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Common data specifications for spray diaries and vineyard blocks to enable data interoperability across the wine value chain (Project Harmony)



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Executive Summary

The project objective was to explore the development of a data specification enabling portability of grower agrochemical application records between spray diary systems. This would allow growers to enter their agrochemical data once, share their data across platforms to permitted parties, and maintain access to their historic spray diary data.

The project research identified two distinct specification requirements for *row/block identification* and *spray application (spray diary) records*.

During our research, row/block identification (row/block ID) emerged as a core data point and enabler for many forms of compliance reporting. For example, row/block ID enables grower contracts, market access through agrochemical residue reporting, biosecurity, traceability and, into the future, will be a key enabler of sustainability reporting. Identifying groups of rows (blocks) or part rows between vintages and grower/wine company contracts is a complex challenge that requires agreement across many, if not all nodes of the viticulture supply chain. Complexities arise as blocks can be added, split, combined, renamed and removed across vineyards. Organisations in the supply chain currently refer to blocks via different identifiers making comparison between organisations and keeping historic records for a grower challenging and often impossible.

The project has been highly valuable, not only as a vehicle to develop the foundations of common specifications for row/block identification and spray diary data sharing but also to inform Wine Australia in steps it should consider in terms of a broader industry data strategy and ecosystem. It has also highlighted a number of functional and non-functional challenges that exist within the Australian wine industry that must be addressed and overcome to enable effective data sharing. Finally, the project also highlighted the value of existing data such as grapevine variety names, grape colour and bottle codes that, when digitised, can be used to improve the quality of grower data.

In addition to the successful development of draft specifications for row/block ID and spray application records, the project delivered the following key findings:

- Two distinct specification requirements were identified through the project: row/block identification and spray application records. They are distinct problem domains.
- The custodian of a centralised row/block ID system was not identified and decentralised solutions require further investigation.
- Not all stakeholders see the value in data interoperability achieved through open standards. Commercial models for data interoperability are not aligned.
- Stakeholders agree that identification of blocks between growing seasons and contracts is challenging and costly to manage across systems in use by supply chain organisations.
- Common data governance requirements of grower data across the supply chain is not well understood/agreed by stakeholders. There is also a lack of conversation about interoperability of data and data governance within the sector that has led to data silo’s, ambiguity regarding data ownership and friction on innovation.

- Few vineyards are accurately mapped and there are no agreed specifications for maps, hindering the adoption and limiting interoperability of geospatial technologies that enable outcomes such as accurate recording of rows/blocks.
- Digital/data capability (knowledge/understanding) within key areas of the viticulture supply chain is low, limiting the uptake and development of interoperable data technologies within Australian viticulture.

The analysis resulted in the following recommendations for consideration by Wine Australia:

- Test the developed specifications for row/block ID and spray diary records as two distinct work streams to address interoperability.
- Row/block ID solutions must include spatial data.
- A proof-of-concept project should be undertaken to test the current row/block ID solution specified by the project with a trusted central provider such as Vinehealth Australia.
- Further develop the business case for interoperable spray diary data expanding the ecosystem beyond the current spray diary providers with stakeholders. For example, with emerging Vineyard Management tool providers, robotic spray suppliers and other organisations innovating in agrochemical application management.
- Collaborate with wine companies to further define the value of wider agrochemical data interoperability.
- Collaborate with growers and the wider innovation ecosystem to develop additional use cases for interoperable agrochemical records.
- Reconfigure the membership of the steering group to remove conflict of interest.
- Design a project to prototype the developed draft row/block ID specification within the supply chain. Potential opportunities exist to prototype this with industry organisations such as Vinehealth Australia and Sustainable Winegrowing Australia.
- Develop an industry data governance framework and supporting policy templates to build trust across the supply chain.
- Champion adoption of the NFF Farm Data Code to industry software suppliers.
- Collaborate with wine companies and AGW's Code of Conduct Committee to develop appropriate contract terms which support grower use of and interoperability of data.
- Develop industry programs that support the creation of vineyard maps and encourage survey quality geospatial data creation and use across the supply chain. Additionally, develop case studies that demonstrate the value of geospatial data across the supply chain.
- Work with SMEs to develop consistent, interoperable approaches to mapping against agreed specifications/standards.
- Develop an industry digital capability program to build capability and capacity of growers to build industry digital maturity, the project has shown that agrochemical and geospatial data present opportunities for grower development.
- Increase collaboration with other organisations outside of the viticulture supply chain to leverage knowledge and expertise to rapidly increase digital/data capacity and maturity.
- Collaborate with APVMA to fast track the development of digital chemical labelling for viticulture.
- Additional process mapping is required to fully understand edge cases (last minute contracts etc).

