AgriTech New Zealand and Ministry for Primary Industries

Geospatial Data Interoperability Project

MVP Final Report

Andrew Cooke, Keith Axon and Don Wilson
29 November 2021

Contents

P: 07-857 0820 | W: rezare.com | A: Rezare Systems, SkyPoint Building, 3 Melody Lane, Hamilton 3216, New Zealand

P: 07-857 0820 | W: rezare.com | A: Rezare Systems, SkyPoint Building, 3 Melody Lane, Hamilton 3216, New Zealand

1. Executive Summary

Achieving effective data interoperability in New Zealand's agricultural ecosystem continues to be both an aspiration and a challenge for the sector. Difficulties in moving data between software tools or sharing data with advisors and supply chain partners result in lost time for farmers and industry organisations, slow the rate of agritech innovation, and make it harder to achieve the environmental and social outcomes sought by the agricultural sector.

From May to November 2021, AgriTech New Zealand with Rezare Systems as its implementation partner, experimented with a grass-roots approach to developing an interoperability specification for geospatial data. The project was funded through the New Zealand government's Agritech Industry Transformation Partnership, led by the Ministry for Primary Industries (MPI) and the Ministry for Business, Innovation, and Employment (MBIE).

The goals of this project were as follows:

- Collaboratively develop a "minimum viable product" (MVP) specification for the interchange of geospatial, or map, data for agriculture, making use of existing international standards.
- Support the development of prototype implementations, recognising that organisations need to learn and gain confidence in interoperability specifications before they can be widely adopted.
- Test, improve, and document a process that could be applied to collaboratively develop specifications in other areas of agricultural data interoperability.

With the involvement of approximately 20 New Zealand organisations (and some Australian organisations), an MVP specification was developed between May and early July 2021. The specification covered data definitions for operating farm boundaries, land management units, and paddocks/fields or orchard/vineyard blocks, and defined how spatial data could be represented as well as the additional attributes that make the spatial maps useful.

From September to November 2021 Rezare Systems supported interested parties with prototyping. This was less successful, as organisations encountered internal resource, funding, and timing issues that make it hard for them to collaborate on prototyping.

The group of participants met again in November 2021 and reflected on the project. Participants felt that the specification development process was effective and helpful, and most participants wanted to continue the cadence of meetings and collaboration. Several recommendations were captured that could improve interaction and involvement in the prototyping process, including the use of in-

P: 07-857 0820 | W: rezare.com | A: Rezare Systems, SkyPoint Building, 3 Melody Lane, Hamilton 3216, New Zealand

person workshops and meet-ups to build deeper relationships between participants and allow collaborative development.

A strong message from those who participated was that the work was valuable and should be continued – increasing the scope of the specifications beyond the initial MVP and providing ongoing support and encouragement for organisations to collaborate on beneficial pre-competitive activities.

P: 07-857 0820 | W: rezare.com | A: Rezare Systems, SkyPoint Building, 3 Melody Lane, Hamilton 3216, New Zealand

2. Introduction and Scope

Data interoperability issues cause friction and loss of benefits for farmers, slow the rate of agritech innovation, and make it hard to achieve the environmental and social outcomes targeted by the agricultural sector.

Improvements in data interoperability will help New Zealand's agricultural and horticultural sectors to achieve their value growth aspirations, supporting the information flows and credibility needed to differentiate our products. It will enable the insights that underpin improved environmental, health, social, and safety outcomes on farms, vineyards, and orchards.

For New Zealand agritech developers, interoperability and the use of global standards will support future innovations and enable greater adoption internationally.

This project focuses on developing an MVP (minimum viable product) specification for interoperable geospatial data in agriculture. It aims to address these problems:

- Farmers and their advisors use a range of tools, many of which need to interact with a variety of geospatial information about a farm or orchard, and that data needs to be synchronised or re-used
- Farm plans will be developed with a variety of tools but need to be displayed or delivered for compliance and audits
- Farmers and their advisors have no appetite for recreating farm or orchard maps in different tools; a process which can take a non-specialist many days of effort
- Software tools and organisations can often import and export farm maps using "shape files", a manual process that requires understanding of the underlying technologies, and can often mean the loss of attributes with only the shapes being transferred
- Information about activities carried out on geospatial areas (such as nitrogen applied to paddocks or sprays applied to rows) is trapped in proprietary formats and not able to be analysed or reused for other purposes.

