



Facilitate Open Science Training for European Research

**Plus ça change: Experiences
from a decade of environmental
research data management**

Dr. Peter Mooney

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plus ça change, *phr.*

Text size: [A](#) [A](#)View as: [Outline](#) | [Full entry](#)Quotations: [Show all](#) | [Hide all](#)**Pronunciation:** Brit. /,plu: sa 'ʃɔ̃ʒ/, U.S. /,plu sa 'ʃɑnʒ/**Etymology:** Short for French *plus ça change, plus c'est la même chose...* [\[Show More\]](#)

'The more things change, the more they stay the same': used to suggest that human nature, institutions, etc., are always fundamentally the same, despite apparent changes.

[Thesaurus »](#)

[1900 *Mind* 9 109 The dreary doctrine that 'it is all one' has maintained its unity in the diversity of its manifestations and admirably illustrated the dictum *plus ça change, plus c'est la même chose.*]

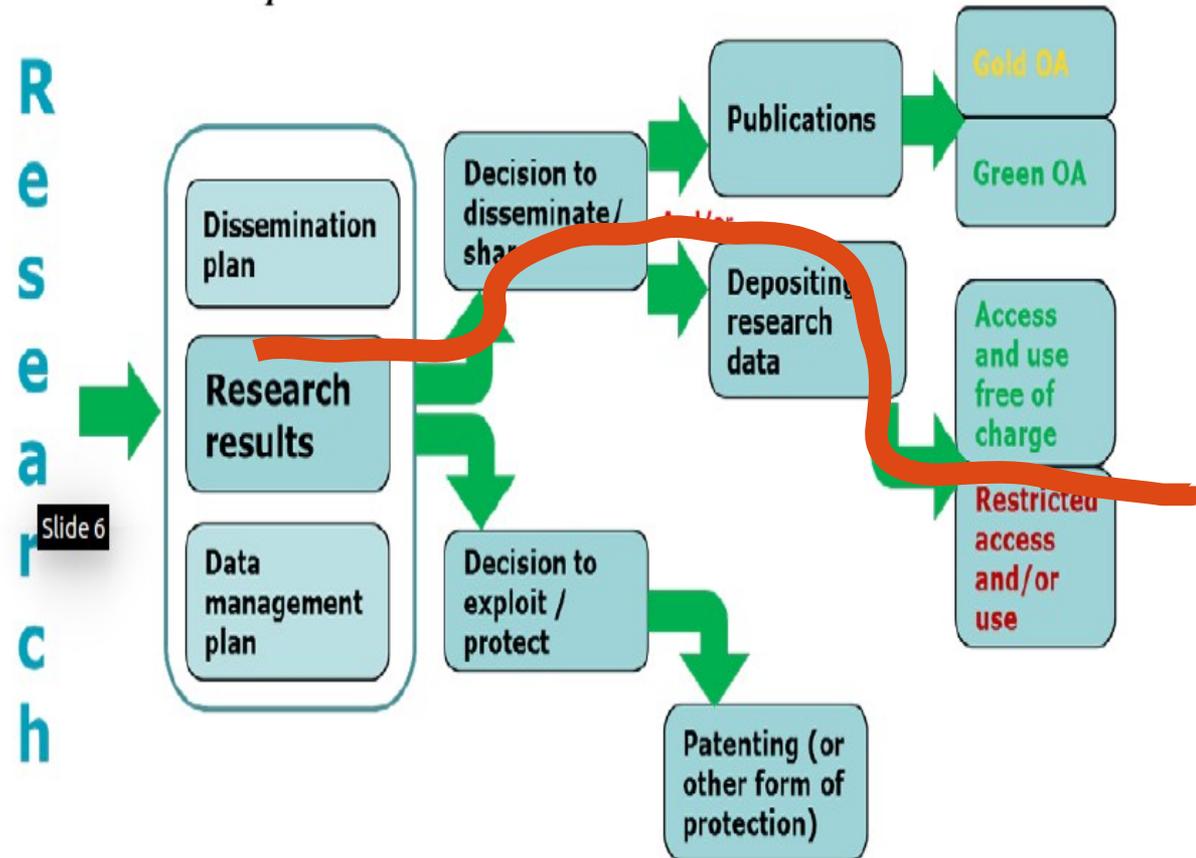
1955 *Times* 5 July 11/4 We have an uneasy suspicion that there is something to be said for the epic angle on history. After all, when boy met—or meets—girl, *plus ça change.*

A furrow we have been ploughing at EPA since 2004



Guidelines on Open Access
to Scientific Publications and Research Data
in Horizon 2020

Graph: Open access to scientific publication and research data in the wider context of dissemination and exploitation

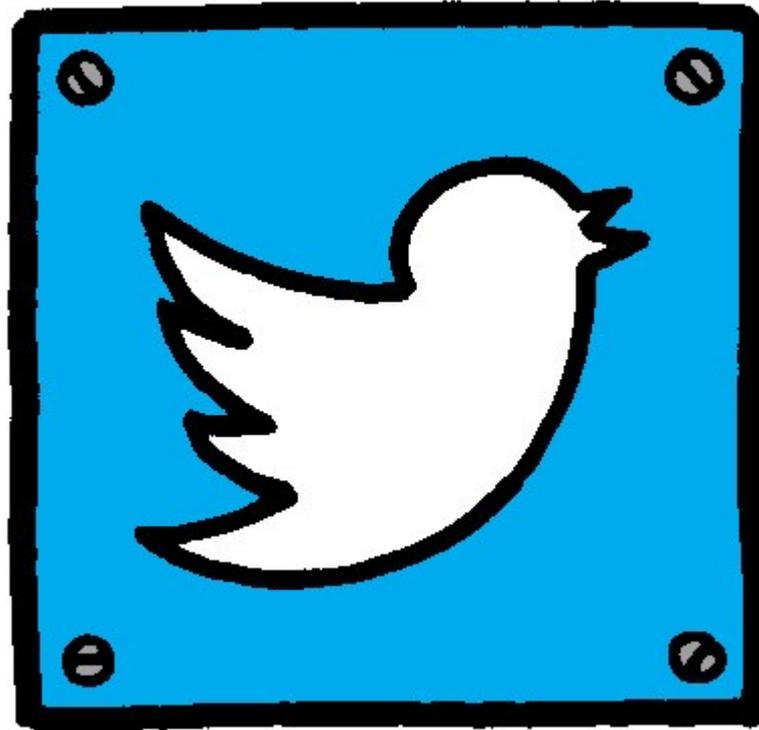


Slide 6

Let's go back to a decade or so...

- Athens held the Summer Olympics (2004)
- Google went public making Brin and Page instant billionaires..
- LOTR Return of the King won Best Picture at the Oscars 2004
- “Clocks” by Coldplay won Best Record at the Grammys 2004
- Brian Cowen became Minister for Finance
- Sumatra–Andaman earthquake/ Boxing Day tsunami

Twitter wasn't even on the scene (it was born in March 2006)



