

INTRODUCTION

Frost events in vineyards can cause significant crop losses. The most effective option for avoiding frost damage is prevention. However,

- predicting temperature decline towards the 'dew point' (i.e. 3 degrees Celsius above freezing) is a challenge
- and it depends on many complex local vineyard conditions – topography, cloud cover, temperature, soil type, humidity and wind flow.

Objectives

The research work looks into visualisation of frost events:

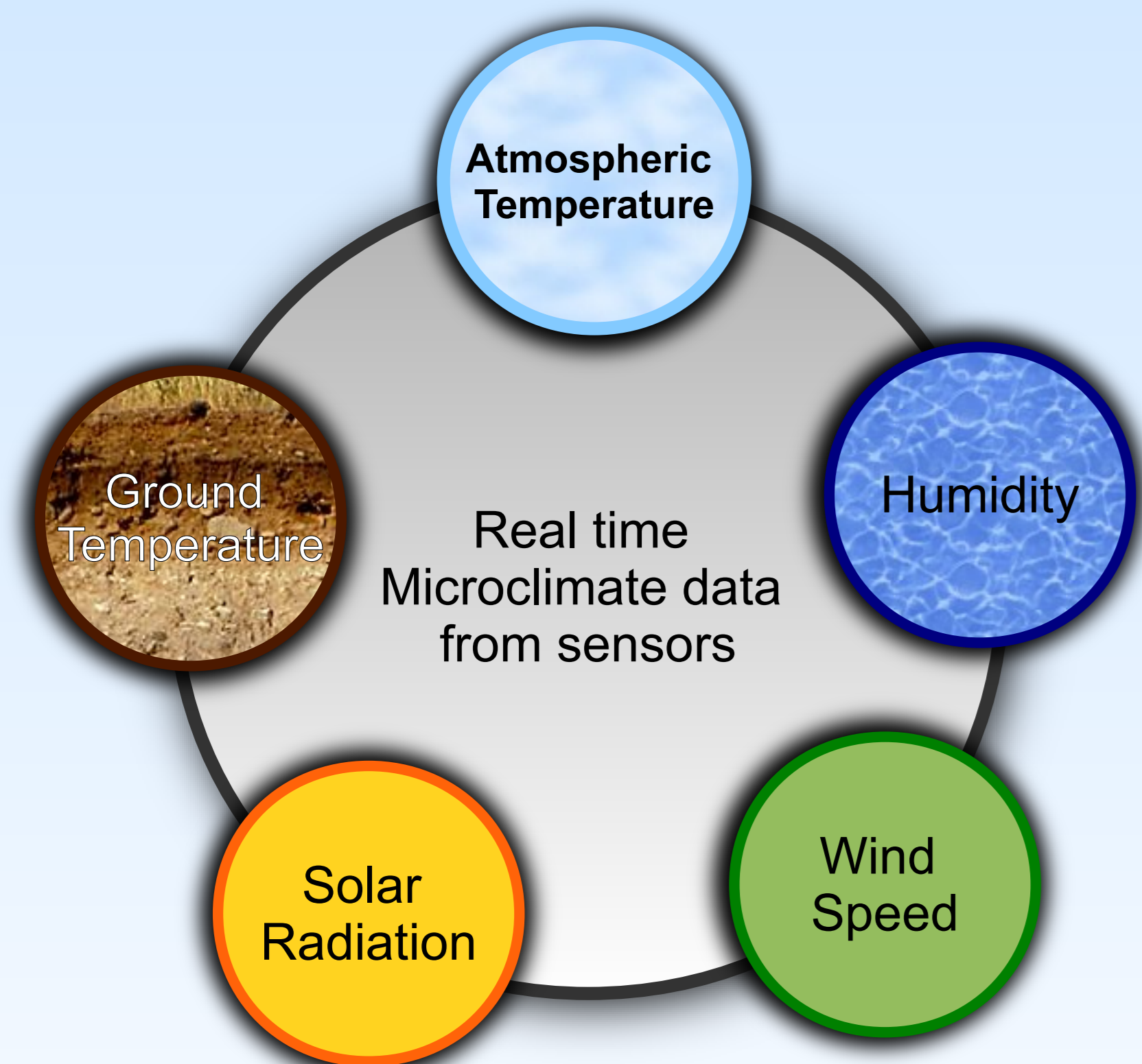
1. Using microclimate data gathered by sensors placed in a vineyard,
2. using topographic, soil and cloud cover imagery,
3. illustrates an advancing frost event related to the precise spatial reference coordinates for each event
4. finally maps the 'frost patches' that occur.