AgriTech New Zealand and the New Zealand Ministry for Primary Industries engaged Map of Agriculture NZ (Rezare Systems) to address these problems by developing an open-source set of specifications for how to interchange farm spatial information accompanied by data about those spatial entities.

P: 07-857 0820 | W: rezare.com | A: Rezare Systems, SkyPoint Building, 3 Melody Lane, Hamilton 3216, New Zealand

An outcome from the project was also to test the hypothesis that agritech companies and agribusinesses would be willing to engage in developing specifications, and that a facilitated, open-source process would be effective in their development.

3. Methodology

3.1. Project Initiation

The initial step was to introduce the project to the industry. An online project kick-off meeting was organised by Rezare Systems and AgriTech NZ for 21 May 2021. Those on AgriTech NZ's mailing list were invited to participate and the meeting was well attended. The dual objectives of the meeting were to a) seek expressions of interest to join an agritech data reference group, and b) encourage interested parties to join the geospatial working group.

The questions that a geospatial working group might address, and the principles proposed for the project were explained. Technical specialists (architects, developers, business analysts and data specialists) were invited to register to participate in the working group.

Twenty-five people registered to participate in the working group, and representatives from other organisations registered their support and interest in the outcome. At that stage (May 2021), the majority of these also indicated an expectation that they would implement the specifications derived by the working group in their solutions.

The topics covered in the kick-off meeting are listed in

P: 07-857 0820 | W: rezare.com | A: Rezare Systems, SkyPoint Building, 3 Melody Lane, Hamilton 3216, New Zealand

Appendix 1: Working Group Meetings.

3.2. Phase 1 – Developing an MVP specification

The first focus of the working group was the collaborative development of a specification for geospatial data for agriculture.

The approach to achieve this was to run a series of online workshops and to develop an open-source repository for the specifications and for supporting discussions and documentation. The workshops were facilitated by Andrew Cooke, the Managing Director of Rezare Systems, drawing on his expertise and experience with facilitating similar groups and his understanding of data interoperability and geospatial data.

The primary aim was a "proof of process" to demonstrate that the group could work together in a short amount of time to create something useful. This would be to develop a minimum viable product (MVP) specification, building on work done by other groups internationally. The MVP would be extendable.

It was made clear that the outcome was to be an open specification not a formal standard (such as those produced by ISO, IEEE, or OGC[1]).

The working group used an "Open Source" process with a Github repository so that the results would be publicly available. The repository operated under an Apache 2.0 licence to provide protection to the participants.

The decision was made that there were significant benefits in re-using and building on existing specifications rather than building everything from scratch.

Three key resources in this regard were:

- European Union's INSPIRE (INfrastructure for SPatial InfoRmation in Europe) specification[2]
- The GeoJSON specification formalised by the Internet Engineering Task Force[3], and
- The Open Geospatial Consortium's Core Features API specification[4]

[1] ISO (iso.org) is the International Standards Organisation; IEEE (ieee.org) is the Institute of Electrical and Electronics Engineers; OGC (ogc.org) is the Open Geospatial Organisation.
[2] INSPIRE - https://inspire.ec.europa.eu/
[3] GeoJSON - https://geojson.org/
[4] OGC API – Features - https://ogcapi.ogc.org/features/

P: 07-857 0820 | W: rezare.com | A: Rezare Systems, SkyPoint Building, 3 Melody Lane, Hamilton 3216, New Zealand

3.3. Phase 2 – Supporting prototyping

The second phase was to facilitate prototyping interoperability by clusters of participants so they could apply the MVP specification established in the first phase. This phase was delayed from its originally planned start in July 2021 because working group participants communicated that their organisations would be better placed to start prototyping later in the year, from September onwards.

Based on earlier feedback from participants, an in-person workshop in Auckland at the end of August 2021 was planned to initiate the phase. Covid restrictions prevented the workshop taking place in the manner proposed. An online workshop was substituted.

The prototyping workshop introduced new participants to the phase 1 specifications and how they could adopt them. Aspects of the detailed specification were discussed, and participants described what they planned for the prototyping phase. Participants were encouraged to notify their interest in working with others in a group of two or more on a prototype based on the specification, particularly to try interoperability with another party. Rezare Systems would connect participants with similar interests and provide technical support to the groups, including assisting with discussions on how to implement the specifications, and prioritising feedback and improvements.

3.4. Phase 3 – reflection and next steps

The third or close out phase was to review and report on the project. Participants in the working group were surveyed and a feedback meeting for participants was held. The feedback meeting discussed the survey questions and responses so that future projects may benefit from the processes and activities experienced and lessons learnt in this project. This report is an outcome from phase 3.

