Establishing the foundations for a research organisation to leverage AI in animal science

Mark Neal, Jenny Jago

AI4AS

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DairyNZ

Our Purpose

Progressing a positive future for New Zealand dairy farming

Our Vision

To make the levy the best investment of every New Zealand dairy farmer

Our strategic priorities

Accelerating on-farm productivity

- World-leading animal genetic gain
- Improved forage gains
- Increased workplace productivity

Powering more adaptable & resilient farms

- Future-fit farm systems
- Credible evidence
- Strong biosecurity systems

Enabling sustainable & competitive dairying

- Healthy waterways
- Enhanced animal care
- Reduced GHG emissions

Our key activities

With farmers, we deliver:

- A comprehensive foundation of farming knowledge & solutions
- Insightful & targeted benchmarking
- High-impact partnerships
- Meaningful connections

For the dairy sector we:

- Progress research & science
- Provide industry analytics & insight
- Inform pragmatic, evidence-based policy
- Develop targeted solutions
- Lead collective action

The DairyNZ difference

We are a preferred partner because we are independent and represent all dairy farmers

We have world-class expertise relevant to our complex industry challenges

We take a farm systems approach in how we work with farmers

Powered by our people: One team at DairyNZ, working for every New Zealand dairy farmer

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Drivers – Modern science is data science

- Range and volume of data
- Modern workflows (code and data) and techniques (Machine Learning, AI)
- Minimise risks
- Quality, credibility and impact

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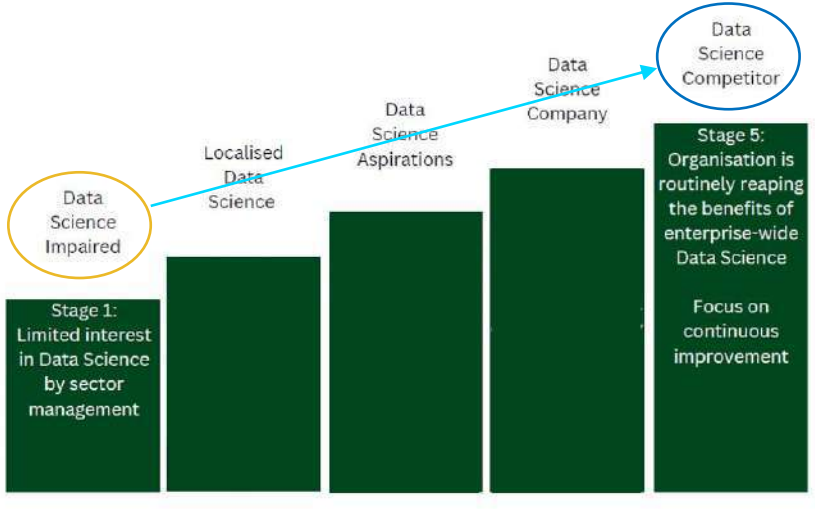

Step 1: Pitch the Plan

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What needed to happen?

- Multi-year vision
- Modern Science Workflows project
  - **Infrastructure**
  - **Skills and Capability**
  - **Business disciplines**

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Step 2: Plan Into Action

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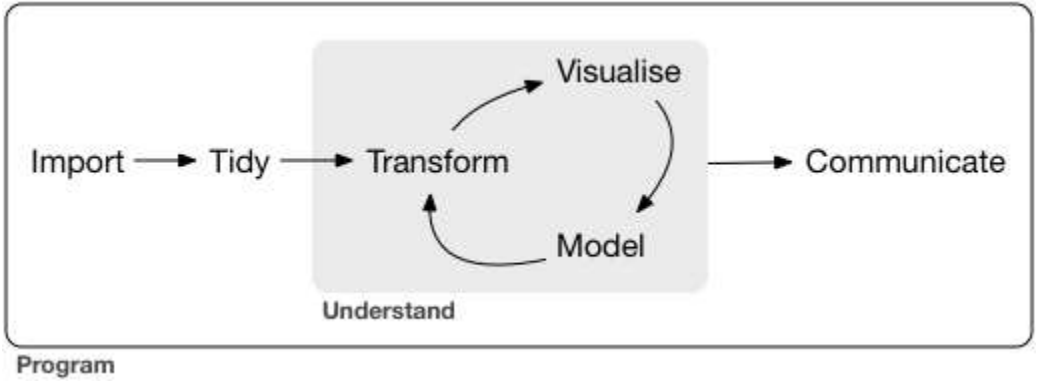
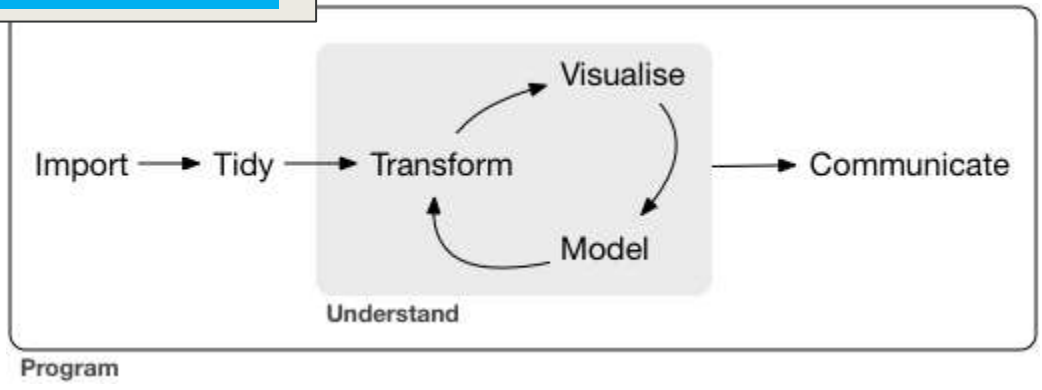
Infrastructure



