

Towards creating a customized wine story for engagement and transparency

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Abstract

The wine industry has evolved thanks to the introduction of new technologies (e.g., sensors, digital tools) and the emerging needs of the wine audience, which seeks transparency for the wine product to ensure quality, sustainability, food safety and engagement. Since the competition in the wine sector is extremely high, transparency via digital means is one of the methods that wine enterprises employ to increase their competitiveness, customer loyalty, and market share. In this paper, we present the MiB (Message-in-a-Bottle) system, a digital tool which exploits different types of data (e.g., weather, traceability etc.) that come from different sources (e.g., sensors, Enterprise Resource Planning (ERP) systems) to offer transparency and better informativeness regarding the different wine labels. The MiB system applies the technique of storytelling in tandem with interactive functionalities to maximize the level of engagement. It is developed in the frame of the MiB project and is planned to go into the market through Lyrarakis wine enterprise. The proposed approach offers a competitive advantage to wine enterprises that can lead to increased sales and profits.

Keywords

Wine industry, storytelling, sustainability, transparency, digital agriculture

1. Introduction

There is a growing trend in food awareness, such as reducing the environmental and climate footprint of the food supply chain [1, 2]. This trend also applies to the wine industry, as the wine audience requires transparency for different aspects of the wine product [3, 4]. For example, wine consumers and wine professionals may be interested in details about the vineyard (e.g., soil texture), the wine matching process (e.g., use of water), or the wine ingredients (e.g., sugar content). This information is valuable to all involved parties in the wine industry, so there is a need for the systematic gathering of information and for applying appropriate presentation methods.

Furthermore, a digital system that exploits information from the wine production chain could improve transparency and increase food awareness, and, thus, strengthen brand recognition and customer loyalty for the respective wine producer, increasing sales and profits.

In the frame of the MiB Project, we developed an information system, called the *MiB system* [5]. The system aggregates meaningful information to create a unique story for each wine label by applying

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storytelling. Storytelling is widely used in the wine sector as an effective engagement technique for customers [6]. The storytelling of MiB is based on *geological, viticultural, wine making, oenological, climatic, cultural and sustainability* data. Data is combined with *multimedia content* (photos, videos) and other achievements (*awards, producers biographies*) to give to the user the full picture for each wine label.

MiB offers a suite of applications that allow users to: (a) navigate through wine products and their related features by providing a storytelling-based presentation (*Main Application*), b) obtain food and wine recommendations (*Le Sommelier Application*) c) register each bottle for validating the authenticity of the product itself (*Authenticity application*), d) interact with a digital label in an augmented reality experience (*AR application*), and e) manage the available data (Admin UI Application).

2. The MiB System

MiB provides a rich ecosystem of services and applications able to create a transparent wine story for the users. These users can be either wine producers/enterprises, or anyone who is interested in wine from consumers to professionals of the domain (oenologists, sommeliers, retailers). Wine producers are the *administrators* of the system, whereas consumers and professionals constitute the *end users*. Administrators can collect data related to their wine products from various sources such as ERP systems, weather stations, or even manually from people that participate in the viticulture or wine making process. These data are injected in the system, allowing the presentation of the wine products using a storytelling technique [7] in an engaging manner [8]. End users can navigate through the available labels and wine characteristics and find the wine that satisfies their needs.

MiB follows a typical *3-tier architecture* consisting of: the data tier, the application tier and the presentation tier. Different applications reside in the presentation tier and they communicate with the database (data tier) through RESTful web services [9] (application tier).

