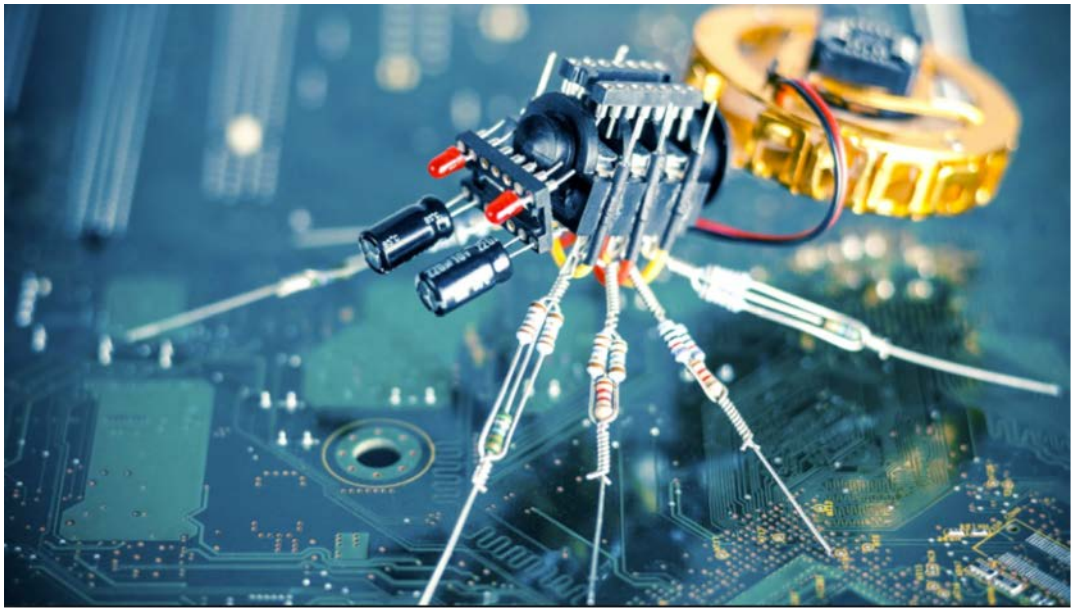


Høsten 2017

kjetil.rommetveit@uib.no

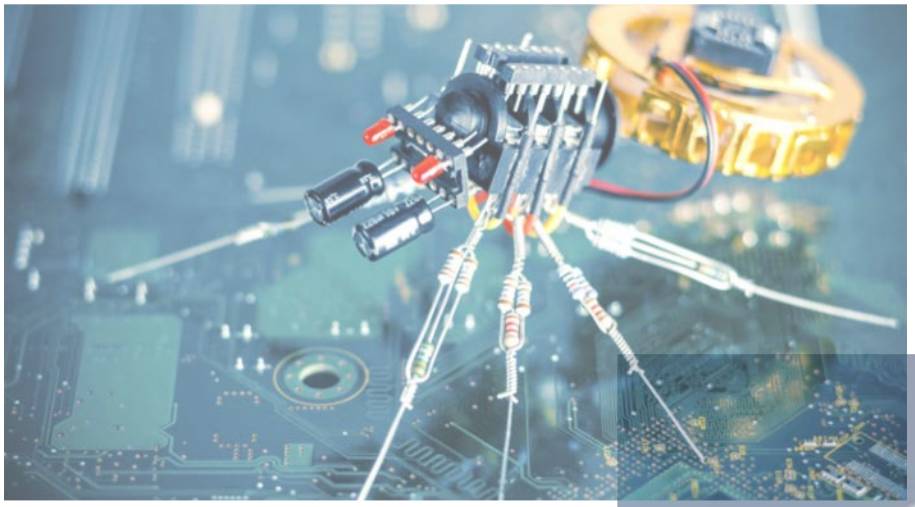
Kjetil Rommetveit

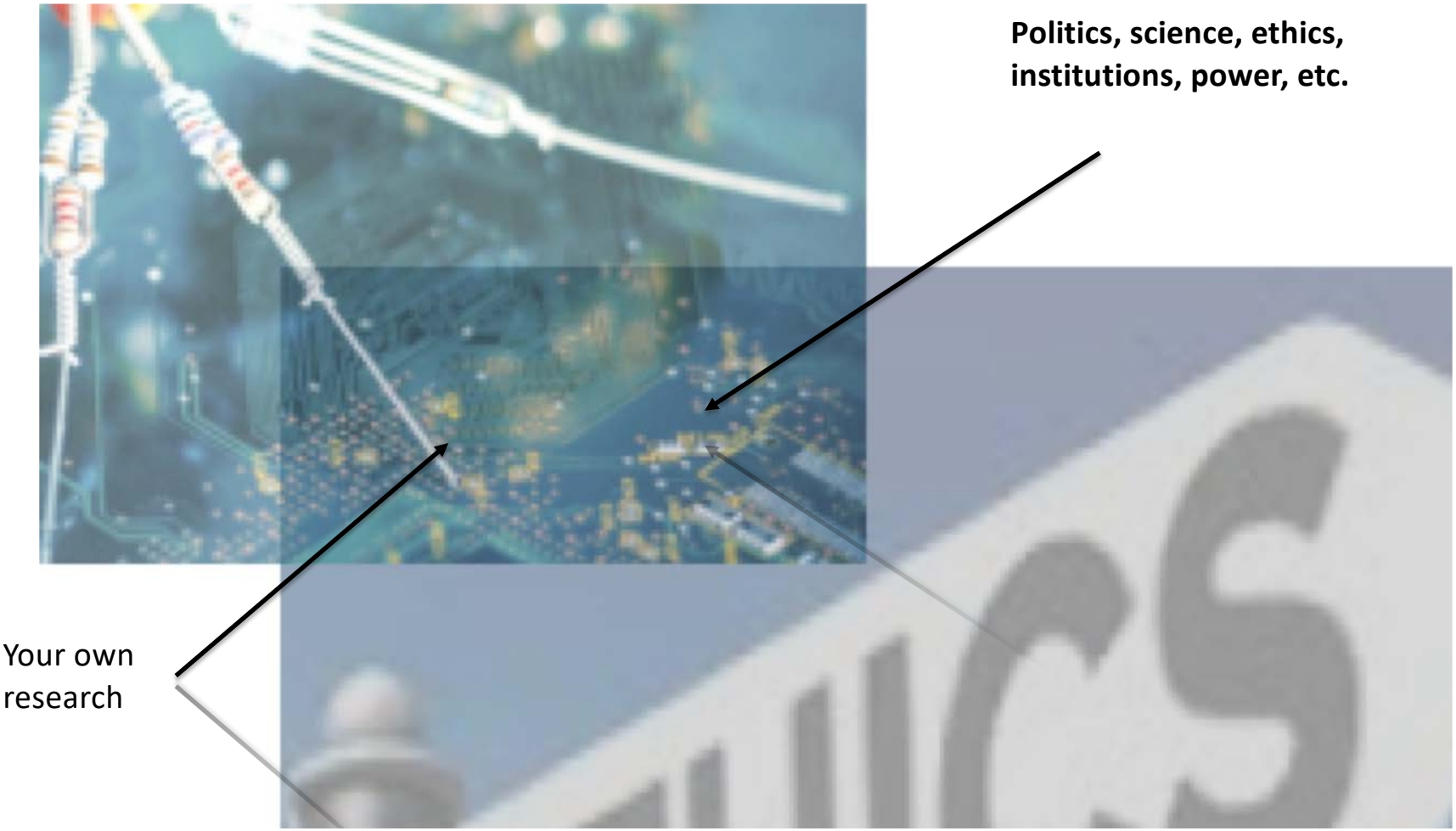
Senter for vitenskapsteori

NANO 310

Høsten 2019

This course




Politics, science, ethics, institutions, power, etc.
Your own research

Knowledge

- 1. kunne gjøre systematisk greie for etiske og samfunnsmessige aspekt ved nanovitskap og nanoteknologi
- (give systematic account of ethical and societal aspects of nanoscience and technology)

- 2. kjenne til innhaldet i sentrale forskings- og vitskapsetiske prinsipp og retningslinjer
- (have knowledge about main ethical principles and guidelines)

Skills

- 3. kunne identifisere etiske og samfunnsmessige aspekt og problemstillingar ved sitt eige forskingsarbeid
- (be able to identify ethical and societal aspects related to their own research)

- 4. kunne analysere aspekta og problemstillingane nemnd i punkt 3, mellom anna ved bruk av NENT-reglane og CoC, munnleg og skriftleg, i ein uttrykksform som er forståeleg for fleire enn spesialistar i nanoVT
