

### *Lesson 1: Impact - why research matters?*

#### Learning outcomes:

LO#1 - The student can understanding of the concept of research impact and the different areas of impact beyond academia

LO#2 - The student can distinguish between output, outcome and impacts

LO#5 - The student will become familiar and differentiate several RMA facilitation roles that add value to research (such as science communication, societal engagement, technology and knowledge exchange)

LO#9 - The student can explain the benefits that impact-driven research can bring to the economy and society

LO#16 - The student can explore several paths to maximise research impact (for example by finding the ways to incorporate the most relevant 17 sustainable development goals into the research project).

#### **Research impact**

When the definition of research impact is sought for in the literature, a clear distinction can be found between ‘academic impact’ defined as the intellectual contribution to a field of study within academia and ‘societal impact’ going beyond academia. This separation can be justified by the fact that academic assessment was often separated from the research impact outside academia. Nevertheless, nowadays the research impact is understood as all-encompassing all the changes created through research.

Depending on the goals and objectives, different organizations and stakeholders had provided focused definitions of research impact, such as:

- The [European Commission’s Better Regulation Guidelines and related toolbox](#) describes research impact as “all the changes which are expected to happen due to the implementation and application of a given policy option/intervention. Such impacts may occur over different timescales, affect different actors and be relevant at different scales (local, regional, national and EU). In an evaluation context, impact refers to the changes associated with a particular intervention which occur over the longer term”.
- The [Research Excellence Framework REF UK](#) defines it as “an effect on, change or benefit to the economy, society, culture, public policy or services, health, the environment or quality of life, beyond academia”.
- According to the [Australian Research Council’s definition](#), “Research impact is the contribution that research makes to the economy, society, environment or culture, beyond the contribution to academic research”.
- The [US National Science Foundation](#) defines it as “the potential [of the research] to benefit society and contribute to the achievement of desired society outcomes”.

Although most of the research impact definitions stress the positive effects of the research, it has been argued that, not only the positive and negative determination is subjective (what benefits one does not always benefit another) but also that some positive effects may turn out negative with time (as for example, the development of a medicine that after time is assessed has having negative effects in one's health).

### Different levels and scales of research impact

Research can have an impact at different scales (from individual research activities to institutional performance) and at different areas, such as:

- Academic impact
- Cultural impact
- Economic impact - contributed to cost savings, or costs avoided; or increases in revenue, profits or funding
- Environmental impact
- Social impact
- Impact on health and wellbeing
- Policy influence and change
- Legal impact
- Technological developments

The **Academic impact** refers to the contribution that research makes in shifting the understanding and the advancing of scientific knowledge, method, theory and application across and within disciplines. Impact at the areas outside academia embraces all the diverse ways in which research-related knowledge and skills benefit individuals, organisations and nations.

For all areas of research impact, its effects can be of different natures:

- **Conceptual:** contributing to the improvement of knowledge (e.g. understanding of policy issues, reframing scientific debates, etc.)
- **Instrumental:** contributing to influence changing of practices (e.g. influencing the development of policy, shaping legislation, etc.)
- **Capacity building:** contributing to the development of individual or collective competences (e.g. technical and personal skill development of the research community, empowering research institutions with tools to improve research performance)

### Major scientific achievements and impact case studies

Let us look at some scientific achievements that reveal the different levels of research impact:

- Lists of major scientific achievements:
  1. [The 50 Greatest Breakthroughs Since the Wheel](#)
  2. [Timeline of scientific discoveries](#)

- Several science outreach associations and magazines have selected the major scientific achievements over the last 10 years, such as [National Geographic Top 20 scientific discoveries of the decade](#) or the [Smithsonian Magazine article The Top Ten Scientific Discoveries of the Decade](#). Some selected science communication articles that provide an overview of some of these major discoveries as follows:
  1. [Astronomers Capture First-Ever Image of a Supermassive Black Hole](#)
  2. Editing genes: [CRISPR genome editing](#)
  3. CERN Detects the Higgs Boson: [The Higgs Boson](#)
  4. A Vaccine and New Treatments to Fight Ebola: [‘Make Ebola a thing of the past’: first vaccine against deadly virus approved](#)
  5. New Human Relatives: [A new species of Homo from the Late Pleistocene of the Philippines](#)
  6. Climate change: [The last five years were the hottest ever recorded](#)
  7. New space missions: [Underground Lake of Liquid Water Detected on Mars](#)
  8. Fossilized Pigments Reveal the Colours of Dinosaurs: [The Colours of Dinosaurs Open a New Window to Study the Past](#)
  9. [40,000-year-old cave art may be world's oldest animal drawing](#)
  10. [Lock the Planck: the kilogram has a new definition](#)