Modern Science Workflow Infrastructure

Data: version, discover, share, data processing

Snowflake



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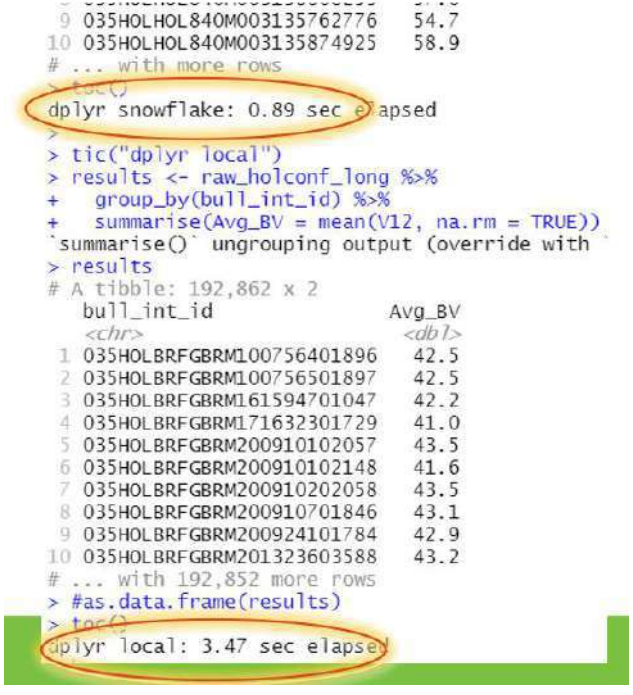
Snowflake (Data warehouse and compute)

- Data ingestion and connections
  - Bronze -> Silver - > Gold
- Efficient compute
  - Relative to local laptop
- Governance plan
  - Accounts for Access



```
 9 035HOLHOL840M003135762776   54.7
10 035HOLHOL840M003135874925   58.9
# ... with more rows
> toc()
dplyr snowflake: 0.89 sec elapsed
>
> tic("dplyr local")
> results <- raw_holconf_long %>%
+   group_by(bull_int_id) %>%
+   summarise(Avg_BV = mean(V12, na.rm = TRUE))
`summarise()` ungrouping output (override with `
> results
# A tibble: 192,862 x 2
   bull_int_id                Avg_BV
   <chr>                       <dbl>
 1 035HOLBRFGBRM100756401896   42.5
 2 035HOLBRFGBRM100756501897   42.5
 3 035HOLBRFGBRM161594701047   42.2
 4 035HOLBRFGBRM171632301729   41.0
 5 035HOLBRFGBRM200910102057   43.5
 6 035HOLBRFGBRM200910102148   41.6
 7 035HOLBRFGBRM200910202058   43.5
 8 035HOLBRFGBRM200910701846   43.1
 9 035HOLBRFGBRM200924101784   42.9
10 035HOLBRFGBRM201323603588   43.2
# ... with 192,852 more rows
> #as.data.frame(results)
> toc()
dplyr local: 3.47 sec elapsed
```