- (be able to analyze the aspects and problems mentioned in 3, among other things by using the NENT-rules and Code of Conduct, in written and oral form, understandable to people who do not specialize in nano-science and technology)

- 5. kunne reflektere kritisk omkring vitskapsetiske og forskingspolitiske spørsmål, både på eit generelt og eit konkret nivå
- (be able to reflect critically on theory of science and research-political issues, in general and concrete levels)

- 6. kunne omsetje konklusjonane av eigne forskings- og vitskapsetiske analyser til tilrådingar til konkret handling
- (be able to translate conclusions from own research, and analyzes based in theory of science, to concrete action)

Competencies:

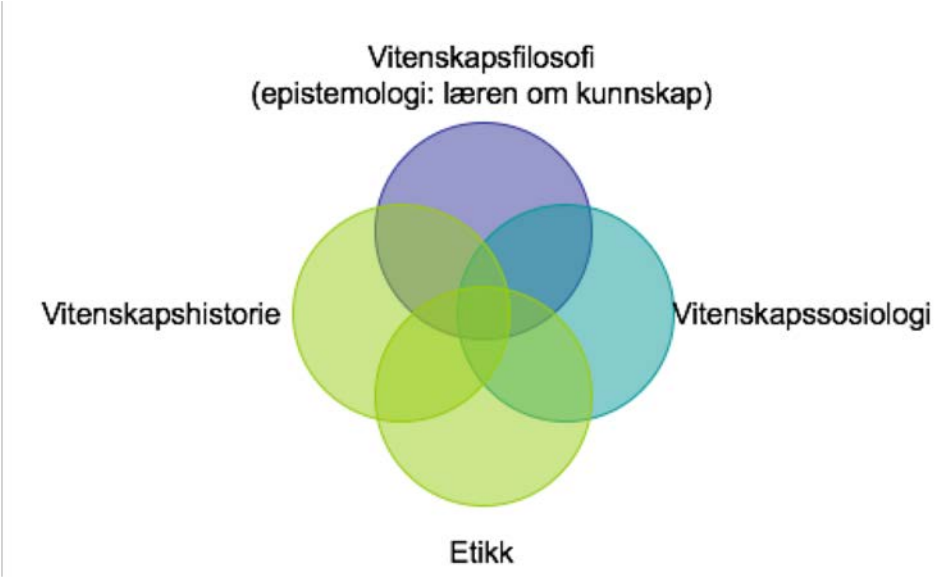
- **7. være i stand til å sette nanovitenskap og egen forskning inn i en videre samfunnsmessig og etisk kontekst**

- **(be able to situate nanoscience and your own research in a broader societal and ethical context)**

Requirements

- Particiapte in lectures and study seminars
- Present an essay (oral, approx. 15 minutes + questions)
- Write essay (10 – 15 pages, ca 3000 - 5000 words). This is a challenge for many students from the natural sciences!