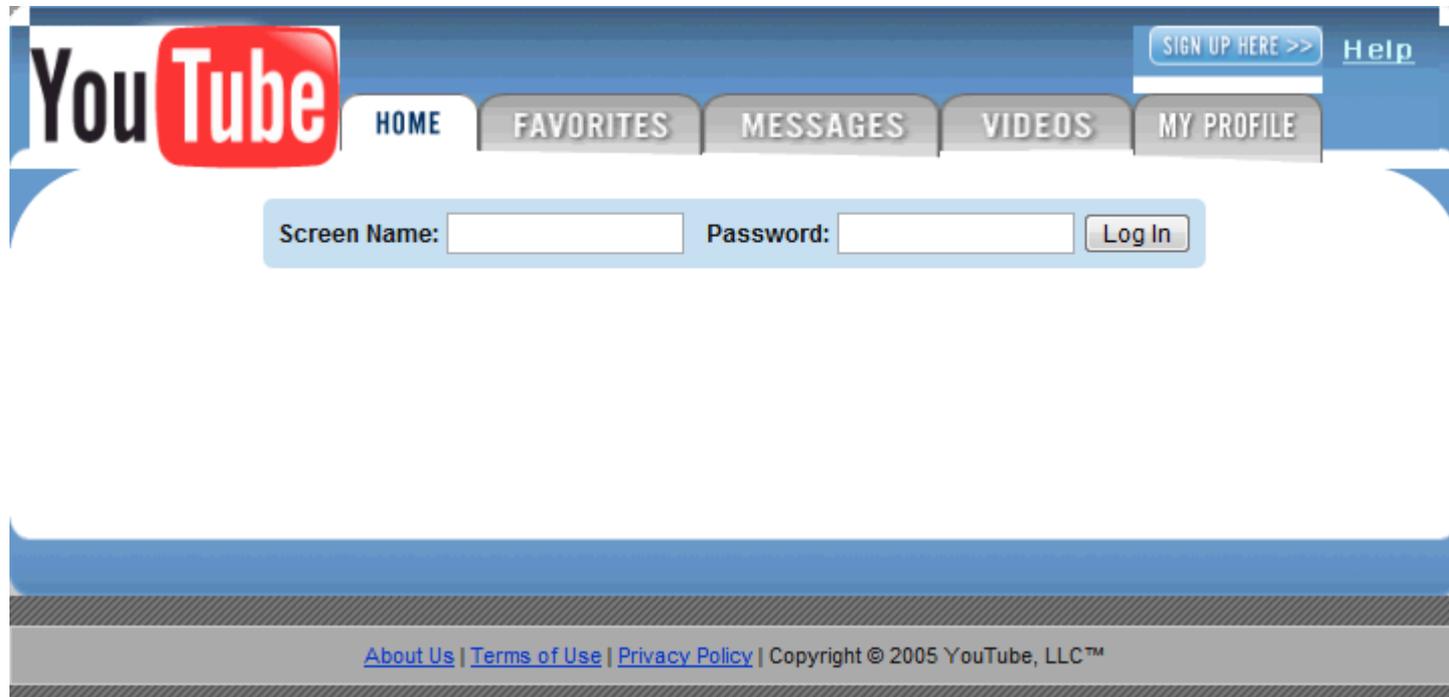
<http://dot-social.co.uk/wp-content/uploads/2014/04/twitter-icon-by-Jurgen-Appelo-on-Flickr-2.0-Generic-CC-BY-2.0-.jpg>

Facebook was taking it's first steps



"Thefacebook" by Source. Licensed under Fair use via Wikipedia - <http://en.wikipedia.org/wiki/File:Thefacebook.png#/media/File:Theface>

YouTube was also taking it's first steps



"YouTube screenshot 2005" by Source (WP:NFCC#4). Licensed under Fair use via Wikipedia -

http://en.wikipedia.org/wiki/File:YouTube_screenshot_2005.png#/media/File:YouTube_screenshot_2005.png

Android arrived in 2008 after the iPhone in 2007. But we still really loved the Nokia 1680

iPhone
3G



NOKIA 1680
Connecting People



aPrecios
deRemate!

2004: IEEE Multimedia Vol 11 (4)

Visions and Views

Editor: Nevenka Dimitrova
Philips Research

Is It Time for a Moratorium on Metadata?

Dick C.A.
Bulterman
CWI, Amsterdam

I'd like to begin this article with a short story about metadata:

Once upon a time, there was a small republic nestled in the heart of an inaccessible chain of mountains. The country was separated geographically into two regions by a range of towering peaks that ran from north to south. Originally, the citizens were mountain dwellers, but they had long since moved downhill, either to the eastern or western side of the country. Over time, two dialects of the national language had developed that, together with the terrain

Where the East had extensive (and mandatory) vocabularies for describing every aspect of bread and bread production, the West had extensive film archives and audio descriptions, all of which were recorded in a proprietary format. All western bread was simply labeled: bread (where and when it was bought differentiated what kind it was).

The limited transport capacity of the balloons and the extended duration of the inter-regional journey made it impossible to import fresh western bread, but this did little to satisfy the appetites of the eastern population. The brightest young bakers were sent out to

Funding of environmental research was undergoing great changes also

- The EPA would manage and administer a substantially large research budget
- **Wider remit of research themes and scientific domains**
- **Closer links to policy** and current needs
- **Scaling up** of the amount of funded environmental research in Ireland

EPA ERTDI Funding Programme 2002

Environmental RTDI Programme 2000-2006

Air Quality

Socio - Economic

News / Events

At the beginning of 2000 the Department of Environment and Local Government (DoELG) provided a budget of £20m for environmental research over the period 2000-2006. This budget forms part of the government programme for Research, Technological Development and Innovation (RTDI) funded under the [National Development Plan \(2000-2006\)](#). This multi-annual research programme is being developed and managed by the Environmental Protection Agency on behalf of the DoELG.

The provision for the programme is given in the [National Development Plan](#) where it is stated that "environmental research will be concerned in particular with the need to measure the impact of economic development as well as contributing to sustainable development of natural resources..." One of the objectives of the programme is to establish networks for data gathering and exchange and the setting up of long term monitoring sites for data gathering. The programme document emphasises the need for applied research and for demonstration projects leading to the development of new systems, models, instruments and techniques as well as contributing data and information to assist policy and decision making.

The EPA began preparation for the programme with a consultation of the research community and those with an interest in the environment. This consultation took place at the end of 1999 and early in 2000. Following the identification of priority research projects in line with the information gaps in the review of state of the environment and the preparation of the indicators report (Environment in Focus, EPA 2000) the Agency launched the [first call for tenders](#) in May 2000 for 28 specific research projects. The first projects commenced in November 2000.

A [second call for proposals](#) was launched in June 2001 for research proposals under four broad areas. The first projects commenced in December 2001.

 The **third call for proposals** was launched on 26th April 2002 for environmental research which addresses identified priorities for the implementation of the EU Water Framework Directive as presented in the technical description of the call, [click here](#) for further information. 

 The **second call for Doctoral Scholarships** was launched on 24th May 2002. The doctoral scholarship scheme invited proposals for basic research in Environmental Science and related disciplines such as environmental sociology, economics and law, [click here](#) for further information. 

It is intended that there will be annual call for proposals and/or tenders in the first three years of the programme. At that point a review and evaluation will be carried out and the results of the review will be used to inform the development of the second half of the programme.

In addition to the annual call for proposals in the ERTDI Programme, applications for small-scale studies are welcome at any time. [Click here](#) for further information.

In addition to the budget for research support the NDP also provides £5m for the establishment of a [National Environmental Research centre of excellence](#) deemed necessary to provide a more structured approach to research than at present and to provide environmental support across the Community Support Framework (CSF).

EPA ERTDI Funding Programme 2004

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Environmental protection is increasingly reliant on scientific research and technology. As our economy becomes stronger, there is greater need for better information on a wide range of pressures and impacts.



The EPA's research programme – the Environmental Research, Technological Development and Innovation (ERTDI) Programme – involves a budget of €32m over seven years, and has supported over 230 projects to date. Our research focuses on a variety of key areas, including air quality and climate change; cleaner production; water quality and eutrophication (over-enrichment).

In addition we have established a National Environmental Research Centre of Excellence, which is an IT-based information and research facility.

Information on some of the projects undertaken can be viewed in this section.

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EPA STRIVE Funding Programme 2007



Environmental Protection Agency



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Water quality
Waste & resource management
Land use, soils & transport
Environmental Technologies
Environment and Health
Socio-economics
Building Research Capacity
» Funding and Resources

EPA Funded Research

The Environmental Protection Agency (EPA) research programme provides funding for projects across a broad range of environmentally related areas.

The EPA has awarded over 400 grants during the Environmental Research Technological Development and Innovation (ERTDI) Programme 2000-2006. We will award new projects in 2007 as part of the Science, Technology, Research and Innovation for the Environment (STRIVE) programme 2007-2013.

Projects range in scale from desk studies and scholarships up to large-scale multi-annual projects. Research is carried out by researchers in colleges, state research organisations, companies and individuals.

Research is funded under the following core topics:

- » [Air Quality](#)
- » [Biodiversity](#)
- » [Environment & Health](#)
- » [Environmental Technologies](#) (including the Cleaner Greener Production Programme (CGPP))
- » [Climate Change](#)
- » [Land-Use, Soils and Transport](#)
- » [Socio-Economics](#)



A very simplified view of the research project lifecycle

Funding Awarded
Project Begins

Project Research and
Development

Project Finished

Reporting
obligations

Report,
papers etc

Project lifetime 6 months to 5 years

1 – 2 years

“Data” was the weakness in all of the EPA Research programmes

- Successful funding of Environmental Research in Ireland
- A growing capacity for Environmental Research and Development
- Funded Projects delivered reports and policy, journal papers, training etc
- **No Data**

Access to the outputs from environmental research looked very like this structure



Project Reports - Land-use, Soils and Transport

Methodologies for the estimation of sustainable settlement size	Final	3,095KB
Methodologies for the estimation of sustainable settlement size	Synthesis	180KB
Preliminary Study of the needs associated with a National Ecological Network	Synthesis	1,562KB
Preliminary Study of the needs associated with a National Ecological Network	Final	13,882KB
Environmental Impacts and Parameters for inclusion in the Economic Valuation of Road Schemes	Final	287KB
Scope of Transport Impacts on the Environment	Final	900KB
Environmental Quality Objectives: Noise in Quiet Areas	Synthesis	2,809KB
Development of Strategic Environmental Assessment (SEA) Methodologies for Plans and Programmes in Ireland	Synthesis	586KB

Providing 'open-data' PDF reports: knowledge distribution - but not actionable

<http://www.theguardian.com/global-development-professionals-network/2013/oct/21/development-open-data-action>



"like funding James Cameron to make Avatar, and then releasing it in a black and white flip book. We are missing all the good stuff".

