle (1/year? multiple times?) etc..
  - Pest-host relationship (which on what?)
  - Available development modells
  - Options of prevention/treatments (available chemicals, traps, etc.)

Result:

Calculated probability of the emergence of a certain pest or pathogen on a specific plant on a specific location in a certain time.