1. Vitenskapsteori (Theory of science'?) & ethics



NANO310 *Nanoethics* – Syllabus Autumn 2019

Roger Strand (2011) "Nano-Ethics", "in L.J. Frewer, W. Norde, A.R. Fischer and F. Kampers (eds): Nanotechnology in the Agri-Food Sector: Implications for the Future. Wiley, London. pp. 271-281.
http://www.andreasaltelli.eu/file/repository/Roger_nanoethics_chapter_1.pdf

Research Council of Norway: A Framework for Responsible Innovation
In Norwegian:
https://www.forskningsradet.no/contentassets/1975cf4657c24ffea33d274adfff0319/rri-rammeverk.pdf
In English (link to pdf-file in My UiB): NFR_Framework_RRI.pdf

Andrew Chen, 2002, The Ethics of Nanotechnology, Markkula Center for Applied Ethics, May 3, 2002
https://www.scu.edu/ethics/focus-areas/technology-ethics/resources/the-ethics-of-nanotechnology/

EEA 2013 Late lessons II Chapter 22 - Nanotechnology - early lessons from early warnings
https://www.eea.europa.eu/publications/late-lessons-2/late-lessons-chapters/late-lessons-ii-chapter-22/view

see also

Steffen Foss Hansen, Andrew Maynard, Anders Baun and Joel A. Tickner, 2008, Late lessons from early warnings for nanotechnology, Nature Nanotechnology, Vol. 3, 444-447.
http://www.andreasaltelli.eu/file/repository/Hansen_et_al_Late_lessons_from_early_warnings_for_nanotechnology.pdf

Jaco Westra (editor), 2014, Assessing health and environmental risks of nanoparticles. An overview, RIVM Rapport 2014-0157.
https://www.rivm.nl/sites/default/files/2018-11/007267_nanoparticles_eng-tr.pdf

Excerpts from Rene von Schomberg (2011) "Introduction: Towards Responsible Research and Innovation in the Information and Communication Technologies and Security Technologies Fields"
https://publications.europa.eu/en/publication-detail/-/publication/60113e8a-0fe9-4911-a7f4-1b330967ef10

Jerry Ravetz and Roy Edgley, 1984, Ideological Commitments in the Philosophy of Science, With a Comment on Ravetz by Edgley, Radical Philosophy 037 (Summer 1984) / Article,
http://www.andreasaltelli.eu/file/repository/Ideological_committment.pdf

R. Feynman, Cargo Cult Science, Commencement Speech at Caltech 1974.
http://calteches.library.caltech.edu/3043/1/CargoCult.pdf
(also available in the book Surely You're Joking, Mr. Feynman!)

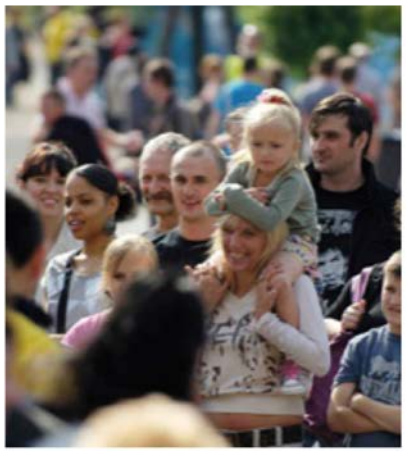
European Commission, 2009, Commission recommendation on A code of conduct for responsible nanosciences and nanotechnologies research & Council conclusions on Responsible nanosciences and nanotechnologies research, ISBN 978-92-79-11605-6, Luxembourg.
http://ec.europa.eu/research/science-society/document_library/pdf_06/nanocode-sec09_en.pdf

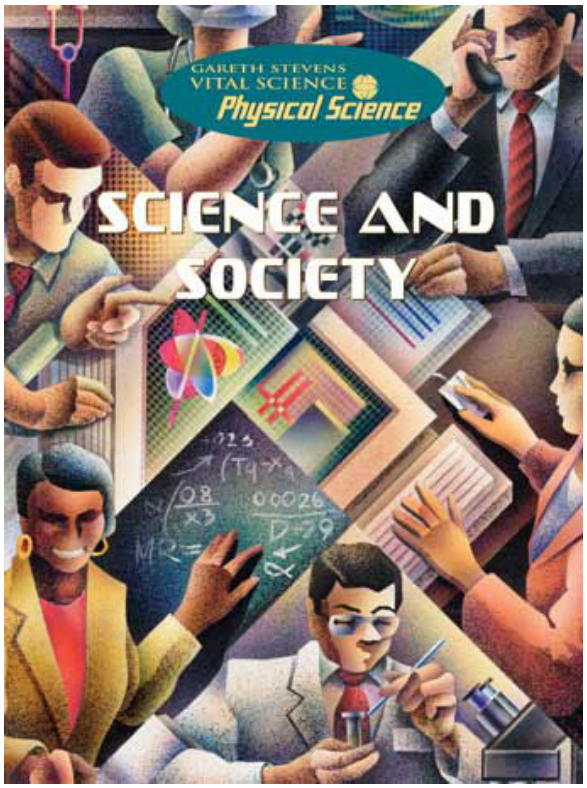
Excerpts from Ravetz, J., 1971, Scientific Knowledge and its Social Problems, Oxford University Press.
http://www.andreasaltelli.eu/file/repository/Bits.pdf