In 2004/2005 we proposed a radical open access approach to Environmental Research in Ireland

- All data created, generated, and collected by EPA funded research projects would be made publicly available – free of charge
- This was **part of the research contract**
- EPA Scientific Committee and Research Team collaborate to identify the data/information for public distribution
- **EPA committed long-term to management of data and related infrastructure.**

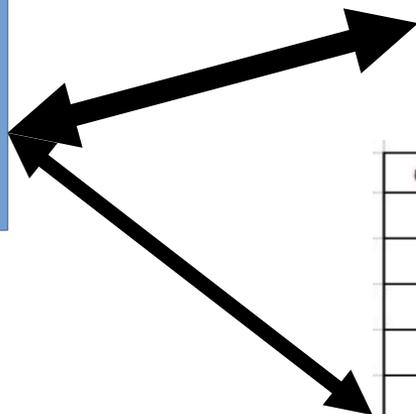
This radical approach would link the primary data to the published reports and papers

The screenshot shows an Excel spreadsheet with a grid of data. The columns are labeled with letters A through Z, and the rows are numbered 1 through 25. The data appears to be organized into sections, possibly corresponding to different samples or experiments.

Cube #	Mass (g)	Volume (cc)	Density (g/cc)
1	151.5	16.3	9.3
2	43.9	15.6	2.8
3	140.3	15.6	9
4	23.6	16.2	1.5
5	150	15.6	9.6
6	9.5	15	0.6
7	19.7	16.9	1.2
8	6.2	15.6	0.4
9	11.4	15.6	0.7
10	18.4	14.4	1.3

Table3: Quantitative Data for Density Cube Experiment

REPORTS
&
PAPERS



Researchers needed IT and other structural support to make their data publicly accessible and available

- **Embargo Period:** up to 12 months after project end
- **Access Control:** ability to control access to certain files/datasets
- **Update and Change:** ability to manage the files into the future

So we (I) built SAFER according to these precise specifications....



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Secure Archive For Environmental Research Data

SAFER-Data is a fully web-based interface to the EPA's Environmental Research Data Archive. Information is presented on SAFER-Data as a "resource" and any related datasets or information objects that are publicly available for download. The goal of SAFER is to provide open access to the environmental research data to citizens, academics, policy makers, researchers, etc in Ireland and around the world.

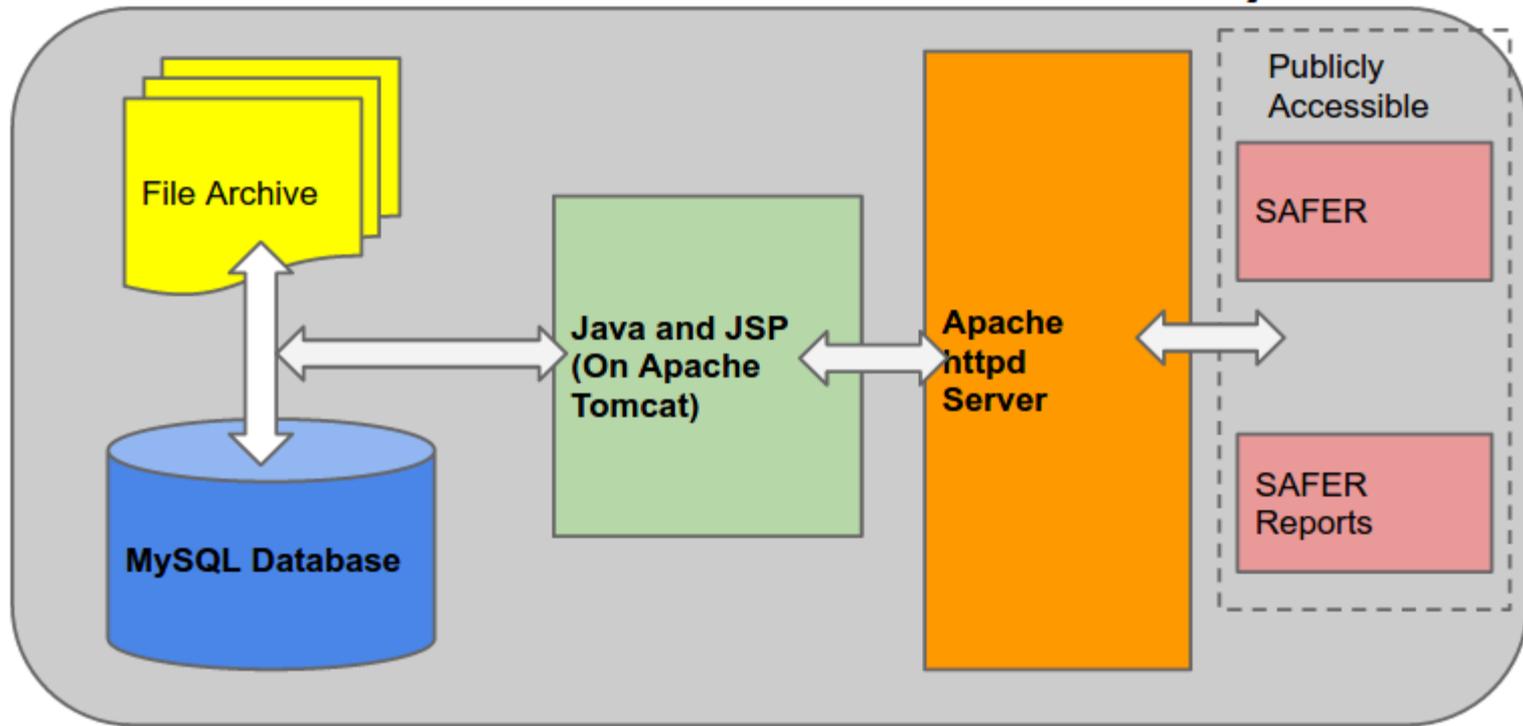
- ▶ **336 Resources Now Publicly Available** ([View All Resources Now!](#))
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This is a listing of the **10 most recently contributed or edited resources** on SAFER.