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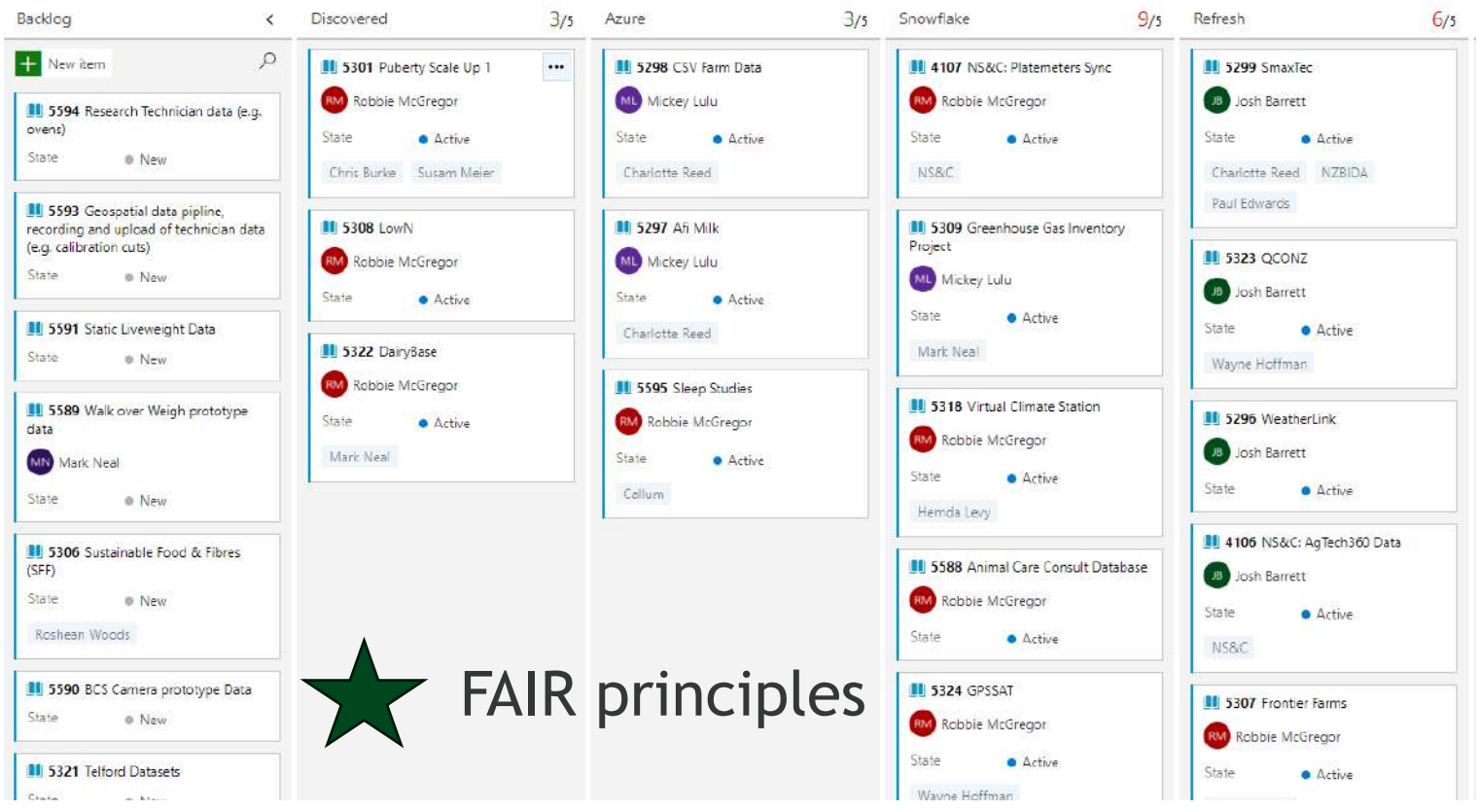
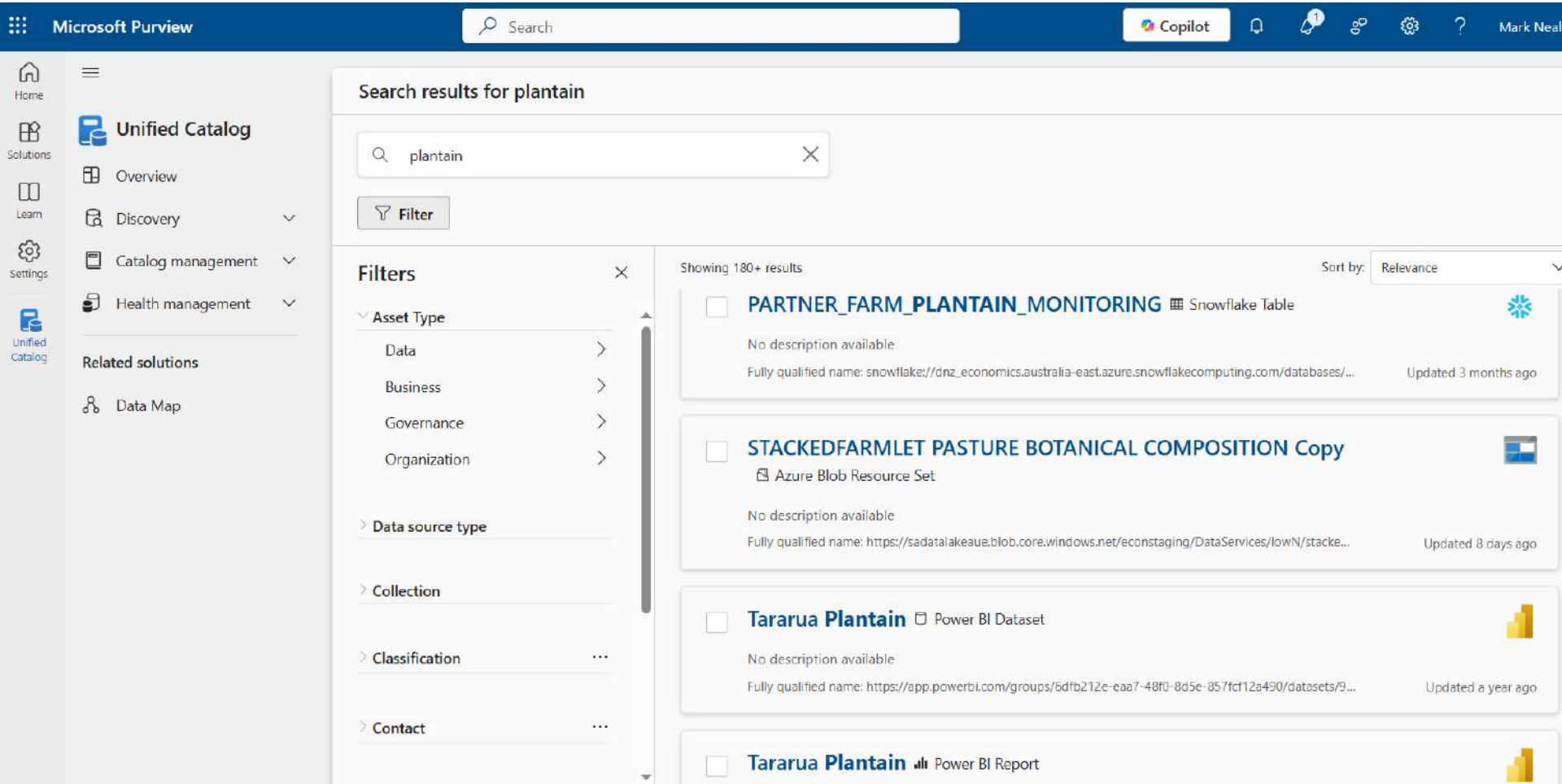
Central ingestion, catalogue data