4. Results

The road map in Figure 1 shows the timing of the working group meetings and other events.

P: 07-857 0820 | W: rezare.com | A: Rezare Systems, SkyPoint Building, 3 Melody Lane, Hamilton 3216, New Zealand

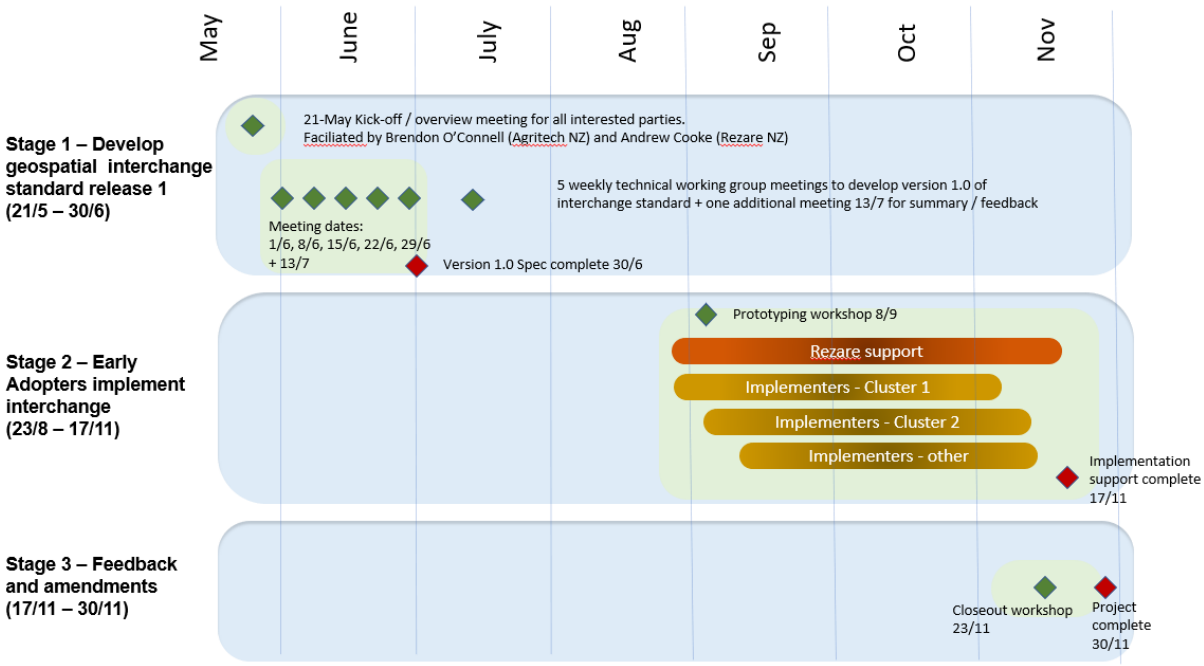

Figure 1 Project road map

4.1. Participation

An enthusiastic core of 20+ organisations participated in the project with 13 – 22 participants attending working group meetings. Organisations were drawn from a range of industries including agriculture, horticulture, viticulture, central and local government, universities, processors, research organisations and information technology providers.

4.2. Working Group Meetings

Working group meetings in Phase 1 were held online weekly in June. Five meetings were planned but an additional sixth meeting was added (on 13 July) because participants agreed it would be valuable.

All but 1 or 2 participants indicated that they would not be ready to start prototyping before September. Consequently the prototyping workshop was delayed until 8 September and was attended by 22 members of the group. This clearly demonstrated the interest among the group after a break of almost 2 months.

The topics covered in each of the working group meetings are listed in

P: 07-857 0820 | W: rezare.com | A: Rezare Systems, SkyPoint Building, 3 Melody Lane, Hamilton 3216, New Zealand

Appendix 1: Working Group Meetings.

Version 1.0 of the specification was completed at the end of the scheduled 5 working group meetings as planned.

4.3. Prototyping

Initial response to the idea of prototyping the new data structures and specifications was very positive. We had planned on perhaps three prototypes (ideally multi-party prototypes), but nine organisations indicated their intent to prototype. At the workshop on 8th September, three groupings were identified:

- A coalition of organisations wishing to prototype farm definitions (including farm boundaries) in relation to digital farm environment plan data. Unfortunately, this group was delayed by contracting and funding requirements outside the scope of our work.
- A local government organisation planning to prototype automated data ingestion from an agricultural industry organisation that was not actively participating in the working group. Unfortunately, the agricultural industry organisation did not have resource available to work with the local government organisation in the timeframe.
- Two or more organisations in the viticulture industry who wanted to investigate synchronisation of block boundary data ("Plots" in the geospatial working group parlance). This group carried out some initial work creating database tables that reflected the data component of the specifications but did not automate a data interchange. This work continues.

