

11.30-12.45

# Data Analysis and CRIS

*Andrew Plume (chair) - Elsevier*

*Simon Kerridge – Kent University*

*Vilius Stanciauskas - Technote*

# Impact of Science

4-6 November, Krakow

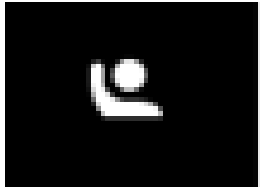
## Data Analysis and CRIS



Nowa Huta room

# Impact of Science

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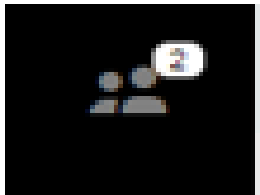
## Broadcast permission:

- Turn on your microphone and/or camera
- Participate in the discussion



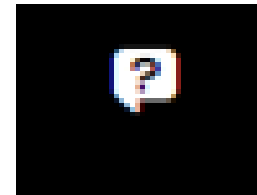
## Conversations:

- General remarks
- Discussion
- News (links)



## Who are the attendees?

- Speakers
- Participants



## Q&A:

- (Targeted) questions
- Speakers answer the questions live



## Lay out view:

Full screen, Tiled, Thumbnail

# Data Analysis and CRIS:

What are the latest developments in measuring to create more structured insight in impact-performance?

# STARTING SOON!

AESIS Impact of Science 2020

November 2020



# Data Analysis and CRIS:

What are the latest developments in measuring to create more structured insight in impact-performance?

**Chair:** Dr Andrew Plume, President – International Center for the Study of Research

**Speakers:** Simon Kerridge, Director of Research Services, University of Kent, UK

Vilius Stanciauskas, CEO – Technote, Lithuania

AESIS Impact of Science 2020

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# Bridging the divide: supporting researchers to maximize impact

Online survey of over 10,000 researchers in Feb-Apr 2020 and 13 expert interviews.

- **95%** of researchers want to achieve broader impacts with their work, and **51%** feel it that they have the primary responsibility to do so.
- **74%** say the growing focus on broader impacts is driving collaboration between academic and non-academic sectors.
- Despite this, **47%** feel they have insufficient employer support for activities such as knowledge translation and impact planning.
- Just **41%** considered that the metrics/indicators or narratives used by their employer to evaluate their broader impacts are fit for purpose.

Proposed improvements included:

- Set empirical goals (appropriate impact metrics and targets) and narrative objectives for research projects and programs.
- **Capture pathways to impact at scale** to evaluate against goals and objectives and improve targeting, effectiveness and efficiency of efforts.



<https://blog.growkudos.com/news/broader-impacts-skills-knowledge-gaps>

# Beyond publications: CRIS come to the fore in China

- Ministry of Science and Technology and Ministry of Education policy documents: “farewell to SCI worship”, peer review of “representative works” and new priority to locally-relevant research.
- Expert call for a national CRIS that contains:
  - *“information about researchers and research groups, their projects, funding, outputs, and **outcomes**”*
  - *“individual applications for funding, institutional annual reports, CVs, publications lists, profiles of research groups, **project reports, information for media and the general public, etc.**”*
  - *“for teaching and **general audiences, inventions, education, government advice and interaction with culture, society and industry**”*
- and that:
  - is *“**structured and quality assured for statistical purposes**”*
  - would *“relieve individual researchers and institutions from providing all the information themselves every time they are evaluated”*
  - can be used for *“monitoring and evaluating research activities and outputs, allocating funding, supporting decision making on their policies and strategies, tracking researchers’ careers, and **describing their systemic role to policy-makers, stakeholders, and the public**”*



Zhang, L., & Sivertsen, G. (2020). The New Research Assessment Reform in China and Its Implementation. *Scholarly Assessment Reports*, 2(1): 3. DOI: <https://doi.org/10.29024/sar.15>

## RESEARCH

### The New Research Assessment Reform in China and Its Implementation

Lin Zhang<sup>1</sup> and Gunnar Sivertsen<sup>2</sup>

<sup>1</sup> School of Information Management, Wuhan University, CN

<sup>2</sup> Nordic Institute for Studies in Innovation, Research and Education, Oslo, NO

Corresponding author: Gunnar Sivertsen ([gunnar.sivertsen@nifu.no](mailto:gunnar.sivertsen@nifu.no))

<https://www.scholarlyassessmentreports.org/articles/10.29024/sar.15/>

# Data Analysis and CRIS:

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The image features a background of numerous fiber optic cables, each with a bright, glowing end. The cables are arranged in a way that creates a sense of depth and movement, with some appearing closer and more in focus than others. The overall color palette is a range of blues, from deep navy to bright cyan. A large, dark blue semi-transparent rectangular overlay covers the central portion of the image, providing a clear space for the text.

Thank you!

# International Center for the Study of Research

The mission of ICSR is to further the study of research and thus to contribute to the evidence base supporting the practice of research strategy, evaluation and policy.

Our vision is a world in which decisions informed by such evidence benefit research and society.