This project has been valuable in identifying key challenges and opportunities for the Australian Wine industry in relation to data interoperability. It has highlighted that in order to achieve the target state of a common data language for spray diary interoperability there is a need for further research, development and collaboration to address these challenges and unlock the potential benefits of data sharing.

Project objective

Responding to industry requirements, the project was initiated by Wine Australia to research the creation of an interoperable data specification enabling portability of grower agrochemical application records between spray diary systems.

A common specification would enable growers to enter their agrochemical data once, share their data across platforms to permitted parties, and to maintain access to their online diary history.

Spray application records are currently collected by growers (approx. 6000) using a number of different applications (Grapeweb, GrapeLink, VitiCentral, paper etc) as dictated by the wineries that they supply and is submitted as a spray diary prior to harvest.

Background

There are currently no common, interoperable data specifications for row/block identification or for capturing spray application records and existing commercial applications do not enable data to be interoperable with other products or easily shared. This means that it is hard for growers to maintain access to historic records. For example, should a grower move between spray diary suppliers it is mostly not possible for them to bring with them their agrochemical information and have it integrated into the new platform. This means that historic data is often lost or remains unused.

Application developers also experience significant overheads supporting their customers to maintain their data as blocks and vine rows are relocated, split and grouped to support winery requirements and as units and business rules used often differ between software tools.

As a result, growers are required to re-enter data into different systems and suppliers of innovative digital systems designed to increase grower productivity and profitability cannot develop the system features required by their customers, stifling innovation.

Through this project we collaborated with key stakeholders to research and develop the following:

- An agreed, open data standard for spray diary records.
- Definition of a row and/or block identifier to enable linkage of data across diary platforms.

The remainder of this report describes our approach, key findings and we make a number of recommendations for further activities.

Approach

Recognising that the adoption of this project's desired outcomes requires the cooperation and action of numerous stakeholders within the Australian viticulture supply chain, the project was executed following a defined approach of co-creation. This strategy ensured extensive consultation with a wide array of stakeholders to ascertain the requirements and validate the resulting specifications.

The consultation activities included:

Formation of a Project Steering Committee
A Project Steering Committee was established early in the project, chaired by Wine Australia and composed of representatives from various segments of the Australian spray diary data value chain. The members of the steering committee were nominated by Wine Australia. The Committee comprised representatives from wine companies, growers and current spray diary providers.

Stakeholder interviews
Throughout the project, an extensive process of interviews and consultations was carried out to understand the existing challenges and future requirements. This involved engaging with various stakeholders including:

- Spray diary software providers
- Growers
- Wine companies (via the project's Steering Committee)
- Viticulturists
- Industry and government organisations including Vinehealth Australia and AWRI
- Commercial providers of vineyard and winery management system software
- Spray contractors
- Geospatial subject matter experts including ground and airborne land survey organisations
- Researchers (e.g., the Collabriculture[1] team)
- Furthermore, additional comprehensive desktop research was conducted to explore the global landscape, revealing a current lack of substantial international activity in this domain.

In parallel with direct industry consultations, engagements with key organisations like the Australian Pesticides and Veterinary Medicines Authority (APVMA) were undertaken to determine the status of digital agrochemical labelling data.

An industry workshop
A workshop was held in Adelaide on 19 September 2022 with 30 stakeholders representing growers, wine companies, spray diary providers (including GrapeLink, GrapeWeb and VitiCentral), industry organisations, mapping providers and consultants/advisors. The facilitated workshop examined the project findings to date, stakeholder requirements as well as project risks and challenges. It also provided a forum to review and provide feedback on

[1] https://collabriculture.com/ - collaborative approaches to shared problems in agriculture

an early draft of the row/block ID and spray diary specifications. During the workshop a design for a possible prototype/reference implementation for the specifications was presented to the general support of the attendees.

Open, co-creation of draft Row/Block ID and Spray Diary specifications

The project took an open, collaborative, co-creation approach to the development of the specifications from the outset. Recent projects such as the Collabriculture project[2] that aimed to provide standards for geospatial data in viticulture acted as inspiration and validation for this approach. The specifications were hosted on the Github[3] and made available under moderated modification and open comment by stakeholders. Throughout this process further consultation with specific stakeholders, particularly wine company viticulturists and data managers was undertaken to ensure completeness of the specifications.

