Who we are

- **Andrew Davies**, Managing Director of **Microgenetics**

- We are a biotech business focussed on microbiology, with the mission to **help win the war against pathogens.**

- We have 2 products:
    - SmartControl – **intuitive micro EM software**
    - SwiftDetect – **rapid sterility test**, in development

SmartControl: End to End EM Data Integrity Solution

Track

Simple modern user interface.

Easy to track end to end microbiological EM sample data workflow

Enumerate and Record

Photobooth for capture high quality photo of samples

Machine learning colony counting technology

Analyse and Report

Data analysis and visualisations

Standard reports and user generated custom reports

System generated insights

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What's this talk about?

- The Data, Information, Knowledge, Understanding, Wisdom hierarchy

- Why this may be useful for you (are you drowning in data?)

- It mixes theory with a running example of how this can be applied to environmental monitoring data
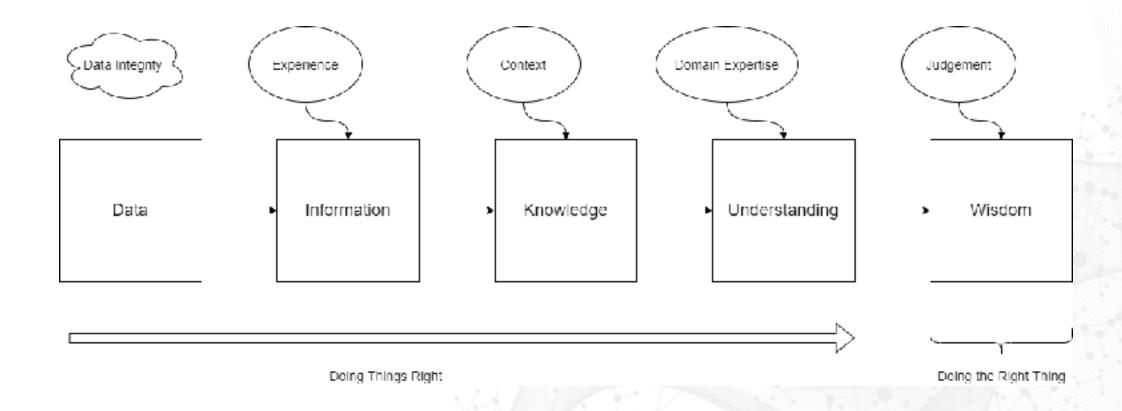
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The Hierarchy

- Roots in the ancient world
- *From Data to Wisdom* [Russell Ackoff, 89]
- Data
  - Representations of objects and events
- Information
  - Data displayed in a readable and functional way
- Knowledge
  - Something we have a justification for believing is true
- Understanding
  - Conveyed in explanations
- Wisdom
  - Is about values and judgements

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Summary

Data

Data Integrity

Data

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Data

- Ackoff: A representation of objects and events
  - Numbers
  - Letters
  - Images?

- Data is messy

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Data integrity

- Vital to GMP and vital to making good decisions from your data!

Data

- Ackoff: A representation of objects and events
  - Numbers
  - Letters
  - Images?

- Data is messy

Data

- Ackoff: A representation of objects and events
  - Numbers
  - Letters
  - Images?

