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# Responsible Innovation in Digital Farming

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SMART AGRI HUBS

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# Who?

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- Senior researcher, Responsible research and innovation, ethics of digital farming
- Wageningen University & Research

# Programme

- What is responsible (research) and innovation?
  - Changing the science-society relationship
  - Definition of RRI
  - The AIRR principles

- Ethical and societal aspects of digital farming
  - Philosophy of human technology relationships
  - What questions does it raise for concrete digital farming technologies?

# A ‘traditional’ story about the science-society relationship

- Cornucopian view of science/technology
  - Enhances health/welfare
  - Fosters economic growth
  - Strengthens our market position
  - Offers solutions to problems

# Future orientation Digital farming

Technology provides a solution for problems or ‘challenges’

‘Current FAO projections indicate that the global population could increase by 2,3 billion people from today’s levels, reaching 9.8 billion by 2050. At the global level, agricultural production and consumption in 2050 are projected to be 60% higher than today. This has to be achieved in spite of the limited availability of arable lands, the increasing need for fresh water and the impact of climate change. Innovative approaches – including information and communication technologies (ICT) – are needed across the agricultural sector to increase productivity, conserve natural resource, and use inputs sustainably and efficiently.’ (FAO 2018, xi)

# Future orientation digital farming

According to the World Bank, "[p]recision agriculture is part of the solution to feeding a population that is growing faster than available land supply, while also ensuring the sustainable use of water and energy" (Ghannam 2017, 5).

For the OECD, a "growing, higher income and more urbanized population" (OECD 2016, 1) is the reason to make "innovation a priority in order to achieve sustainable productivity growth" (OECD 2018b, 16).

Digital technologies can help "optimize crop growth and yields"(World Bank 2017, 108), "optimize the utilization of natural resources"(FAO 2018c, 25), and "optimize (..) use of nutrients" (OECD 2018a, 1)

# Story supports ‘traditional’ science-society relationship

- Scientists receive money and had freedom to pursue their own projects
- They serve society by means of publications, teaching, and discovering knowledge which would eventually lead to products/technologies that would serve everyone
- ....is only possible when science is expected to bring only good things

# Function of a narrative about the future

A narrative

- Puts order in experiences and events by showing relationships between them
- Gives single events meaning in relation to others that preceded it or follow it in time
- Suggests alternative options for the future, which offer orientation for actions in the present
- Is shared with (a group of) listeners who are therewith invited to tell the same story, or to take action or invest to realize the future it anticipates

# The societal story about digital farming

*What stories* do we tell about the societal future of digital farming?

*By whom* are these stories told?

*To whom* (the audience)?

And *why* (with what purpose)?


# Stories about innovation

Usually the story is told by scientists/innovators

The story has a linear structure: it narrates about a scientific finding, which is developed into an applicable innovation which will benefit society

Society figures as *recipient* of the story, as well as of the 'goods' that science and innovation offer

Motto of the Chicago worldfair 1933: 'Science fiends, industry applies and man conforms'

# But is the science and innovation process linear?

Science does not produce the future:

puzzles, feedback loops,

unexpected results

Technologies may be used in unexpected ways



# And is the end-product always valued?

- Since WW II more discussion about science and innovation: does science and innovation only bring good things?
- Cochlear implant: what about the deaf culture?
- GM foods: what are the risks?
- Older (60+) women get pregnant: is this still natural? What about the wellbeing of the child?

# Toward a new social contract

- Society no longer writes a blank cheque,
  - but wants returns for investment (economic)
  - and becomes sceptical about the benefits that science produces: science is not ‘cornucopian’ (hazards, risks, disagreement about value)
  - Society wants to have a say in where science and technology go
  - Social participation in science!

# Responsible (Research) and innovation

Von Schomberg defines RRI as “a transparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view on the (ethical) acceptability, sustainability and societal desirability of the innovation process and its marketable products (in order to allow a proper embedding of scientific and technological advances in our society” (Von Schomberg 2012: 9)

# Different views

- René van Schomberg
  - Rejection of collective view of the ‘good life’ to guide Europan research and innovation
  - Reliance on EU normative framework
  - Focus on product
  - Attend to the challenges of society!