At the same time, we can also look at research project’s impact case studies that reveal impact at a level of a concrete and current research projects:

- REF (Research Excellence Framework) - the system for assessing the quality of research in UK higher education institutions - provides a list of 2,200 impact case-studies that students can select according to their research subject area: <https://impact.ref.ac.uk/casestudies/Results.aspx?Type=S&Tag=770>
  - o [Fast Track Impact R&I company](#) developed a study that analysed 7 of these case studies and recognized best practices and common errors. The results of such studies are available at the blog post [10 lessons from grant proposals that led to the most significant and far-reaching impacts](#) and on the Nature article [Writing impact case studies: a comparative study of high-scoring and low-scoring case studies from REF2014](#)

### Societal impact: the case of the UN Sustainable Development Goals

Society faces tough challenges such as global inequality or climate crises, and the research community is also called to collaborate and take actions to overcome them. The social responsibility of research is thus at the forefront of this discussion with R&I institutions bringing societal impact as the core goal of its action in 4 areas: research, teaching, outreach and operational level.

Adopted in 2015 as part of the 2030 agenda for sustainable development, the United Nations defined [17 Sustainable Development Goals](#) (SDGs) and associated 169 targets identify the areas

considered of critical importance for humanity to achieve a very ambitious goal: to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030.

- Goal 1. End poverty in all its forms everywhere
- Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture
- Goal 3. Ensure healthy lives and promote well-being for all at all ages
- Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
- Goal 5. Achieve gender equality and empower all women and girls
- Goal 6. Ensure availability and sustainable management of water and sanitation for all
- Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all
- Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
- Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
- Goal 10. Reduce inequality within and among countries
- Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable
- Goal 12. Ensure sustainable consumption and production patterns
- Goal 13. Take urgent action to combat climate change and its impacts\*
- Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development
- Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
- Goal 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
- Goal 17. Strengthen the means of implementation and revitalize the global partnership for sustainable development

Academia is clearly mentioned in the list of stakeholders in target 52:

*‘We the peoples’ are the celebrated opening words of the Charter of the United Nations. It is “we the peoples” who are embarking today on the road to 2030. Our journey will involve Governments as well as Parliaments, the United Nations system and other international institutions, local authorities, indigenous peoples, civil society, business and the private sector, the **scientific and academic community** and all people. Millions have already engaged with, and will own, this Agenda. It is an Agenda of the people, by the people and for the people and this, we believe, will ensure its success.”*

In consequence of this clear global call for action, the 2030 UN Agenda is currently an important driver of public policy, including research policy. As such, research funding at national and

international level is aligned with this agenda, as the R&I framework programme Horizon Europe will have the SDGs as the backdrop for its funding mission to address a set of global challenges.

The UN SDGs impact goals also provide recognition to the institution/ project that links their achievements with such a Policy Agenda. As such, several impact measurements were developed to rank institutions regarding their contribution to SDGs, as [Times Higher Education \(THE\) Impact Rankings](#) in regards to universities. Here, **impact on society** is based on the institutions' success in **delivering the United Nations' Sustainable Development Goals**. While impact rankings can provide interesting insights, they can also result in biased analysis on impact assessment. For that regards, the 2018 MIT Sloan article [The Right Way to Support the Sustainable Development Goals - A company's support of the SDGs is not necessarily a proxy for doing good](#) acknowledge challenges related to the use of SDGs by companies, concerns that can be easily transferable to R&I institutions.