ICSR position on responsible research metrics and evaluation:  
Elsevier and ICSR endorsed the Leiden Manifesto for Research Metrics in July 2020.

ICSR approaches this by:

- 1 IDENTIFYING** critical challenges and questions in research organised around key Research Themes developed with the research community
- 2 ENGAGING** with experts in the study of research and researchers themselves, with support from the ICSR Advisory Board
- 3 SUPPORTING** qualitative and quantitative approaches, enabling analysis through ICSR Lab and sharing insights through ICSR Perspectives and peer reviewed publications

# Impact of Science

## Data Analysis and CRIS

AESIS

4<sup>th</sup> Nov 202, London



*Simon Kerridge*  
*Director of Research Policy & Support*



 [orcid.org/0000-0003-4094-3719](https://orcid.org/0000-0003-4094-3719)

 [@SimonRKerridge](https://twitter.com/SimonRKerridge)

<https://inorms.net/activities/raaap-taskforce/>



CRedit Working Group, NISO 

Board Member, EARMA



Immediate Past Chair, ARMA



# Simon

- Ex Entrepreneur
- Ex Researcher
- Research Manager and Administrator
  - Entrepreneurial
  - Researching
  - Teaching
- EARMA Board Member
- Open Research Advocate
- Responsible Metrics (eg *Metric Tide* report)
- Research Administration as a Profession (RAAAP)
- JHU Masters in Research Administration
- Journal of Research Management and Administration



# Simon

1987: Graduated (Natural Sciences)

1987-1990: Didn't become Bill Gates

1990-1994: Researcher (Durham) x3 projects

1994-1995: Researcher (Sunderland) x3 projects

***1995-2012: It's complicated***



2012-Present: Director of Research Policy & Support,  
University of Kent, UK



University of  
**Kent**



# Overview

National systems [UK]

PIDs

- CRediT example

SciENCv, Résumé for Researchers

- And related initiatives

Evidence for Impact

- Vertigo Ventures

The REF

- ICS and ... more coming

Reduction in Burden

# Impact in the UK

- Pathways to Impact
  - “mainstreamed”
- Research Excellence Framework
  - REF2014
    - Impact Case Studies (80% of 20%) → 16%
    - <https://impact.ref.ac.uk/> [6,679]
  - REF2021
    - Impact Case Studies → 25%



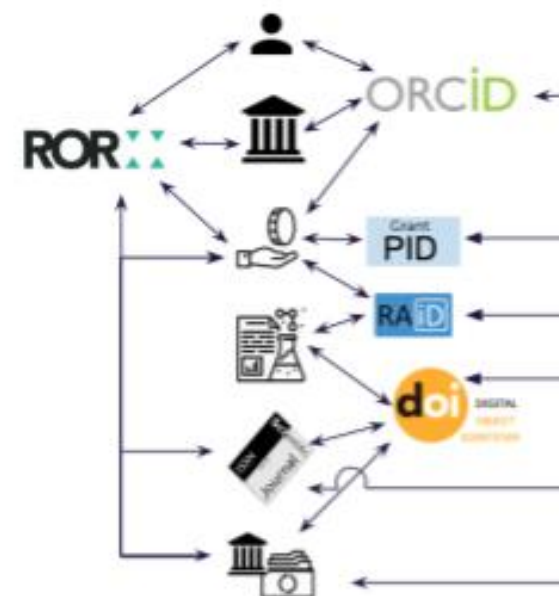
## PIDs

- All the REF ICS Analysis took a LOT of time
- Lots of text-mining
  - “There was a large amount of numerical data (ie, c170,000 items, or c70,000 with dates removed) that was inconsistent in its use and expression and could not be synthesized.”
- “The use of standardized lists of information and the definitions in the case studies would aid future analysis”
  - Matching (eg) institutions was also problematic
    - Eg Funders
    - Or even Select Committees [in government, policy impacts]
  - Also eg QUALY



## PIDs ... 5 years on

- Jisc PIC Stakeholder Group
- <https://scholarlycommunications.jiscinvolve.org/wp/2020/10/09/theres-a-pid-for-that-next-steps-in-establishing-a-national-pid-strategy/>
- 5 priorities
  - Grants [CrossRef?]
  - Projects [RAiD?]
  - Organisations [ROR/ISNI?]
  - People [ORCID]
  - Outputs ... so many types!



An approximate representation of a PID-enabled research information workflow. This image is based on the workflows described in *Developing a persistent identifier roadmap for open access to UK research* <http://repository.jisc.ac.uk/id/eprint/7840>