Marc A. Edwards and Siddhartha Roy, Academic Research in the 21st Century: Maintaining Scientific Integrity in a Climate of Perverse Incentives and Hyper-competition, ENVIRONMENTAL ENGINEERING SCIENCE, 34(1), 2017
https://www.liebertpub.com/doi/10.1089/ees.2016.0223

C. Marris, "Final Report of the PABE research project funded by the Commission of European Communities," 2001.
http://www.andreasaltelli.eu/file/repository/PABE_FAIR_CT98_3844_DG12_SSMI_eu_studie_akzeptanz_biotech_011201.pdf

Nanoethics and ‘responsible research’ – what are thay? The changing role of research / science, and of researchers





The rest of this lecture:

- Changing ethos of science
- Ethics
- Governance: Responsible Research and Innovation (RRI)

Ethos and ethics (from ethos to ethics?)(RRI)

- **Ethos:**
- internal norms of a group or community
- **Mostly informal & 'local'**

- **Ethics:**
- frequently centered on individuals
- **Mostly formal & universal**

MORALITY

- Character
- Habits
- Customs
- Collective
- Etc.

- Rules ('Do no harm')
- Principles (Autonomy, Dignity, Precaution…)
- Guidelines
- Soft law

Socratic ethos

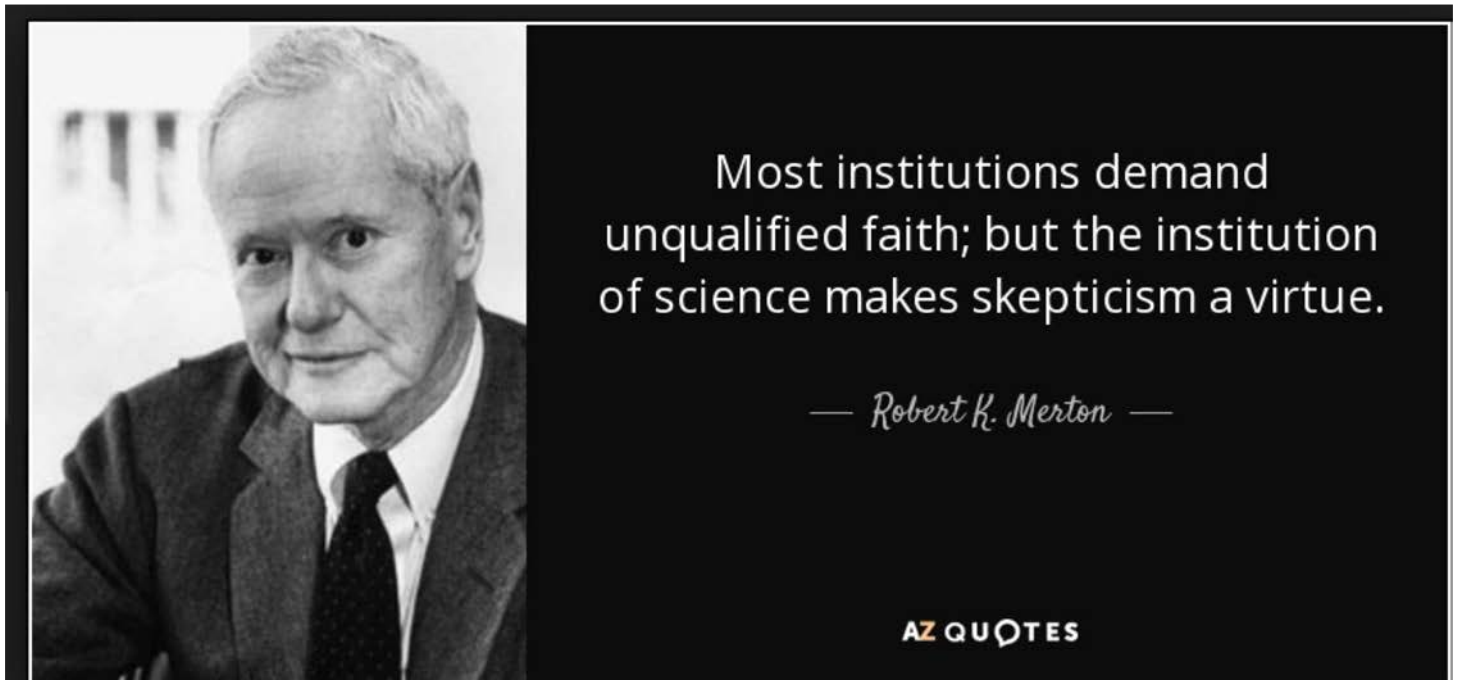
And what kind of man am I? One of those who would gladly be refuted if anything I say is not true, and would gladly refute another who says what is not true, but would be no less happy to be refuted myself than to refute, for I consider that a greater benefit … I believe there is no worse evil for man than a false opinion about the subject of our present discussion