The narrative relating to these visualisations describes the following sensor data used to build the 'maps', this refers to the terrain topology and correlation of variable values all of which influence the individual frost events.

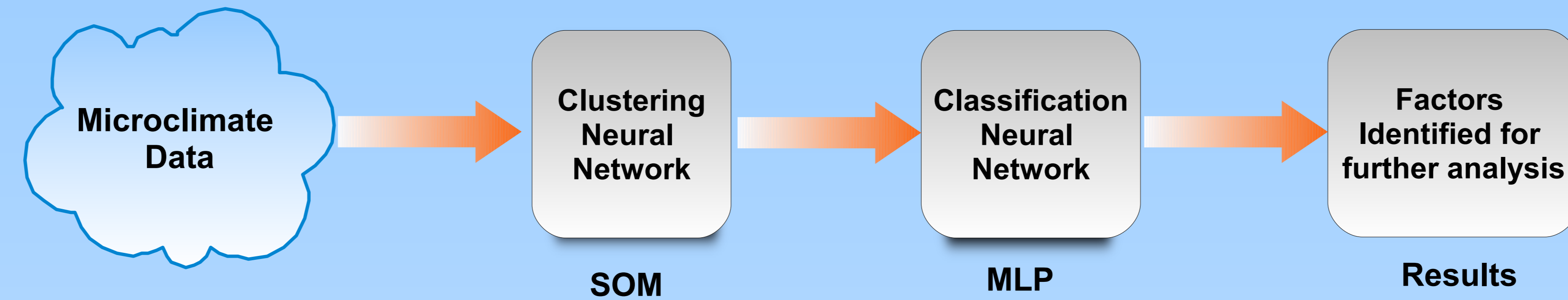
METHODOLOGY

Data Acquisition

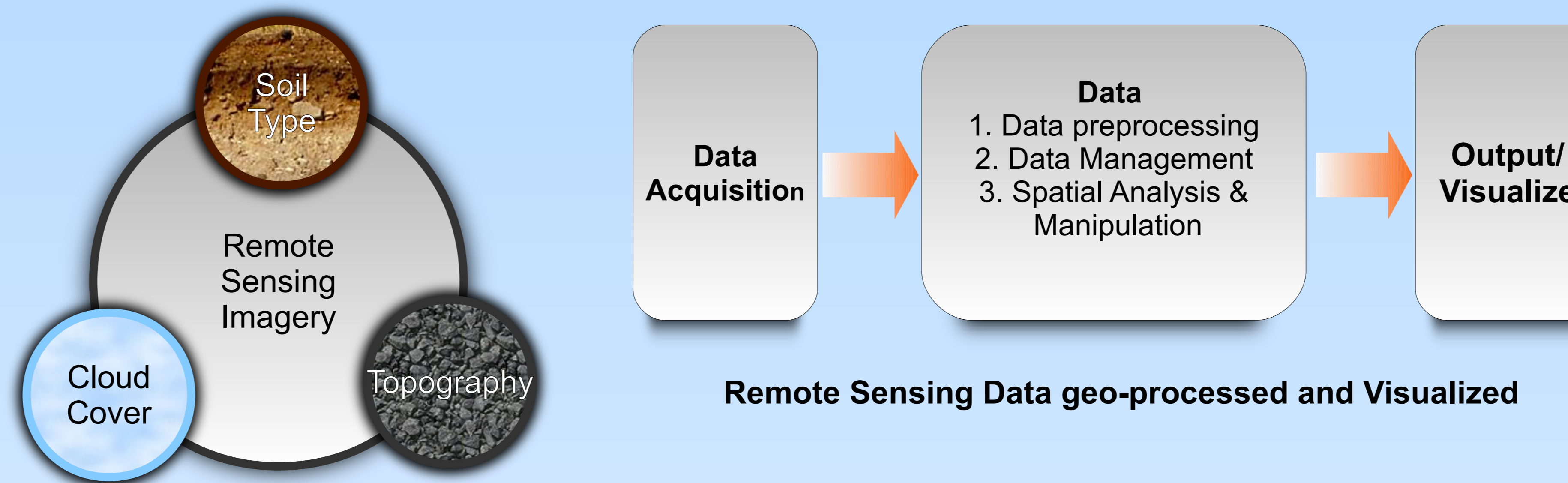
- Real time microclimate data from sensors in vineyard is need is required for absolute effectiveness.