# PIDs ... Another Example



- CRediT: <http://credit.niso.org/>

Contributor role	Role definition
Conceptualization	Ideas; formulation or evolution of overarching research goals and aims.
Methodology	Development or design of methodology; creation of models
Software	Programming, software development; designing computer programs; implementation of the computer code and supporting algorithms; testing of existing code components.
Validation	Verification, whether as a part of the activity or separate, of the overall replication/reproducibility of results/experiments and other research outputs.
Formal analysis	Application of statistical, mathematical, computational, or other formal techniques to analyze or synthesize study data.
Investigation	Conducting a research and investigation process, specifically performing the experiments, or data/evidence collection.
Resources	Provision of study materials, reagents, materials, patients, laboratory samples, animals, instrumentation, computing resources, or other analysis tools.
Data Curation	Management activities to annotate (produce metadata), scrub data and maintain research data (including software code, where it is necessary for interpreting the data itself) for initial use and later reuse.
Writing – original draft preparation	Creation and/or presentation of the published work, specifically writing the initial draft (including substantive translation).
Writing – review and editing	Preparation, creation and/or presentation of the published work by those from the original research group, specifically critical review, commentary or revision – including pre- or post-publication stages.
Visualization	Preparation, creation and/or presentation of the published work, specifically visualization/data presentation.
Supervision	Oversight and leadership responsibility for the research activity planning and execution, including mentorship external to the core team.
Project administration	Management and coordination responsibility for the research activity planning and execution.
Funding acquisition	Acquisition of the financial support for the project leading to this publication.

Who did what... if extended past articles could be useful for evidencing impact!?

- Tool for creating NIH Biosketches
  - describe the magnitude and significance of scientific contributions (including publications)
  - provide detailed information about research experience in the context of the proposed project

<https://www.ncbi.nlm.nih.gov/sciencv/>

# Résumé for Researchers



- How have you contributed to the generation of knowledge?
- How have you contributed to the development of individuals?
- How have you contributed to the wider research community?
- How have you contributed to broader society?



This module can include examples of societal engagement and knowledge exchange. It can include engagement with industry and the private sector. It can be used to mention engagement with the public sector, clients and the broader public. It can be used to highlight positive stakeholder feedback, inclusion of patients in processes and clinical trials, and other impacts across research, policy, practice and business. It can be used to mention efforts to collaborate with particular societal or patient groups. It can be used to highlight efforts to advise policy-makers at local, national or international level and provide information through the press and on social media.

<https://royalsociety.org/topics-policy/projects/research-culture/tools-for-support/resume-for-researchers/>

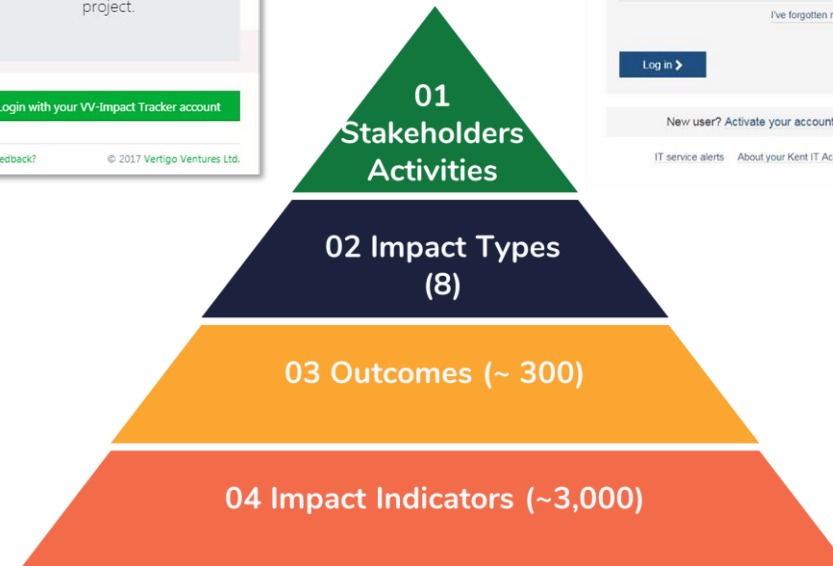
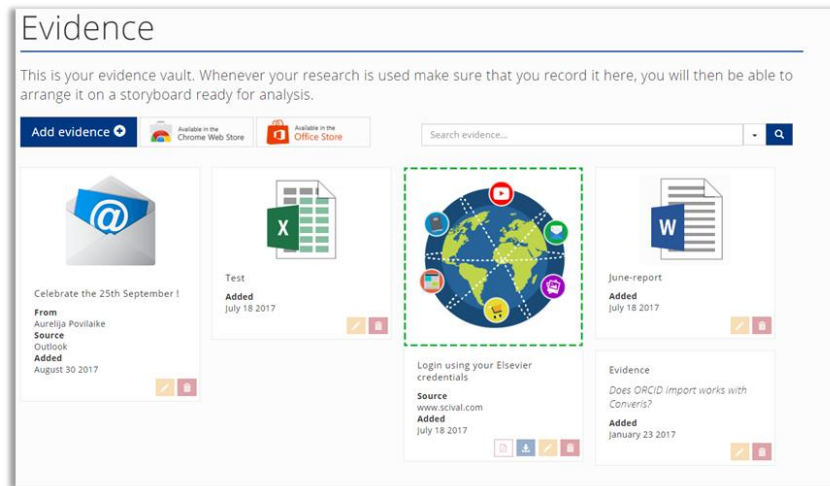
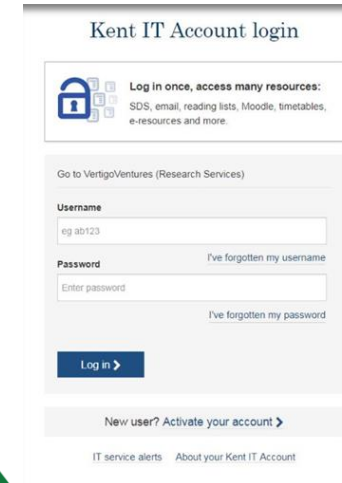
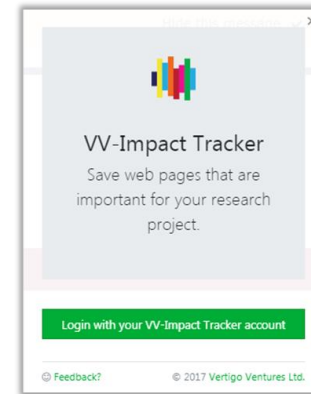
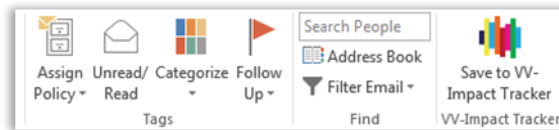