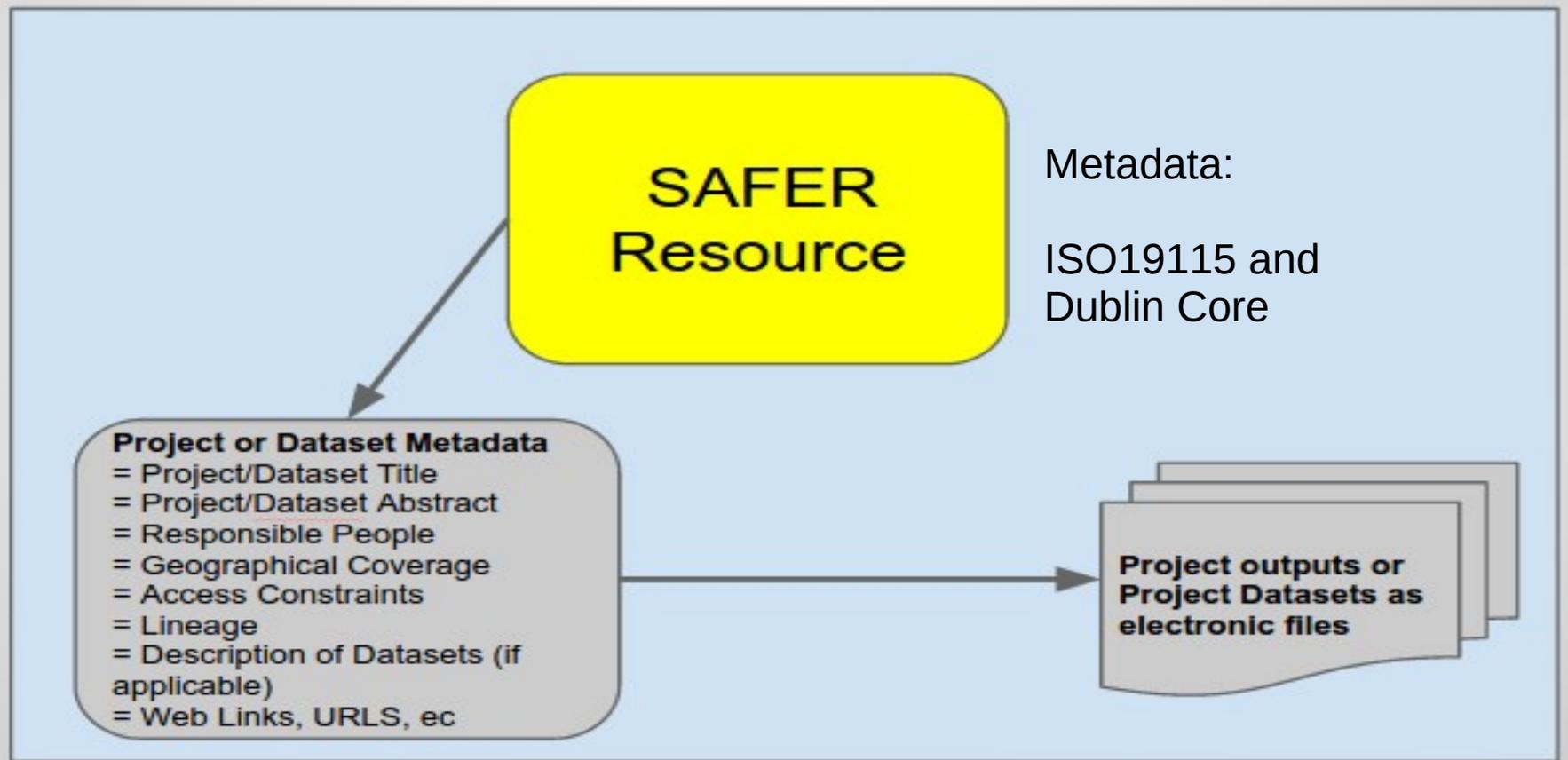
Irish SIS Final Technical Report 15: Irish SIS SISCore Data Model

Title:	Irish SIS Final Technical Report 15: Irish SIS SISCore Data Model
Owners/Creators:	Dr. Rachel Creamer
Keywords:	data model, modelling, SISCore

The SAFER architecture - easy for us to extend to update functionality or include new functionality as needed



The basic building blocks for reporting in SAFER are “Resources”



As an open data access tool SAFER has been very successful over the past number of years

- Around **5,500 downloads per year**
- Almost **3,500 datasets/files publicly available** for access and download
- Approximately **200 different project resources** on SAFER
- Approximately **80GB of data**

SAFER is used by the EPA itself to provide open access to some of key EPA datasets



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EPA Ireland Archive of PM10 Monitoring Data

This page displays all of the metadata information which describes this [resource](#). This metadata information provides details of: the owners and creators of this resource; download links to any files which are available for downloading; geographical and temporal information about the datasets or project in general; other information such as a description of the project, experimental techniques used, data download restrictions, etc.

[Files attached to this resource](#) have been downloaded 2773 times. [View Download Timeline Graphic](#)

Where in the world are users downloading files from this resource? [Show Download Locations Map](#)

Resource or Project Abstract

Particulate Matter (PM) less than ten micrometres in size (PM10) can penetrate deep into the respiratory system increasing the risk of respiratory and cardiovascular disorders. PM10 arises from direct emissions of primary particulate such as black smoke and formation of secondary PM in the atmosphere by reactions of gases such as sulphur dioxide and ammonia. The main sources of primary PM10 are incomplete burning of fossil fuels such as coal, oil and peat and emissions from road traffic, in particular diesel engines. Other sources of particulates include re-suspended dust from roads. Natural PM includes sea-salt and organic materials such as pollens. The diverse

SAFER is an example of a tool developed for the research audience but expanded to a wider audience



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Drinking Water Monitoring Results and Water Supply Details for Ireland - Year 2013

This page displays all of the metadata information which describes this [resource](#). This metadata information provides details of: the owners and creators of this resource; download links to any files which are available for downloading; geographical and temporal information about the datasets or project in general; other information such as a description of the project, experimental techniques used, data download restrictions, etc.

[Files attached](#) to this resource have been downloaded 323 times. [View Download Timeline Graphic](#)

Where in the world are users downloading files from this resource? [Show Download Locations Map](#)

Resource or Project Abstract

This dataset consists of drinking water monitoring results and water supply details reported annually to the EPA by water services authorities in accordance with the Drinking Water Regulations. There are 48 parameters monitored under the regulations, including E. coli, coliform bacteria, pH, conductivity, turbidity, taste, odour and colour. The information on water supplies

We attempt to integrate SAFER into the project lifecycle of EPA funded research projects

- Projects are provided with an account on SAFER early in project lifecycle
- Engagement with project on data management practices (if required, but recommended)
- Research project creates metadata resource on SAFER close to project end
- Ongoing process of dataset upload
- Direction from EPA and Steering groups, etc

One size doesn't fit all - every project will have different reporting interaction with SAFER



Dependent upon many criteria:

- = Type of project
- = Data generation or information generation
- = Field surveys, computer simulations, etc
- = Use of mapping and GIS
- = The use of 3rd party data - particularly 3rd party data requiring a license

EPA are happy to discuss the specific characteristics of each project's data reporting to SAFER

But there is still a disconnect between funded research projects



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Research database search

Search the EPA Research Database

The EPA have funded over 800 projects (valued over €10,000) since 2001 varying in size from desk-based studies to large multi-annual projects. This database contains information about all of these projects and is searchable by: keywords, lead researcher, research institution etc. This database also provides details of the project abstract, expected end date and where relevant a link to the final report/output. 5180 searches have already been performed!

Please note: You can search with multiple terms ie 'Climate Change', 'Waste discharge'. We are improving this search facility further for the next version.



Lessons Learned

What have we learned over this past decade in making Environmental Research Data publicly accessible in Ireland?