Identification and development of supporting data

During the design of the data specifications, it became clear that there were opportunities for the specifications to be supported and enabled by other datasets to improve data quality. These "core enabling datasets" including Grapevine Varieties[4], Growing Region[5] and Vine Growth Stage[6] data, improved the data quality resulting from the application of the specifications. For example, ensuring that grapevine variety names were spelt correctly and that the correct bottle codes (such as SHZ for Shiraz) were used. In addition to the supporting data, the specifications are supported by validation documents (JSON Schema) that could be used to test that data interoperated against the specifications is valid and in the expected format. These activities were designed to ensure and improve the overall quality of the data being transferred between parties using the specification.

Prototype

To validate the project findings and the specifications, a pilot project was designed to share data between multiple parties in the spray diary data ecosystem. These parties included providers of spray diary software systems, farm management systems, and also organisations such as Sustainable Winegrowing Australia and Vinehealth Australia as both of these organisations require accurate agrochemical usage or block identification information for compliance purposes. The project participants were sourced and project agreements drafted. Unfortunately, the prototype activities were stopped when one of the winery partners advised that it was unable to provide de-identified grower spray diary records to the pilot due to internal data governance concerns.

Key Findings and Recommendations

The project has been highly valuable, not only as a vehicle to develop the foundations of common specifications for row/block identification and spray diary data sharing but also as a

[2] https://collabriculture.com/ - collaborative approaches to shared problems in agriculture
[3] Github https://github.com/morethanmachines/project-harmony
[4] Grapevine variety list https://github.com/morethanmachines/project-harmony/blob/main/specifications/australian-grapevine-variety-list/variety-list/json/variety-list.json
[5] Growing Regions data - https://wineaustralia-opendata-wineaustralia.hub.arcgis.com/datasets/ede7ffb0e73b4504a5ed613965b11e0f/explore?layer=1
[6] EL Growth Stage dataset - https://github.com/morethanmachines/project-harmony/blob/main/specifications/australian-spray-diary-specification/data/growth_stages.json

set of activities that have helped Wine Australia further understand its role in the Australian Wine industry data ecosystem, informing the development of its future industry data strategy. It has also highlighted a number of functional and non-functional challenges that exist within the Australian Wine industry that must be addressed and overcome to enable effective data sharing. These will be discussed below.

Two distinct specification requirements were identified through the project: row/block identification and spray application recording. They are distinct problem domains.

The project was predicated on requirements to address both row/block identification and the interoperability of spray diary records. Through the project research it has become clear that these are two distinct research topics.

> *"Interoperable block information will be the key to biosecurity management and to simplifying sustainability reporting for growers."* - **Industry Organisation**

> *"Understanding chemical use across vintages is a key data point informing withholding periods and other points of interest affecting market access"* **- Viticulturist**

Through our research, row/block identification has emerged as a core data point and enabler for compliance. Row block ID enables grower contracts, market access through agrochemical residue recording and, into the future, will be a key enabler of sustainability reporting.

Identifying groups of rows or part rows between vintages and grower/wine company contracts is a complex challenge that requires agreement across many, if not all nodes of the viticulture supply chain. Blocks can be added, split, combined, renamed and removed from vineyards, vineyard systems and wine company management systems. Organisations also refer to blocks via different identifiers making comparison between organisations and keeping historic records challenging and often impossible.

Recommendation:

- ***Test the developed specifications for row/block ID and spray diary records as two distinct work streams to address interoperability.***

  It is recommended that future project activities be researched as two concerns: row/block identification and spray record specification. This project has delivered specifications for both row/block ID and spray diary data. Both need to be tested through prototype activities but require different resources and stakeholders to achieve outcomes.

- ***Row/block ID must include spatial data to enable future value.***

We observed the value and potential of including spatial data such as spatial polygons into the row/block ID during the development of the row/block ID specification. This received support from growers and service providers such as those providing soil (carbon) sampling, viticulture services etc., but was less well received by existing spray diary providers who did not see the need. Further work is required to ensure all stakeholders are aligned but it is clear that spatial data adds significant improvements to data quality and utility that would be of value to growers. Data quality is improved because records can, for example, be compared for collisions and overlap.

- ***Additional process mapping is required to fully understand edge cases (last minute contracts etc). Opportunity for the commercial sector.***

  It was observed that there are edge cases in process where data loss occurs, for example last minute contracting of grapes with growers immediately prior to harvest. These edge cases require further research to ensure the row/block id specification and resulting technology implementations are complete.