# Evidence for Impact

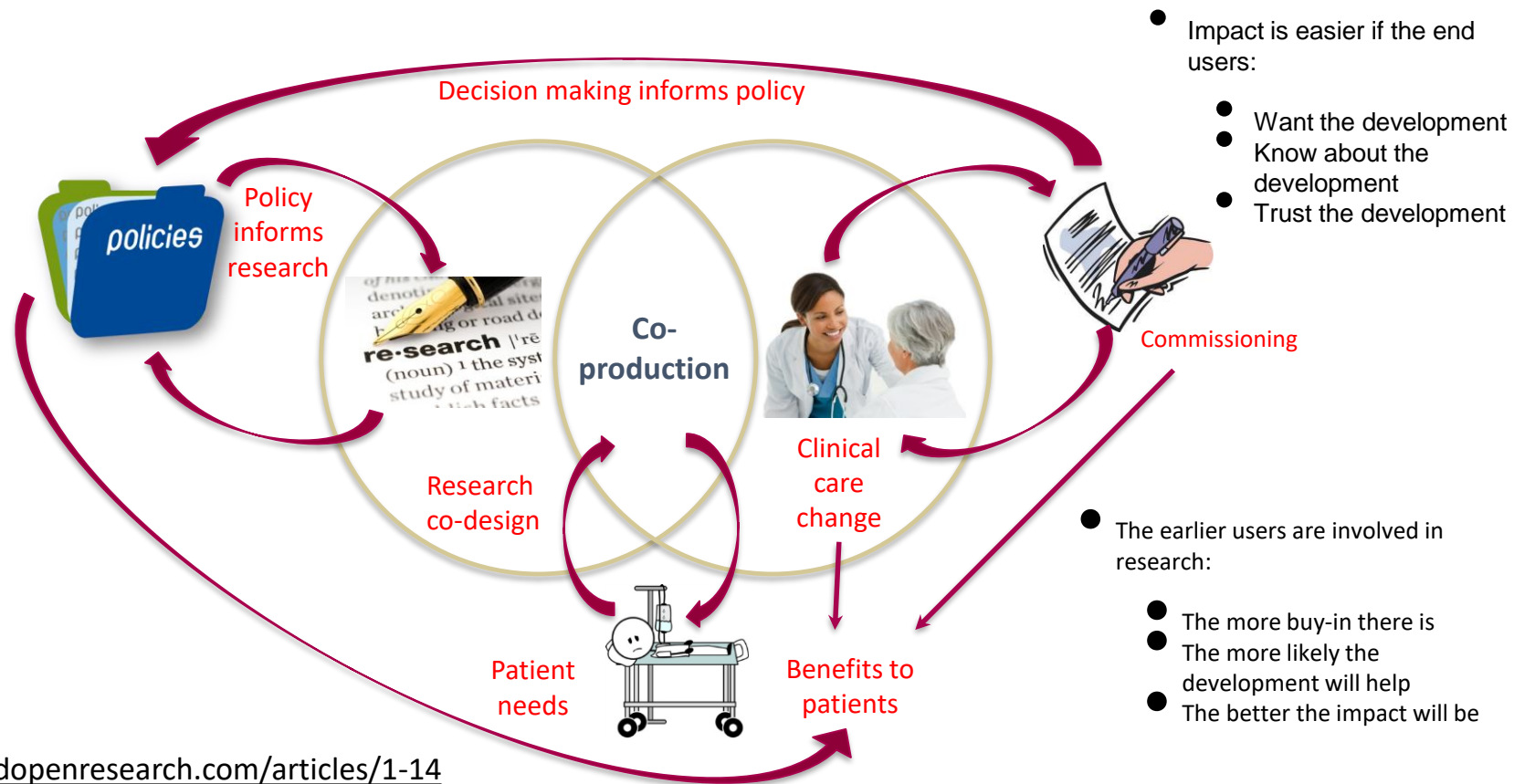
- VV Impact Tracker



<https://www.vertigoventures.com/impacttracker/>



# Co-Design → Knowledge Mobilisation → Better chance for evidence collection!



- Impact is easier if the end users:
  - Want the development
  - Know about the development
  - Trust the development