Discovery with MS Purview



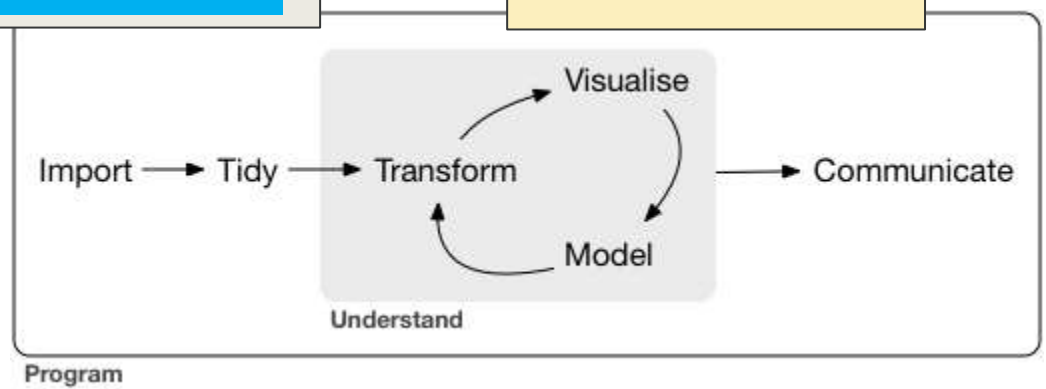
Modern Science Workflow Infrastructure

Data: version, discover, share, data processing

Snowflake

Code: version, share, re-use

GitHub



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GitHub

- Account for organisation
- Expectations
  - What lives where?
  - Discoverability and reuse
  - Best practice password storage

Modern Science Workflow Infrastructure

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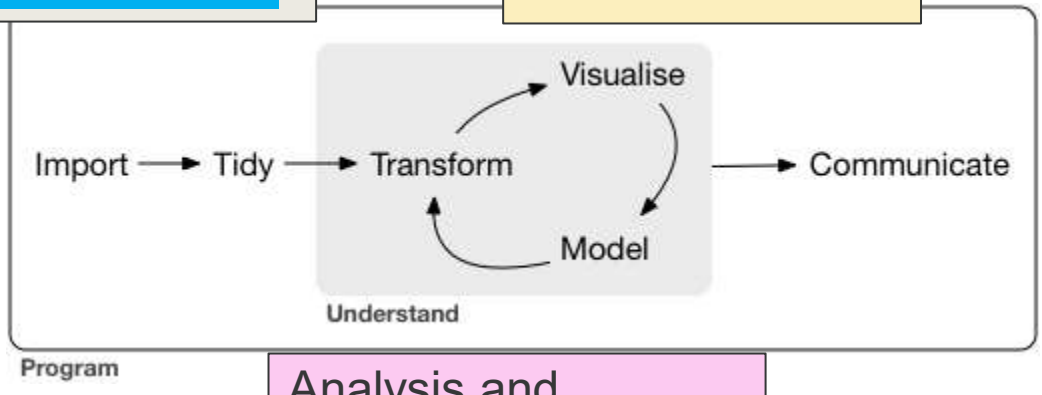