In addition, a small set of group members were interested in prototyping but did not have an intended partner. We connected these group members and they made introductions over email. There were some synergies in the biosecurity and environmental space, although the working group specifications do not yet cover those areas. This group did not progress with prototyping but identified needs for future specification work.

In addition to these planned prototypes:

- An Australian viticulture industry company, joining the group later, introduced Wine Australia and Vine Health Australia to the specifications, and demonstrated how data sets they were collecting could be adjusted to meet the specifications
- A New Zealand software developer produced a demonstration implementation of the data model created by the working group in their own software tool, and

P: 07-857 0820 | W: rezare.com | A: Rezare Systems, SkyPoint Building, 3 Melody Lane, Hamilton 3216, New Zealand

- A coalition of organisations proposed to use the specifications to share farm map data with farmers' permission. This proposal is currently awaiting considerations for co-funding.

The fact that further prototyping did not materialise during the time allocated suggests that organisations were still not ready or had higher priority commitments. In some cases, participants had been encouraged by their organisations to participate in the working group and had taken this as a sign of commitment, but their organisations had not allocated internal time beyond participation. In other cases, agreements between partners or with funders took much longer than anticipated.

4.4. Repository

A publicly-accessible repository for the project was established in Github at https://github.com/Datalinker-Org/Geospatial.

The repository contains the specifications that were developed by the Agritech New Zealand geospatial working group for geospatial data for agriculture. The specifications in JSON Schema[5] and mark-down format are organised into the following folders:

Folder	Description
resources	Primary resources for use in GeoJSON or REST/gRPC APIs
types	Data types used within the resources, including identifier and relationship types
enums	Enumerated values
url-schemes	Open API specifications for API methods
well-known	Maintainable lists of well-known values (where we don't have a complete set to make an enumeration)

The repository includes an "Issues" section, and this was used to propose and discuss details of the specification. Issues also provide a forum for the community and may be used for comments, queries, and responses by working group members (and in fact by any members of the public). We expect this will continue to be used as people start implementing geospatial interoperability.

Importantly, the repository includes documentation in a wiki[6] that explains the specification and how it should be used.

[5] JSON (JavaScript Object Notation) is a structured data format used in data interchange, and JSON Schema is a formal specification language that can be read by people or machines (see https://json-schema.org/).
[6] A wiki is a collaboratively edited hypermedia publication. See https://en.wikipedia.org/wiki/Wiki.

P: 07-857 0820 | W: rezare.com | A: Rezare Systems, SkyPoint Building, 3 Melody Lane, Hamilton 3216, New Zealand

Topics addressed in the wiki include:

- Understand the specifications
    - Relationships between spatial objects
    - Resources and other data types
    - Embedding resources into GeoJSON features
- Identifier schemes and well-known identifiers
- Getting involved with the project
- Using these specifications

Minutes from working group meetings are available in the wiki.

Figure 2 shows the key spatial entities defined in the specification. The specification currently covers Holdings, Sites, and Plots, with Cadastral Parcels already defined by LINZ and Properties by local government authorities.

