Electronic labnotes

Mari Wigham

FOOD & BIOBASED RESEARCH
WAGENINGEN UR

COMMIT/

Information Management @ WUR

Welcome! I am Tiffany

Research is all about learning from each other. It is my goal to assist you in sharing information at all stages of the research process, from the first outline of a research question through to final publications and reports. It is up to you to decide what should be disclosed when and to whom. Your research is in safe hands with me.

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One last thing before you set off to explore what I have to offer. I am still learning and so I'd love to hear about your experiences and ideas. Please let me know how I can serve you best!

All yours,

Tiffany

P.S. If you need any help, please have a look at the Tiffany Documentation.

Username

IPolet

Password

••••••••

Role

BB1009 Researcher
BB1600 Researcher
KM001 Researcher
TT001 Researcher

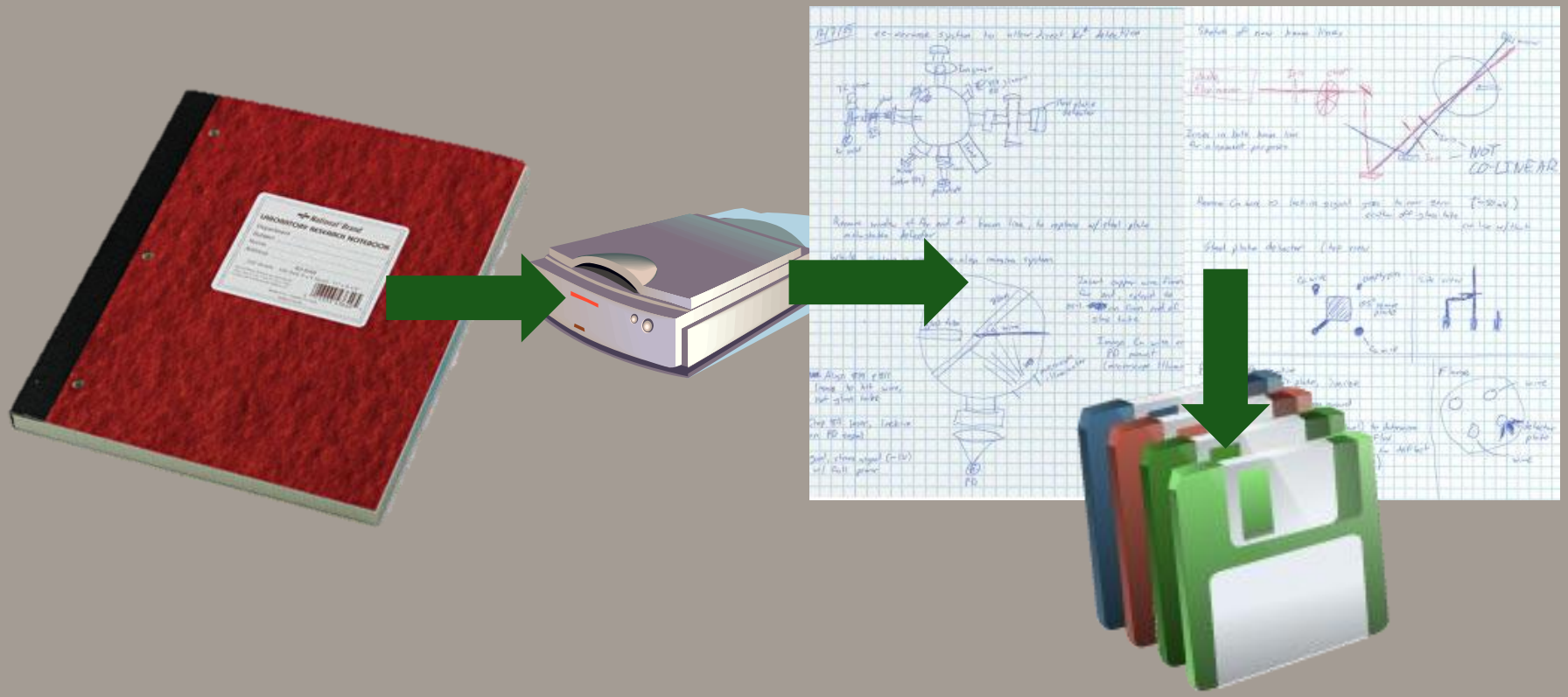
Login

This presentation

- What is an electronic labnote?
- Example: Study on the effects of diet on health
- What is an electronic labnote? – The Answer
- Tiffany
- Storing data semantically
- Questions

What do you think of when you hear the term “Electronic lab note”?

What is an electronic labnote?



Why do you keep a lab notebook?