The custodian of a centralised row/block ID system was not identified and decentralised solutions require further research.

> *"We still need to see the proposed solution tested in a real-world prototype"* - **Wine Company representative**

> *"Who will issue these IDs, how do we know the solution will work? What is the process of obtaining an ID?"* - **Spray Diary software provider**

Further to the previous finding that there is a requirement for distinct specification requirements for row/block identification and spray application recording. We observed from stakeholder input that there are two possible approaches to the delivery of a common row/block ID system that would be acceptable. Centralised and decentralised. Centralised, where an industry organisation such as Vinehealth Australia would manage the provision of row/block ids and decentralised where they would be issued by nodes of the supply chain. The preference of the stakeholders is to explore a centralised approach to the provision of a common row/block ID issued from a trusted provider such as an industry or government organisation. There are a number of organisations that have been identified to potentially undertake this role including Vinehealth Australia, AWRI and Wine Australia. The provision of a common row/block identifier requires further design.

Recommendation.

- ***Undertake a pilot project to test the row/block ID specification developed by the project with a trusted, centralised provider.***

The specification delivered through this project requires verification through real world use. This can be achieved through the development of a prototype API delivered through a trusted organisation such as Vinehealth Australia and integrated with existing spray diary providers. This will also test the wider process of issuing and managing row/block ids through a centralised system.

At this time, it is considered by stakeholders that a decentralised approach is not currently necessary however Wine Australia could consider a future decentralised pilot.

Not all stakeholders see the value in data interoperability achieved through open specifications. Commercial models for interoperability are not aligned.

> *"It is hard to justify the additional development at this time. The cost to us of making the change to our product that is required to adopt the proposed specification would be huge. Who pays?"* - **Spray Diary software provider**

> *"Our wine company customers are not asking us for this"* - **Spray Diary software provider**

> *"Retaining my spray records is of huge value to me. Not having to enter the data into multiple systems for different needs would save me a huge amount of time"* - **Grower**

> *"These specifications would give us confidence that we would be able to provide additional value to our growers by enabling us to provide spray data to existing spray diary providers used by wine companies."* - **Farm Management System Provider**

The spray diary software providers and some of the wine companies on the Steering Committee are reluctant to embrace the specifications as they presently perceive only escalated costs. They also lack concrete evidence to substantiate the value proposition. There is role for Wine Australia to demonstrate the value proposition, potentially as part of a broader investigation around the value to the sector of data interoperability across the value chain.

While spray diary software providers expressed interest in assuming the role of a common row/block identifier issuer, grower preference is for an industry organisation to undertake this responsibility. This divergence in preference resulted in a friction point in achieving consensus. Consensus was eventually achieved that, at least for a South Australian proof-of-concept, an organisation such as Vinehealth Australia would be well suited to assume this role.

Existing spray diary providers expressed a preference towards collaboration among themselves for data exchange over creating an interoperable spray record ecosystem that

would facilitate diverse use cases for agrochemical data alongside new providers. This inclination poses a hurdle in fostering a more inclusive environment within the industry.

Notably, it was observed that some wine companies also display a level of apprehension concerning the potential exposure of competitive advantages through interoperable data - a concern that warrants careful consideration and resolution through future stakeholder engagement.

Finally, a significant challenge surfaces as the supply chain struggles to conceptualise potential future use cases for interoperable spray data. This lack of foresight could impede the realisation of broader applications and benefits within the industry and creates barriers for new and innovative tech/platform providers to enter the wine supply chain underscoring the importance of fostering a collective vision for this technology.

Recommendations:

- **Further develop the business case for interoperable spray diary data expanding the ecosystem beyond the current spray diary providers.**

  Wine Australia should continue to undertake activities to further demonstrate, document and communicate the business case for a common row/block identifier for wine companies, spray diary providers, growers and other supply chain beneficiaries.

- **Collaborate with wine companies at a strategic level to address any misgivings of wider agrochemical data interoperability.**

  Wine Australia must continue to work with wine companies through appropriate forums, such as the CEO Roundtable, to understand commercial concerns and address these through further development of the specification and supporting data governance activities.

- **Collaborate with growers and the wider innovation ecosystem to develop use cases for interoperable agrochemical records.**

  Wine Australia must continue to consult with growers and the wine industry startup community to develop further use cases for common row/block identification and interoperable spray records.

- **Reconfigure the membership of the Steering Committee to remove conflict of interest.**

  There were clear conflicts of interest for members of the steering committee, specifically the spray diary providers that affected their ability to objectively guide the project to meet its outcomes. These commercial conflicts added significant friction to the ability of the project team to deliver on the outcomes of this project. Future investments in the development of common data specifications can learn from this when identifying and engaging steerco members.