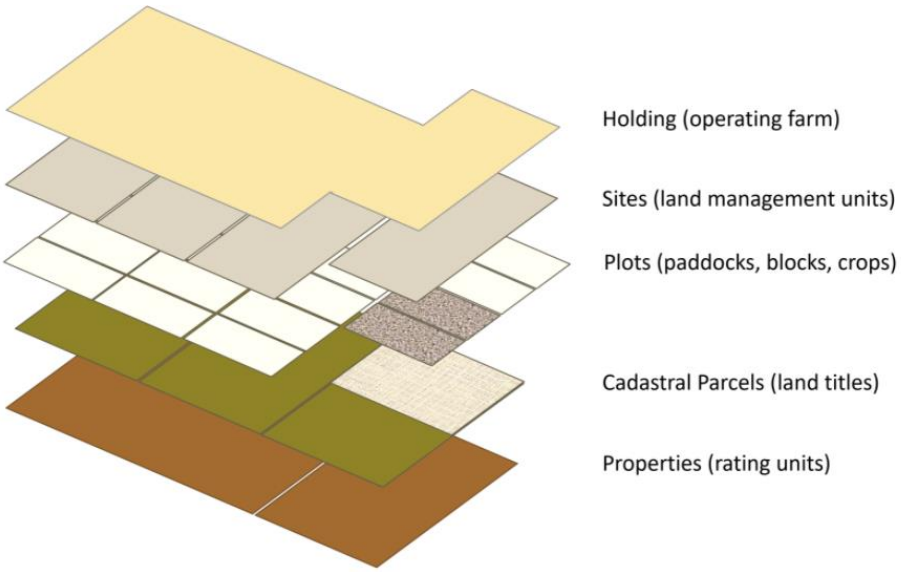

Figure 2 Spatial relationships

5. Discussion and Lessons Learnt

5.1. Use of Github with an Apache 2.0 Licence

The use of the open-source Github repository provides a framework that anyone can read and get up to speed. The wiki is particularly powerful because it is where you can explain why you have done things. The specifications themselves are fairly sparse, whereas the wiki allows you to explain the approach we are taking and why and provides links to other sources. It means someone can read and get up to speed and understand these things.

P: 07-857 0820 | W: rezare.com | A: Rezare Systems, SkyPoint Building, 3 Melody Lane, Hamilton 3216, New Zealand

The Apache 2.0 licence adopted for the project means that people who create content in the repository retain the copyright for it, but the licence gives anyone who wants the right to copy or use it. All the liability and risk sit with the person who chooses to use it.

This is powerful because people can share things without fear of legal comeback. Equally people involved must decide to only be prepared to share materials that will effectively become public information. People may choose to share proprietary information verbally with the group, but not upload it to Github.

The wiki documentation was not prepared until late in the first phase of the project. In retrospect, it would have been useful to have created this documentation much earlier in the process.

The wiki documentation supports a non-technical audience and allows new attendees to get up to speed. It also provides answers to frequently asked questions – such as the relationship between spatial entities, or consideration of existing standards such as the OGC specifications.

5.2. Cadence

The cadence of the working group meetings was valuable. The first goal was to see if we could create a collaboration and create a minimum viable product. The short, tightly focussed piece of work, with 6 one-hour meetings at weekly intervals helped progress. The weekly frequency kept it in people's minds, and it didn't drag out and disappear off their radar. All sessions were pre-booked, so people knew it was happening. After each weekly meeting the documentation, issues, and specifications were updated, so progress was rapid and visible.

Participants expressed that they would rather the cadence of meetings continued, perhaps at a fortnightly rather than weekly frequency. They enjoyed the collaboration and felt it was achieving useful results for the sector. There is a list of other items that the working group would have liked to continue with.

Funding cycles did not readily allow the facilitation to continue, however. We delayed the start of prototyping support from July to September based on participant feedback, but there may have been better participation and progress in prototyping if the regular collaboration through the working group had continued.

Future project should consider how working groups that wish to continue could be supported to do so, as this will both support much greater technical progress and build a more active community of implementers. The approach of having four initial weekly meetings to build a community, then moving to fortnightly meetings with occasional in-person events could be a useful template.

P: 07-857 0820 | W: rezare.com | A: Rezare Systems, SkyPoint Building, 3 Melody Lane, Hamilton 3216, New Zealand

5.3. Prototyping

The prototyping phase of the project (phase 2) did not achieve the amount of progress we had intended. During the project review, participants reassured us that this was not caused by a lack of intent. Participant's explanations included:

- Internal timing and priorities – other development projects within organisations taking longer or being a higher priority than expected when the project began.
- Funding restrictions – organisations waiting longer than expected for internal or external funding to be approved for their development work, or funding being re-prioritised for other purposes.
- Dependencies on partners – organisations who wanted to progress with a data integration using the specifications finding that the partner organisations they intended to work with were not ready.
- Lack of technical ability – a few participants were highly motivated and had a good understanding of both the data requirements and their needs but did not have internal technical resource or capability to participate. These participants would have benefitted from finding partners earlier in the process.

When the group reflected at the end of the project on the barriers to participation, they made several suggestions for future improvements:

1. Help participants establish relationships
2. Hold prototyping workshops for developers
3. Consider student internship resources
4. Provide an implementation for testing

Help participants establish relationships

The workshop to launch prototyping was intended to be a face-to-face meeting. However, it had to be conducted as an online meeting by the COVID-19 lockdown. An in-person meeting was more likely to have established personal relationships between participants and engendered more motivation to prototype.