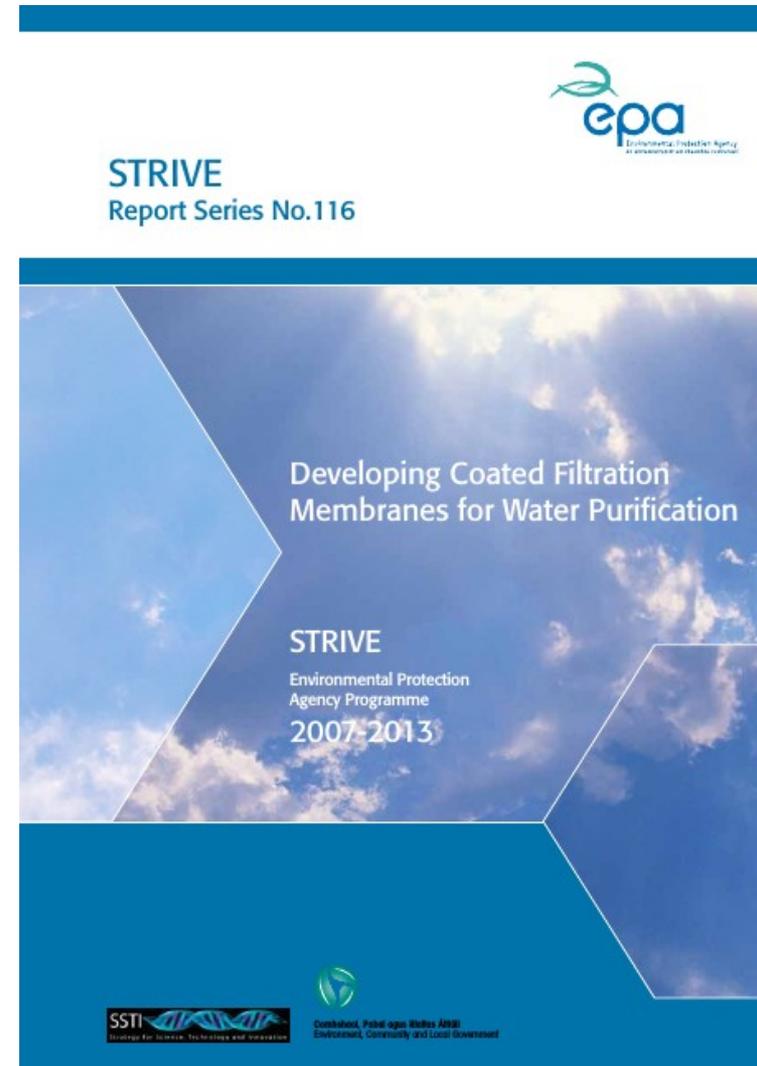
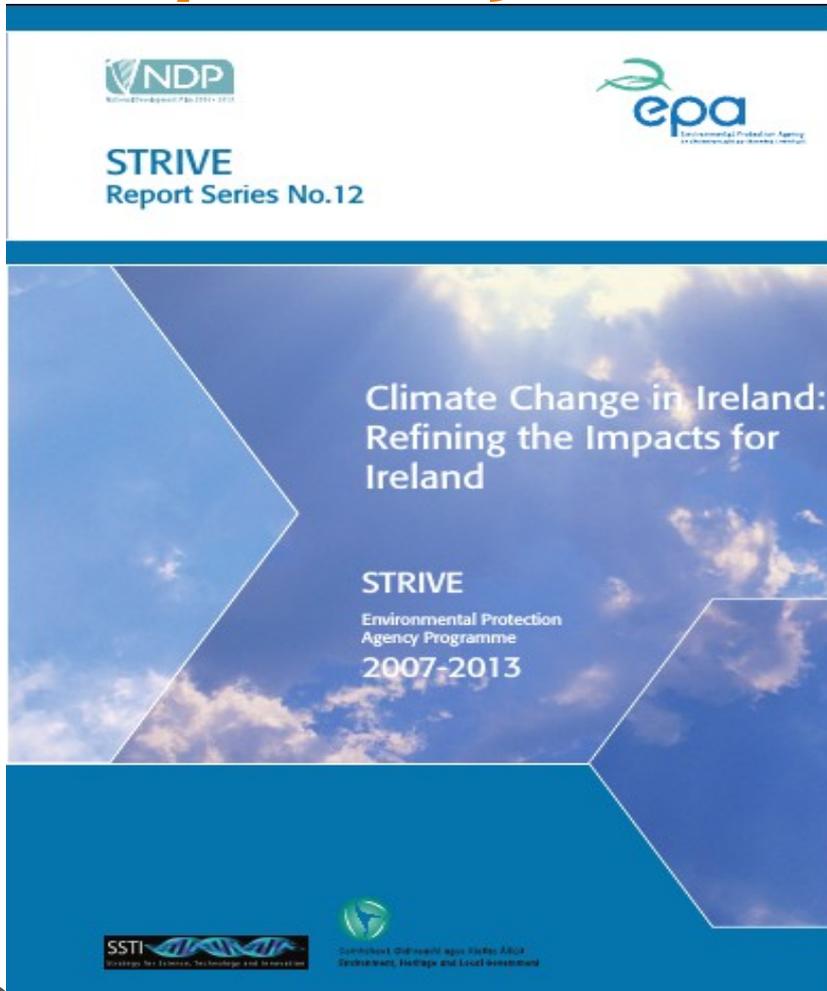
So has anything really changed?

- **YES and NO**
- **YES:** The “digital natives” involved in Environmental Research are more **open**
- **NO:** We're still struggling to find the correct structures for **open access to data**
- **NO:** Data management and making data openly accessible is still (a low priority) (misunderstood)

There is still a lack of understanding of data management principles

- **Metadata is still a mystery to most researchers** (metadata about projects, metadata about data....)
- **Metadata is still an annoyance or burden** to most researchers (too time consuming)
- There is **lack of appreciation of the need to manage data correctly** (for example use databases rather than spreadsheets...)

“But our project didn't generate any data or information that could be made publicly available”



Microsoft Excel is still completely dominant in Environmental Research



- **Excel is used almost universally** as an analysis tool, visualisation, data storage, data capture, etc etc
- **This greatly reduces the reusability of the data** – without very detailed metadata and supporting documentation Excel datasets can be wildly complex

EPA offer researchers the opportunity to discuss data management plans

- Before data collection, surveys, modelling etc gets underway – discuss plans and requirements with EPA Research IT expert
- This consultation has many advantages:
 - Opportunities for the researchers to undertake proper data modelling from the beginning
 - Consider use of databases rather than Excel
 - Guidance on how to separate data collection, analysis, visualisation, long-term storage



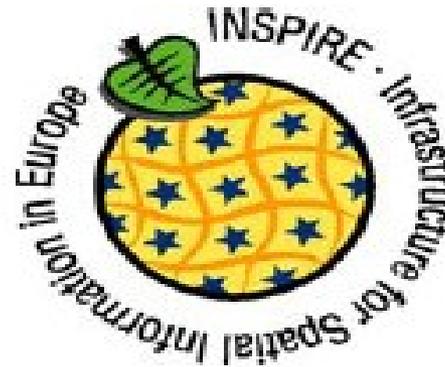
The FEAR of allowing data to be freely and openly available is pervasive - this leads to data remaining hidden for years!

A scenic landscape featuring a two-lane asphalt road that stretches from the foreground into the distance, leading towards a bright sunset. The sun is low on the horizon, casting a warm, golden glow across the sky and the road. The sky is filled with dramatic, dark clouds, some of which are illuminated by the setting sun. To the left of the road, there is a green field with a fence, and further back, a wetland area with water reflecting the sky. In the background, there are rolling hills and mountains under a cloudy sky. The overall mood is one of hope and forward-looking optimism.

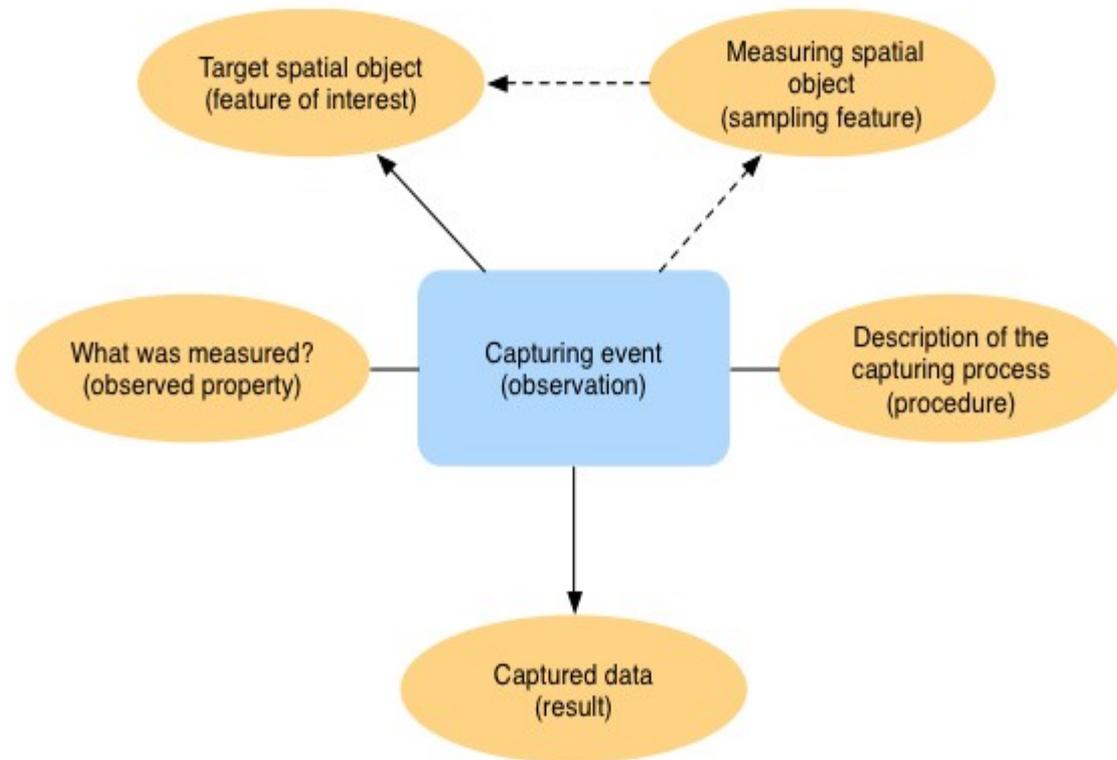
The road ahead: Future Work

Environmental data, geographic data, geoscientific data etc will be heavily influenced by INSPIRE