It is agreed by stakeholders that identification of blocks between growing seasons and contracts is challenging and costly to manage across systems in use by supply chain organisations.

> *"By far the largest cost we incur is supporting growers and wine companies identify contracted blocks between seasons"* - **Spray Diary software provider**

> *"This year [identifying contracted blocks] was so time consuming and costly we nearly decided this was our last season"* - **Spray Diary software provider**

> *"A common block ID would be the best outcome from this project but who would be the custodian"* - **Spray Diary software provider**

> "Adoption of a common block/row ID would be challenging across jurisdictions" **- Industry organisation representative**

We heard from the spray diary providers that the cost of rationalising data between vintage and between systems (e.g. wine company and spray diary systems) was challenging and expensive to support in its current form. This is due to many factors including incomplete data, broad changes to block configuration and limited aligned process however as expected the largest factor is the lack of a common data specification for identifying blocks. Interestingly stakeholders struggled to articulate a solution that would be effective in all scenarios and for a broad spectrum of stakeholders.

We also heard disagreement between parties on the need to include geospatial information within a row/block ID specification.

The project team in collaboration with stakeholders co-developed a draft specification for consideration and future implementation however it is widely agreed that this now needs to be tested within the supply chain. Support for spatial information was included as part of the specification to ensure compatibility with future requirements and other broader use cases for a row/block ID, for example, to identify blocks and points used for soil sampling for carbon accounting.

Recommendations:

- **Design a project to prototype the developed draft row/block ID specification within the supply chain.**

  A project should be developed to test and validate the design of the draft specification against real world use between a row/block id provider such as Vinehealth Australia

and identified nodes of the agrochemical supply chain, for example, between spray diary and farm management systems and/or spray diary and wine company systems.

There is little awareness and no agreed position across the supply chain on the governance of grower data".

> *"As far as we are concerned once a grower enters their spray record into the spray diary we provide, we own it"* - **Wine company representative**

> "I own my spray diary data. I am shocked that anyone thinks any different" **- Grower**

We heard that there is ambiguity and confusion over ownership and chain of custody of spray diary data. Growers rightly claim ownership of their data, however so do software providers and wine companies. Nobody we spoke to during the project was certain of their contractual position. There is an opportunity for Wine Australia to collaborate with stakeholders to clarify the position for growers and wine companies while also promoting the adoption of initiatives such as the National Farmer's Federation's Australian Farm Data Code[7] and Food Agility's Data Sharing Agreement template[8] for best practice data contracting.

Recommendations

- **Develop an industry data governance framework and supporting policy templates.**

  Growers could be further supported by an industry framework for governance of viticulture supply chain data. Wine Australia should provide growers with tools, templates and resources to make informed choices about use of their data.

- **Champion adoption of the NFF Australian Farm Data Code to viticulture software suppliers.**

  Wine Australia should widely promote the adoption of the National Farmers Federation Farm Data Code to viticulture software suppliers and the Australian wine supply chain. The code promotes best practice for managing grower data covering topics such as ownership, access, sovereignty and security. Adoption of the data code by viticulture software suppliers would improve the quality of the software offered to growers and reduce data risk across the supply chain.

[7] https://nff.org.au/programs/australian-farm-data-code/ - National Farmers Federation Farm Data Code
[8] https://www.foodagility.com/posts/data-sharing-agreement-template-released - Food Agility Dat Sharing Agreements

- **Collaborate with wine companies to understand current grower agreements and develop appropriate contract term templates to support grower use of and interoperability of data.**

  Wine Australia has an opportunity to build grower capability by facilitating a conversation between growers and wine companies regarding ownership of their data. Understanding the needs of all parties is essential in facilitating adoption of interoperable data across the Australian wine supply chain.

Few vineyards are accurately mapped and there is no agreed specification for Vineyard maps, limiting interoperability and hindering the adoption of geospatial technologies.

There is growing acceptance that accurate, portable maps of vineyards are required to enable process improvements to increase productivity, automation to reduce labour costs and requirements and to support and reduce the friction of compliance. Accurate mapping is also seen as essential for future sustainability reporting.

We also heard through the project that accurate vineyard maps are also an essential component in solving the software provider challenge of resolving data conflicts when a grower removes a whole block or part, changes its variety, or combines areas. For example, being able to detect that two block IDs occupy the same physical location adds an additional dimension of error detection.