Hold prototyping workshops for developers

Prototyping interoperability requires critical mass: it is easier when there are more developers. For future similar projects, a workshop for developers should include an online coding session to create a fictitious prototype.

Organisations could see this as a fun and valuable activity for their developers to participate in, and it would take less time (perhaps 1-2 days) than a full implementation. This would help developers to

P: 07-857 0820 | W: rezare.com | A: Rezare Systems, SkyPoint Building, 3 Melody Lane, Hamilton 3216, New Zealand

gain confidence in implementing the specification and might also help organisations identify and work with potential integration partners.

Provide an implementation for testing

Participants would have benefited if we could have provided a worked implementation, perhaps even a service, so that participants had something to interoperate with. Internationally, two approaches are sometimes taken:

- Develop demonstration source code as part of the specification-development process and make this available as open-source code, along with instructions so that developers can build this in their own organisation and test against it.
- An organisation might volunteer to be the first to implement the specifications, and then make available a test version of a service so that other organisations can test their implementations against this.

Both approaches require significantly greater commitment of time and effort, though in the latter case this may be absorbed by a participating organisation.

5.4. Online meetings

When the project started Auckland was in lockdown, so the kick-off meeting was carried out online. 200 people registered and more than 120 attended. It is unlikely the attendance would have been as great for an in-person event about data interoperability, particularly where travel was involved.

Meeting online has its challenges too. Participants are very focussed on what they are doing together, and the side discussions that might otherwise happen over coffee or a meal do not occur. In our opinion:

- A cadence of relatively short, focussed online meetings is ideal to progress technical work such as a specification.
- In-person opportunities allow us to build an eco-system of inter-personal relationships (and hence also relationships between businesses). These opportunities open the door to more strategic interactions between organisations.

The use of online meetings should be retained, but these should be supplemented by:

- Regional engagements such as the AgriTech NZ roadshows
- Workshops or “meet-ups” alongside industry events such as DigitalAg (previously MobileTech), EvokeAG (Australia), or the NZ Primary Industry Summit.

P: 07-857 0820 | W: rezare.com | A: Rezare Systems, SkyPoint Building, 3 Melody Lane, Hamilton 3216, New Zealand

5.5. Participant engagement

We achieved excellent engagement and attendance in the meetings. People were open to contribute and share their experiences.

Rezare Systems facilitators: Andrew Cooke and Paula Phillips, made themselves available for people to contact them outside of the meetings. This proved to be particularly vital.

Contacts outside of meetings included new attendees "catching up", and others seeking reassurance that their contributions would be useful. Some participants appreciated testing their ideas in a more private context, receiving reassurance that they were helpful, before contributing them to the group.

5.6. Range of experience

The group had a wide range of experience. There were people who believe data interoperability should happen and know their area well but who are not data specialists. Others who are data specialists – people who can critique and say what would be the valid values for an attribute or how attributes should be structured in an entity. Finally, developers or GIS specialists who can look at some JSON schema or software code and understand it.

If is beneficial to support each of these different types of people. Those who know the business area can help with scope and prioritisation, while the data specialists understand the details of what should be recorded or transmitted. Developers often do not have the same deep knowledge of the subject matter but can speak to how data is transmitted and handled, and ease of integration.

Diagrams and lists help people visualise information, and greater use of these would have been an advantage. We made use of the GitHub Wiki for documentation and diagrams targeted at non-developers, but we did this late in the process and it would have benefited from doing so earlier. Building diagrams interactively during meetings, perhaps starting with a partial diagram, could be particularly effective.

5.7. Group size

Having a group of 20 with 7-10 who attend regularly is ideal and about as big you are going to regularly achieve. In small groups people have more opportunity to say something and they are not going to feel embarrassed raising things. If a larger group was involved, it might be better to break it into two sub-groups to cover different areas of interest.

5.8. Scope of content

We covered the content that we had initially planned (the MVP). In the first meetings we defined the scope together. Overall, participants would have liked to cover additional scope. It would have

P: 07-857 0820 | W: rezare.com | A: Rezare Systems, SkyPoint Building, 3 Melody Lane, Hamilton 3216, New Zealand

been great to just move onto the next items raised. This would have required an ongoing level of facilitation funding.

6. Participant Feedback

Feedback from participants was consistently positive and there was strong encouragement to continue with the working group and to build on the specifications. Feedback was formally captured through a survey and a feedback meeting. This considered:

- Whether the workshop met expectations
- Most important or useful things learned
- How the workshops are run
- Use of Github for the repository
- Prototyping data interoperability
- Topics for the continuation of the project.