Analysis and simulation compute

Posit Workbench

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Posit Workbench (Analysis compute)

- Pretty seamless
  - GitHub
  - Windows to Linux

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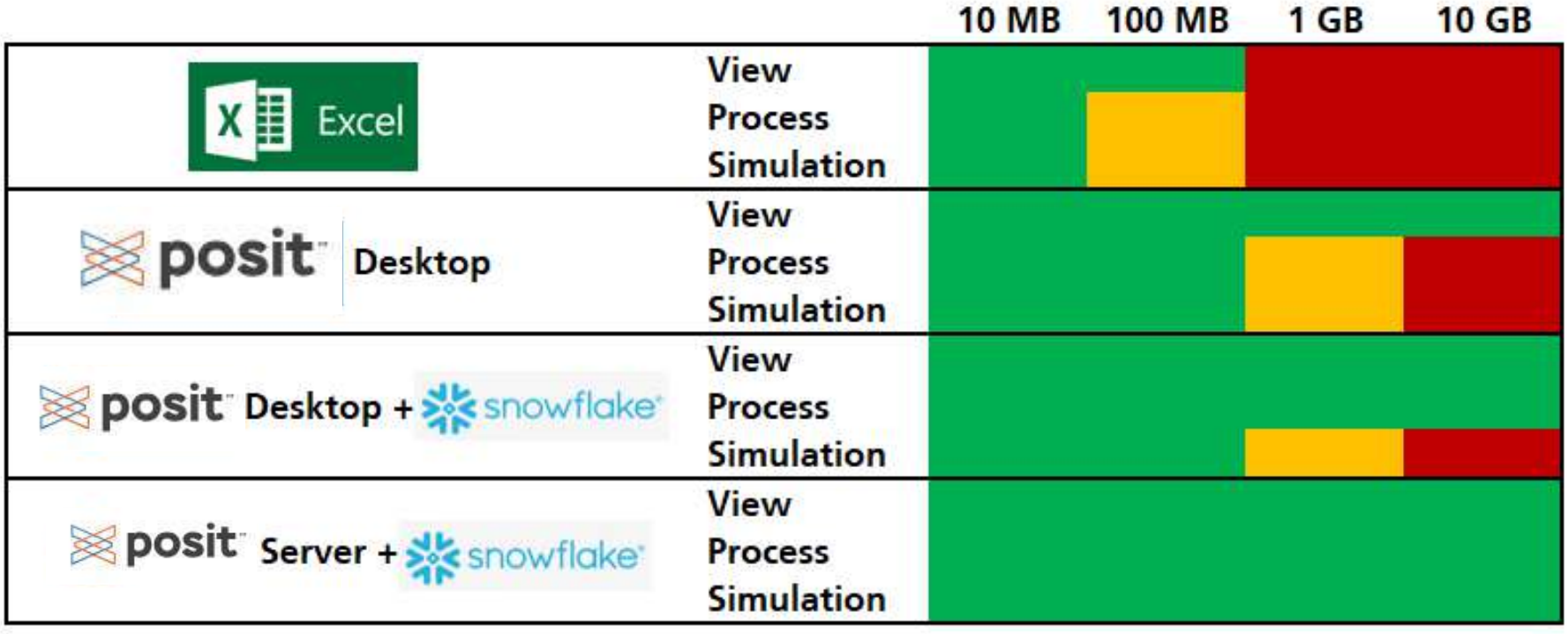
Analysis at scale