However geospatial mapping is currently a complex, specialist and often costly process for growers. Supporting the development and coordination of new, easy to use applications that enable growers to adopt the technology is seen as an essential component in supporting the adoption of a new row/block id specification enabling spray diary data interoperability.

Recommendations:

- **Educate growers and supply chain organisations of the value of geospatial data. Also, future value. e.g. sustainability.**

  Wine Australia and Vinehealth Australia should consider the development or expansion of extension programs that support grower adoption of vineyard maps such as commissioning the maps on behalf of growers.

- **Develop industry programs that support the creation of vineyard maps and encourage survey quality data creation.**

  Wine Australia should consider funding and further research into the development of tools and services that support growers in the creation of maps for their Vineyard operations and develop use cases that demonstrate the value of geospatial mapping

at different levels of accuracy as not all growers will require highly detailed maps.

- **Work with SMEs to develop consistent, interoperable approaches to mapping against agreed specifications/standards.**

  We heard that there is still a level of standardisation required across the geospatial community for the mapping of vineyards. The Collabriculture[9] project went some way to address this but still requires further development and adoption support. Wine Australia should continue to develop this work into a comprehensive best practice approach for Australian growers and SMEs.

Digital/data capability within the viticulture supply chain is low, limiting the uptake and development of interoperable data technologies within Australian viticulture. Furthermore, the business cases required for grower adoption of digital technologies require further development.

We observed that there is still a low level of digital/data maturity and capability across the wine supply chain. This is driving a preference for maintaining the status quo rather than looking for ways to disrupt and reimagine current processes to reduce costs and increase productivity as well as addressing some of the wider challenges of the industry.

Recommendations:

- **Development of an industry digital capability program focused on specific use cases such as agrochemical data would build industry digital maturity.**

  There is a clear opportunity to educate growers on the value of digital record keeping, data interoperability and the use of spatial technology to increase productivity across their enterprise. Additionally, we observed that wine companies also have a knowledge gap that is challenging them to identify digitisation and process improvement opportunities. A targeted, extension/development program linked with other Wine Australia program activities could be used to develop industry digital/data maturity.

- **Increase collaboration with other organisations outside of the wine supply chain to leverage knowledge and expertise to rapidly increase digital/data capacity and maturity.**

  There is a wealth of transferable research and technology that could be leveraged to fast-track digital maturity across the Australian wine sector. Wine Australia must ensure this knowledge is leveraged and that public/private partnerships are capitalised upon to avoid reinventing wheels and reducing risk.

[9] https://collabriculture.com/ - collaborative approaches to shared problems in agriculture

Triple bottom line impact

We have considered the triple bottom line impact of the project on the Australian wine supply chain. The triple bottom line impact of interoperable agrochemical data on the Australian wine industry would include:

Economic
Interoperable agrochemical data can streamline operations, reduce redundancies, and optimise resource allocation. This efficiency leads to cost savings for vineyards and wineries, enhancing overall profitability. Additionally, improved data access and insights can drive innovation, fostering the development of new products, processes, and markets, thereby contributing to economic growth within the industry.

Social
Enhanced data interoperability promotes collaboration among stakeholders, fostering a more connected and cooperative community within the Australian wine industry. By enabling information sharing and standardisation, it empowers growers, suppliers, and other players to make informed decisions, ultimately enhancing productivity and livelihoods. Moreover, transparent and accessible data can lead to better communication and trust among industry participants, contributing to a healthier and more inclusive working environment.

Environmental
Interoperable agrochemical data facilitates better monitoring and management of chemical usage in vineyards. This can result in more precise and targeted application of agrochemicals, reducing overuse or misuse, minimising environmental impact, and promoting sustainable agricultural practices. By enabling data-driven decisions on pesticide and fertiliser application, it supports the industry's efforts toward environmental conservation and sustainability, preserving the land for future generations.

Summary

This project has highlighted key challenges and opportunities for the Australian wine industry in enabling spray diary data interoperability through common specifications. While distinct specifications were developed for row/block identification and spray records, further research, development, and collaboration is needed to address concerns around data governance, capability building within the sector, vineyard mapping, and proving value to stakeholders. Wine Australia must continue engaging across the supply chain to align on a vision, improve digital literacy, develop governance frameworks that protect growers, and prototype solutions that focus on different problem domains. Testing centralised row/block IDs and expanding use cases is critical to drive adoption. By addressing these recommendations, Wine Australia can lead the industry towards seamless data sharing that drives efficiency, sustainability and innovation.