For yourself

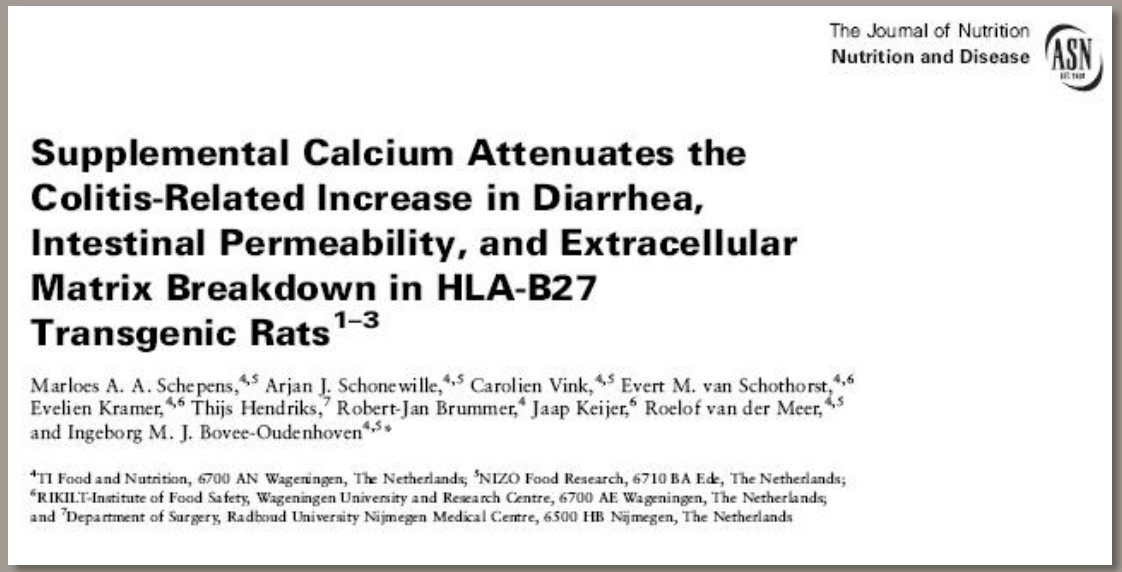
- Note results for further processing and analysis
- Help in writing reports and papers
- Reference for later

What is an electronic labnote?

For others

- Provenance and traceability
- Journals are starting to demand more than just the paper
- Research institutes and funding institutions such as the EU and NWO are also starting to demand more for their money!
- Your research colleagues – the ‘lone genius’ is very rare

Insight into your research



The Journal of Nutrition
Nutrition and Disease

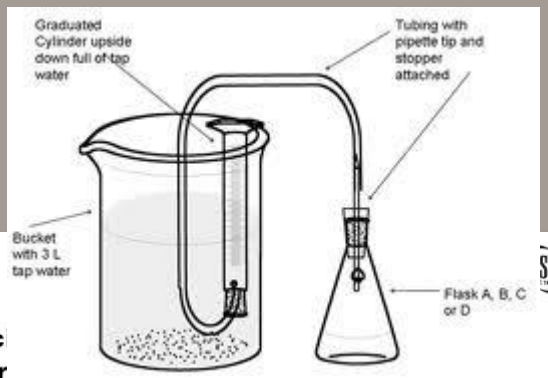
Supplemental Calcium Attenuates the Colitis-Related Increase in Diarrhea, Intestinal Permeability, and Extracellular Matrix Breakdown in HLA-B27 Transgenic Rats[1–3]

Marloes A. A. Schepens,[4,5] Arjan J. Schonewille,[4,5] Carolien Vink,[4,5] Evert M. van Schothorst,[4,6] Evelien Kramer,[4,6] Thijs Hendriks,[7] Robert-Jan Brummer,[4] Jaap Keijer,[6] Roelof van der Meer,[4,5] and Ingeborg M. J. Bovee-Oudenhoven[4,5]*

[4]TI Food and Nutrition, 6700 AN Wageningen, The Netherlands; [5]NIZO Food Research, 6710 BA Ede, The Netherlands; [6]RIKILT-Institute of Food Safety, Wageningen University and Research Centre, 6700 AE Wageningen, The Netherlands; and [7]Department of Surgery, Radboud University Nijmegen Medical Centre, 6500 HB Nijmegen, The Netherlands

Insight into your research

- Explicated knowledge
  - Materials
  - Methods
  - Data
  - Models
  - Results



Supplemental Calc
Colitis-Related Incr
Intestinal Permeability, and Extracellular Matrix Breakdown in HLA-B27 Transgenic Rats[1–3]

calcium would strengthen the mucosal barrier, which is considered important for prevention of colitis.

Materials and Methods

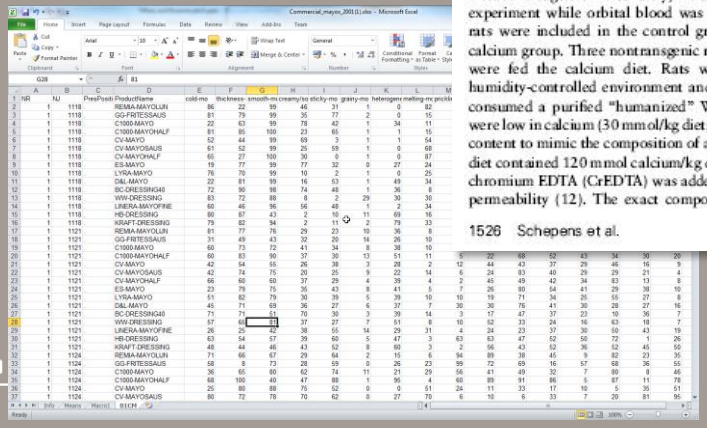
Experimental design: rats and diets. The experimental protocol was approved by the animal welfare committee of Wageningen University (The Netherlands). Female HLA-B27/β2-microglobulin transgenic rats on an inbred Fisher 344 background and their nontransgenic counterparts ($n = 7$) (Taconic Farms), 8–10 wk old and with a mean body weight of 128 g at the start of the experiment, were housed individually in metabolic cages. Unfortunately, 1 transgenic rat died at the start of the experiment while orbital blood was obtained. Therefore, 9 transgenic rats were included in the control group and 8 transgenic rats in the calcium group. Three nontransgenic rats were fed the control diet and 4 were fed the calcium diet. Rats were kept in a temperature- and humidity-controlled environment and in a 12-h-light/-dark cycle. Rats consumed a purified "humanized" Western diet ad libitum. The diets were low in calcium (30 mmol/kg diet; Sigma-Aldrich) and had a high-fat content to mimic the composition of a Western human diet. The calcium diet contained 120 mmol calcium/kg diet at the expense of glucose. Inert chromium EDTA (CrEDTA) was added to the diets to quantify intestinal permeability (12). The exact composition of the diets is provided in

