

## Our Project with Elmitel Slovenia with eVineyard

In the vineyard, devastating diseases and pests adversely affect wine grape production and cause enormous economic damages annually. Unfortunately, traditional treatments incur additional costs for growers and are largely inefficient.

Sensor technology, however, is changing that. Based on scientific observation, measurement, and response.

*Wireless sensor networks enable many new opportunities and innovations in the field of Predictive systems.*

With these, pest prevention and irrigation can be administered when necessary.

The end result is improved management, better grape quality, and lower costs.



## Predicting Vineyard Conditions, Preventing Disease



### Predicting Diseases of Vine

In Slovenia, Elmitel specializes in wireless sensor networks and has developed new viticulture solutions based on Libelium Wasp mote Plug & Sense! encapsulated sensor nodes. It so happens that the Elmitel team is a group of young engineers, who are also agronomists, sommeliers and wine growers.



### Easy setup for a single Wasp mote or multiple nodes

Getting up and running is easy. A Wasp mote Plug & Sense! sensor user can connect to the computer via USB, follow a simple set of instructions, and the node is configured and ready to install. With Elmitel's eVineyard and eViti solutions, this setup is done without the need for programming knowledge, or any installation of software development tools (IDE).



### Two sites, two approaches to precision agriculture

- Irrigation control for young plants.

*Vineyard in Podgorci:* Near Podgorci, the eVineyard system is deployed in a grapevine nursery.

- New vineyard.

*Vineyard in Zvabovo:* The geographical diversity of this area creates a variety of climate conditions.

# Smart Vineyards Slovenia with eVineyard

In Slovenia, **Elmitel** specializes in wireless sensor networks and has developed new viticulture solutions based on **Libelium Waspnote Plug & Sense!** encapsulated sensor nodes.

When it comes to wine, the company is well situated in the heart of one of the world's oldest historic wine producing regions. This proximity brought them closer to the problem of geographic diversity in farming and viticulture. It also influenced their approach of bringing modern "smart" sensor-and-Cloud technology within reach of non-technical users, including the farmers and vintners of traditional wine producing regions in 10 countries.

**Elmitel** has developed a Cloud platform core, called **Elmitel Sensing**, to create a **Waspnote**-based vineyard monitoring solution to cover all three parts of a sensor network: data acquisition, storage, and processing. The solution adds a unique functionality to **Waspnote Plug & Sense!** nodes that simplifies deployment, and so reduces network setup costs, making it attractive for non-technical users and small growers.

The **Elmitel Sensing Cloud** platform allows custom applications on top of the measured data. One spin-off application for the viticulture market, called **eVineyard**, effectively combines **Elmitel Sensing** and **Libelium** technology for a complete Cloud-based solution for managing vineyards that incorporates the easy node deployment feature.

With the environmental data collected and measured by **Waspnote Plug & Sense!** nodes, including temperature and soil humidity, the **Elmitel's eViti** application can advise growers as to the best time to spray the vineyard against different diseases that occur in their area.

*"Constant monitoring of vineyards is critical to ensure that disease doesn't appear, If you can see it on the leaves, it is already too late."*

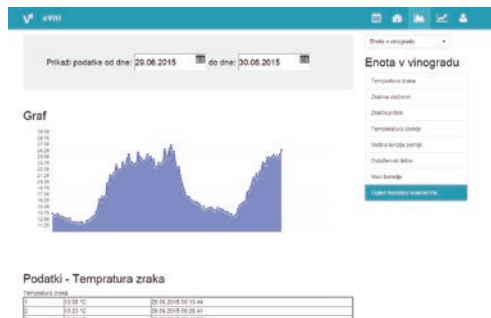
*Matic Šerc*



*Node installation with solar panels in Slovenia*



*Geodiversity accounts for some of the diversity in wine*



*Temperature graph in eViti*



*Vineyard in Zvabovo*

**eVineyard** generates, connects and compiles the sensor node code in the Cloud, and assists the user in uploading the software to the node via a simple setup wizard accessed from a laptop computer.

The benefits for farmers are multiple, including savings of not only time and money, but also savings related to the environment. Using sensor technology means that toxic spraying must occur only when absolutely necessary. What's more, **eVineyard** alerts farmers and vintners in case of dry soil and other conditions that may require attention or human intervention. Users can create maintenance and weather reports and also log in directly from the vineyard. Because of the easy deployment of the sensor nodes, the cost of a smart viticulture solution is suitable for smaller vineyards and also for organic production. "That goes for any farmer who needs to spray their crops extensively and who could benefit from optimizing the crop spraying schedule," said Matic Šerc. In certain cases, the return-on-investment (ROI) for a wine grower translates to 20-30 percent less spraying.

Two sites, two approaches to precision agriculture:

1. Irrigation control for young plants. Near Podgorci, the **eVineyard** system is deployed in a grapevine nursery where young plants require close monitoring with regard to watering to ensure they get off to a good start. Among its many indicators, the system is configured to send an alarm when the soil is getting dry and when watering schedules need revamping. Spray-timing predictions are also used as a means for treating the diseases of the vine.
2. New vineyard. In this location, **eVineyard** is installed in a recently planted vineyard that was formerly a cultivated field. The vineyard is near the woods, so the sensor nodes are used to guard against disease outbreak prediction and to provide optimal spray timing, according to the vineyard's micro-location. **Elmitel's eViti** vineyard decision support system is helping the grower avoid problems with *Oidium*, or powdery mildew, once present in the location in previous years.