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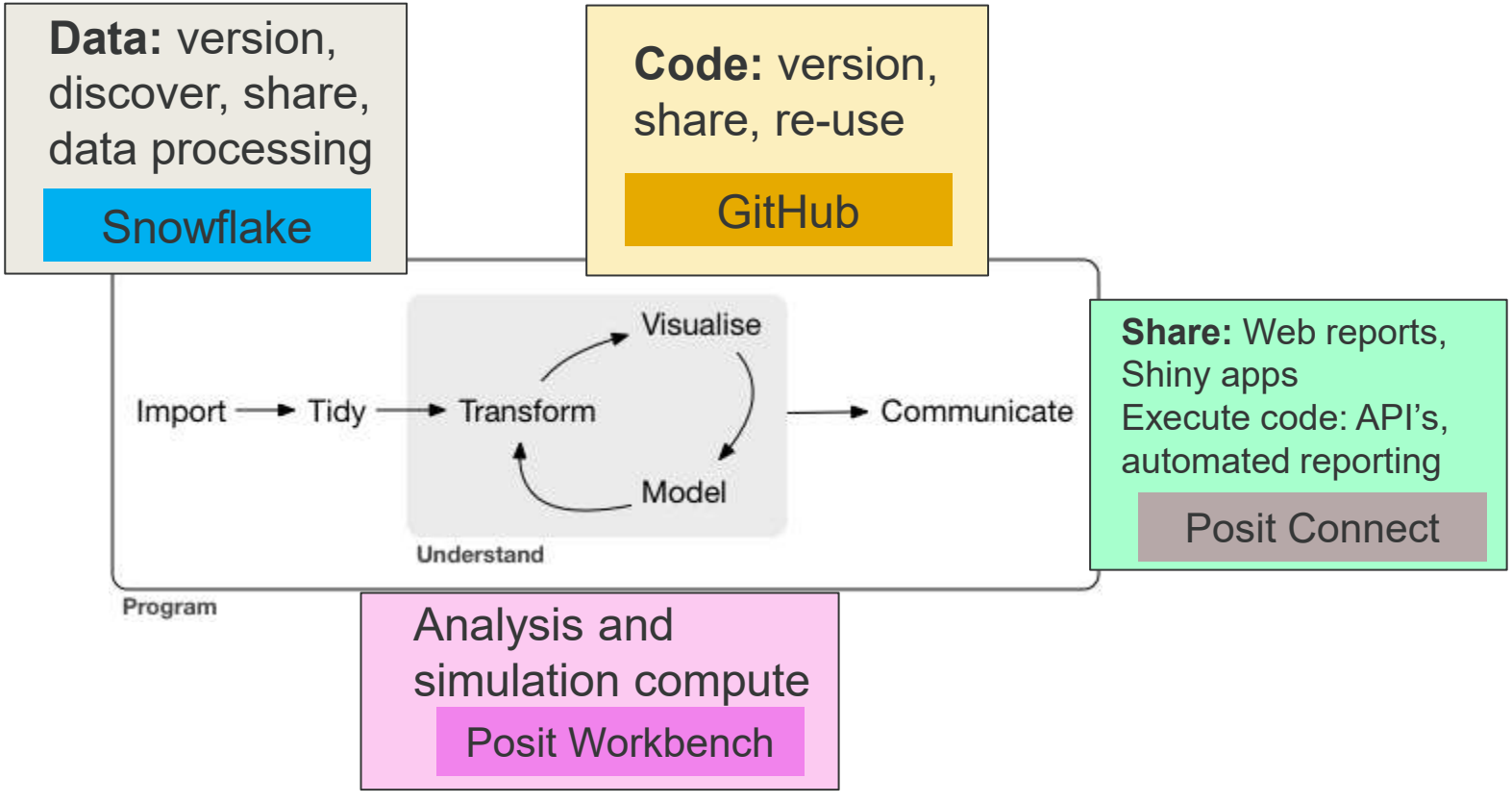

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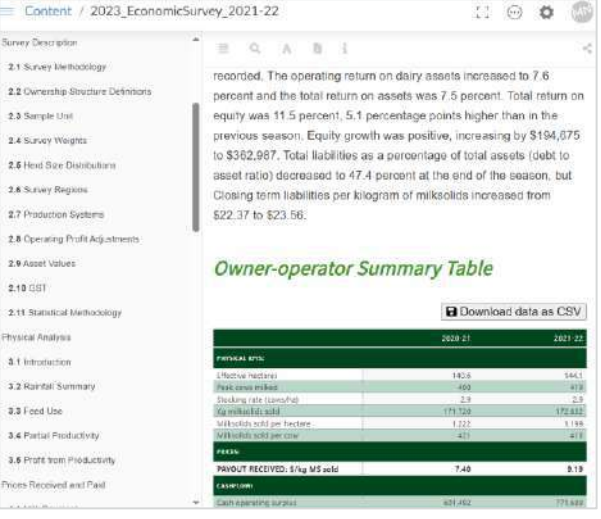
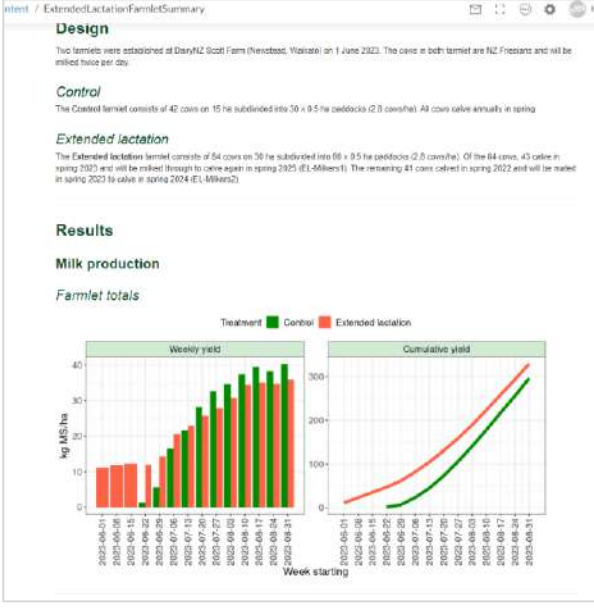
Posit Connect for distribution