### Impact assessment

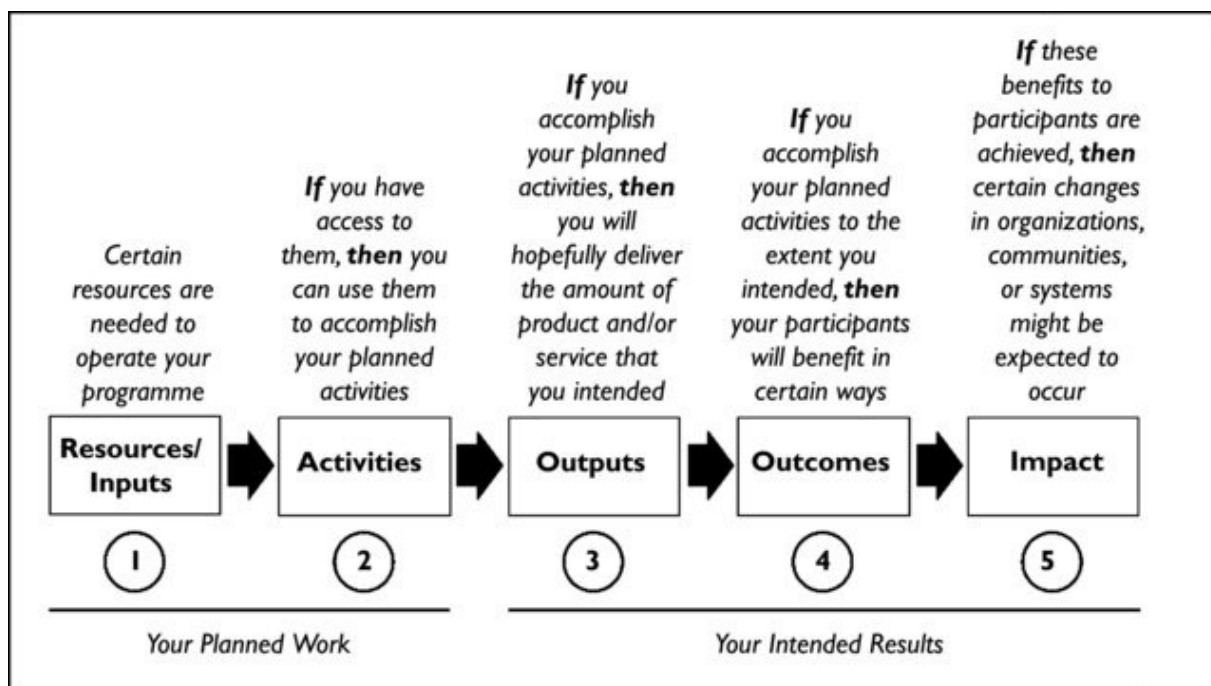
As impact implies change, to assess the impact we must be able to understand, identify and assess change. When we analyse a research activity, for example a research project, we can identify changes at different levels and at different stages. As such, it is important to distinct what is changed within the project timeframe (outputs) and the impact. LERU - the League of European Research Universities - provided the following list of impact related concepts in its [Impact and the next Framework Programme for Research and Innovation \(FP9\)](#) study:

- **Input:** the resources a researcher, a research funder or institution spends in the research process (e.g.: people, infrastructure, money, etc.)
- **Research activities:** the research work performed, or the actions taken as a result of research inputs (e.g. teams established, research undertaken, networking with stakeholders, etc.)
- **Output:** the results of the research activities (e.g. publications, conferences, new research lines, new interdisciplinary collaborations, new products to end-users, etc.)
- **Outcome:** the changes that occur as a result of a project/programme implementation, in a more immediate term than the research of impact. (e.g. contribution to policy debates or documents, strategy development, creation of start-ups and spinoffs)
- **Impact:** “Effect on, change or benefit to the economy, society, culture, public policy or services, health, the environment or quality of life, beyond academia” (HEFCE’s definition used in REF)

In the LSE blog article [What is the difference between an impact and an outcome? Impact is the longer-term effect of an outcome](#) we can see a concrete example of such distinction. In here we have as output an information and advice intervention programme on healthy eating, nutrition or weight loss:

- Example of outcome: changes in body weight or body fat - *it is a measurable objective change brought about by engagements with information and advice.*
- Example of impact: increased sense of happiness and or a decreased sense of insecurity - *it is the effect information and advice had on ability to make an informed choice, empowerment or wider life experiences.*

In conclusion, to be able to achieve impact, we must be able to convert **outputs** into **outcomes** and, subsequently into **impact(s)**.



Source: A Simple Logic Model (W. K. Kellogg Foundation, 2004)

Planning and assessing research impact are thus a complex and multi-faceted phenomenon that requires a non-linear understanding and network-oriented process of engagement with stakeholders beyond the academia community. Although researchers are requested to plan and maximize their projects' impact, doing it at the proposal stage is a very difficult task due to the level of uncertainty and risk which is inherent to research and its interaction with the target audience and stakeholders. At the same time, as impact represents a long-term effect, assessing it shortly after the research project conclusion is an impossible task since we only have outputs and outcomes to assess at that time.