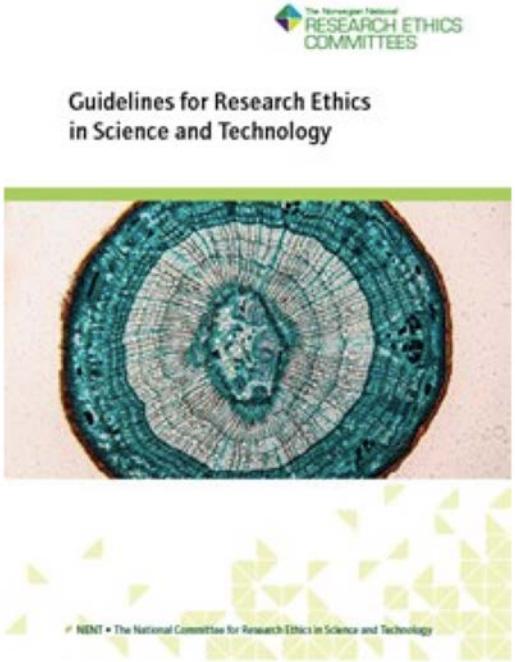
Four Mertonian norms [edit]

The four Mertonian norms (often abbreviated as the CUDO-norms) can be summarised as:

- **communism**: all scientists should have common ownership of scientific goods (intellectual property), to promote collective collaboration; secrecy is the opposite of this norm.[3]
- **universalism**: scientific validity is independent of the sociopolitical status/personal attributes of its participants[4]
- **disinterestedness**: scientific institutions act for the benefit of a common scientific enterprise, rather than for the personal gain of individuals within them
- **organized skepticism**: scientific claims should be exposed to critical scrutiny before being accepted: both in methodology and institutional codes of conduct.[5]

https://en.wikipedia.org/wiki/Mertonian_norms





Oath of Hippocrates

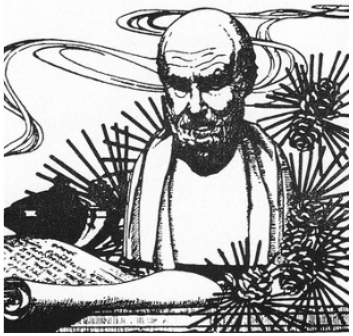
I SWEAR *by Apollo the Physician, and Aesculapius, and Hygeia, and Panacea, and all the gods and all the goddesses—and I make them my judges—that this mine oath and this my written engagement I will fulfil so far as power and discernment shall be mine.*

HIM *who taught me this art I will esteem even as I do my Parents; he shall partake of my livelihood and, if in want, shall share my goods. I will regard his issue as my brothers, and will teach them this art without fee or written engagement if they shall wish to learn it.*

I WILL *give instruction by precept, by discourse, and in all other ways, to my own sons, to those of him who taught me, to disciples bound by written engagement and sworn according to medical law, and to no guiltless and hallowed will I keep my life and mine art. I will cut no one whatever for the stone, but will give way to those who work at this practice.*

INTO *whatsoever houses I shall enter I will go for the benefit of the sick, holding aloof from all voluntary wrong and corruption, including venereal acts upon the bodies of females and males whether free or slaves. Whatsoever in my practice or not in my practice I shall see or hear, amid the lives of men, which ought not to be noised abroad—as to this I will keep silence, holding such things unfitting to be spoken.*

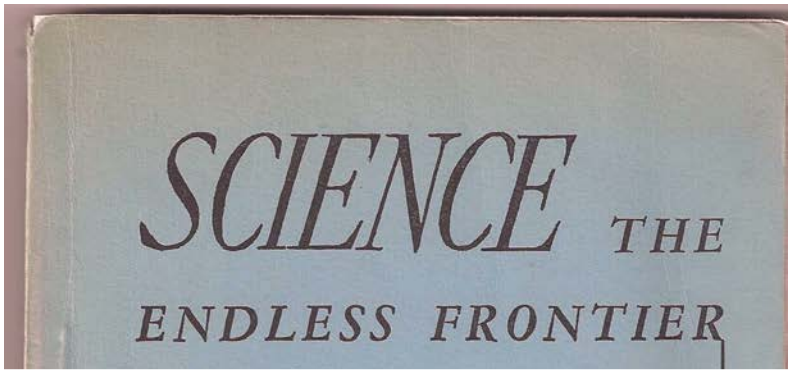
AND NOW *if I shall fulfil this oath and break it not, may the fruits of life and of art be mine, may I be honored of all men for all time; the opposite, if I shall transgress* id be forsworn.



I acknowledge that I am a part of an international community of researchers. I will practise my activities in line with the recognised standards for good research practice. I shall conduct my research in an honest and truthful way and show respect for humans, animals, and nature. I shall use my knowledge and skills to the best of my judgement for the good of humanity and for sustainable development. I shall not allow interests based on ideology, religion, ethnicity, prejudice, or material advantages to overshadow my ethical responsibility as a researcher.