- Data is messy
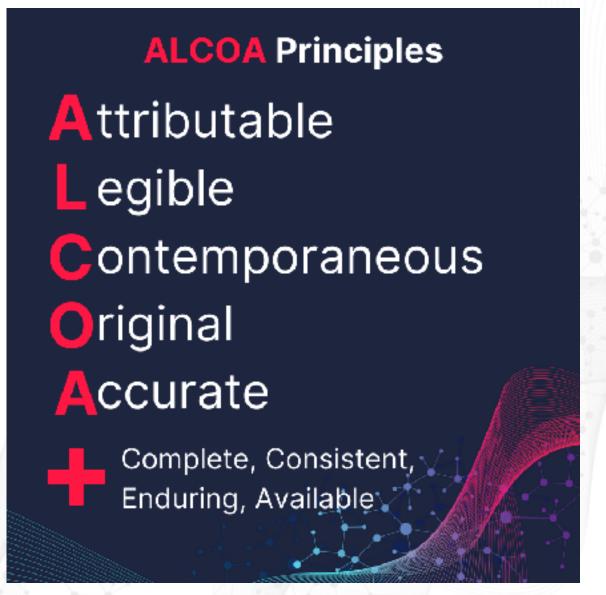
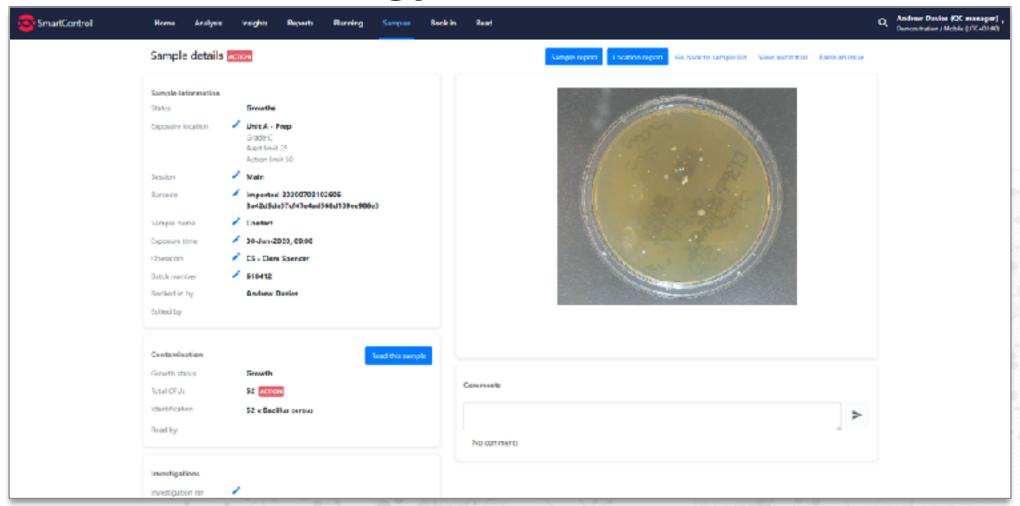,field_number,time,leaf_layer,treated,result
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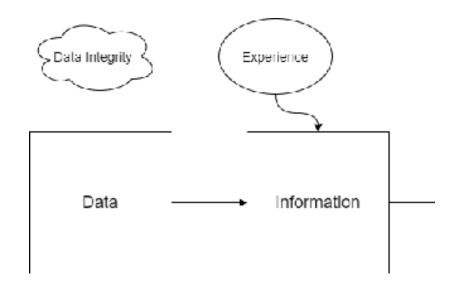36,9.0,2,3,U,0.0

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Data in microbiology

Information

Information

- Ackoff: Data displayed in a readable and functional way

- What does functional mean?

- Still representations, but displayed in a useful way
- You have to get information – data doesn't just transform itself!
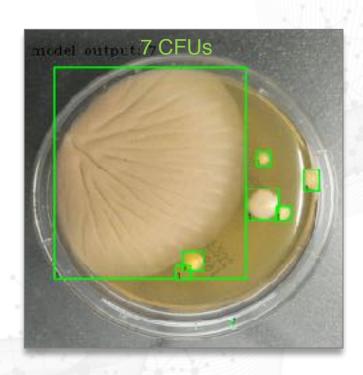

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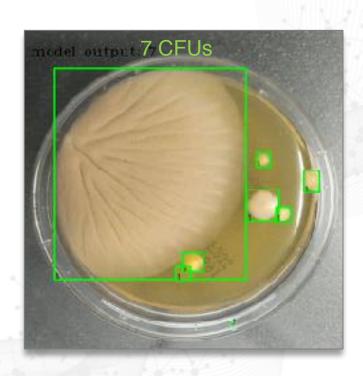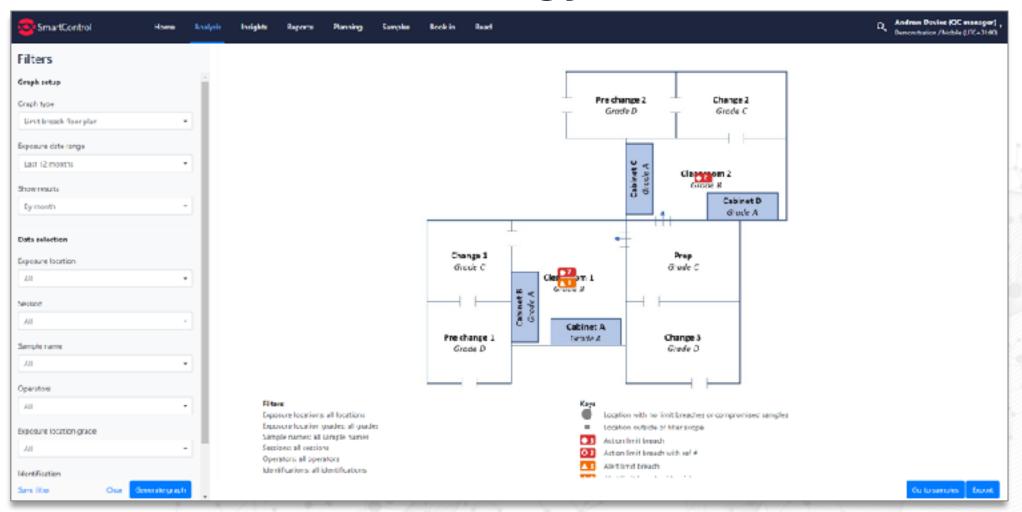- You have to get information – data doesn't just transform itself!