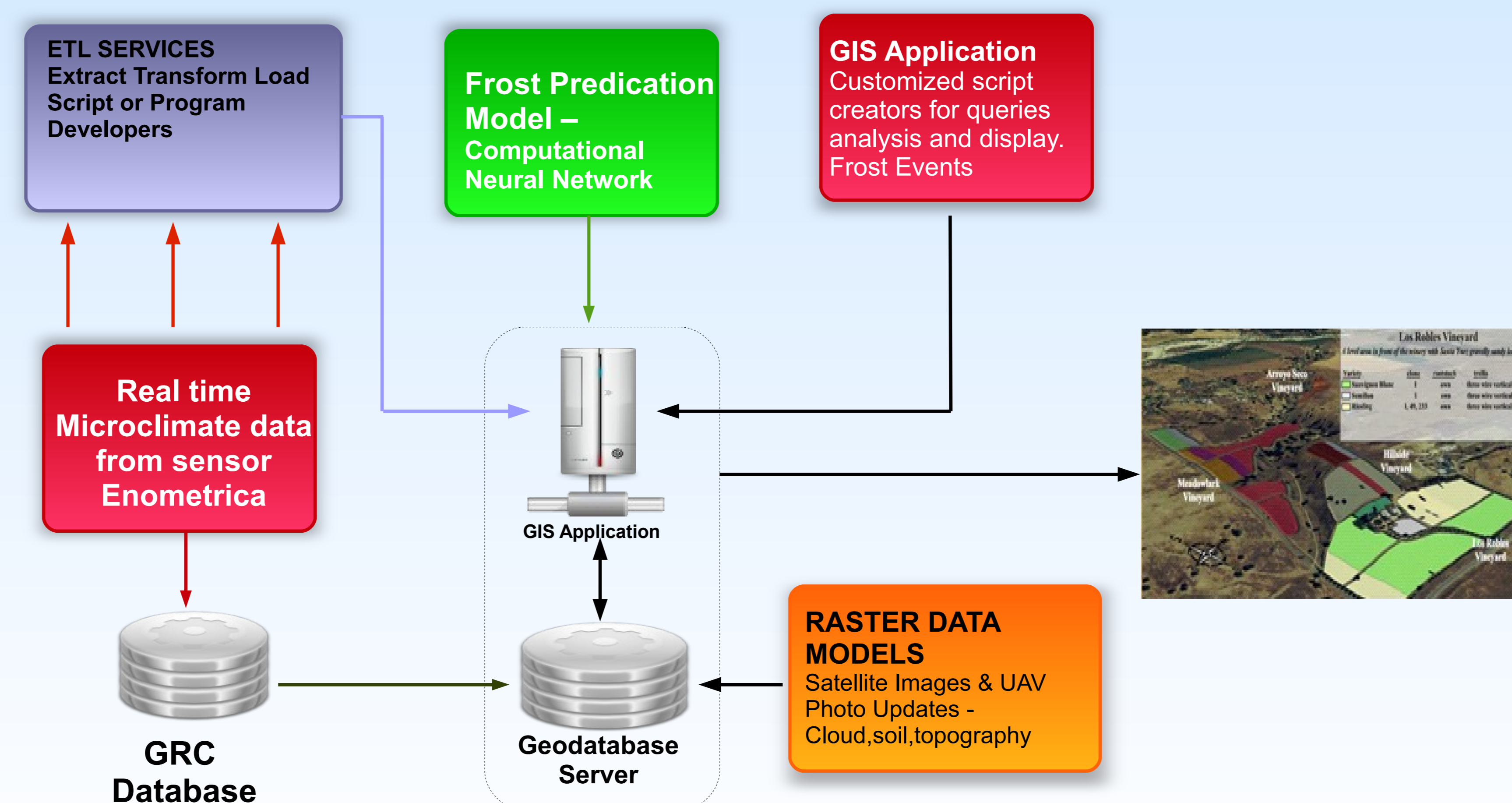
Proposed model for predicting frost uses of Self-Organizing Map(SOM) methods in conjunction with Multi-Layer Perception(MLP). This model focuses on few variables thereby concentrating only on the dependencies of the microclimate data presented, and reduces complexities of data dependencies and focus on factors relating to frost prediction



- The non-climate data from Remote Sensing imagery. This will be Geo-processed and overlaid for spatial referencing of visualization of frost