- The earlier users are involved in research:
  - The more buy-in there is
  - The more likely the development will help
  - The better the impact will be

<https://emeraldopenresearch.com/articles/1-14>

Bayley & Phipps

# The REF

- Distributes approx. €2Bn a year...
  - For 6-7 years
- Impact Case Studies are 25% of this
  - Lots of caveats... but even so...
- An ICS is worth around €300-400k

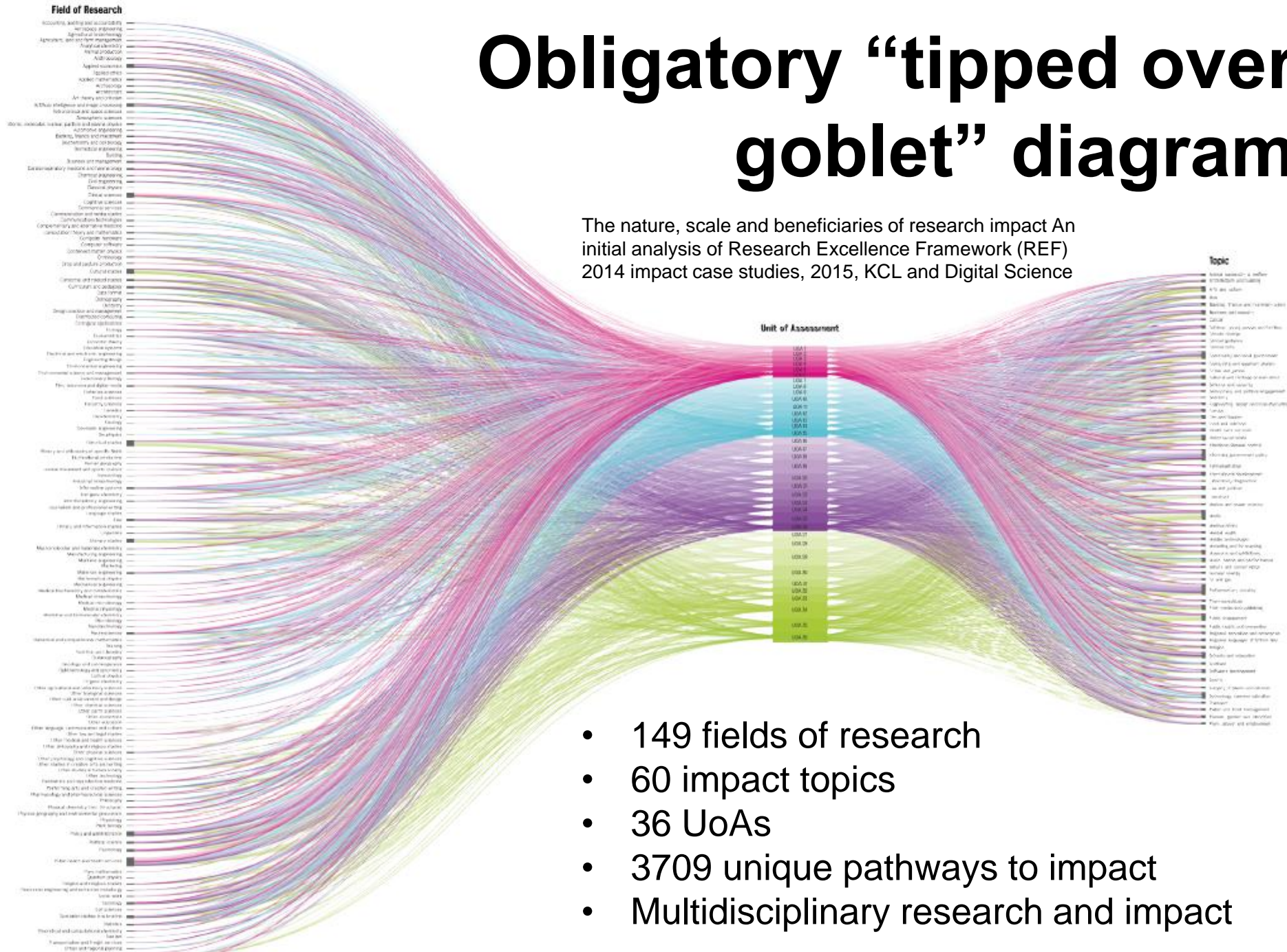
<https://www.fasttrackimpact.com/post/2017/02/01/how-much-was-an-impact-case-study-worth-in-the-uk-research-excellence-framework>

**REF 2021** Research  
Excellence  
Framework

<https://www.ref.ac.uk/>

# Obligatory “tipped over goblet” diagram

The nature, scale and beneficiaries of research impact An initial analysis of Research Excellence Framework (REF) 2014 impact case studies, 2015, KCL and Digital Science



- 149 fields of research
- 60 impact topics
- 36 UoAs
- 3709 unique pathways to impact
- Multidisciplinary research and impact







# Reduction in Burden



Photo by Damir Spanic on Unsplash

Although intended for simple purposes, universities have turned the REF into a major industry, with rising costs and complexity.