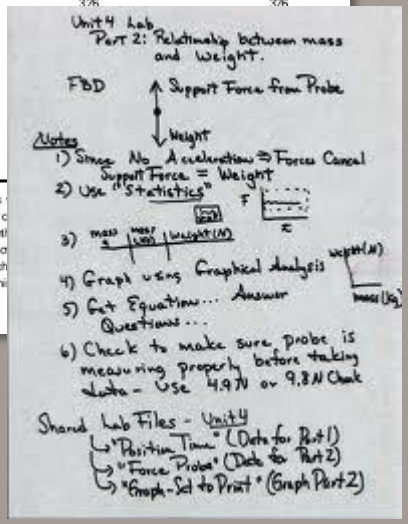
1526 Schepens et al.

TABLE 1 Composition of the experimental diets

Ingredients	Control diet	Calcium diet
	g/kg	
Acid casein	200	200
Corn starch	326	326
Glucose		
Palm oil		
Corn oil		
Cellulose		
CrEDTA		
$CaHPO_4 \cdot 2H_2O$		
Vitamin mix[1]		
Mineral mix[1]		

[1] Vitamins and minerals … following adjustments: … added separately to both … phosphate; chromium pic… the diets; and choline ch… casein, no additional ami…





Science methodology

- Critical thinking, reproducibility, argumentation, collaboration
- Scientific ‘workflow’ – a sequence of actions with inputs (e.g. observations) and outputs (e.g. data files)
- For example: explicating research questions, preparing materials, experimenting, data analysis, reporting

I don’t have time for this!!!

Example

Study to examine the effects of diet on health

There are many ways to organise the data. We will look at three:

- By researcher
- By year
- By activity

Example

It is now the May holiday 2013. Peter and Anna are on holiday, and Lisa has received some urgent questions from the reviewers. They need to know:

- the procedure used to produce the high protein diet
- which bureau measured the data
- what sort of preprocessing was carried out on the data.

Organisation by year/researcher

Need to know what was done when or by who

- the procedure used to produce the high protein diet
  - This can be found as it has a good name
- which bureau measured the data
  - May be able to guess which email gives the information
- what sort of preprocessing was carried out on the data.
  - Need to read through Peter's labnotes...

Example – Organising by activity

Easy to navigate through, for each question you quickly find the right folder *even if you had no prior knowledge*.

- the procedure used to produce the high protein diet
  - This can be found as it has a good name
- which bureau measured the data
  - May be able to guess which email gives the information
- what sort of preprocessing was carried out on the data.
  - Need to read through Peter's labnotes...

Example – Organising by activity plus extra structure and metadata

- Enter a brief description for each activity (folder)
- It may help to identify inputs and outputs, or types of files (e.g. dataset, procedure, sample, document)
- Linking to items produced in other activities allows you to follow the workflow and reuse items
- How much or how little you do depends on your data

Example – Organising by activity plus extra structure

Easy to navigate through, for each question you quickly find the right folder *even if you had no prior knowledge*

- the procedure used to produce the high protein diet
  - This can be found regardless of name as it is in the folder 'procedures'
- which bureau measured the data
  - In description
- what sort of preprocessing was carried out on the data.

Where are the labnotes?

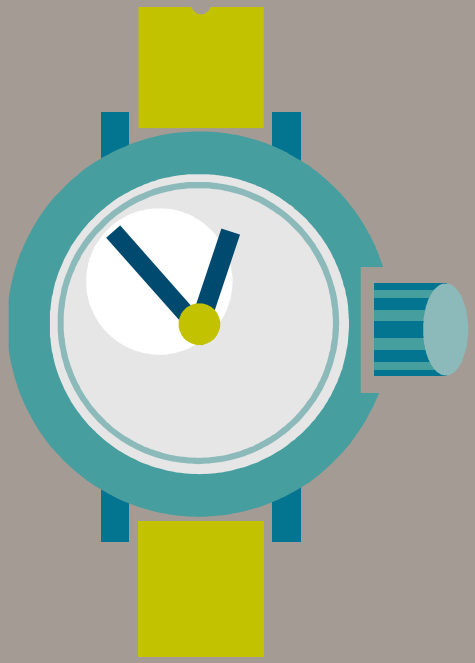
- Labnotes are most accessible when you structure the information contained with them
- There is room for all the information in the labnotes in the structure described
- How far you structure them depends on your own circumstances. More structure = easier to understand but also = more time!
- It can be useful (and sometimes necessary) to preserve them in their rough form
- Sometimes handy if you split them up per activity

What is an electronic labnote?