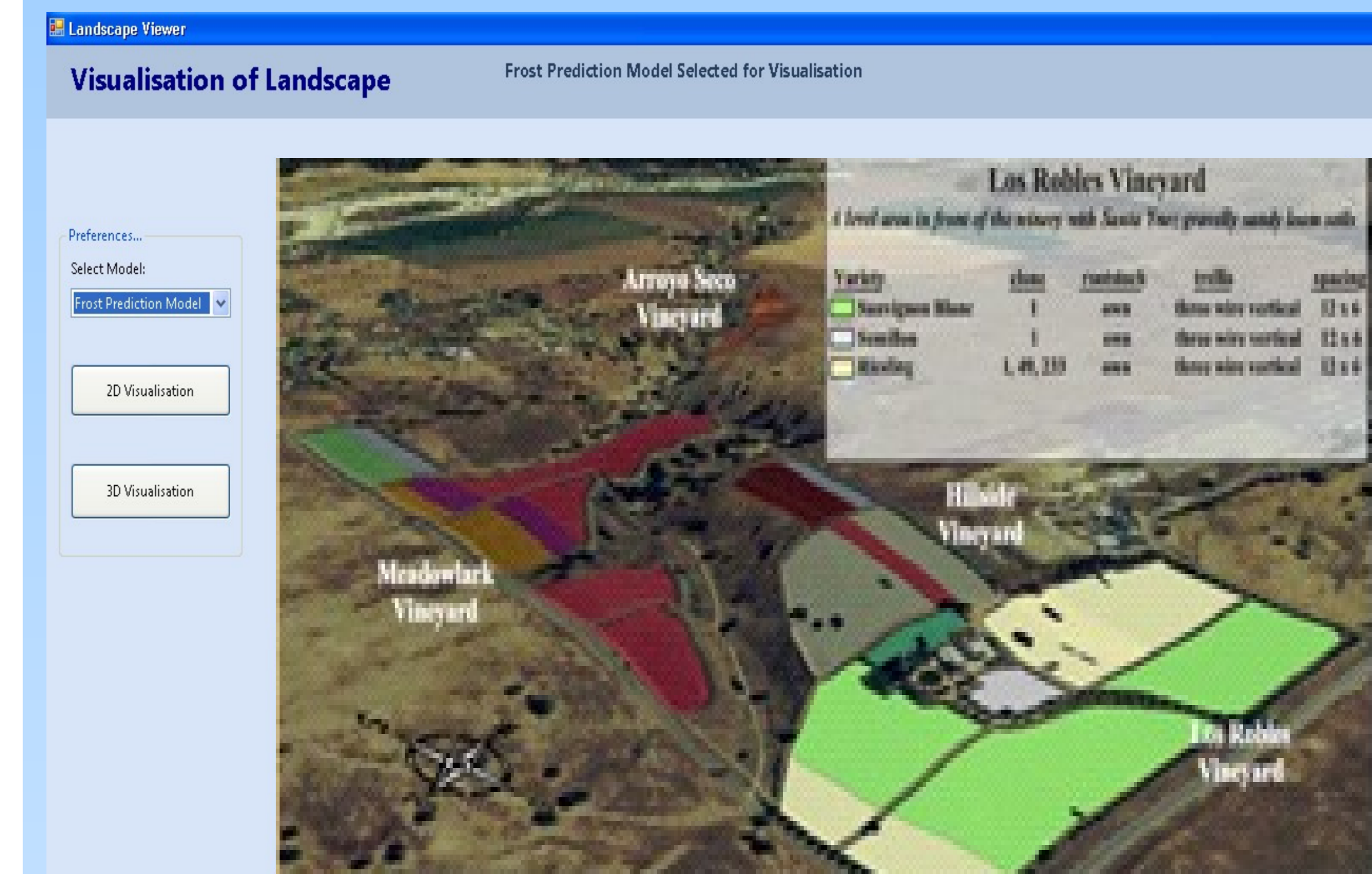
Integration into Generic Framework



EXPECTED OUTCOME

With this generic framework, users of the system could select Frost Prediction Model for visualising factors related to individual vineyards.

Visualisation could be in 2D maps or 3D animations



CONCLUSION

- Micro climate data from EnoMetrica will be modeled and simulated for frost prediction
- Topographic raster image Geo-processed will be used to spatially visualize the frost patches in the vineyard.
- An advancing frost event is visualised which relates to the precise spatially referenced coordinates of each event.
- Generation of maps of occurred frost patches
- The narrative relating to the visualisations described the sensor data that would be used to generate maps in relation to the terrain topology along with correlation of variable values that would influence the individual frost events

REFERENCE

Sallis, P., Jarur, M., and Trujillo, M. (2008) *Frost Prediction Characteristics and Classification using Computational Neural Networks IN Australian Journal of Intelligent Information Processing Systems.*

Prabha, T., Hoogenboom, G. (2008) *Evaluation of Weather Research and Forecasting model for two Frost Events, Computers and Electronics in Agriculture.*

Shanmuganathan, S., Ghobakhlou A., and Sallis P. (2008). *Sensor data acquisition for climate change modelling. WSEAS Circuits & Systems, Issue 11, Volume 7*