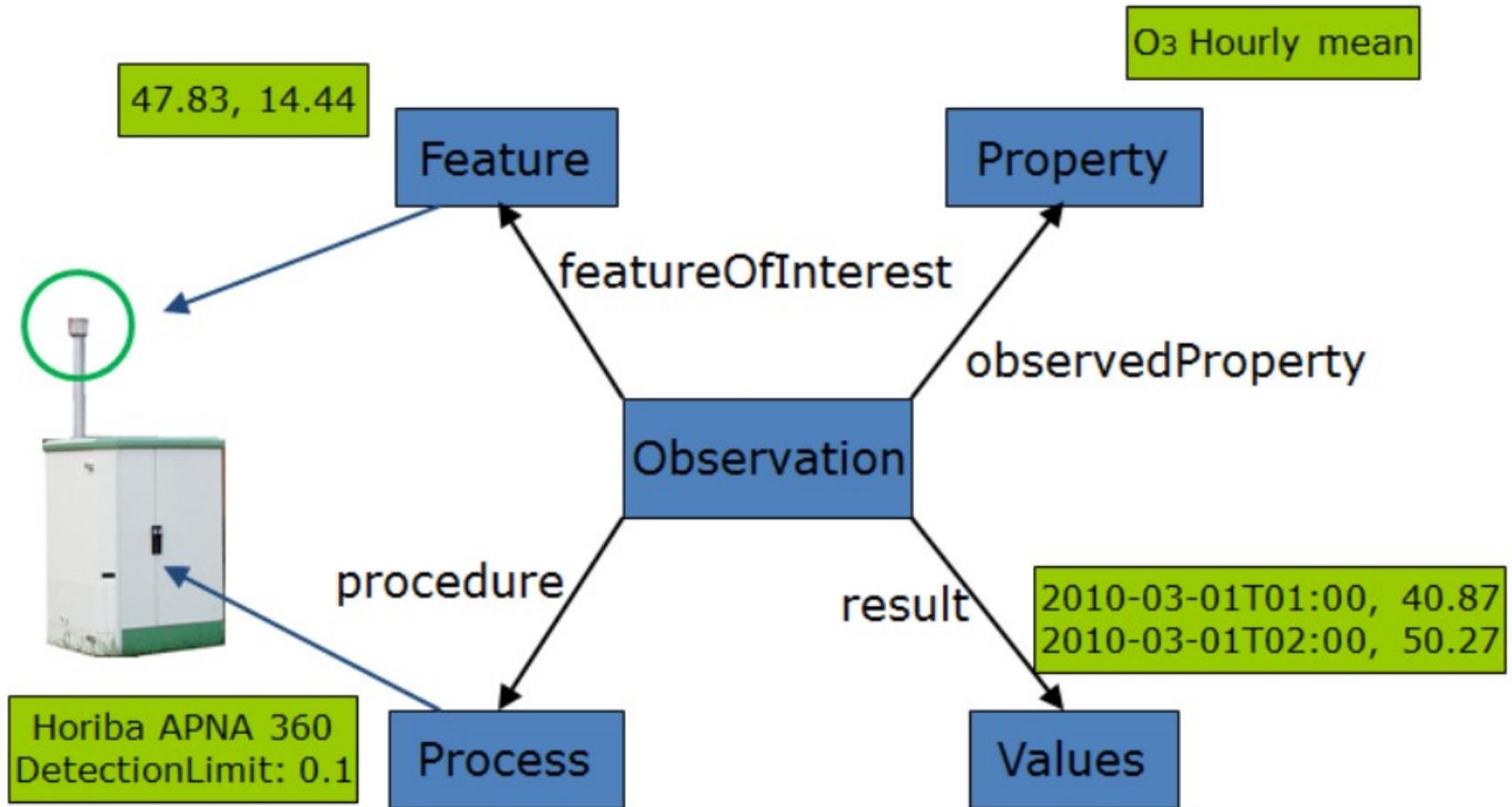
Need to begin to think seriously about making data more “INSPIRE Friendly”

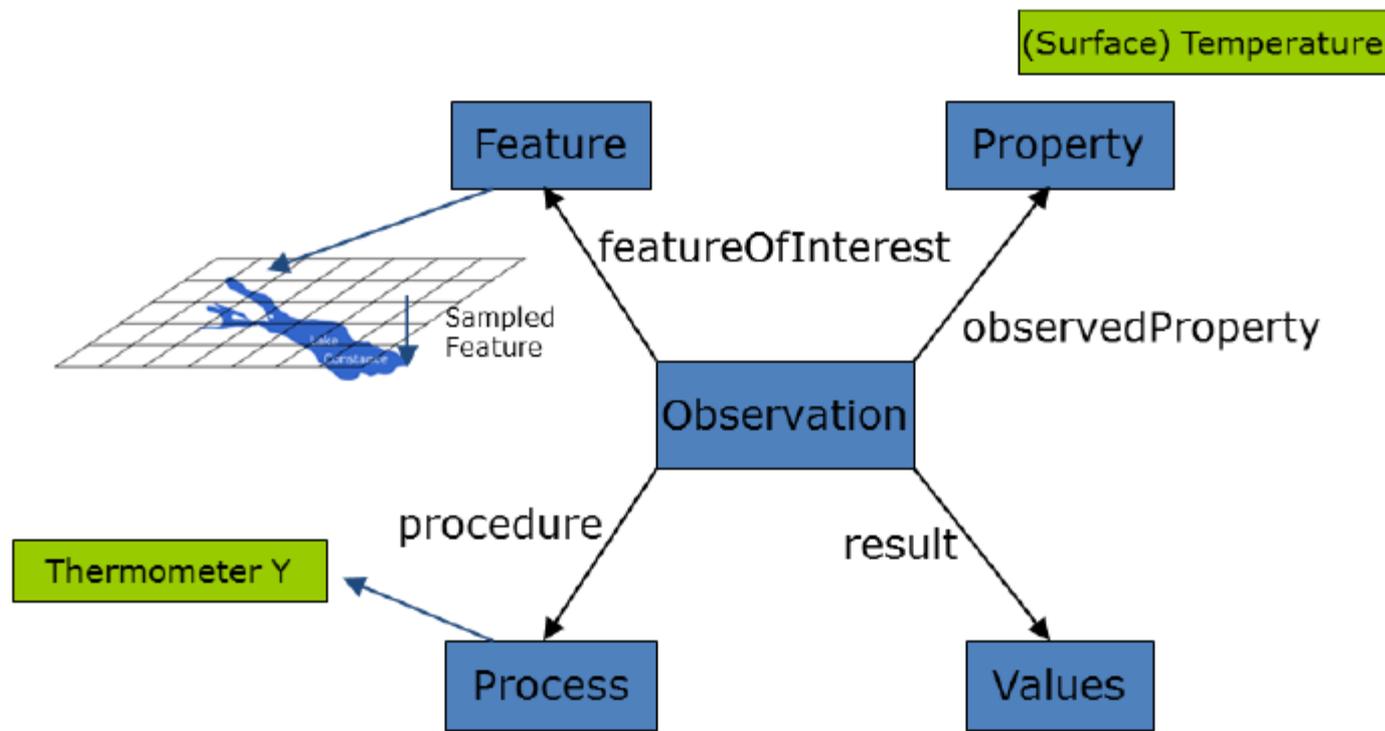


Observations & Measurements (O&M) is an international standard for modeling observation events and describing their relations to the target spatial objects under observation, the measured properties & measurement procedure, and the captured data resulting from those observation events.



O&M Example 1





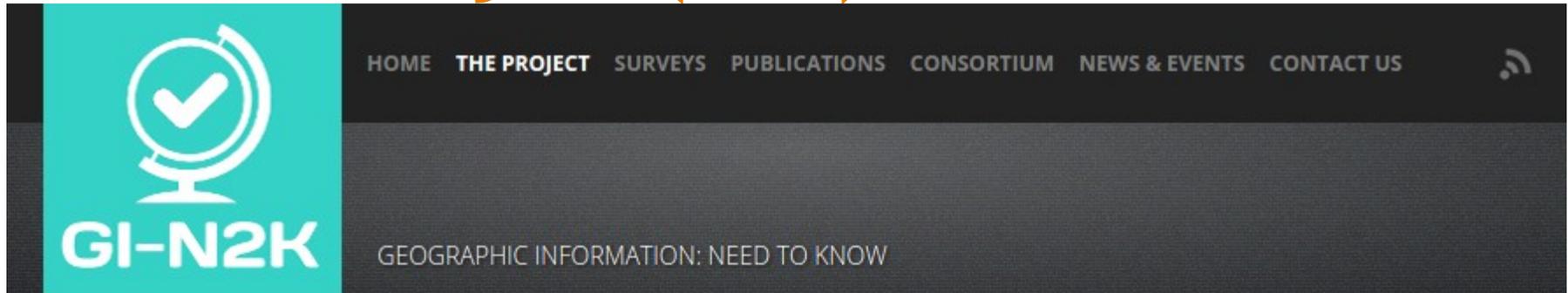
Domain: [1,1,T1], [1,2,T1], [1,3,T1], ...
 [1,1,T2], [1,2,T2], [1,3,T2], ...