- iPad, laptop, PC, smartphone...
- Notepad, Word, PDF...
- Dropbox, hard drive, website...

The electronic bit is easy. But to really benefit you need to structure your data – that's the hard part!

Structuring data



It takes time!

But it’s an investment – not time lost

What tools should you use?

There is no single best solution. You need to consider:

- What are you going to store?
  - What do you need to do your work?
  - What is required from your employer, or your funding instituition?
  - What sort of files, and how large?
  - Is it confidential?
- Backup and archiving
  - Is it backed up, how often and how easily can you get it?
  - How long is the data kept?
  - Is there support?

What tools should you use?

- Security issues
  - Who can access the data?
  - Can everyone with access see **all** data? Also edit?
  - Regulatory issues – particularly 'in the cloud'
- Where do you need access?
  - Single location or multiple?
  - In the field?
- Will you only share data or edit it together?
  - If editing then you need to consider
    - how to manage different versions
    - Attributability of changes

Tiffany

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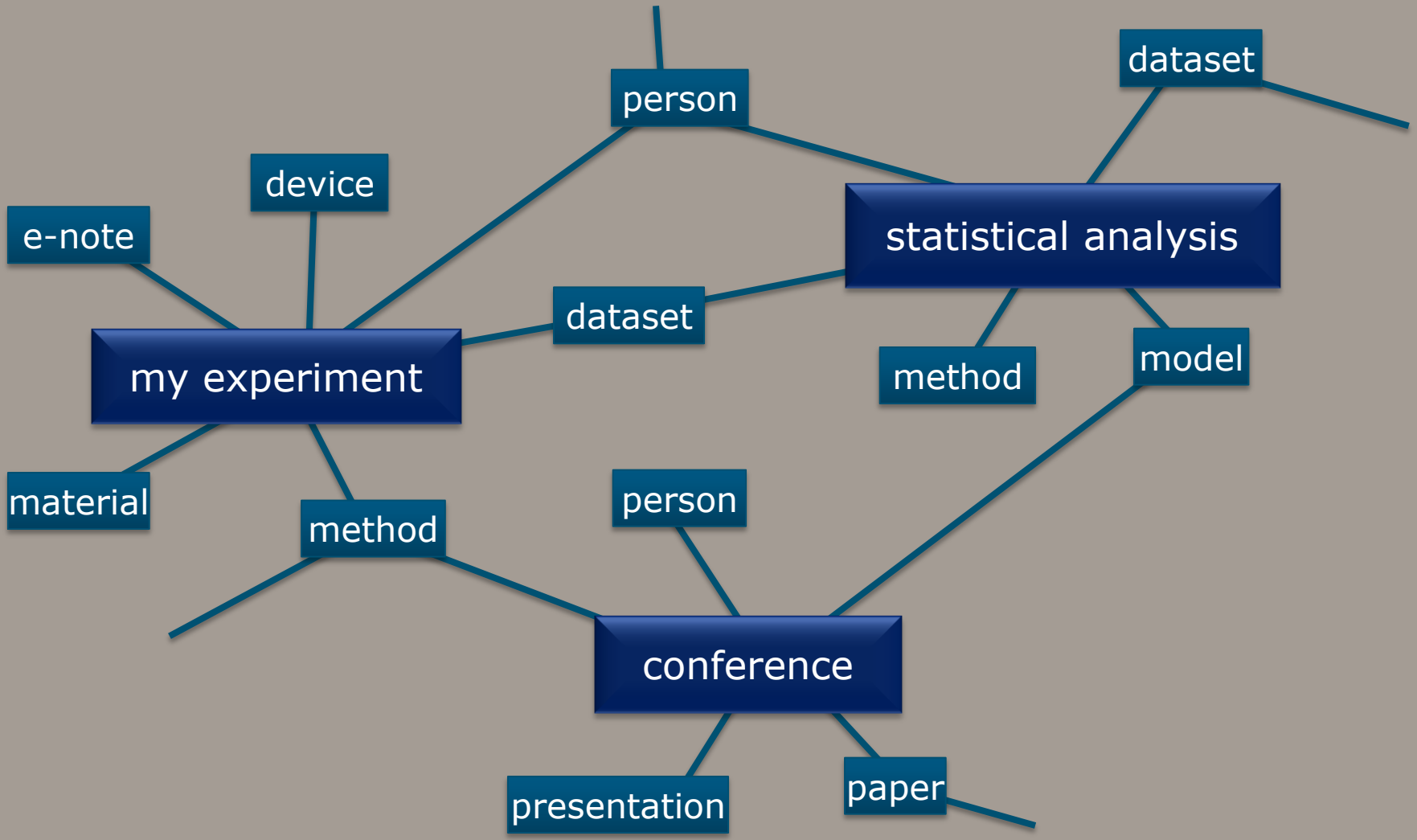
KM001 Researcher
TT001 Researcher