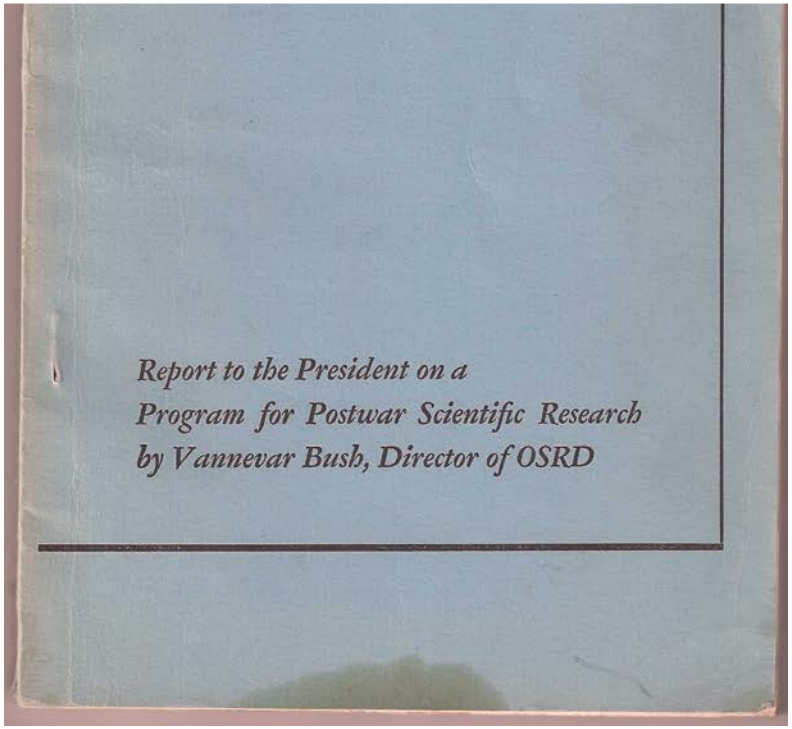
The National Committee for Research Ethics in Science and Technology (NENT)

Ethos of research and it's societal mandate



Basic research → Applied research → Technological Development → Production → Diffusion

One of our hopes is that after the war there will be full employment. To reach that goal the full creative and productive energies of the American people must be released. To create more jobs we must make new and better and cheaper products. We want plenty of new, vigorous enterprises. But new products and processes are not born full-grown. They are founded on new principles and new conceptions which in turn result from ***basic scientific research****.* ***Basic scientific research*** *is scientific capital. … Clearly, more and better scientific research is one essential to the achievement of our goal of full employment (Bush 1945)*



Strand 2012:

Until World War II, science was a lifestyle choice and involved a small elite. Since 1945, the *gentlemen* have become vastly outnumbered by the *players*, and research is now ordinary work, not even particularly well paid or highly esteemed, at least not for the majority of the research workforce. In the natural sciences, many researchers do not enjoy the freedom to develop their own research questions, but rather work as "super-technicians" within large research teams. Many senior researchers have vested interests in the products of their own research. Without

Regjeringens FoU-strategi for nanoteknologi 2012–2021

US funding of medical research 1946-1965:

	Massachusettes General Hospital	National Institutes of Health
1945	$ 500 000	$ 701 800
1955	$ 2,222,816	$ 36,063,200
1965	$ 8,384, 342	$ 436,600,000

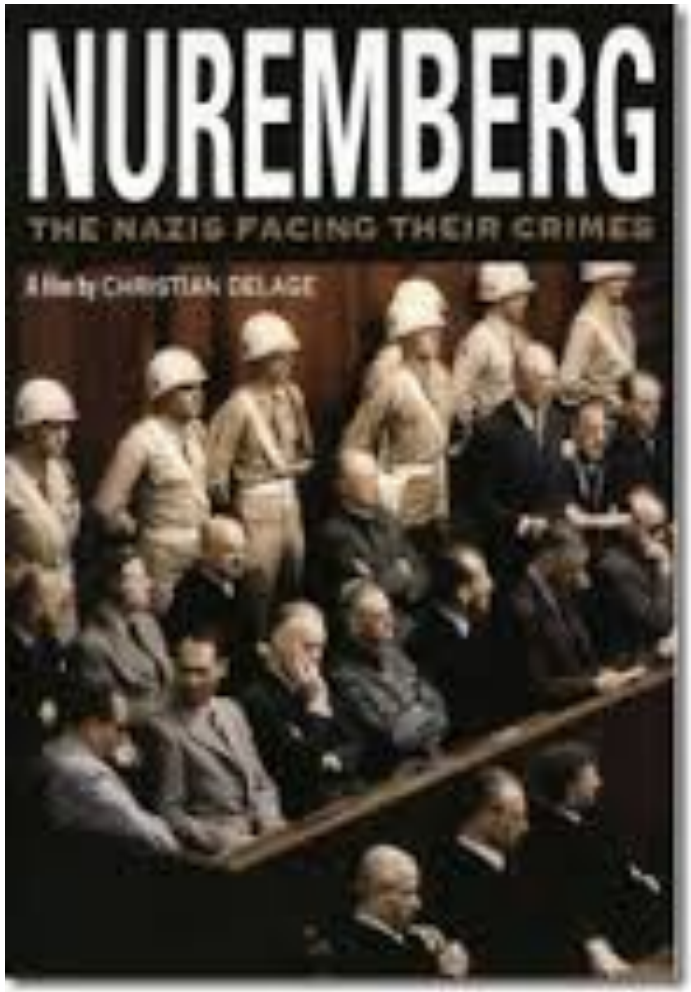
Henry Beecher: **Ethics** and clinical research (New England Journal of Medicine 1966)

Experimentation in man takes place in several areas: in self-experimentation; in patient volunteers and normal subjects; in therapy; and in the different areas of experimentation on a patient not for his benefit but for that, at least in theory, of ***patients in general****. The present study is limited to this last category*

