How to Question Technology

A Framework for Technology Assessment in Business Education

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Lectorate Change Management / Knowledge Center for Digital Operations and Finance
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Content

Introduction

This framework has been developed from June 2020 to February 2021 in assignment of the Knowledge Center for Digital Operations and Finance, lectorate Change Management at the Hague University of Applied Sciences. It is part of the project Reshaping Business Education and supervised by professor Jacco van Uden. This report is both an assessment of the needs for Technology Assessment as well as a proposal on how to implement TA in business education. The framework is based on interviews with teachers, content analysis of the study program and two workshops. I analyse this input from my experience in Technology Assessment as senior researcher at the Rathenau Institute (2005-2012) and independent researcher in cyber security at my own company Tek Tok (2012-present).

1. Context: would teachers and students want to question technology?

The Hague University of Applied Sciences provides about 1.500 students business education, which involves subjects such as Management, Marketing, Economics, Accounting, Finance and Business Law. New students can read on the website that doing business is not just about making money, they are also being prepared to take up their social responsibility. For example, the introduction page on the interest area "Business & Management" states:

"We help you make a well-considered decision that takes the world around you into consideration. This means first and foremost learning to change - alone and together - by continuously experimenting with new insights, perspectives, knowledge and skills. We prepare you for a future in which you view the business world not only from an entrepreneurial perspective, but also from a social and communal perspective."

According to Simone Fredriksz, Dean Faculty Business, Finance & Marketing (until September 2020), a communal perspective is not just taking into account human rights or environmental impact of doing business, it requires departing from the classical, linear economic model and think more circular. According to her, the culturally diverse student population may provide a fertile ground for new perspectives. Her estimate is that roughly 20% of the students is highly ideologically driven, while the rest still sees company profit as the dominant goal of business. So there is a substantial minority that may be open for a more socially driven curriculum, while the majority may needs to be persuaded or may not be interested at all.

When it comes to technology, there is much terrain to be explored for stimulating a communal perspective. In short: technology, especially ICT, is perceived as a means to gain efficiency, develop new services and fuel new business models. The effects of technology on humans, be it customers, employees, business partners or society as a whole, receives very little attention according to the teachers I interviewed. This is on the one hand due to the limitations for them to create room for reflection in an already tight curriculum. Students on the other hand may not see many advantages in criticising ICT, as they have adopted it with ease, perceiving it just as given means to an end, and something that is dealt with by technicians once they start working at a company. One may add that some teachers may fear to run the risk of being perceived as conservative and old fashioned once they urge for a more critical perspective to technology, while what they actually would like to do is show a way forward.

In this context, Technology Assessment (TA) may just provide a perspective which is both critical, as well as showing a more constructive way in adopting new technologies. I will describe this perspective using four "C's" as a framework. First, I will provide some key Concepts commonly used TA. Second, I will go into three of the major societal Controversies, to draw the broader societal picture. Third, I will introduce the Case study method as a very practical way to implement TA in education. That leads us to the fourth and final C: suggestions for the Curriculum.

2. Concepts: introducing the TA toolbox

Technology Assessment can be defined as "the analyses of the societal, legal and ethical aspects of technological developments" (Brom & Van Est 2012). Societal aspects have to do with equality and the use of technology to gain power over one another. The legal aspects are not just whether the use of technology is allowed by law, but also if current legislation still fits the rapidly changing technologies. Ethical aspects mostly have to do with larger philosophical questions and moral standpoints. Typically, an assessment of

technology involves several voices questioning those of providers and technical experts, such as those of politicians, activists, philosophers, lawyers, sociologists, psychologists and artists.

This definition above, by Rinie van Est and Frans Brom is published the Rathenau Institute, which is the Dutch office for Technology Assessment. This independent institute has the aim to survey trends in technological developments and stimulate debate in both the Dutch parliament, as well as the society as a whole. Most European and some Asian countries have similar institutes, who also collaborate on projects. These assessments can involve medical, nano, energy and information and communication technology. I will focus on ICT as the other technologies mostly deal with very specific issues in specific contexts, while computers, phones, networks, apps and the like are much more widely and generally applied, especially in doing business.