This is listed in Appendix 2: Participant Feedback.

P: 07-857 0820 | W: rezare.com | A: Rezare Systems, SkyPoint Building, 3 Melody Lane, Hamilton 3216, New Zealand

Appendix 1: Working Group Meetings

The following identifies the topics covered in the Working Group meetings.

Kick-off Meeting – 21 May 2021

- Sought expressions of interest to join an agritech data reference group and to join a geospatial working group.
- Agritech Industry Transformation Plan
- Agritech Data Reference Group
- Geospatial Data Working Group
- Background on Rezare and their involvement in farm data interoperability
- Identified different models of interoperability
- Datalinker
- Geospatial data interoperability
- Working group approach
    - Questions that could be answered: e.g. share/get geospatial date type of interest; label spatial data; attributes; representing things; useful API patterns; the master system; manage updates and changes
    - Principles: address specific technical issues; acknowledge technical solutions not whole answer; re-use; open-source approach; short facilitated initial activity (MVP); establish long-term mechanism for improvement, extension
    - Call for technical specialists (architects, developers, business analysts or data specialists) to get involved

WG Meeting 1 - 1 June 2021

- Introductions
- Collaboration expectations
    - Proof of process
        - Demonstrate we can work together, in a short amount of time, to create something useful, that can be used
        - Minimum viable product – build more afterwards
    - It is a “specification” not a “Standard”
    - Use an “Open Source” process
        - Apache licence 2.0
        - Github repository
        - Use Issues to define, specify, agree approach

P: 07-857 0820 | W: rezare.com | A: Rezare Systems, SkyPoint Building, 3 Melody Lane, Hamilton 3216, New Zealand

        - Use Pull Requests to propose specs
- Focus – What is our “Minimum Viable Product”?
    - Captured potential areas
- Foundation – approaches / standards to build on

WG Meeting 2 – 8 June 2021

- Geospatial format – some keen to use GeoJSON. Useful for those who want to design APIs.
- Identifier schemes – It seems that objects will likely have multiple identifiers for different schemes.
- Classes – "farm boundaries" and "blocks or management units" and their attributes
- Preferred format to work with (Both ESRI and GeoJSON are used); notation of the co-ordinates; including the projection format in the meta data.
- Handling multiple ids

WG Meeting 3 - 15 June 2021

- Defining attributes for holdings and sites as defined by the INSPIRE specification.
- Definition of a holding and possible attributes.
- Who the owner is, who has rights over the data and its modification.

WG Meeting 4 – 22 June 2021

- Review of proceedings so far:
    - Scope is *Holding* (operating farm), *Sites* (operating land management units), *Plots* (generalised form of paddocks/sub-blocks)
    - Handling identifiers
    - Handling relationships and links between items
- Other attributes of Holdings
- Attributes of Sites (land management units)
- Discussion on data structure
- Using standard definitions for activities on a site; keeping it simple with very generalised options.

WG Meeting 5 – 29 June 2021

- Classification for land characteristics
- Attributes for a plot; permanent attributes vs the seasonal attributes which may be classified as events rather than attributes; data types for attributes.
- Github example schemas and contributing.
- Discussed what the MVP API should look like.

P: 07-857 0820 | W: rezare.com | A: Rezare Systems, SkyPoint Building, 3 Melody Lane, Hamilton 3216, New Zealand

WG Meeting 6 – 13 July 2021

- Went through the updates to the documentation and the schemas in the resources and types folders in Github.
- Considered the entity relationship diagram for a vineyard on another site.
- Discussed points of interest, tree areas and other layers.
- Agreed to have a half day workshop for those wanting to implement in following few months.

WG Prototyping Workshop – 8 September 2021

- Project overview for participants who had not been involved before.
- Discussed support Rezare could give to end of November and how to get it.
- Participants gave a summary of what they planned to work on in the prototyping phase.
- Topics for the next phase of work in the project.
- Template for defining use cases.
- Relationship between entities.

P: 07-857 0820 | W: rezare.com | A: Rezare Systems, SkyPoint Building, 3 Melody Lane, Hamilton 3216, New Zealand

Appendix 2: Participant Feedback

The following summarises the feedback from the survey and the feedback workshop.

A2.1 Did workshops meet expectations?

- Made very good progress, it is a long game to get anywhere. Just keep doing it.
- Big thing was that we got the minimum viable product.
- We've been really impressed by the work that Rezare and NZ AgriTech community are doing, and the events have been approached really well.