Range: 16.2, 16.4, 16.3, ...
 15.9, 16.1, 16.1, ...

Data Management **MUST** become part of under graduate curricula in Science and Arts

- Part of the wider problems around open access and data management grow from a lack of skills/understanding in this area
- Data Management (*intro to Databases, metadata, data formatting etc*) must become part of undergraduate curricula
- **This should be considered as an essential part of professional scientific training**

GI-N2K Project (FP7) 2013 - 2016



THE PROJECT

Geographic Information Science & Technology (GI S&T) has gained importance over the past years. The challenge is to **better align GI S&T curricula at the academic level and in vocational training offers, with the needs of the GI job market.**

The GI N2K project is an extensive network of **31 partners from 25 countries** from the academic and non-academic sector linking up with associated partners from the broader industry (e.g. SHELL), major GI associations and individual experts.

The project will **analyze the current training offer in the field** and brought in line with new needs.

The challenge is to better align GI S&T curricula at the academic level and in vocational training offers, with the needs of the GI job market.

The new BoK will follow an ontological approach (i.e. defining knowledge areas, units and topics, linked to key concepts in the field). The BoK will be a dynamic e-repository including a series of toolsets to maintain and explore it, to define curricula, and to allow to define learning paths and courses. In addition, tools for defining job profiles will be made available too.





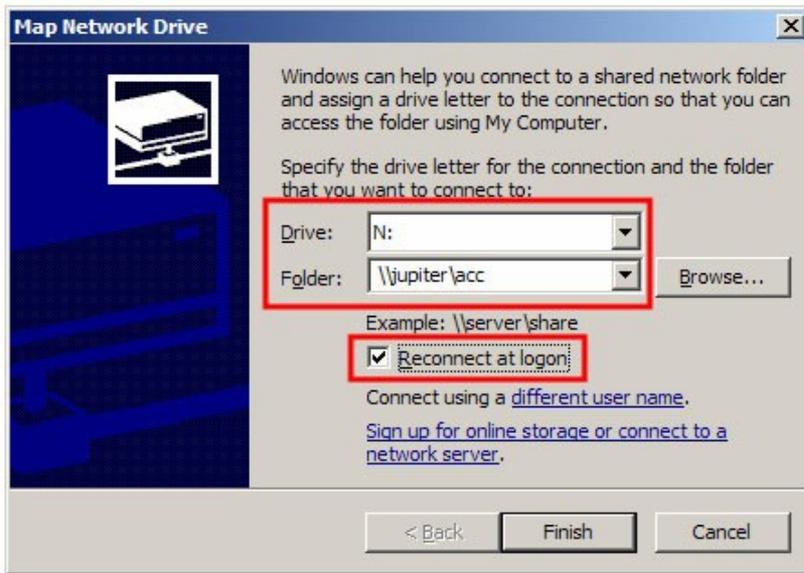
How do we ensure access to data and datasets into the future as the ways of storing data changes?

We feel that there is an increased danger of losing some datasets or data forever if researchers do not “buy into” open access and data management practices

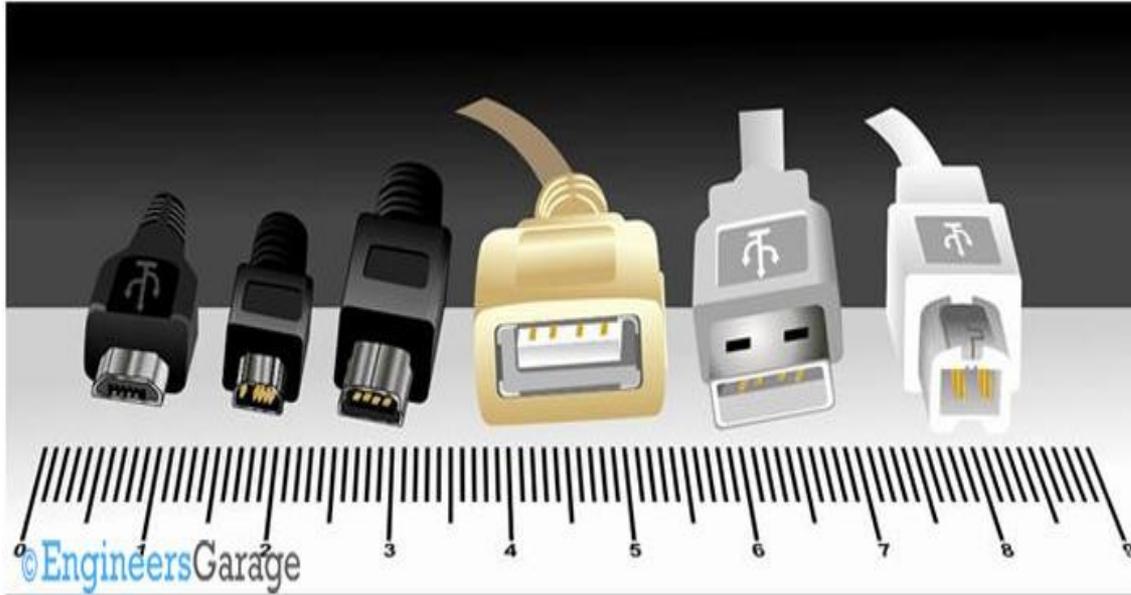
© GlynLowe.com

A decade ago we all stored our data in a physical way on media we could “touch”

FIGURE 4-7
Zip disks. Zip disks are read by Zip drives; the newest Zip disks hold 750 MB.



Then the removable media USB revolution came along - suddenly we were able to bring our data anywhere



Today we have so much (cheap) storage that we cannot keep track of the amount of data we have



PNY Wave Attaché 3.0 128GB

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[Add to your Wish List](#)

USB 3.0

41.⁹⁵

34,11 ex. VAT



Seagate Expansion Desktop 4TB

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3.5", USB 3.0, Power supply included