Amanda Solloway MP,  
Science Minister

And, building on work done by the UK's Forum for Responsible Metrics, Research England and UKRI are working with Dutch and South African partners on a global event on Responsible Research Assessment.

<https://www.globalresearchcouncil.org/news/responsible-research-assessment/> 23 Nov 2020

<https://www.gov.uk/government/speeches/science-minister-on-the-research-landscape>

## Evidencing Impact... in the future

- Trusted and “complete” infrastructure
- Open
- Semi-automated data collection
- Impact “stories”
- Reward & Recognition
  
- However...  
    this is what we said 5 years ago...

# THE UK'S EUROPEAN UNIVERSITY



[orcid.org/0000-0003-4094-3719](https://orcid.org/0000-0003-4094-3719)



[@SimonRKerridge](https://twitter.com/SimonRKerridge)



[s.r.kerridge@kent.ac.uk](mailto:s.r.kerridge@kent.ac.uk)

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[www.kent.ac.uk](http://www.kent.ac.uk)

AESIS



[@SimonRKerridge](https://twitter.com/SimonRKerridge)

[earma.org](http://earma.org)



[credit.niso.org/](https://credit.niso.org/)

NISO



University of  
**Kent**

# **Building a CRIS system for impact pathways**

## Context

Emphasis on societal impact → see the EU's Orientations towards the first Strategic Plan for Horizon Europe.

EU R&I funding must contribute to EU policy objectives and UN SDGs.

## How?

EC CRIS system in Horizon Europe:  
people, organisations, projects and  
outputs (publications, research data,  
patents) + key exploitable results

Automated data collection, linking,  
integration, etc.

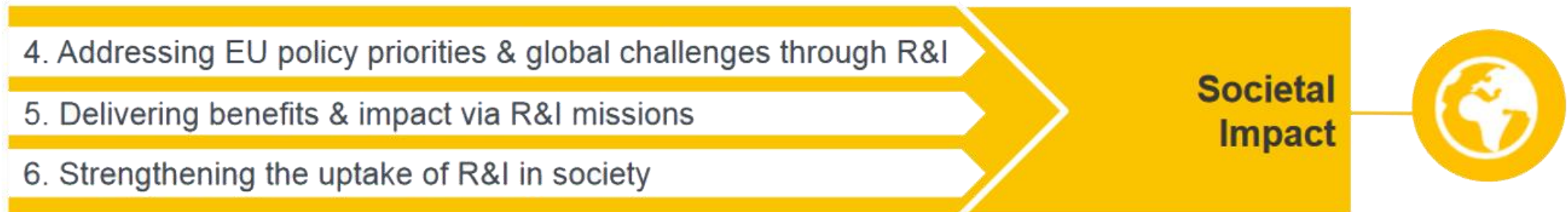
Tracking of performance after the end of  
EU funding

## Tracking of impact pathways:

- Analysis by focus areas/challenges, not individual programmes
- Knowing what is happening now, fast → what are researchers and organisations doing?
- Highly granular data – we don't know what the challenge will be in 2 years



# Key Impact Pathways Framework



# PATHS principles

## Proximity

Knowing who the individual researchers and companies are

---

## Attribution

Microdata collection supporting the identification of control groups

---

## Traceability

Minimised burden on beneficiaries through automatic data harvesting from existing databases; use of additional primary (including qualitative) data sources

---

## Holism

Telling the story of the progress of the Programme as a whole according to the objectives, at any moment in time

---

## Stability

Building on the current systems, piloting

# Proximity

Generally understood as a problem of tracking entities through their persistent identifiers

**BUT:** proximity is not a binary concept in many grant types (collaborative, project-based, etc.)

	RESEARCHER 1:	RESEARCHER 2
Name, Surname:	Jan Wijnholds	Didier Queloz
Affiliation: Name and PIC	KNAW (999518362)	University of Geneva (999974650)
Link to profile:	<a href="https://academic.microsoft.com/author/2008286538">https://academic.microsoft.com/author/2008286538</a>	<a href="https://academic.microsoft.com/author/2422312633">https://academic.microsoft.com/author/2422312633</a>
Project:	CRUMBS IN SIGHT (200234);	ETA EARTH (313014)
Affiliated beneficiary PIC?	Yes	Yes
Number of publications	15	16
Mentions in deliverables	236 mentions, of which 55 mentions in text Mentioned in the DoW	22 mentions, 2 mentioned in text Mentioned in the DoW
Author and project FOS	Author FOS: biology; retina; retinal; retinitis pigmentosa; CRB1; anatomy; molecular biology; cell biology; retinal degeneration Project FOS: Photoreceptor cell, Retinal degeneration, CRB1, Gene therapy of the human retina, Outer nuclear layer	Author FOS: physics; astronomy; astrophysics; planet; exoplanet; planetary system; radial velocity; stars; hot Jupiter; Kepler-47 Project FOS: Kepler-62, Kepler-22b, Kepler-47, Kepler-37d, Rogue planet, Outer planets, Exocomet, Star activity, Stellar density, Blue straggler
FP researcher?	???	???