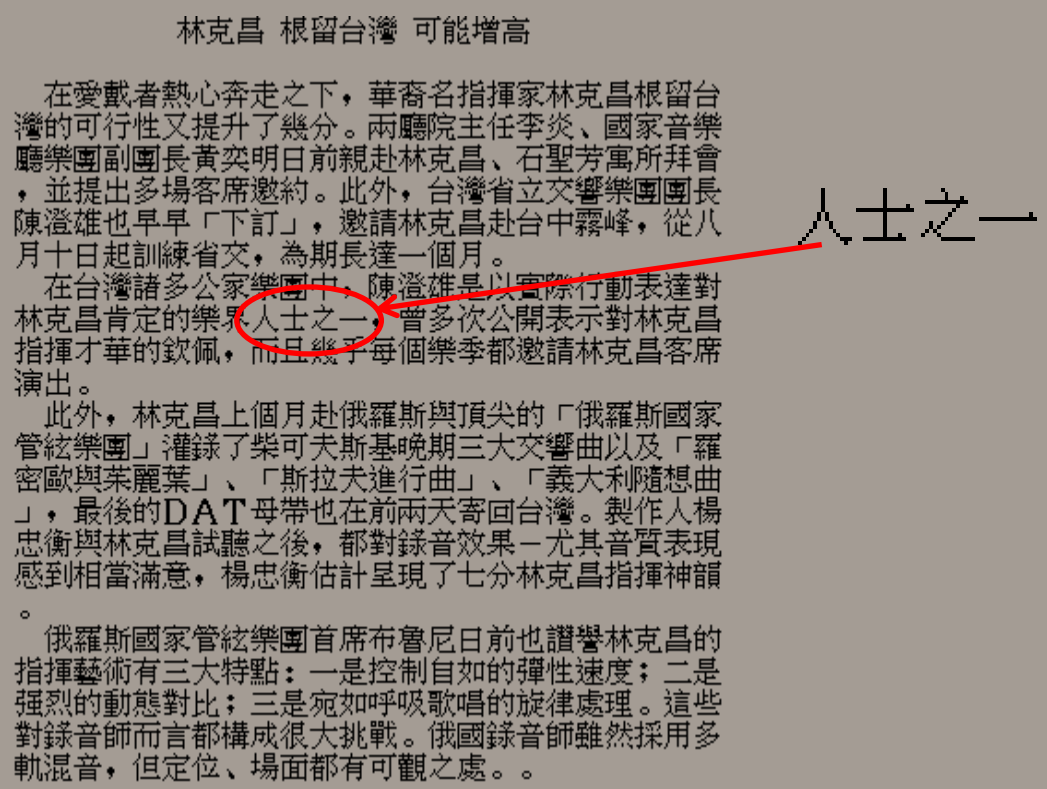
Login

Tiffany - context for research activities



Storing data semantically

This is what your research data looks like for a machine



林克昌 根留台灣 可能增高

在愛戴者熱心奔走之下，華裔名指揮家林克昌根留台灣的可行性又提升了幾分。兩廳院主任李炎、國家音樂廳樂團副團長黃奕明日前親赴林克昌、石聖芳寓所拜會，並提出多場客席邀約。此外，台灣省立交響樂團團長陳澄雄也早早「下訂」，邀請林克昌赴台中霧峰，從八月十日起訓練省交，為期長達一個月。

在台灣諸多公家樂團中，陳澄雄是以實際行動表達對林克昌肯定的樂界人士之一，曾多次公開表示對林克昌指揮才華的欽佩，而且幾乎每個樂季都邀請林克昌客席演出。

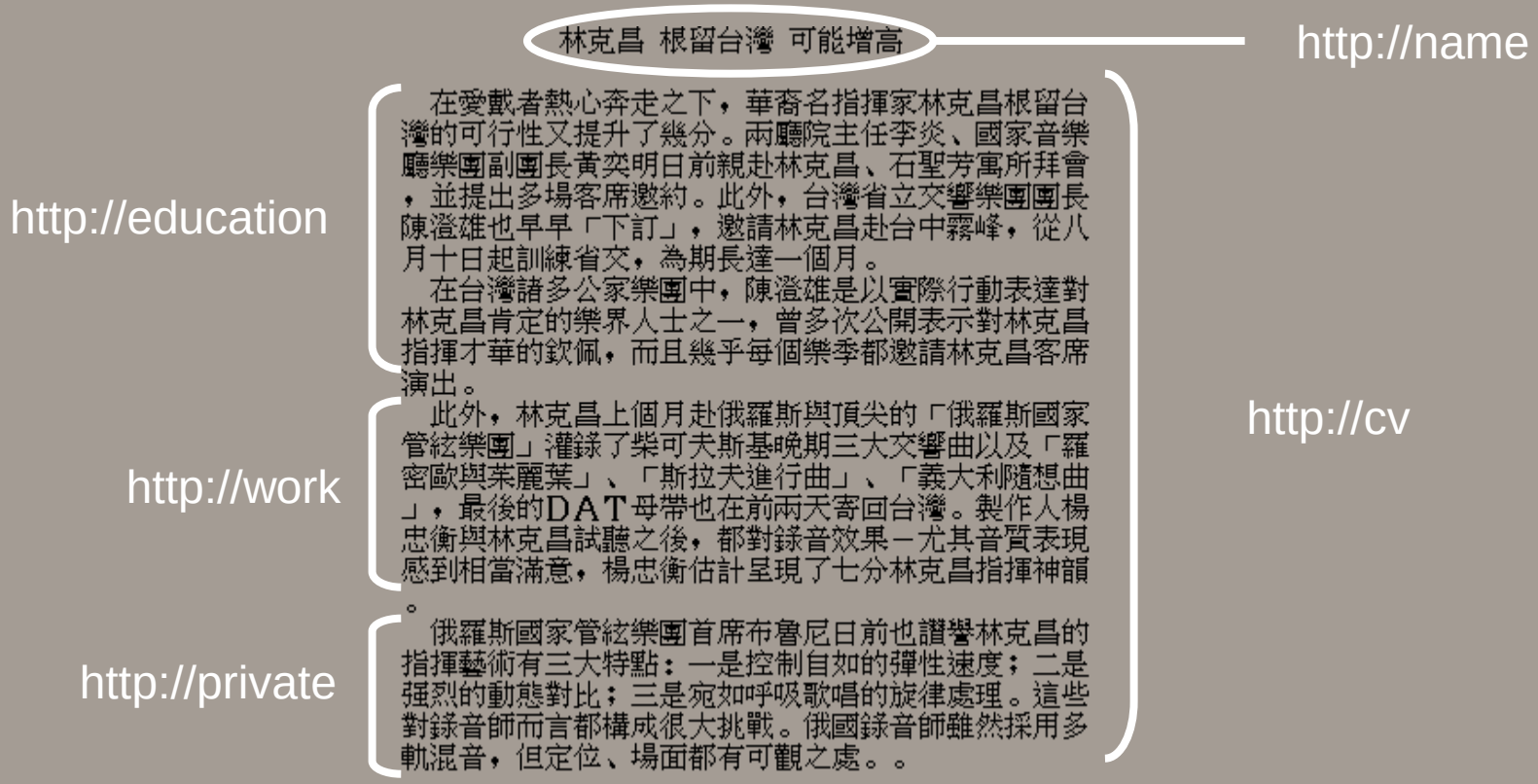
此外，林克昌上個月赴俄羅斯與頂尖的「俄羅斯國家管絃樂團」灌錄了柴可夫斯基晚期三大交響曲以及「羅密歐與茱麗葉」、「斯拉夫進行曲」、「義大利隨想曲」，最後的DAT母帶也在前兩天寄回台灣。製作人楊忠衡與林克昌試聽之後，都對錄音效果－尤其音質表現感到相當滿意，楊忠衡估計呈現了七分林克昌指揮神韻。