- Economic Survey
- Econ Tracker
- Experiment tracking





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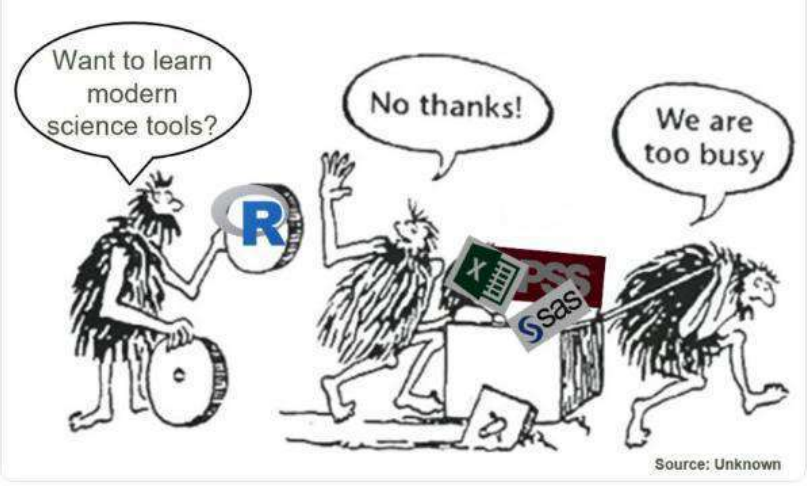
Skills & Capability

- Statistics Internal course
  - 47 people from 6 teams
- R for Data Science
  - Scientists and Postgrad Students
  - Three times, Waikato Uni, Lincoln Uni
  - Integrate with Learning & Dev. plans
  - Recruiting starts soon



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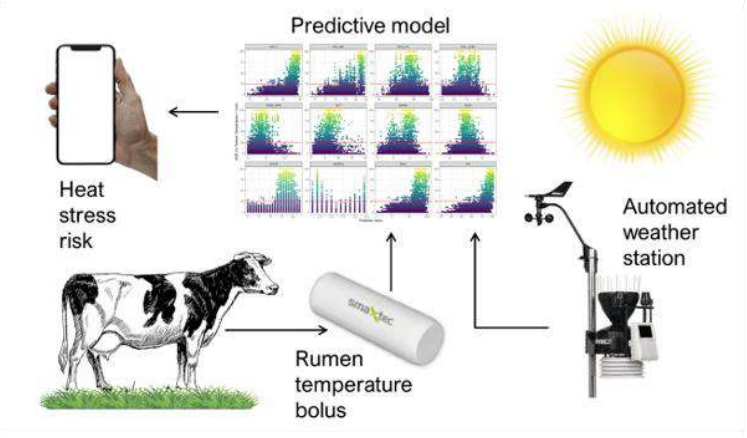
Step 3: Results

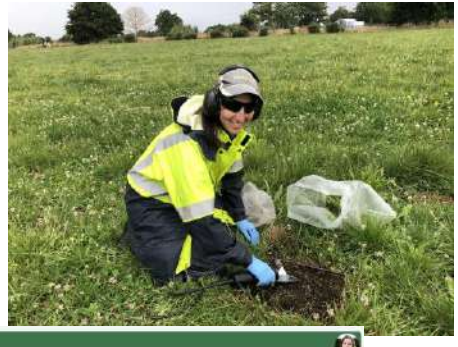
- Many examples
  - Data recording for Quality
  - Business continuity
  - ML to predict grazing performance
  - ML to create performance benchmarks for farms

Data recording for quality



Connected Farm

Calibration Cuts App



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Business continuity

Documenting code

- Previously: loss of key individuals -> Loss of model
- Creating culture where documenting code expected
- Multiple users can now access and run key models

What happens to models when key person leaves?