149.⁰⁰

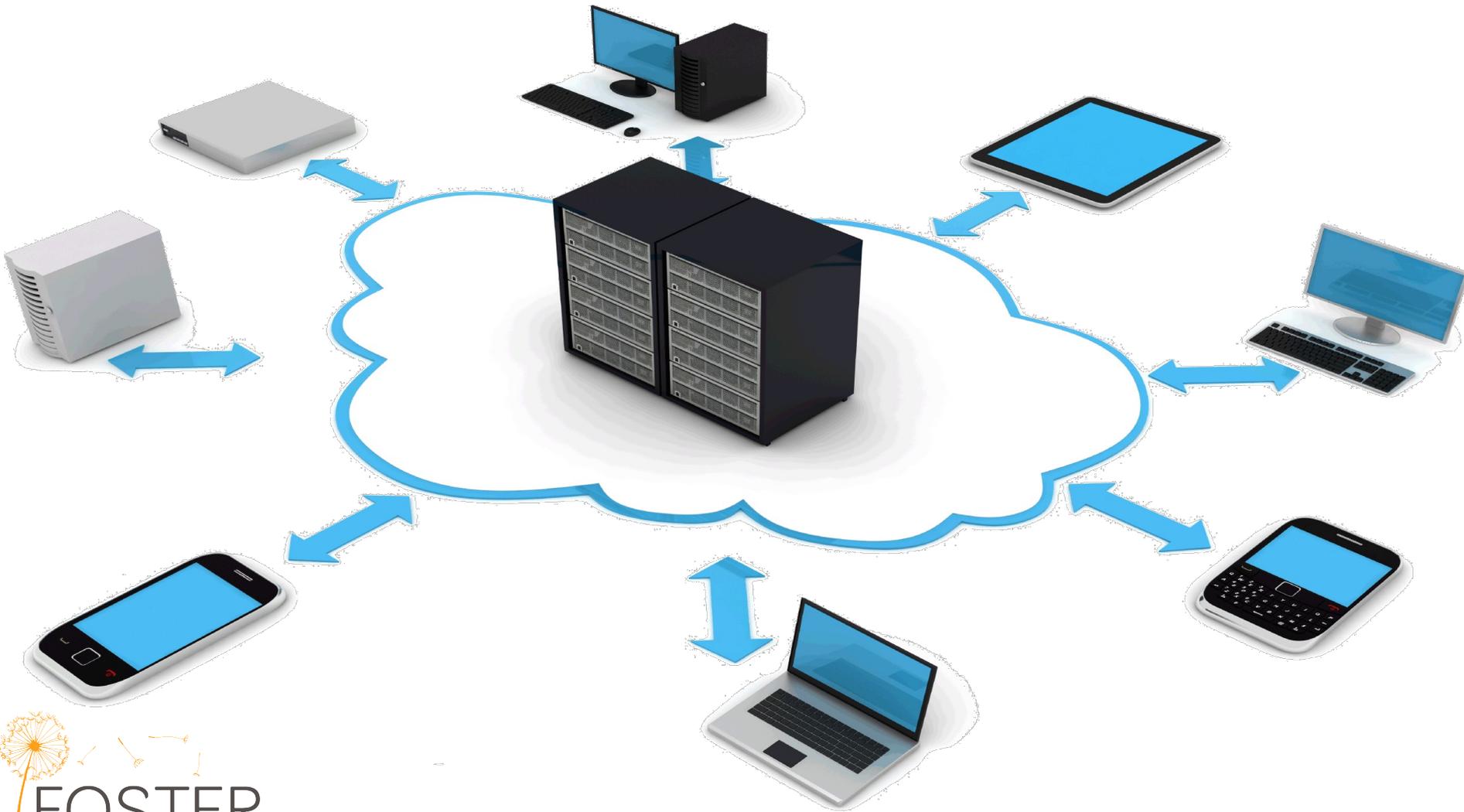
121,14 ex. VAT

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in April 2015



And we also have “The Cloud”

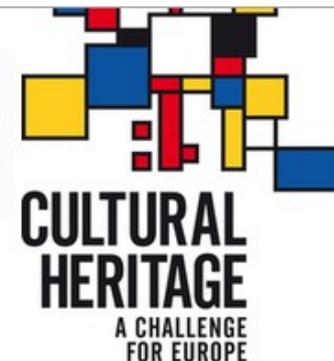


Cloud storage gives us the comfort of data access anywhere, any way, any time and almost without limits



We are redesigning the whole architecture of SAFER over the next few months in EPA

- **Optimising project reporting** – reporting metadata once and in one place in EPA then this metadata is reused in several other services
- Encouraging researchers to make data and information resources available for long-term storage and open access
- **Building better researcher services using web-based services**



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Catalogue of Environmental Research Expertise in Ireland

The Catalogue of Irish Expertise in Environmental Research provides an insight into Irish Companies and Research Organisations active in the field of Environmental Research. You can **View and Search** the profiles of Irish researchers and companies; **Register your profile**; **Keep it up-to-date**; but also post your **Partner Search Request** or **Expression of interest** in a specific Call.

1. [Browse the Catalogue](#) for Irish companies and research organisations active in Environmental Research
2. [Search the Catalogue](#) for Irish companies and research organisations active in Environmental Research
3. [Download](#) the Catalogue for offline viewing
4. [Add a New Research Expert Profile](#) or [Update](#) your information.
5. Post your [Partner Search Request](#) or [Expression of Interest](#) in a specific Call

If you would like any further information please Dr. Alice Wemaere (a.wemaere@epa.ie)

Catalogue Information

There are currently **215 research profiles** in this catalogue. You can view all of these profiles using the [catalogue browser](#) page.

There are currently **8 partner search requests** in this catalogue. You can view all of these partner search requests using the [partner search browser](#)



DROPLET

Database of **Research Outputs: Projects, Literature and Environmental Technologies**



DROPLET is an easy-to-use interactive web application for exploring information about projects which have been funded in Ireland on Water Research. DROPLET has been developed by the **Environmental Protection Agency** but includes projects from many other **funders of environmental research in Ireland**. DROPLET has been designed to be fully accessible across all screen and device platforms and types.

EXPLORE RESEARCH



DROPLET provides two principal means of exploring the project information database. There is an interactive map-based viewer and a

FIND RESEARCH FUNDING



Looking for funding opportunities? We provide a list of currently open research funding calls.

CONNECT TO RESEARCH



DROPLET provides links to tools which will allow you to connect with other Environmental Scientists and Researchers in Ireland.

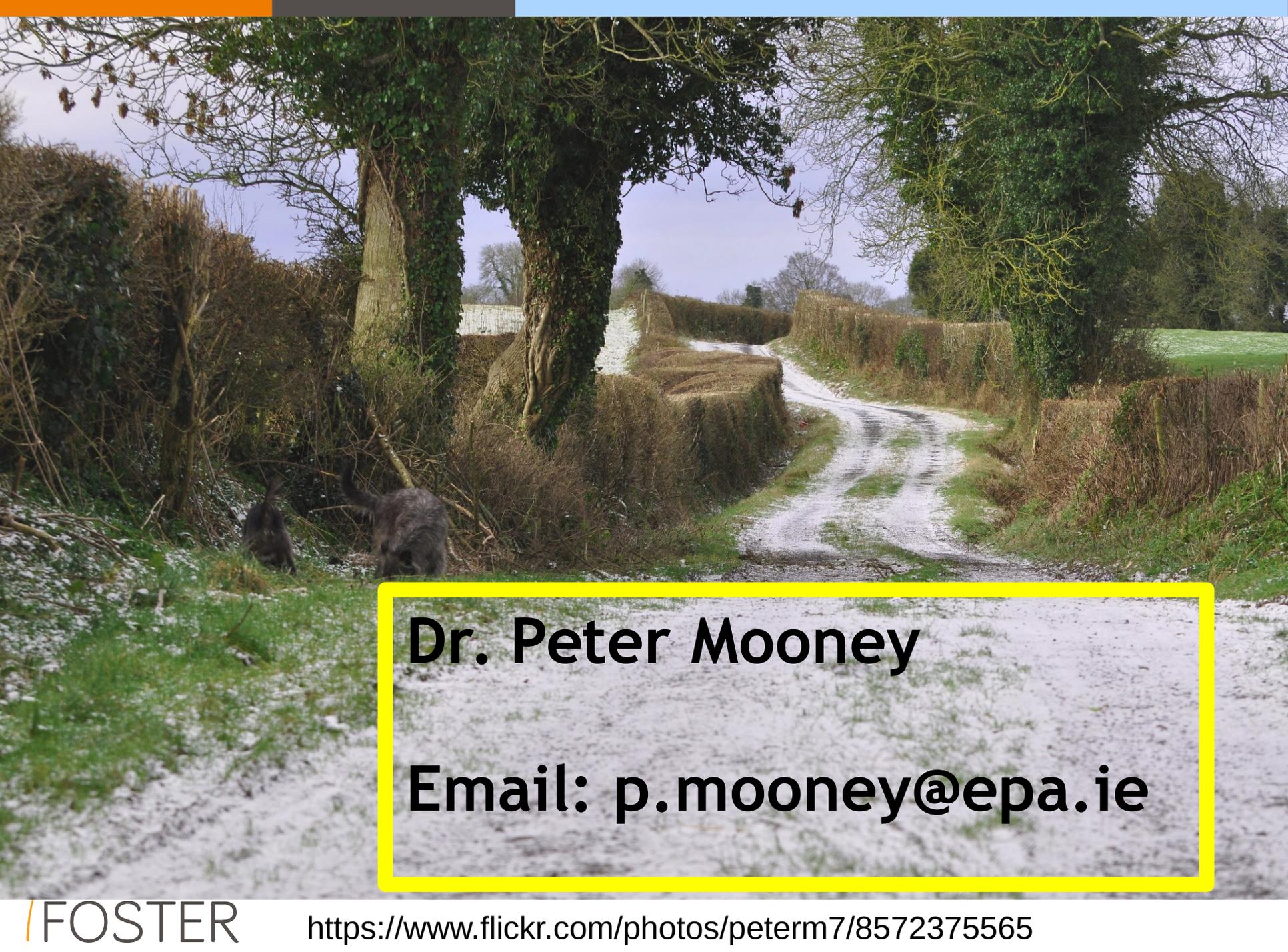
Explore our map of research institutions and organisations who have carried out research presented here on DROPLET

You can easily browse the map. When you click on an icon you will be given the option to view more details about that specific project. The information about this project will appear under the map display. You will then have the option to view the full details of the project on a separate web-page.



In summary - much has changed but many things have stayed the same

- Technologies have moved one beyond anyone's expectations in 10 years
- ICT infrastructures for Research provide incredible opportunities for collaboration, connectivity, learning and discovery
- Still **the very fabric of open access is researchers and scientists with *their* datasets and data**
- **Education, consultation, implementation!**



Dr. Peter Mooney

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