If we look at the implementation, “delivering impact” is also not an easy task. As thus, the process is often planned in a very linear way, using ‘Default’ activities (workshops, seminars), assume dissemination/ information leads to impact, aiming too broad impacts not easily transferable to the realities of implementation.

But, then, **why do we evaluate research impact?** Impact assessment is a useful exercise since it helps researchers and its institutions to achieve (and learn how to achieve) different goals. Teresa Penfield et.al in [Assessment, evaluations, and definitions of research impact: A review](#) summarizes it into four main reasons:

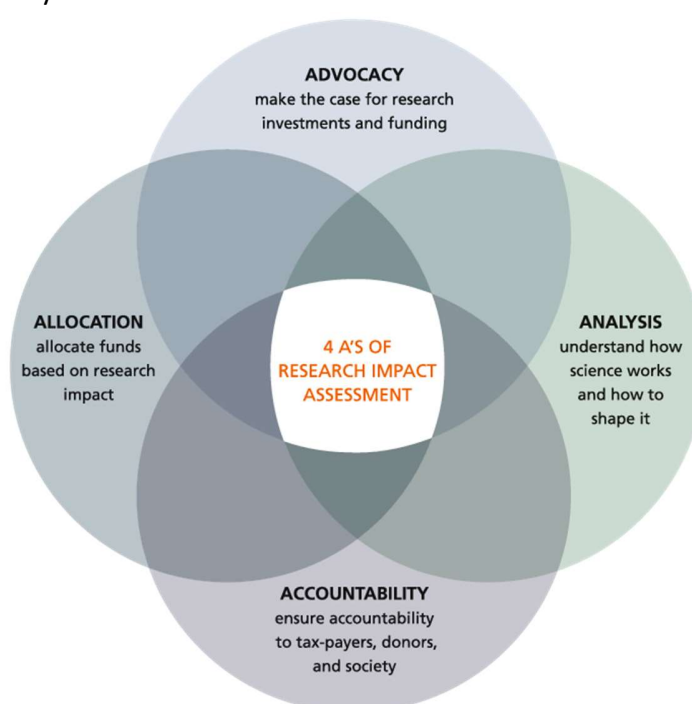
1. overview their performance



2. inform funding decisions
3. understand the pathways to maximize research impact
4. demonstrate to government, stakeholders, and the wider public the value of research

Another way to look at the topic is proposed by Paula Adam et al. in [ISRIA statement: Ten-point guidelines for an effective process of research impact assessment](#) where the authors define the main reasons to assess impact as “the 'Four As' of research impact assessment:

- analysis
- allocation
- advocacy
- accountability



Source: [https://www.researchgate.net/figure/The-Four-As-of-research-impact-assessment-advocacy-analysis-accountability-and\\_fig2\\_323024747](https://www.researchgate.net/figure/The-Four-As-of-research-impact-assessment-advocacy-analysis-accountability-and_fig2_323024747)

### ***The role of the RMA in promoting research impact***

RMAs play an important role in all of these “Four As” or in the four reasons proposed by Penfield, such as:

- RMAs working at pre-award encourage researchers to reflect and identify potential areas of impact and stakeholders to engage, as well as support the writing of such elements in the research proposal.
- RMAs are also the facilitators involved in many public engagement activities (the focus of next lesson)
- RMAs working on post-award also have an important role in monitoring and reporting the Key Performance Indicator (KPIs) of research impact.

- RMAs working in research strategy and Policy provide important inputs to support the definition, monitorization and assessment of impact at the institution and policy level, supporting the development of strategic impact plans.
- Transversely, RMAs, as part of the research community, are big players in advocating and lobbying for science

In lesson 1 we can look closely at the RMA role in supporting the researcher to design its pathways/ routes for impact. For example, and as a first step, an RMA can help the researcher to self-reflect and identify the possible impacts (at its different levels and natures) and also to map the activities to achieve those impacts. Researchers often do not reflect on the non-intended impacts of their own research activity/ project, so it is important to promote the identification of possible negative impacts but also non-intended ones.