A2.2 Most important or useful things learned

- How much this was needed. We all needed it last year.
- There is some baseline stuff we can agree on. Many common threads from diverse areas.
- Specifications are often more important that Standards.
- One of the big challenges is overcoming the legacy systems we have. It takes time to overcome the existing momentum to do things in a new and different way. Takes time to build a consensus outside groups like this that we need to shift.
- Industry does not need to keep running on CSV downloads.
- When we talk about data sharing people immediately agree but they are very import-focussed. The learning was that export functionality was critical but not so favoured. Everyone is aware of the urgency that we must do that. The farmer wants to take their farm boundary from product to product. People are starting to get that.
- It would be good to point out the required technical level to the application team and the engineering team. How much time and money do we have to spend on doing it? Everyone understands it is important to do but get pushback when the time comes to incorporate it.
- Discovered a very robust and simple ontology for farms.
- Contacts for further conversations. Getting everyone to focus in the same direction.

A2-3 Changes in how workshops are run

- There are things you cannot do remotely. Miss a lot not getting in a room around a whiteboard. Conversations you have. Suggest a 1–2-day workshop, perhaps once a year.
- Would be good to have mocked up an API that people could query. Some people need to see things to help understanding.
- Might be an opportunity to have a student to provide programming support. Perhaps if the workshop was run in semesters, it could be a student project to support the working group. Or perhaps an internship. Datacom indicated that they could be in a position to help the

P: 07-857 0820 | W: rezare.com | A: Rezare Systems, SkyPoint Building, 3 Melody Lane, Hamilton 3216, New Zealand

student(s) with technical guidance and support at no cost to help them get more learnings out of the process.

- Most important thing is to keep going, and it'd be great to link more formally with Australia as well.

A2-4 Use of Github

- Github is preferred.
- Ideal.
- Would be useful to have a technical document as well.

A2-5 Prototyping data interoperability

- Management was happy for them to be here but not a priority to actually work on anything.
- Want to work with somebody and prototype more. Start with a small group of 2-3 so progress can be made then scale up the same use case. Too hard to get a larger group of 10 people focused.
- While had planned to participate other priorities have jumped in front.
- Need buy-in from each organization's leadership to allocate resources to prototype solutions.
- Co-ordination will be hard to have participants available at the same time.
- It might be worth trying to do this with some Australian involvement to make it more robust, so we don't end up with a NZ silo. David Philpott from Mapipedia in Australia is very keen to work with people and get involved in the project. The grape industry in Australia are keen to align and join us in this collaboration.
- We have willing parties in the group, but we need more time to carry on and perhaps next year we will see something come out of it. The timeframe was good for the MVP but not for getting something done.
- Have a day at an event like Mobiletech where some developers could get together and work on a prototype. Could make much more rapid progress in a short period.
- Some support for the idea of a hackathon. Suggested mixing people from the same organisation up. It would help getting to know other people.
- It takes so much time to get things aligned between tech teams in terms of agreeing to focus on the same thing for a sprint (and often very limited dev resources) If Wine Australia were involved, it'd be great to see them contributing to a small amount of participants development time to trial things and report back.

P: 07-857 0820 | W: rezare.com | A: Rezare Systems, SkyPoint Building, 3 Melody Lane, Hamilton 3216, New Zealand

A2-6 Topics for continuation of project

- Activities done on land like spraying and fertiliser application.
- Different operational layers on top of base land. Examples of data that fits the standard.
- Understand the requirements for collaboration with regional councils.
- Consider where it will not work, perhaps challenging in specification of overlaps.
- Comparison of software systems being used.
- Nice to know who the members of the group are, where you work and what you have done.
- Closing the digital loop on fertiliser placement, orders, and proof of placement. Record keeping across multiple systems. Giving the industry a way where it doesn't matter what system you are using, here is a way you can exchange the data for the benefit of the customer.
- The data warehouse tool Snowflake might be of interest to this group as a way to share data in the cloud without using APIs.
- Focus on getting a prototype up and running.
- Keep developing the farm mapping specification.
- Would be good if LINZ were represented.
- Related fields for integration like biodiversity on private land, rural contractors.
- MPI encouraged everyone to stick with the project and keep going.
- Would be great to go into viticulture / permanent tree crops and look at combining Aus + NZ.

P: 07-857 0820 | W: rezare.com | A: Rezare Systems, SkyPoint Building, 3 Melody Lane, Hamilton 3216, New Zealand