- 22 cases of scientific and ethical encroachments upon human rights
- No prior information
- No consent

Nürnberg-koden (1945)

"…the person involved should have legal capacity to give consent; should be so situated as to be able to exercise free power of choice, without the intervention of any element of force, fraud, deceit, duress, overreaching, or other ulterior form of constraint or coercion; and should have ***sufficient knowledge and comprehension of the elements of the subject matter*** *involved as to* ***enable him to make an understanding and enlightened decision****. This latter element requires that before the acceptance of an affirmative decision by the experimental subject there* ***should be made known to him the nature, duration, and purpose of the experiment****; the method and means by which it is to be conducted; all inconveniences and hazards reasonably to be expected; and the effects upon his health or person which may possibly come from his participation in the experiment"*



INNOVATION

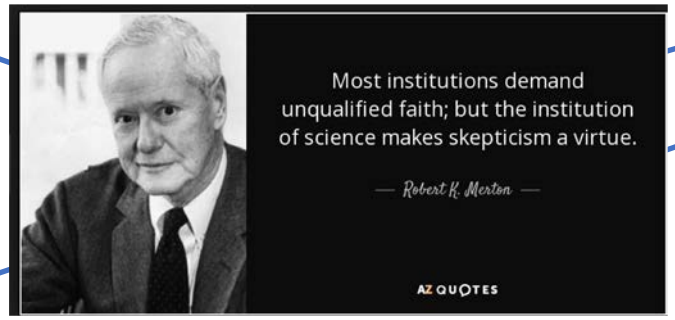

European Commission
HORIZON 2020
The EU Framework Programme for Research and Innovation
European Commission > Horizon 2020 > Nanotechnologies
What is Horizon 2020?
Find Your area
How to Get funding?
News, Events & Publications
Projects
Sections navigation
Industrial Leadership
Leadership in Enabling and Industrial Technologies
Nanotechnologies, Advanced Materials, Advanced Manufacturing and Processing, and Biotechnology
Nanotechnologies
Article
Newsroom
Nanotechnologies, which is science and technology at the nanoscale of atoms and molecules, will help address key societal challenges such as climate change, reducing carbon emission, developing renewable energies, more efficient use of resources and addressing medical needs of an ageing population.


Forskningsrådet
Nanoteknologi og avanserte materialer (NANO2021)

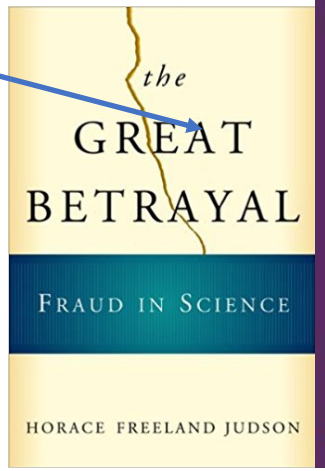
The scientific ethos under pressure

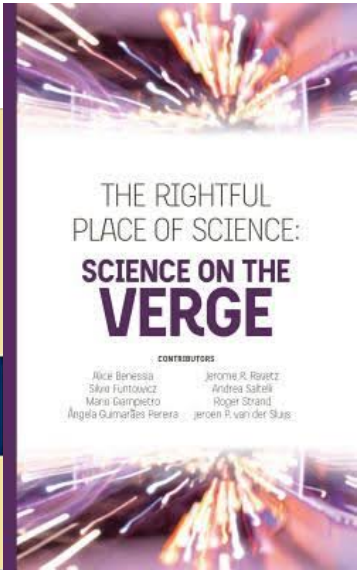
’to promote collective collaboration; secrecy is the opposite of this norm’

Uredelighet (fraud): "virtual absence... which appears exceptional



Intellektuelle eiendomsrettigheter, forretningshemmeligheter, etc.





Governance & public participation

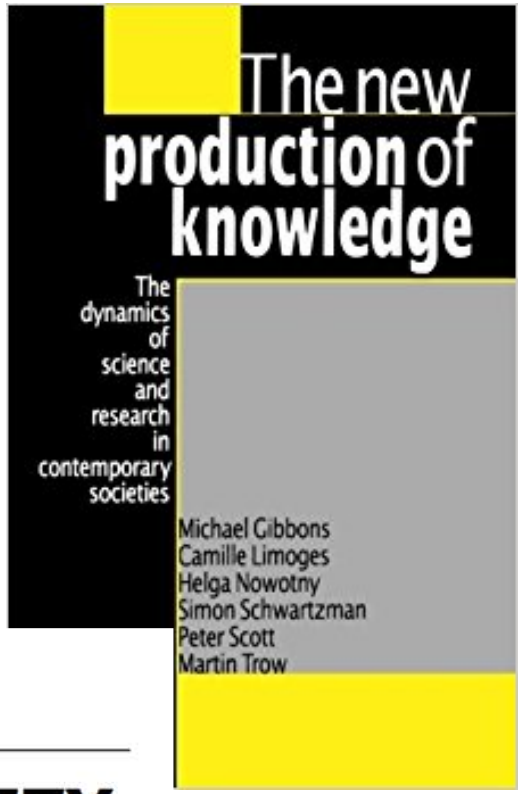
The 'Problem': Public Unease with Science?