# Attribution

Generally understood as a problem of finding suitable control groups for analysis

**BUT:** things get murky when one tracks progress over an extended period of time

Time lag issue;

Much of data on societal impact comes from unstructured data sources

Before capturing impact, can one at least track what's on the market? Through which entities?

One can do this through:

- Domain specific databases (esp. in health)
- Product databases (health, food, chemicals)
- Exploitable foreground (innovation outputs, technologies → **NEW entity**)

# Attribution

## Innovation

### Deep probing helicopter borne transient electromagnetic system for deep penetration subsoil exploration

**Market Maturity**

**Market Ready:** More about market maturity categories

**Date of analysis**

Innovation Radar's analysis of this innovation is based on data collected on 21/09/2019

**Innovation topic**

Smart & Sustainable Society

**Go to market needs**

Needs that, if addressed, can increase the chances this innovation gets to (or closer to) the market include:

- Prepare for Market entry
- Scale-up market opportunities

## Project

This innovation was developed under the Horizon 2020 project **Smart Exploration**. Details of this project are provided below:

**Project acronym:** Smart Exploration

**Project Title:** Sustainable mineral resources by utilizing new Exploration technologies

**Project description:** Smart Exploration consists of a research and application team supported by a group of technological... [Read more >](#)

**Project end date:** 30/11/2020

**More info:**

- Read more about this project on [CORDIS](#) (find names of contact persons and their phone numbers on the [CORDIS](#) page)
- Details of this project on the [Horizon 2020 dashboard](#)



**Name** SKYTEM

**Country** Denmark

**Website** [skytem.com](http://skytem.com)

**Keywords** groundwater, mineral exploration, geophysical survey, aquifer, geological survey, data acquisition, bedrock, data collection, data quality, magnetic survey, project management, groundwater flow, surface water, line spacing

**SDG** 6

Technote has identified 21 key products linked to SKYTEM. In the graph below, two or more products are linked if they share similar technological profiles. Further details on each product are in the table below.

● Has trademark (0)  
● No trademark (21)

**Key products**

elect	Q	Keywords Q
electromagnetic SkyTEM survey in Central Alaska		precious metal, mineral, metal, project, zinc, rock, electromagnetic, airborne, difference, high
electro-magnetic (EM) airborne geophysical surveys		form, find, diamond, magnetic, correct, airborne, integral, electro, exploration
generation SkyTEM312 high power electromagnetic system		presentation, follow, burn, generation, by, centre, belt, electromagnetic, candle, case
line kilometre airborne electromagnetics (AEM) survey		mineral, rock, airborne, conduct, line
heliborne SkyTEM electromagnetic survey for Macarthur Minerals		electromagnetic, mineral, priority, high, conductor, gold, project, content, drink, bedrock



# Traceability

Generally understood as easy access to data, low marginal cost/effort, human experts involved.


BUT: tracing impact where?

By challenge/priority: policy priorities change


Extend coverage to national levels: most data are not in EN

**Possible solutions:** highly granular data (at the cost of analytics/aggregation?), standardization of data (incl. use of machine translation)

# Possible solutions: examples

*internal radiation therapy* 


Your search retrieved **20 Projects** within **6 Programs** and **15 Fields of Study**

Project name and acronym (20) 

- DR THERAPAT**  
Digital radiation therapy patient
- PEDDOSE.NET**  
Dosimetry and Health Effects of Diagnostic Applications of Radiopharmaceuticals with particular emphasis on the use in children and adolescents
- ENVISION**  
European NoVel Imaging Systems for ION therapy
- MULTIBIODOSE**  
Multi-disciplinary biodosimetric tools to manage high scale radiological casualties
- HAMLET**  
Human Model MATROSHKA for Radiation Exposure Determination of Astronauts
- FUSIMO**  
Patient specific modelling and simulation of focused ultrasound in moving organs
- ARTFORCE**  
Adaptive and innovative Radiation Treatment FOR improving Cancer patients treatment outcome
- REQUIRE**  
Validating predictive models of radiotherapy toxicity to

Program (6)

- HEALTH
- ICT
- KBBE
- SEC
- SPA
- TPT

Field (15) 

- Artificial intelligence
- Endocrinology
- Cancer research
- Radiology
- Computer vision
- Quantum mechanics
- Nuclear physics
- Optics
- Nuclear medicine
- Pathology

...

