Richfields

Food | Consumer | Health

Presenter: Bent Egberg Mikkelsen & Sophie Hieke
Date: October 14, 2017
Occasion: pre ENS 2017 MetroFoods/EUROfir meeting

EuroFIR

Mikkelsen, BE & Hieke, S

Digital devices & smart technologies –

a case study of European behavioural food labs in the Richfields research infrastructure design study

Joint Metrofoods/EuroFIR Food Metrology and Food Composition Workshop
Saturday 14th October, Buenos Aires, Argentina

Date: 14th October, Buenos Aires, Argentina

Venue: Auditorium of the Argentine Society of Nutrition, Buenos Aires, Argentina

www.richfields.eu Coordinated by Wageningen Economic Research:
#RICHFIELDS WAGENINGEN

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Big Data Informs Food Research Infrastructures

2 dimensions. Hard & Soft

Hard part: labs, devices, machines etc

Soft part: multi source data

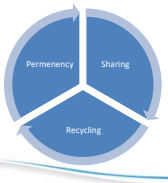
- Lab generated
- Bizz generated
- Consumer generated
- Register stored

My agenda

1. The digital
2. The labs and the digital
3. Case of The Food scape lab
4. Cross view of 3 European cases
5. Conclusion

Digitalisation has become a matter of European leaders

Data for food, nutrition and health science - a new digital driven sharing economy?



Smart Data, Smart Food & Smart City

Urban Food Living Big data

- Case of The Urban Living Big data Trento (Italy)
- Whole village provide data by consent
- Subsequent big data analysis on the city.
- Work with a personal data store PDS
- Provides citizens with opportunities to manage their data
- Feeds into the Urban Food Strategies agenda (UFS)
- Potentially donate to Open/Citizen data app

See more on Personal Data Store (PDS): http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0080790

Alex "Sandy" Pentland: https://www.project-syndicate.org/commentary/alex-pentland-imagines-communities-guided-by-rich-streams-of-real-time-citizens

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A new openness in science

Open access
Open science
Open IP
Open protocols

Digitalisation, food, nutrition & health

facts & figures DK/Nordics

Between 82% and 92% of the population use mobile ICT devices daily.
89 % of Danish consumers own a mobile phone/smart phone
88 % of Danes carry out digital self-service
88% of Danes do e-Shopping
22 % of internet users between 16 and 74 are skeptical about IT security
Penetration of wearables and according to Statista - the sale of smart watches has risen by 141 percent in recent years*
52 % of information workers across 17 countries report using + 3 three devices for work**

Statistics Denmark, http://www.dst.dk/da/Statistik/Publikationer/VisPub?cid=26973
* Statista, Nordics
** https://blogs.business.microsoft.com/en-au/2016/02/16/employee-devices-bring-added-security-concerns

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Digitalisation, food, nutrition & health

is Europe ready for digitalisation & RI's?

1. Well developed ICT infrastructure
2. High level of ICT literacy
3. Legal & privacy issues well handled
4. High trust in research from citizens
5. Good infrastructure for training/extension services
6. Tradition multistakeholder governance
7. Tradition for multistakeholder governance structures

Food & the digital 1

http://tsenso.com/en/temperature-monitoring/supply-chain/

Food & the digital 2

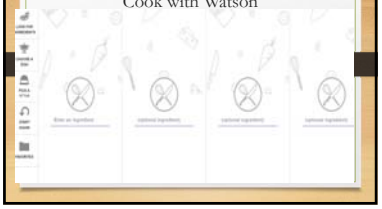
https://visual-recognition-demo.mybluemix.net/#cm_mc_uid=18221225533561504250527 1&cm_mc_sid_50200000=1504250527

Food & the digital 3

Food & the digital 4

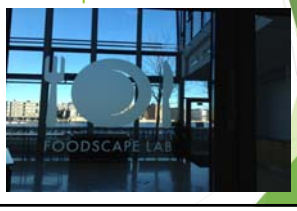
https://developer.ibmcloudwatson.com/tupler

Cook with Watson



Food & the digital 5

Example: the foodscapelab



Example: the FoodScape lab floorplan

Example: the foodscapelab

First 5 devices

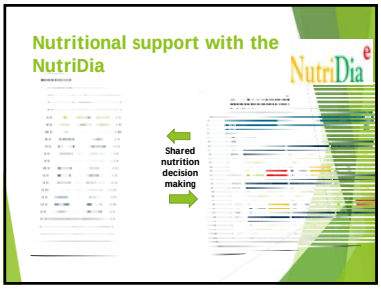
1. The FoodScape Heatmapping - used for analysis of motion and food choices
2. FoodScape Tracking - for executing real time food ethnography
3. Virtual Food Choice - Simulation which can create food environments
4. Intelligent Buffet - record food intake in canteen environments
5. Dietary Intake Monitoring System (DIMS) - capturing food intake and food waste.

Example: the foodscapelab

Example: the foodscapelab
Virtual Supermarket

Monitor with the DIMS

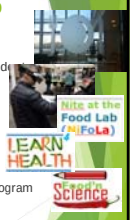
Nutritional support with the NutriDia



Example: the foodscapelab
Street & Food'n Science

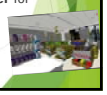
- Foodscape Lab. Teaching of graduate studi
- Refined at annual Researchers Festivals
- Refined at Annual culture nigths

Conceptualized in the Food'n Science Program



Example: the foodscapelab
Three new iterations on smart devices

- **Augmented reality technology** for plant food literacy training – the VeggiMatchi food educational app. Ada Zawadzka
- **Sensorial shopping** in the virtual vegetable market Shova Acharya
- The **Eye4Food plant food literacy trainer** for kids in kindergarten. Shova Acharya



Learning insights from FSL

- Lab approach provide opportunities for research regarding idea **conceptualization,** consumer food choice and behaviours for both **research and education.**
- Studies often developed in **small scale pilots studies** based on prior developed ideas.
- **Validation of the methodologies** is important. For technologies to prove their performance, validation studies are necessary.
- Important aspect of lab experimentation **relates to the biases** introduced.
- Potential bias is the "**noise" introduced by inviting subjects** into lab environment since
- More **stakeholders need to collaborate** to sustain work.