- Richard Owen, Phil MacNaghten, Jack Stilgoe
  - RRI demands stewardship and therefore
  - Focus on process as well as product
  - More substantive reflection about the value of purposes;  what futures do we want to prevent, which ones do we want to realize?
  - Impossible to prevent reflection about the ‘good life’ to which science and technology should contribute

# The AIRR principles

- *Anticipate*: Explore and describe impacts that are produced for human (social) life
- *Reflect*: Reflect on the (often positive) story that underlies innovation: what are its presuppositions? Can they reasonably be expected to materialize in reality? Are there also other motivations behind the development of this technology? (Conflicting) values?
- *Deliberative dialogue/debate*: be inclusive! Enhance dialogue to find out what other stakeholders think about it: what are their stories?
- *Respond*: invite scientists/innovators to pay attention to the preferences of other stakeholders and attend to their views/values

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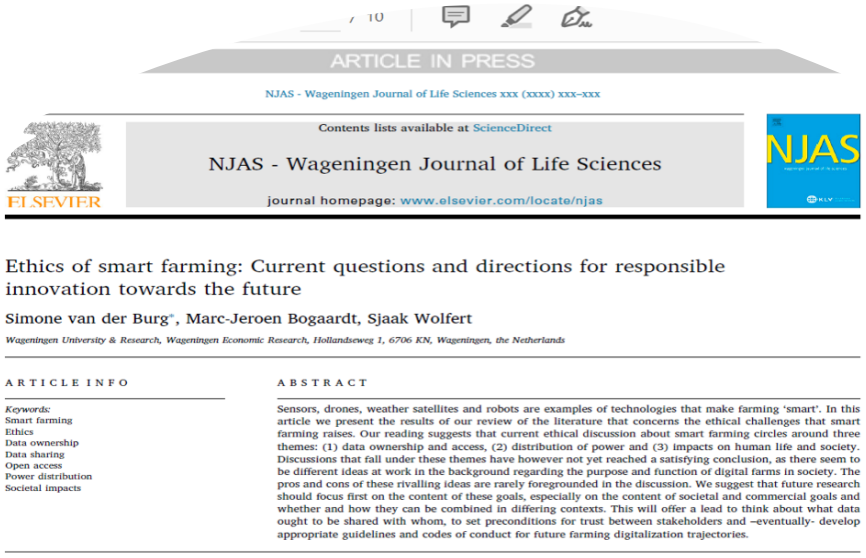

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Ethics of smart farming: Current questions and directions for responsible innovation towards the future

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ABSTRACT

Sensors, drones, weather satellites and robots are examples of technologies that make farming 'smart'. In this article we present the results of our review of the literature that concerns the ethical challenges that smart farming raises. Our reading suggests that current ethical discussion about smart farming circles around three themes: (1) data ownership and access, (2) distribution of power and (3) impacts on human life and society. Discussions that fall under these themes have however not yet reached a satisfying conclusion, as there seem to be different ideas at work in the background regarding the purpose and function of digital farms in society. The pros and cons of these rivalling ideas are rarely foregrounded in the discussion. We suggest that future research should focus first on the content of these goals, especially on the content of societal and commercial goals and whether and how they can be combined in differing contexts. This will offer a lead to think about what data ought to be shared with whom, to set preconditions for trust between stakeholders and –eventually- develop appropriate guidelines and codes of conduct for future farming digitalization trajectories.

# Questions circle around four themes

- Data sharing, accessibility and control
- Fairness of distribution of benefits harvested from data
- Power (re-)distribution in the network around farms
- Expected impacts on human and animal life and wellbeing.

How is technology related to human (social/moral) life?

Hans Achterhuis

Tsjalling Swierstra

Peter-Paul Verbeek

Don Ihde

Bruno Latour

# What is morality? And ethics?

- What is morality?

  Morality generates in a history of interaction between people and tells what is good/desirable/acceptable/approved or forbidden