Perhaps the most widely recognised indicator of public unease concerns reactions to issues at the intersection of 'science' (including science-based technologies) and 'risk'. The public is thought to

- "**people increasingly distrust institutions and politics** or are simply not interested in them" (European Commission 2001, 3)

- "Society's relationship with science is in a critical phase. Science today is exciting, and full of opportunities. Yet public confidence in scientific advice to Government has been rocked by BSE; and many people are uneasy about the rapid advance of areas such as biotechnology and IT—even though for everyday purposes they take science and technology for granted. **This crisis of confidence is of great importance**…" (UK House of Lords, Science and Society report, 2000)

Society speaks back?



Nature 402, C81 (1999) © Macmillan Publishers Ltd. impacts

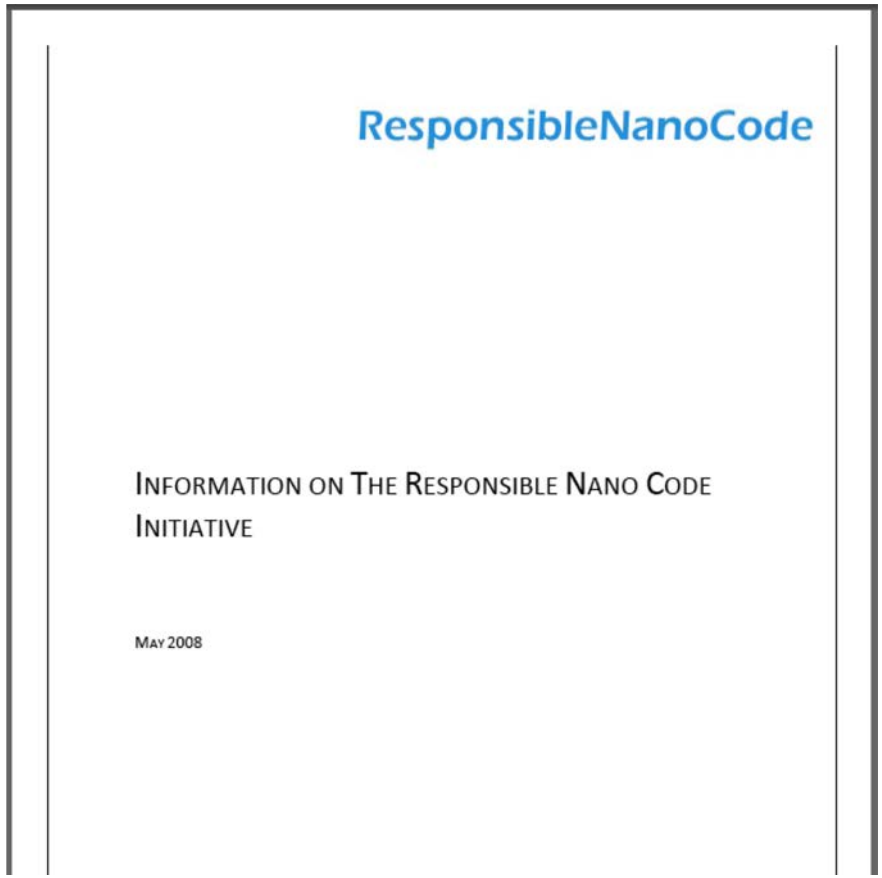
SCIENCE'S NEW SOCIAL CONTRACT WITH SOCIETY

Under the prevailing contract between science and society, science has been expected to produce 'reliable' knowledge, provided merely that it communicates its discoveries to society. A new contract must now ensure that scientific knowledge is 'socially robust', and that its production is seen by society to be both transparent and participative.

MICHAEL GIBBONS

Michael Gibbons, a former director of the Science Policy Research Unit at the University of Sussex, is now secretary-general of the Association of Commonwealth Universities,

- 1990 - Human Genome Project (ca. 1990 – 2001): ELSA research (Ethical Legal and Social Aspects)
- 2000s – Public engagements with science and technology
- Ca. 2000 Nano: Responsible research
- 2000 - ICTs, food, energy, etc.



Responsible Research & Innovation (RRI)

Responsible research & innovation

Article | Newsroom

Responsible research and innovation is an approach that anticipates and assesses potential implications and societal expectations with regard to research and innovation, with the aim to foster the design of inclusive and sustainable research and innovation.

Responsible Research and Innovation (RRI) implies that societal actors (researchers, citizens, policy makers, business, third sector organisations, etc.) work together during the whole research and innovation process in order to better align both the process and its outcomes with the values, needs and expectations of society.

In practice, RRI is implemented as a package that includes multi-actor and public engagement in research and innovation, enabling easier access to scientific results, the take up of gender and ethics in the research and innovation content and process, and formal and informal science education.

Roger Strand 2012.
Responsibility:

Product and process

Research and technology in research / laboratory / clinical etc. **practice**

Overall societal good

Nanoethics (2011) 5:99–113
DOI 10.1007/s11569-011-0114-2

ORIGINAL PAPER

Conversations About Responsible Nanoresearch

Kamilla Lein Kjølberg · Roger Strand

Typology nano-researcher

- ‘Excellent’)
- Risk-oriented
- Submissive
- Social democratic
- Oriented towards uncertainy and risk
- Ironic

Concept of responsibility

- Traditional, ‘Mertonian’
- New contract for science and society
- New moral consiouscness

The ethos of science oprovides its own constraints

Need for new institutions and mechanisms working across disciplines

Inner dialogue arising in meeting with external constraints

Your own research in the near future:

- 5-10 years into the future
- What would it take for your research to be adopted on a broad scale (society, research, technology, markets, etc.)?
- Who would put it into practice? Whose help would you need?
- Who will use your research?