2.1. The MiB Model

The MiB data model (Figure 1) embraces fundamental entities that typically appear in a wine story [10, 11]. Thus, it captures information related to:

- 1) *label*; wine details such as year, flavor, alcohol and acidity (Label entity)
- 2) *variety*; details such as the color and the name (Variety entity)
- 3) *historic and folklore* elements (Cultural entity)
- 4) *sustainability*; information such as water management and farming soil health (Sustainability entity)
- 5) *meteorological*; information as captured by the installed vineyard weather sensors (Meteo entity)
- 6) *vineyard*; information such as the altitude, location, other viticulture details such as irrigation or ripening (Vineyard entity), and the producers (Producer entity)
- 7) *winemaking*; details including a wine making diary (Wine Making Diary)
- 8) *food elements*; including recipes and recommendation captured in the respective entities (Food, Recipe, Justification)
- 9) *awards*: details for specific years of wine labels (Award entity)
- 10) *authenticity*; information that denotes if a specific bottle has been already registered (Bottle entity)

2.2. The Applications

The MiB system includes five applications: *Main Application*, *Le Sommelier Application*, *Authenticity Application*, *Augmented Reality (AR) Application* and *Admin (UI) Application*.

The *Main Application*² (Figure 2) embeds the other applications, except from the Admin UI Application³, which is available only for the MiB administrators. It offers a storytelling experience upon

² Demo: <https://mibproject.lyrarakis.com/demo/>

³ <https://mibproject.lyrarakis.com/demo-admin/> (username/password: test/test)

the ingested wine labels of the database. The Main Application is accessible via the web browser, or via QR code scanning. All data are retrieved through the MiB web services, populated in the Main Application and presented accordingly in two information layers. The basic layer contains coarse-grained information: basic description of the label itself, the producer(s), the vineyard, the winemaking process, the number of acquired awards (if any), food pairing suggestions and cultural elements. This layer is presented to the users through scrolling. The second layer contains more detailed information such as sustainability, meteorological, and geological information. This layer is activated by call-to-action buttons, which are included in different sections of the interface.

The *'Le Sommelier Application'* (Figure 3) allows pairing wine with food and vice-versa, enhancing both the experience of the user and the information she receives. In contrast to most similar approaches that hardcode one-to-one wine-to-dish pairings, our application enables exploring wine suggestions that nicely pair to multiple dishes, potentially diverse in flavor and characteristics. Le Sommelier models domain-experts' knowledge in the form of strict and weak prioritized rules, and performs logical reasoning using the declarative language Answer Set Programming (ASP) [11]. The application executes reasoning by exploiting the state-of-the-art tool Clingo⁴ to tackle different search problems that appear during processing recommendations.