A useful tool to map this potential impact, but also to explain how research plans will enable the impacts you are anticipating, is the [Theory of Change](#) (TOC). TOC is basically a comprehensive description and illustration of how and why a certain change is expected to happen in a particular context. It starts by identifying the desired long-term goals and then, looks back to identify the activities that must be put in place for that long-term goal to be achieved. This mapping strategy, by identifying the link between activities and the major goal, leads to a better overview of how change actually happens and, in consequence, to a better planning. It is important to stress the need to think beyond the activities themselves, to what those activities actually achieved – what difference it made to those participating and the areas they work in.

#### Bibliographic references:

- *40,000-year-old cave art may be world's oldest animal drawing*. (2018, November 7). Science. <https://www.nationalgeographic.com/science/2018/11/news-oldest-animal-drawing-borneo-cave-art-human-origins/>
- Adam, P., Ovseiko, P. V., Grant, J., Graham, K. E. A., Boukhris, O. F., Dowd, A.-M., Balling, G. V., Christensen, R. N., Pollitt, A., Taylor, M., Sued, O., Hinrichs-Krapels, S., Solans-Domènech, M., Chorzempa, H., & for the International School on Research Impact Assessment (ISRIA). (2018). ISRIA statement: ten-point guidelines for an effective process of research impact assessment. *Health Research Policy and Systems*, 16(1), 8. <https://doi.org/10.1186/s12961-018-0281-5>
- Australian Research Council. (n.d.). *Research Impact Principles and Framework*. Research Impact Principles and Framework. <https://www.arc.gov.au/policies-strategies/strategy/research-impact-principles-framework>
- Bennett, J. (n.d.-a). *Astronomers Capture First-Ever Image of a Supermassive Black Hole*. Smithsonian Magazine. Retrieved 15 January 2021, from <https://www.smithsonianmag.com/science-nature/astronomers-capture-first-images-supermassive-black-hole-180971927/>
- Bennett, J. (n.d.-b). *The Top Ten Scientific Discoveries of the Decade*. Smithsonian Magazine. Retrieved 15 January 2021, from <https://www.smithsonianmag.com/science-nature/top-ten-scientific-discoveries-decade-180973873/>



- Bennett, J. (2018, July 25). *Underground Lake of Liquid Water Detected on Mars*. Popular Mechanics. <https://www.popularmechanics.com/space/moon-mars/a22541370/underground-lake-liquid-water-mars/>
- Black, R. (n.d.). *The Colors of Dinosaurs Open a New Window to Study the Past*. Smithsonian Magazine. Retrieved 15 January 2021, from <https://www.smithsonianmag.com/science-nature/colors-dinosaurs-open-new-window-study-past-180972070/>
- Callaway, E. (2019). 'Make Ebola a thing of the past': first vaccine against deadly virus approved. *Nature*, 575(7783), 425–426. <https://doi.org/10.1038/d41586-019-03490-8>
- Détroit, F., Mijares, A. S., Corny, J., Daver, G., Zanolli, C., Dizon, E., Robles, E., Grün, R., & Piper, P. J. (2019). A new species of *Homo* from the Late Pleistocene of the Philippines. *Nature*, 568(7751), 181–186. <https://doi.org/10.1038/s41586-019-1067-9>
- England, H. F. C. of. (n.d.). *Guidance on submissions (2019/01) - REF 2021*. Higher Education Funding Council for England. Retrieved 15 January 2021, from <https://www.ref.ac.uk/publications/guidance-on-submissions-201901/>
- European Commission. (n.d.). *Better regulation toolbox* [Text]. European Commission - European Commission. Retrieved 15 January 2021, from [https://ec.europa.eu/info/law/law-making-process/planning-and-proposing-law/better-regulation-why-and-how/better-regulation-guidelines-and-toolbox/better-regulation-toolbox\\_en](https://ec.europa.eu/info/law/law-making-process/planning-and-proposing-law/better-regulation-why-and-how/better-regulation-guidelines-and-toolbox/better-regulation-toolbox_en)
- Fallows, J. (2013, October 23). *The 50 Greatest Breakthroughs Since the Wheel*. The Atlantic. <https://www.theatlantic.com/magazine/archive/2013/11/innovations-list/309536/>
- Karbassi, R. G. E. and L. (n.d.). *The Right Way to Support the Sustainable Development Goals*. MIT Sloan Management Review. Retrieved 15 January 2021, from <https://sloanreview.mit.edu/article/the-right-way-to-support-the-uns-sustainable-development-goals/>
- LERU - League of European Research Universities. (2018). *Impact and the next Framework Programme for Research and Innovation (FP9)* (p. 16). <https://www.leru.org/files/Publications/Impact-and-the-next-Framework-Programme-for-Research-and-Innovation.pdf>
- *Lock the Planck: the kilogram has a new definition*. (n.d.). CERN. Retrieved 15 January 2021, from <https://home.cern/news/news/engineering/lock-planck-kilogram-has-new-definition>
- Penfield, T., Baker, M. J., Scoble, R., & Wykes, M. C. (2014). Assessment, evaluations, and definitions of research impact: A review. *Research Evaluation*, 23(1), 21–32. <https://doi.org/10.1093/reseval/rvt021>
- Reed, S. B. and P. M. (2016, February 14). *10 lessons from grant proposals that led to the most significant and far-reaching impacts*. Fast Track Impact. <https://www.fasttrackimpact.com/post/2016/02/14/pathways-to-topscoring-impacts-an-analysis-of-pathways-to-impact-in-grant-applications>
- *REF impact - Research England*. (n.d.). Retrieved 15 January 2021, from <https://re.ukri.org/research/ref-impact/>