Before

After

Step 4: Working on and the future

- Continuous improvement
- Open science
- What’s next
- Lessons from the revolution

Continuous improvement

- Digital and Research & Science working together
- Celebrate the wins
  - Speed, efficiency, documentation, errors, techniques
- Keep learning
  - R Community, Training
- Link to national and international Initiatives
  - Open Science, Horizon EU
- Use best practice
  - Research and Science goal
  - Digital book – Getting set up for Data Science @ DairyNZ

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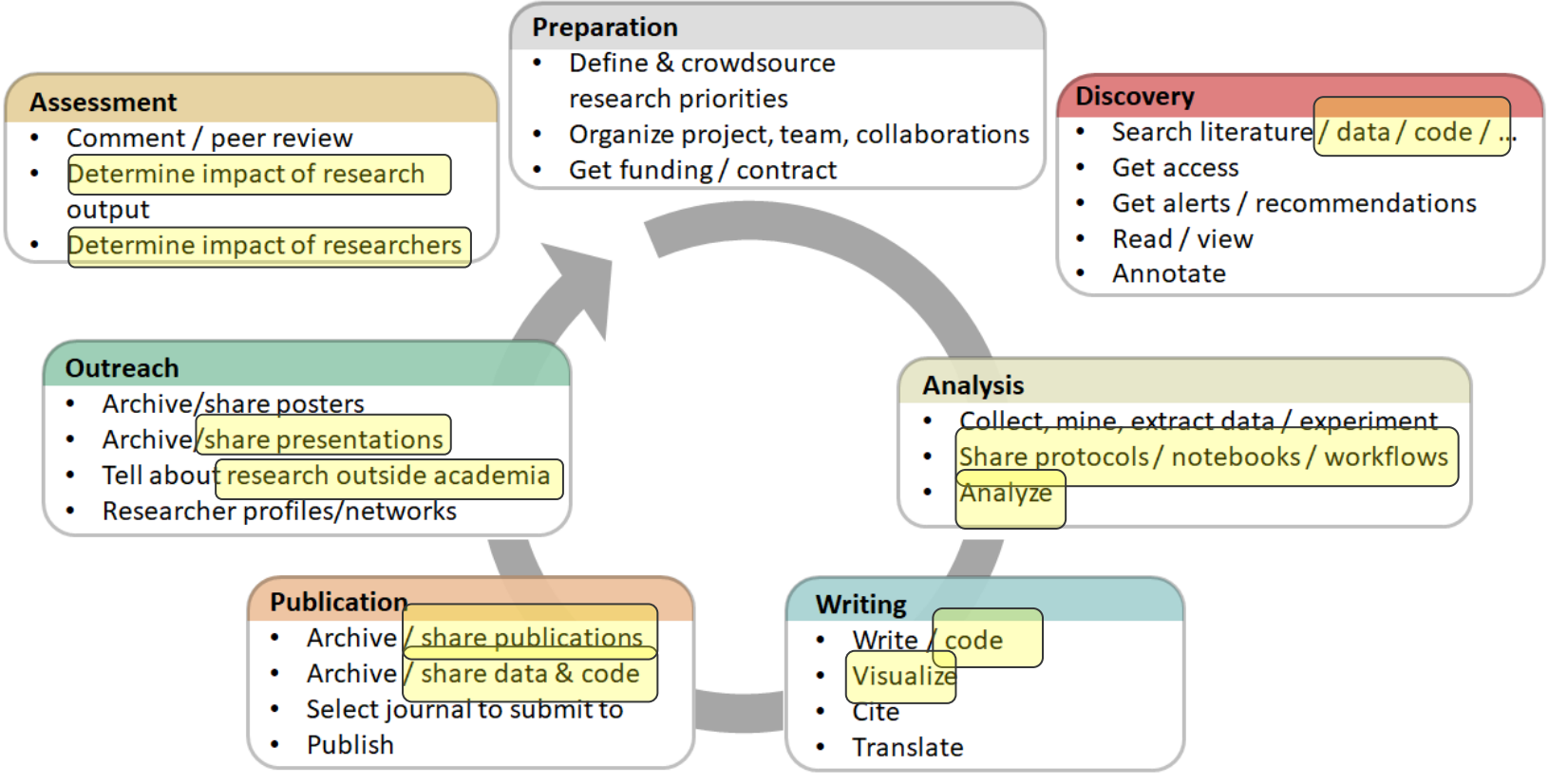
Modern Science is Open Science



Visit: https://open-science-training-handbook.gitbook.io/book/open-science-basics/open-concepts-and-principles

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What’s next for us?

- From Research to Organisation wide
  - Governance
  - Operating model
  - Prioritisation
  - Change management

- Use cases
  - LLM RAG – researchers, advisers, farmers
  - Paperless data ingestion
  - Metadata quality
  - Copilot
  - Decision support
  - Animal gains from pasture gains

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Revolution becomes Business as Usual?

- Getting the foundations right
  - Makes the pain disappear
  - Go a little slower now, to go much faster soon
- Progress doesn’t happen by accident!
  - Vision
  - Coalition of the willing
  - Senior buy-in

4th International

Precision Dairy Farming Conference

3-5 Dec 2025 I New Zealand

precisiondairyfarmingconference.nz

Hosted by DairyNZ

mark.neal@dairynz.co.nz