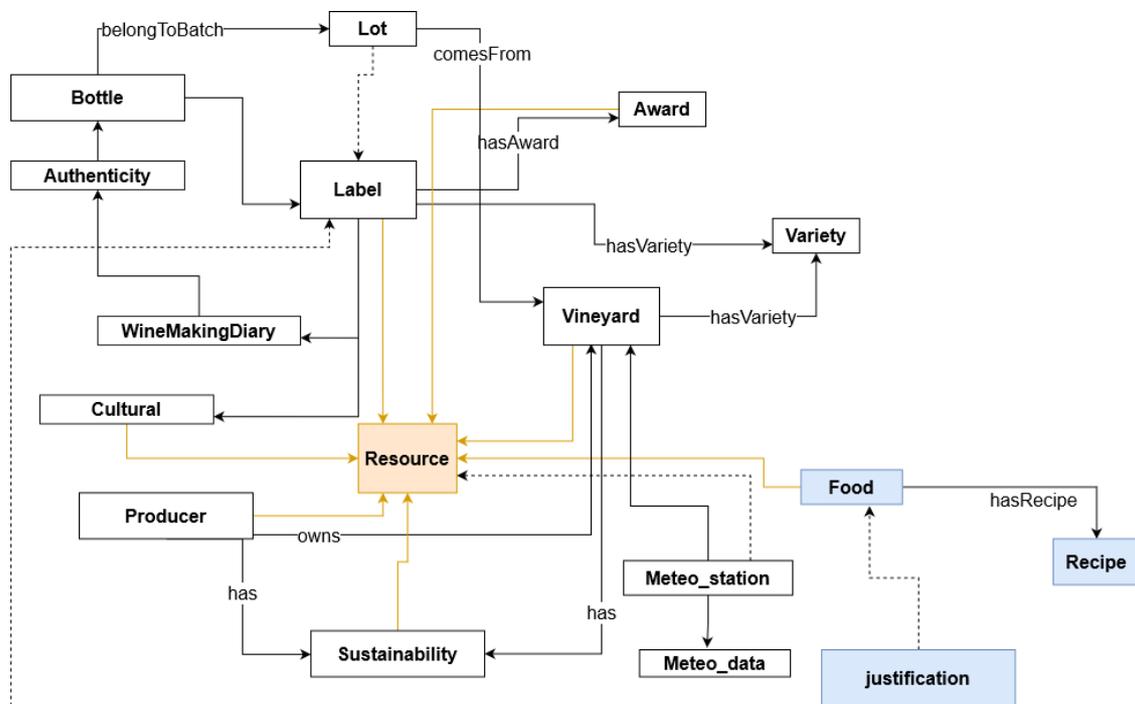


Figure 1: The MiB Model

⁴ <https://potassco.org/clingo/>

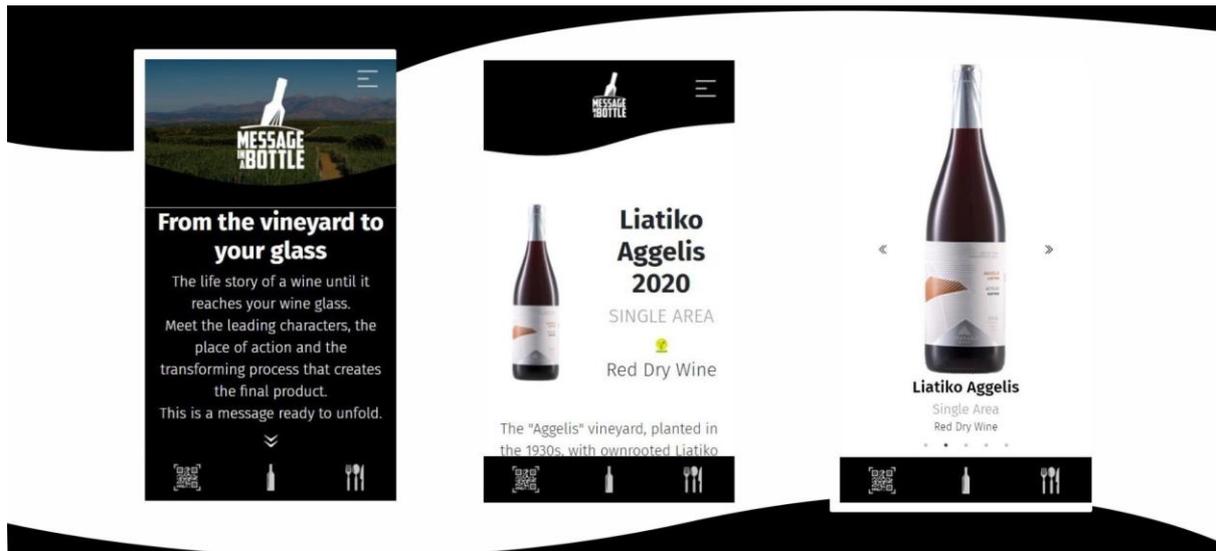


Figure 2: The Main Application

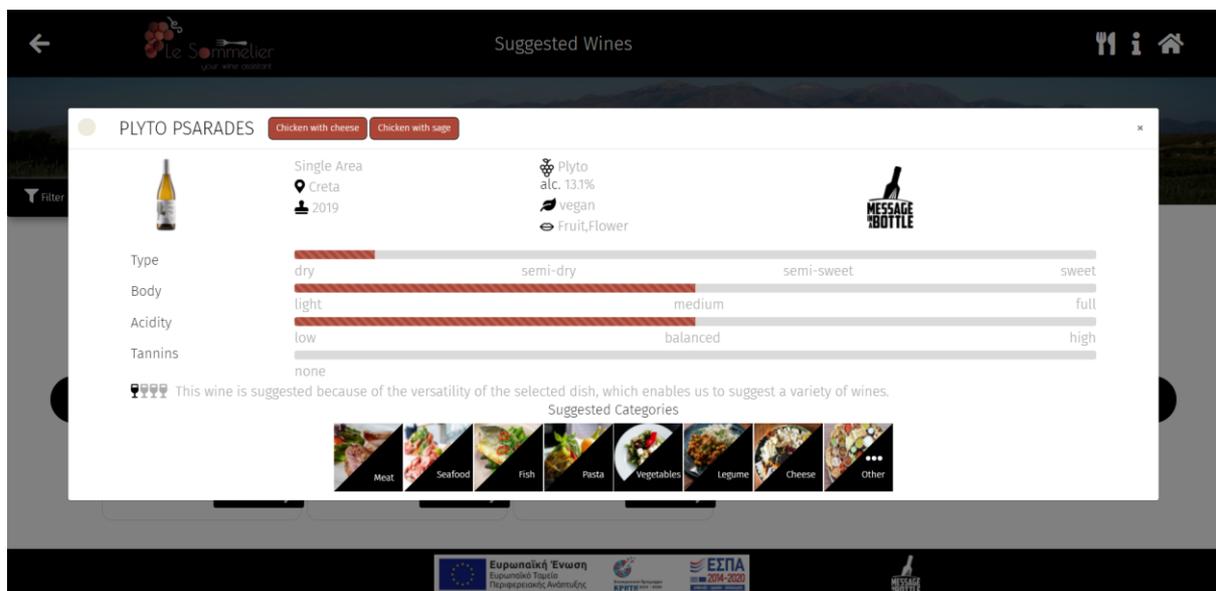


Figure 3: The Le Sommelier Application

The *Authenticity Application* applies a crowdsourcing approach for authenticating bottles. It is based on pairs of public and private keys, uses plain QR printers, and requires the active participation of consumers for checking and registering authentic bottles, and for providing information for the counterfeit ones. This interactive process creates a relation of trust between consumers and producers, and can be incentivized by offering a gamification approach to customers that register their bottles.

The *Augmented Reality (AR) Application* (Figure 4) aims at letting consumers interact with the digital label of a corresponding wine label, in an engaging way using WebXR⁵. WebXR is currently offered on top of Google's AR services⁶ for supported devices. The application overlays a digital interactive label on top of the real-world one, which has to be tracked accurately and consistently in real-time and in various light conditions.

⁵ <https://www.w3.org/TR/webxr/>

⁶ AR services 1.29.213210223



Figure 4: The AR Application

The *Admin UI Application* (Figure 5) offers a content management facility for administrators, allowing them to manage the MiB database or add new data, such as the wine making diary of a new year for a specific wine label, or adding new photos or videos that will be part of the corresponding wine story. In addition, it offers an exploratory service for monitoring the bottles that are available in the market, along with any non-genuine bottles and their associated information added by worldwide customers.