俄羅斯國家管絃樂團首席布魯尼日前也讚譽林克昌的指揮藝術有三大特點：一是控制自如的彈性速度；二是強烈的動態對比；三是宛如呼吸歌唱的旋律處理。這些對錄音師而言都構成很大挑戰。俄國錄音師雖然採用多軌混音，但定位、場面都有可觀之處。。

人士之一

How do we improve this situation?

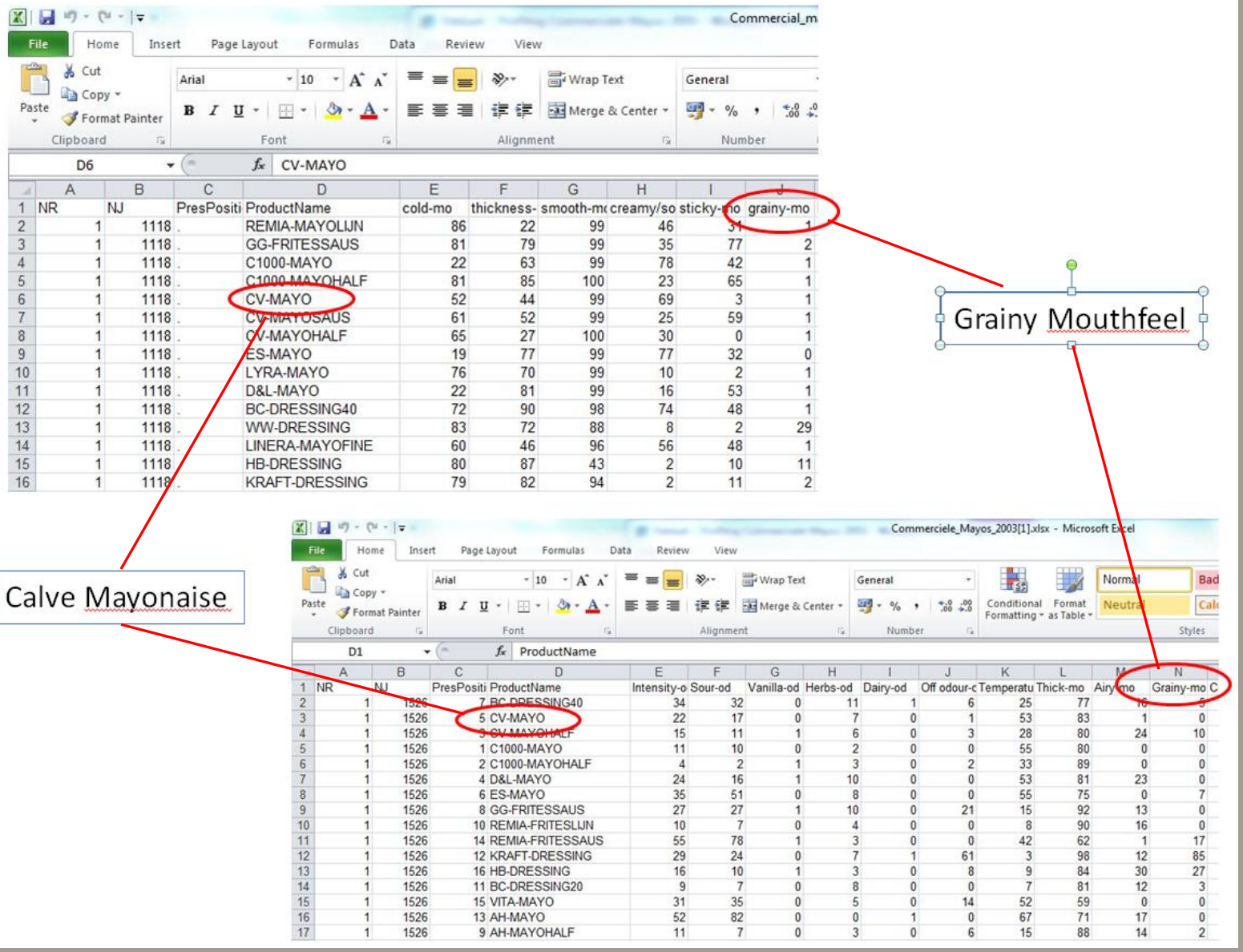
Not words but ‘resources’ – with a strict definition and a relationship with other resources