  Sometimes made explicit in rules or principles

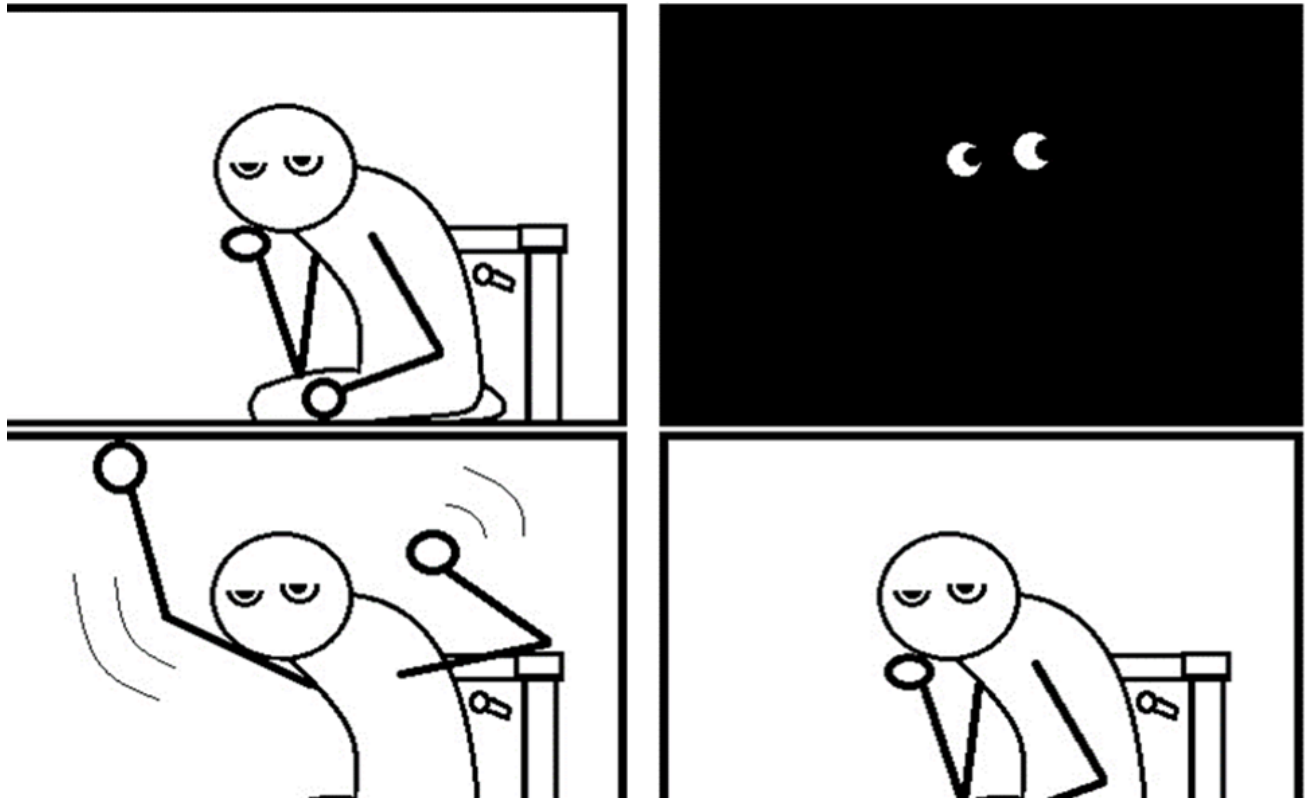
  Sometimes remains tacit in expectations, (emotional) reactions and habits

- What is ethics?
- Ethics is a systematic reflection about morals. Is needed when:

  - There is a value related problem, disagreement or conflict
  - When new issues arise, and current morality does not suffice to deal with them
  - The goals to strive for are shifting and we need to reflect on their value and choose well

# Artefacts change actions/choices

- Sometimes artefacts enhance freedom to choose,
- Sometimes they nudge you in a direction
- …sometimes they steer people's choices

# Artefacts change actions/choices

- Does a device offer information that fosters the autonomy of farmers?
- Does it steer the farmer toward making certain choices?
- Are there good reasons to steer a farmer’s actions towards a result?
- Does it matter who is steering?

# Digital breeding system

- Selects animals based on their resistance to disease and productivity
- ....a biological farmer wants to select what he calls ‘maternal characteristics’
- ....another farmer wants to focus on taste
- ....another farmer wants to produce the perfect ‘Lakenfelder’

# Interaction with humans and other sentient beings

- What new skills and routines are needed? Can every farm adopt them?
- What does the introduction of a robot mean for the wellbeing of the animal/human labourer?
  - Risks and harms?
  - Healthy/safe work environment?
  - Skills of labourers?
- Effects on the job market? Are low-skilled labourers robbed of their opportunity to provide for themselves? (labour-migrants)

# Changing perception/experience

- Perception of what the soil/crops/animals need
- Welfare of animals/plants is estimated based on numbers, rather than ‘ feeling’ and craftmanship
  - Do numbers tell all there is to know?
  - Can data be misused? (for ex. animal activists; controlling bodies of the government)
  - Is a farmer’s story needed to inform what the device should do? (for ex. breeding and the genetic characteristics to select)

# Changing view of the ‘good’ life?

- How to understand the value/meaning of current changes?
- Is it liberating people from heavy physical labour?
- Does it push people to do a-social industrial work, under increasing performance pressure?

# RRI invites to look at how technology changes

- Options for action/interaction
- What people feel responsible for
- Skills, routines and habits that people develop
- What people experience/perceive in the world around them
- What they see as good, desirable behaviour
- People’s view of the ‘good life’ worth striving for

# This may raise ethical questions!

- If we want to realize the societal expectations related to digital farming, what demands does this impose on our technologies and on people (farmers/consumers etc.)?
- Should the technologies foster farmer's autonomy? Is it justified to sometimes limit human autonomy? (And why)
- What changes do we expect in our dealings with animals? How will animal welfare be affected? And how should we evaluate this?
- What changes do we expect in the division of labour? Are these changes just/fair/defensible? Should something be done to mitigate possible detrimental effects?
- What types of farms does digital technology support best? What does this mean for current diversity of farms? And how should we value these developments?
- New technologies lead to new relationships and new dependencies. What is the best way to deal with them?

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