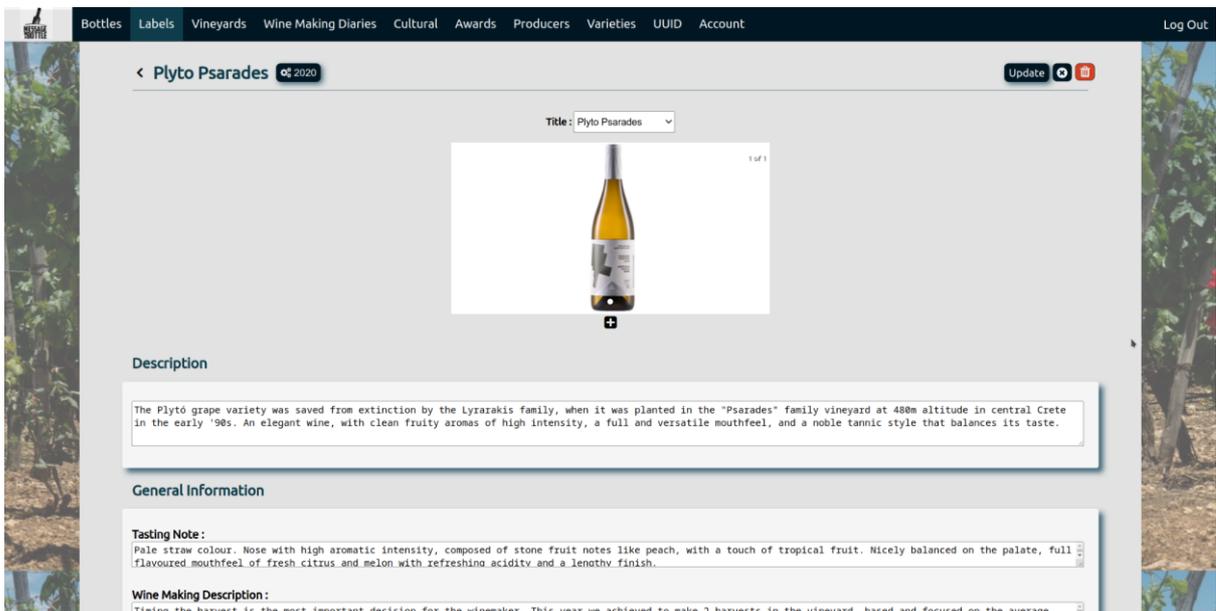


Figure 5: The Admin UI Application

2.3. Added value from using the MiB System

The contribution of MiB is twofold. On the one hand, it offers a system that is easy to use (*web-based, mobile-friendly, platform agnostic, multilingual, easy access*) by both administrators and end users. On the other hand, it creates benefits for the wine enterprises which employ it.

2.3.1. Benefits for users and administrators

The MiB System offers a storytelling experience for wine labels. This experience raises *awareness* by providing accurate and clear information about the entire wine production process. It also gives them *recommendations* for food and wine pairing, as well as relevant recipes that make the wine selection process more playful and meaningful. Additionally, the *augmented reality application* lets consumers interact with the digital label while exploiting MiB data. By authenticating specific bottles, the users benefit from increased trust in the *authenticity* of the product.

MiB Administrators benefit from the *data management* functionality and the *monitoring* of authenticity. The first allows them to curate wine stories whereas the second gives them an extra level of control, especially for receiving information on multiple cases of non-genuine bottles.

2.3.2. Benefits for Wine Enterprises

The MiB system offers multiple benefits for wine enterprises. It contributes to *transparency* because it gives access to information related to the wine production chain for any involved parties. Also, it provides an *engaging way of presenting* wine stories to consumers based on combined data from the past (e.g., cultural data, vineyard geological elements) and the present (e.g., data from weather sensors, photos, videos). Moreover, the MiB system contributes to *food safety* because the authentication of the wine purchased guarantees its origin.

Finally, the system offers an extensible and scalable approach to support additional meaningful features for the wine industry. For example, MiB can support the legal obligations that arose for wine enterprises in the EU to support access of consumers to nutritional information for each wine⁷.

3. Conclusion

We described the MiB system, a web-based information system developed in the context of the MiB project, which allows the wine audience to better understand the characteristics of the wine purchased or consumed. The system is composed of five applications. The main one provides a storytelling experience and allows users to navigate through the wine characteristics at the desired level of detail. Other applications provide value-adding services, such as the ability for optimal wine-food pairing, the ability to verify the authenticity of the purchased bottle and the enhancement of the wine drinking experience through an AR application. The functionality of the MiB system is based on data provided by the winemaker through the Admin UI application.

Although the system has been tested over the labels of the Lyrarakis wine enterprise, it is designed to be generic and can be easily adapted to support other wine enterprises, as well as other domains (e.g., oil, cognac, etc). We argue that using the MiB system will help wine producers stand out from the competition, increase customer engagement and loyalty, and, thus, increase sales and profit.

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⁷ https://ec.europa.eu/food/safety/labelling-and-nutrition/food-information-consumers-legislation/alcohol-labelling_en

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