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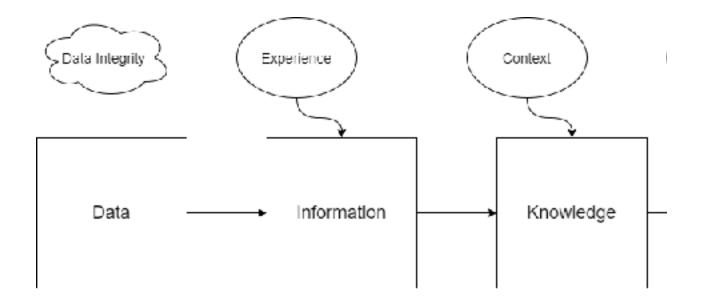
Information in microbiology

Knowledge

Knowledge

- Ackoff: Conveyed in instructions (how-to)
- Plato (and us): Something we have a justification for believing is true. It connects different bits of information
- Doesn't require an understanding of the mechanisms involved.
- Can machine learning generate knowledge?
  - Automate repetitive tasks
  - Reveal hidden relationships
- Requires specialist domain knowledge/ context

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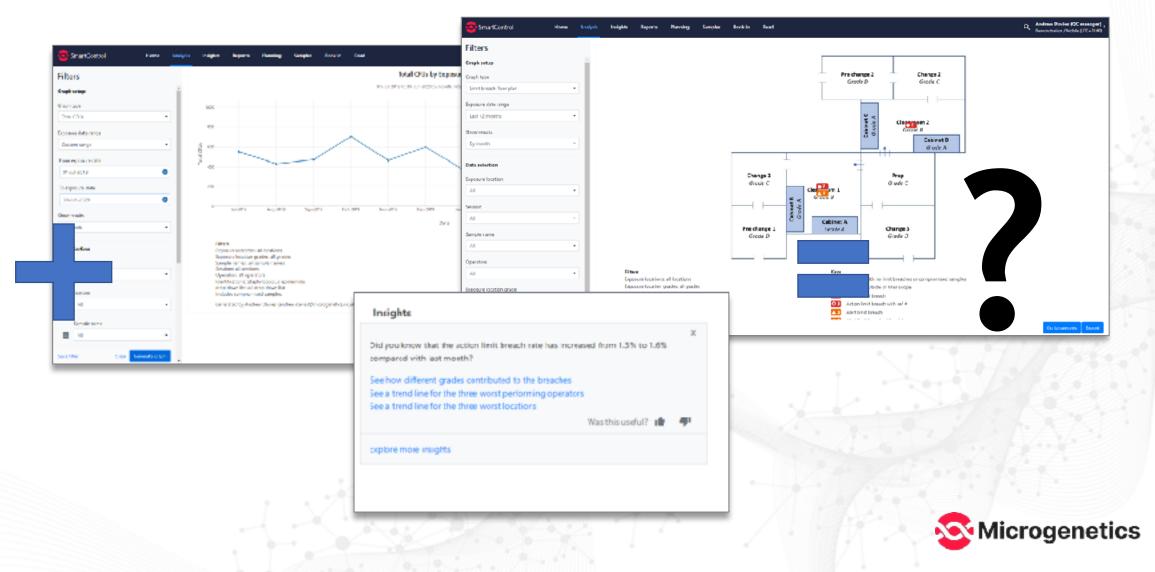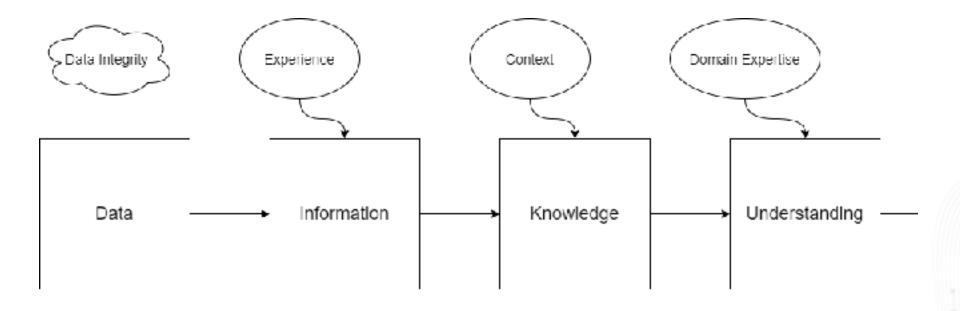Microgenetics