- Reichard, B., Reed, M. S., Chubb, J., Hall, G., Jowett, L., Peart, A., & Whittle, A. (2020). Writing impact case studies: a comparative study of high-scoring and low-scoring case studies from REF2014. *Palgrave Communications*, 6(1), 1–17. <https://doi.org/10.1057/s41599-020-0394-7>
  - says, E. (2014, October 27). What is the difference between an impact and an outcome? Impact is the longer term effect of an outcome. *Impact of Social Sciences*. <https://blogs.lse.ac.uk/impactofsocialsciences/2014/10/27/impact-vs-outcome-harding/>
  - Staff, S. (n.d.). *What Is CRISPR Gene Editing?* ScienceAlert. Retrieved 15 January 2021, from <https://www.sciencealert.com/crispr-gene-editing>
  - *The Higgs boson* | CERN. (n.d.). Retrieved 15 January 2021, from <https://home.cern/science/physics/higgs-boson>
  - *The last five years were the hottest ever recorded*. (2019, February 6). Environment. <https://www.nationalgeographic.com/environment/2019/02/2018-fourth-warmest-year-ever-noaa-nasa-reports/>
  - *These are the top 20 scientific discoveries of the decade*. (2019, December 5). Science. <https://www.nationalgeographic.com/science/2019/12/top-20-scientific-discoveries-of-decade-2010s/>
  - Times Higher Education (THE). (2020, March 4). *Impact Ranking*. Times Higher Education (THE). <https://www.timeshighereducation.com/impactrankings>
  - *Transforming our world: the 2030 Agenda for Sustainable Development* ∴ Sustainable Development Knowledge Platform. (n.d.). Retrieved 15 January 2021, from <https://sustainabledevelopment.un.org/post2015/transformingourworld>
  - US National Science Foundation. (n.d.). *GPG Chapter III*. Retrieved 15 January 2021, from [https://www.nsf.gov/pubs/policydocs/pappguide/nsf13001/gpg\\_3.jsp](https://www.nsf.gov/pubs/policydocs/pappguide/nsf13001/gpg_3.jsp)
  - What is Theory of Change? (n.d.). *Theory of Change Community*. Retrieved 15 January 2021, from <https://www.theoryofchange.org/what-is-theory-of-change/>
  - W.K. Kellogg Foundation. (2004). *Logic Model Development Guide* (p. 72). W.K. Kellogg Foundation. <https://ag.purdue.edu/extension/pdehs/Documents/Pub3669.pdf>
  - Wooding, S., Nason, E., Klautzer, L., Rubin, J., Hanney, S., & Grant, J. (2007). *Policy and practice impacts of research funded by the Economic and Social Research Council: A case study of the Future of Work programme, approach and analysis*. [https://www.rand.org/pubs/technical\\_reports/TR435.html](https://www.rand.org/pubs/technical_reports/TR435.html)
- World Heritage Encyclopedia. (n.d.). Timeline of scientific discoveries. In *World Heritage Encyclopedia*. [http://self.gutenberg.org/articles/eng/Timeline\\_of\\_scientific\\_discoveries](http://self.gutenberg.org/articles/eng/Timeline_of_scientific_discoveries)