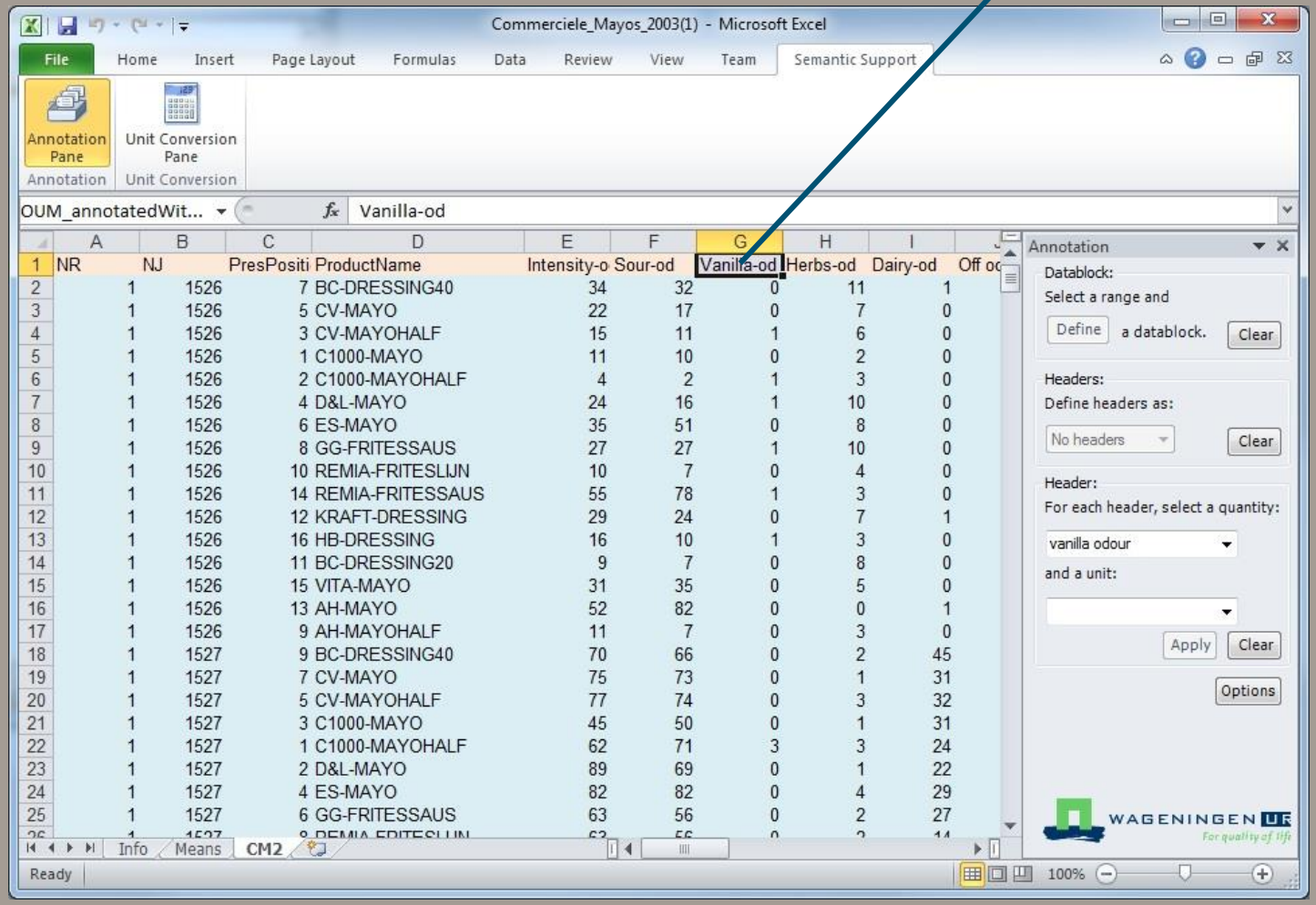
‘Semantic Web’