Case report from FSL to Richfields

Learning insights from developing & implementing FSL

- **Knowledge triangle** has proven to be a sound conceptual foundation for understanding how new applications and **experimental setups develop** over time.
- In particular, the synergies obtained **from inter-sectorial and interdisciplinary** cooperation between different scientific paradigms are important.
- In the case of the Foodscape lab this has involved **the AAU Multisensory Experience lab.**
- The FSL has proven to be relevant in the context of **choice architectures and nudging**
- Running a FoodScape lab **requires an operational model – a business model.**

Connecting laboratories and facilities

1) What do the **purpose, structure, technology/devices used** and **data storage** of various laboratories and facilities in Europe look like?
2) Are there ways (and interest) to offer **data access, exchange and linkage** to external research infrastructures, like RICHFIELDS?
   - What would be the challenges and constraints?
3) What are potential **ethical issues** related to sharing consumer data (e.g., data privacy, ownership rights etc.)?
4) Is there a suitable **business model** to manage data exchange (e.g., user and access rights, fees, governance of data usage for different purposes)?

Connecting laboratories and facilities

Step 1
- **Case studies on three facilities** (Fake Food Buffet, FoodScape Lab, Restaurant of the Future)
- Food choice, purchase and consumption

Step 2
- Mapping additional facilities across Europe (private and public)
- **Expert interviews** in selected facilities (commercial and public-private institutions)

Step 3
- **Stakeholder workshops** to discuss these insights
- Synthesis of findings and recommendations

Connecting laboratories and facilities

Case study 1

Fake Food Buffet
ETH Zurich
University of Konstanz, DE
University of Newcastle, AUS
Queens University, Belfast, NIR

"food choice"

Case study 2

FoodScape Lab
Aarlborg University

"food choice, consumption"

Case study 3

Restaurant of the Future Wageningen University

"food choice, purchase & consumption"

What commercial research centres say

- A large MNE will carry out their research all around the globe – every facility in every country does their own thing and staff in other facilities and other countries may not have any overview of the data generated within that MNE
- Most likely, there is no central repository within an MNE, to date. It would take months to gather all the data and insights that have been generated on one specific product, from all over the globe
- **Conclusion:** *It may not be possible to harmonise all the existing data, but it is important to have a starting point from where we can standardise future data collection and make data integration easier."*

Interest in RICHFIELDS:
Yes. One such example is the project carried out at the Tufts University: the Global Dietary Database (they provide specific requirements for the data structure that external stakeholders share with them).

Reasons to participate in RICHFIELDS:
The food industry is under pressure from regulators, activists and the public. Public health, consumer trust and transparency along the food chain are at stake. Only joint efforts will lead to success, including collaboration within the industry and outside, e.g. with researchers through RIs

What public-private research institutes say

- There are often **strict national regulations** in place, e.g. The French consumer protection agency (CNIL), that require procedures regarding data privacy, anonymisation and storage/access (e.g., data have to be destroyed after 5 years)
  - Public-private research institutes are required to **comply with such rules**, in order to maintain their reputation and receive future funding
  - For example, consent forms often guarantee participants that their **data are not being used for purposes other than research** (sometimes even restricted to one specific study)

Interest in RICHFIELDS:

- Yes, but there are restrictions regarding **the sharing of consumer data (regulations)**
- Interested **to play an active role in such an RI,** to better connect existing data and learn from each other on how to analyse big data, e.g. on inter-individual differences
- RICHFIELDS could offer a platform to **collect the history of research undertaken** (e.g., which topics were studied, did it work or not – connect, learn, work together)
- RICHFIELDS could offer a **repository of protocols**

First conclusions from the interviews

For industry, the main barrier is **direct access to data** (often they need an academic partner to access such data)
"Researchers from industry and academia are not treated equally. Access is key. Industry needs access to data to make actual improvements. For better global health we need to have a revolution in the relationship between companies, academy and policy makers."

- The food industry is happy to share data that they do not use anymore
- *"There is a trend in the food industry to make healthier products. The industry is under pressure to do this, but if we are the only ones that do it, we lose."*

For public-private research institutes, **replicable data** and **standardisation** are important

- Individual level data are needed: how people eat
- A 'task force' is being called for, to investigate inter-individual differences

"We have to be careful with sharing data, because in our consent forms we guaranteed the individuals that the data is not used for purposes other than in research. Maybe in the future we need to release these constraints. For us it is a matter of credibility. We don't have a university label. We have to demonstrate that we do what we do in the right way."

Conclusion
if RI is the answer whats then the question

1. Complexity of RQ's require inter university cooperation
2. Research are no longer neccessarily the best to create data
3. Open science calls for sharing of data
4. Project created data tends to vanish post-project
5. Society increasingly expects realtime answers

Conclusion
way forward for RI

1. Universities need to agree **nationally**
2. Universities need to agree **internationally**
3. **More stakeholders** need to support: industry, government agencies, NGO's
4. **Bizz models** crucial
5. **Operational** model crucial
6. **Governance** structure needed
7. **Ethics and GDPR** should be handled
8. Clear vision on **soft AND hard** mode RI's
9. **Things Takes Time**
10. **Education & training** is needed

Thanks for your attention

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