Knowledge in microbiology

Understanding

Understanding

- Ackoff: Conveyed in explanations (why)

- Includes causation

- Human skill of combining different types of knowledge to build a theory of what's happening

- Root cause analysis

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- Includes causation

- Human skill of combining different types of knowledge to build a theory of what's happening

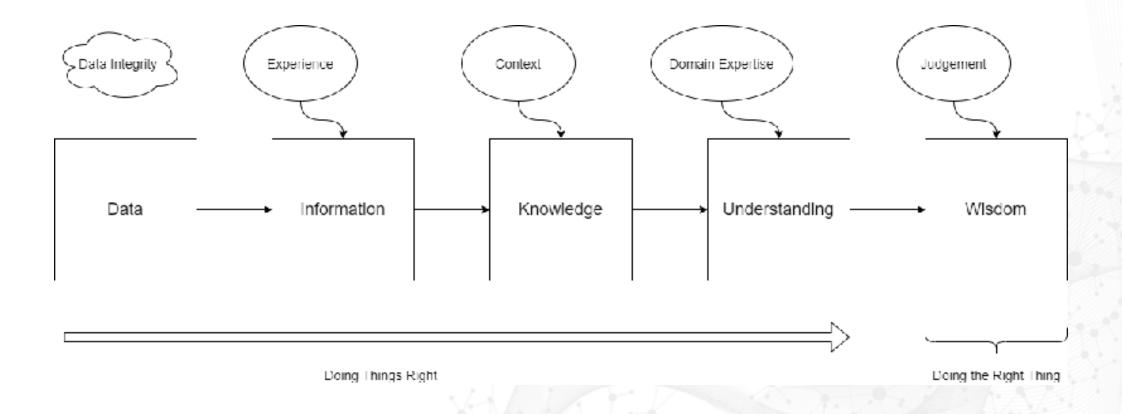- Root cause analysis

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Understanding in microbiology…. ish

Wisdom

Wisdom (making wise decisions)

- Ackoff: Is about values and judgements

- Example: Covid 19

- Data, information, knowledge and understanding makes wise decision making more effective.

- Do you have a complete enough understanding?

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Wisdom (making wise decisions) What should we do about it?

- Ackoff: Is about values and judgements

- Example: Covid 19

- Data, information, knowledge and understanding makes wise decision making more effective.

- Do you have a complete enough understanding?

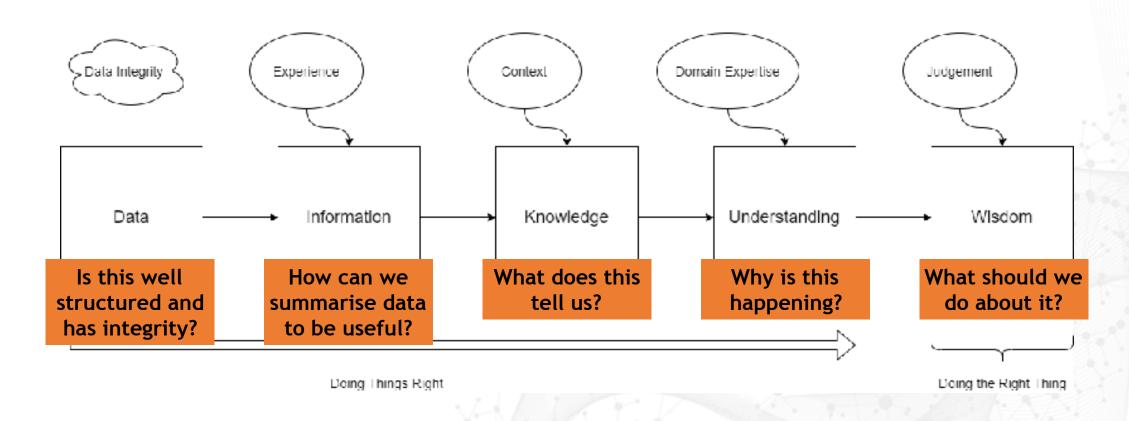Microgenetics

Wise decisions in microbiology

Summary

What can you do differently?

- Data – Ensure data integrity

- Information - What do you want to know?

- Information – Can you draw that graph?

- Knowledge/Understanding – Review your information with specialists

- Wisdom – It's only a wise decision if it's informed!

- Wisdom – Be clear on what you don't understand

- Data – Introduce feedback loops to make sure your data collection is appropriate

Thank you

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Thank you for listening – any questions?

Andrew Davies

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