[VIEW DATA FOR THE SELECTED PROJECTS \(20\)](#)

## Top similar companies: key facts

Company name	Country	Keywords Q	Selected products
FENDER GEOPHYSICS PTY LIMITED	AU	fender, mineral exploration, water table	Fender Geophysics IP survey
ARCHAEO PHYSICS LLC	US	magnetic field, geophysical survey, excavation	Geoplot™, Surfer™
SO.GE.T.	IT	bedrock, ground-penetrating radar, geophysics	GEM™, Geonics™, compact™
MCPHAR INTERNATIONAL	CA	magnetometer, data acquisition, instrumentation	COAST™, Eclipse™, OmniSTAR™
RESOURCE POTENTIALS PTY LTD	AU	passive seismic, geologist, geophysical survey	TROMINO™
GEOMETRICS INC.	US	software, data processing, data acquisition	Oasis montaj®
MARINE MAGNETICS CORP	CA	magnetometer, magnetic field, magnetic survey	GM-SYS™, Y gradient grids, EMFM sensors
VIBROMETRIC OY COSMA	FI	borehole, specially design for use, geophone	fractures and deformation zones
CHUSTZ SURVEYING INC	US	photogrammetry, hydrographic survey, bathymetry	Canon™, The Flare™
PRINCETON GEOSCIENCE INC	US	groundwater, aquifer, bedrock	Geoprobe™

FileName	SDG_1	SDG_2	SDG_3	SDG_4	SDG_5	SDG_6	SDG_7	SDG_8	SDG_9	SDG_10	SDG_11	SDG_12	SDG_13	SDG_14	SDG_15	SDG_16
Los Objetivos de Desarrollo Sostenible en Colombia y el aporte de la	1	1	5	2	1	0	1	1	10	3	11	5	1	1	2	12
Los Objetivos de Desarrollo Sostenible.txt	4	3	9	5	6	3	2	6	10	10	19	13	2	2	4	16
La dimensión bioética de los Objetivos de Desarrollo Sostenible.txt	3	0	13	2	2	1	3	1	8	10	19	8	6	2	1	25
Objetivos de Desarrollo Sostenible una revisión crítica.txt	2	0	13	1	0	1	0	1	9	16	30	6	3	0	1	33
Epistemología del Sur una visión descolonial a los Objetivos de Desa	0	0	11	1	1	0	1	1	10	2	19	1	1	0	1	12
La ingeniería en Colombia, Educación de calidad cuarto objetivo de c	1	0	3	23	5	0	0	1	13	5	17	7	1	0	0	22
Hacia una educación inclusiva formación del profesorado de primari	1	0	7	21	22	0	0	2	3	6	9	0	0	0	0	14
Escuchar las voces del alumnado para construir la ENG.txt	0	0	9	25	0	0	0	2	2	2	3	0	0	0	0	7
Retos de los Objetivos de Desarrollo Sostenible en ciudades y territ	8	3	10	2	1	0	3	3	7	5	50	14	6	0	7	10
Impactos de la contaminación por basura marina ENG.txt	0	11	10	0	0	5	0	0	3	0	17	7	1	16	9	5
Algunas consideraciones en torno ENG.txt	0	7	3	1	0	0	0	1	6	2	15	11	20	33	6	34
El desarrollo sostenible como reto pedagógico de la universidad EN	3	0	7	44	0	0	0	1	8	3	15	8	2	0	1	31
La incorporación de los objetivos como factor de competitividad em	0	1	2	0	1	0	0	5	23	5	7	10	2	0	1	8
Inclusión de los Objetivos de Desarrollo Sostenible ENG.txt	3	1	10	20	1	0	0	4	3	8	3	1	1	0	0	18
Uso de las TIC y su relación con los Objetivos ENG.txt	1	0	6	4	4	0	0	3	19	6	12	4	1	0	2	8
Los Objetivos de Desarrollo Sostenible como marco ENG.txt	2	2	3	12	2	0	1	1	5	3	16	11	16	0	1	22
Odeseizar la educación y la cooperación ENG.txt	0	0	5	31	4	1	0	0	7	12	17	1	0	0	0	39
Sostenibilidad empresarial en relación a los objetivos del desarrollo	1	1	6	3	0	1	1	3	19	4	20	21	1	0	1	19
Educación para la Paz Creatividad Atenta y Desarrollo Sostenible EN	2	0	10	25	1	0	0	1	10	2	7	13	0	0	0	34
Los objetivos de desarrollo sostenible una estrategia para evitar la c	11	17	27	8	14	1	0	4	3	11	6	0	0	0	0	18
Comportamiento y desigualdades sociales en.txt	7	1	31	2	2	0	0	2	0	8	1	0	0	0	2	23
Estimación de la calidad del agua ENG.txt	0	6	40	0	0	24	0	0	3	1	27	1	1	0	0	3



# What's next?

## EC monitoring system in Horizon Europe:

The EC is designing an advanced monitoring system for R&I performance

Some potential pilots with national level datasets to be performed in 2021

Some elements/experiments may feed into the monitoring system (up to the EC to decide)

More broadly (not EC-specific):  
can one build a **scalable and automated CRIS system** that:

- Works with minimum input data: list of projects & beneficiaries + list of publications
- Addresses multilingualism
- Returns data for users/experts from multiple data sources/domains



# Thank you



## Vilius Stanciauskas

CEO at Technote  
vilius@technote.ai  
[www.technote.ai](http://www.technote.ai)

## Virtual tour through Krakow & Lounges

(12.45-14.00)