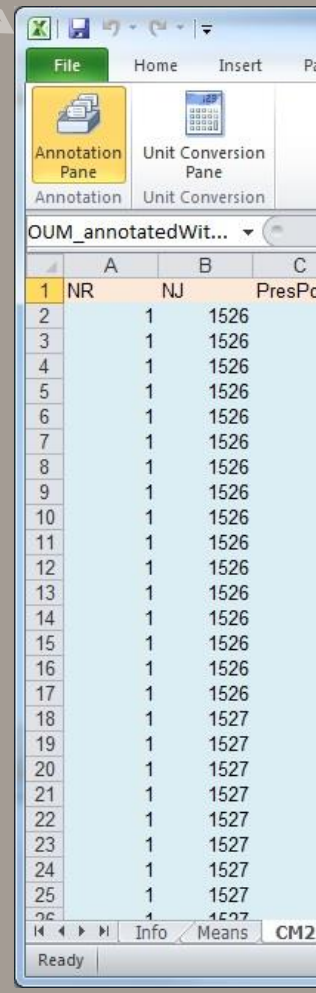
Semantic Web

Semantic Excel - Rosanne

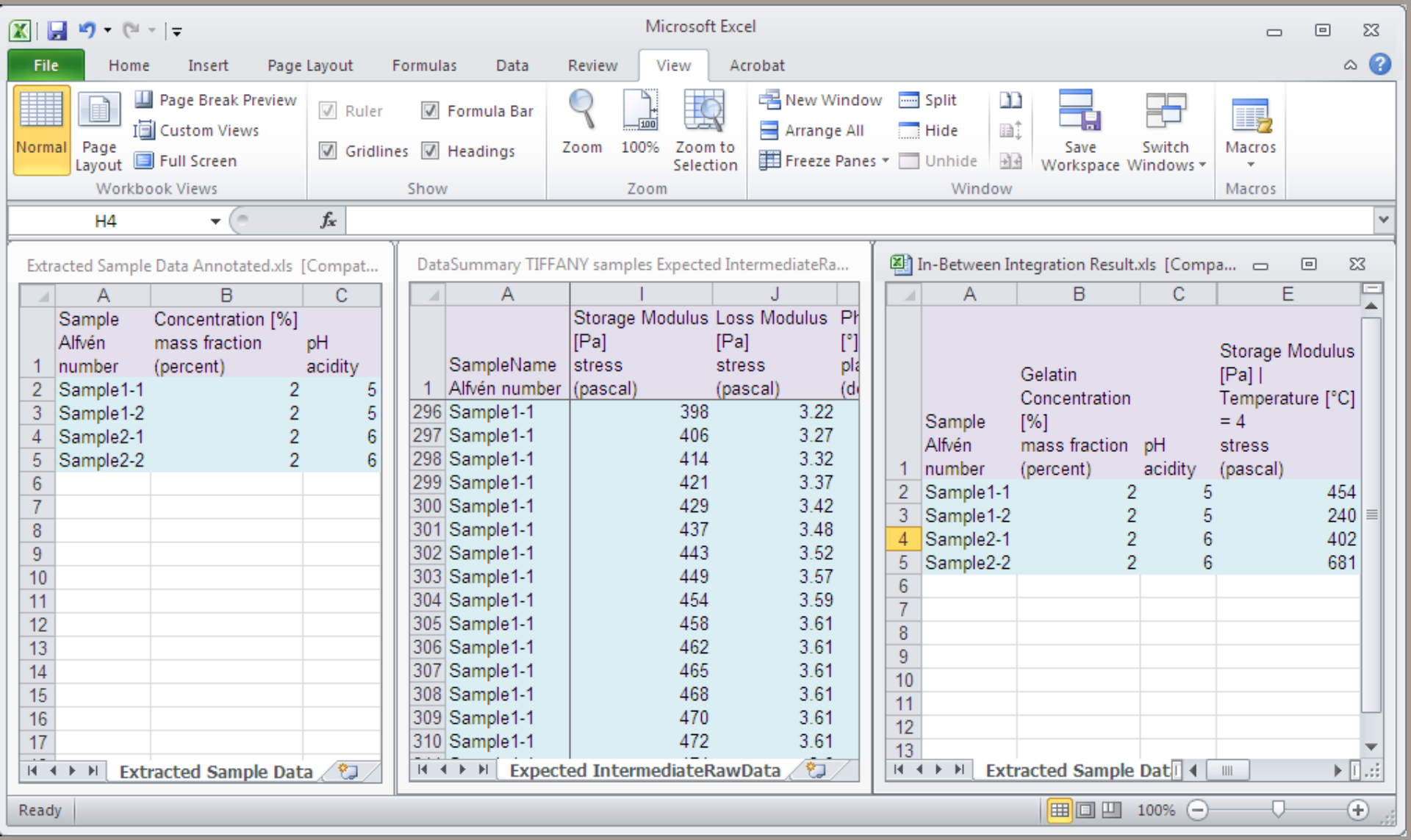


Semantic Excel - Rosanne





Integrating data



So what can electronic labnotes do for you? In 2013

If you scan your lab book in...

- Store your data electronically and make it available via email, website etc.

If you create a searchable file...

- Search for keywords in your labnotes

If you store your files in a structure...

- See your research in context
- Find information more easily
- Make your research more easily traceable
- Make your research more easily reusable

So what can electronic labnotes do for you? In 2023

- Instead of just a literature search when you start a new project, do a ‘dataset’ and ‘method’ search?
- Get automatic research credits when someone reuses your data?
- While listening to a speaker at a conference, download his data and integrate it with yours, then discuss collaborating on a new paper to present the results over the wine and nibbles?

Questions?