Assessment of ICT is generally performed at three levels. At the *micro level*, you analyse the interaction between individuals and devices i.e., the interface. What options does the technology provide? How does it help, stimulate, manipulate or enforce certain behaviour? And what are the psychological and social effects on its users? Interesting concept on this level are provide for example by B.J. Fogg in his study of *Captology: Computers as Persuasive Technologies* (2003), which I will elaborate on later on.

At the *meso level*, we look beyond devices to the network of organisations that influence the use of this technology: the provider of the technology, the companies that implements it, law makers and enforcement who regulate use, governments that try to stimulate innovation, hackers who challenge the functioning of technologies and consumer organisations forming coalitions with user groups. What are the goals and restraints of these organisations? How do they interact and how does this affect the development and use of certain technologies? Take for example privacy regulations, how companies try to comply and how this affect identities of users of information technologies.

The *macro level* deals with the information society as a whole. Humans use more and more ICT, which is increasingly integrated into one internet, everywhere, always on. How does this digitalisation of human life help, shape or hamper us in reaching societal goals? What is the role of governments versus big tech companies? Do we need to perceive internet not just as a technological means to an end, but rather as an intelligent life form in itself? Who serves who? Here we see a growing body of literature trying to define our directions in digital life, using concepts such as datafication, filter bubbles and transhumanism.

Technology Assessment on these three levels can help business students and teachers to analyse technologies they implement to create a better relationship with their customers, realise their business goals and work in a more responsible towards society as a whole. Still, what is at stake becomes clearer when things go wrong, and their business reputation is ruined. From a TA perspective, controversies are the ideal opportunity to analyse what kind of assumptions the use of technologies is based on and what is at stake for the actors involved.

3. Controversies: opening the black box of presumptions

"Technology is neither good nor bad, neither is it neutral", Kranzberg wrote in 1986, a statement which is perhaps even more true today. A knife can help you prepare food, as well as kill a person. You may say only the human is responsible for the deed, but the knife enables and therefore becomes an actor too. This is a rough summary of the perspective used in Actor Network Theory, promoted by scholars as Bruno Latour. In his book Science in Action (1987) he describes how technology is both shaped by, as well as shapes its users and both form networks in which behaviour is mutually enforced. Every time you fill your car with gasoline, you don't think of all the engineers developing cars, oil companies pumping oil from the ground and pipelines bringing it to you. Still, all these technologies help you go forward, while you help them to stay in existence. The rituals enforcing the network of both human and technological actors are taken as a given, they are a black box.

Until things go wrong. More people get killed when everybody carries knifes, our environment becomes too polluted while we use more oil. Then it is time to open the black box: why do we do what we do? On which assumption did we base the use of these technologies? Are there ways to do things differently? This cannot change overnight, as the whole network of both human and technological actors keep enforcing the behaviour that created it.

This counts perhaps even more for information technologies. We use them all day, enforcing their place in the network, without questioning the inner working. Until things go wrong, and we open the black box. Take for example the current controversy about personal data being sold by employees of the Dutch local healthcare service GGD. The export function in patient files may have been useful when there were just a few people using the database, or perhaps it was just a standard feature nobody questioned. Now

there are so many people using it, the organisation lost track of who does what, sensitive data is lost and even sold on the black market. Only now we ask why the button was there in the first place.

ICT has, perhaps more than any other technology, possibilities to broaden its use. In TA we call this function creep. Systems are built for one function, say navigating your way on the road, but it may as well serve others to track you. Here, again, it can be positive or negative, but mostly not neutral. Innovation for one group of actors, may be a limitation for another. From an Actor Network Theory perspective, function creep is inevitable, as actors and networks change continuously. Best example is the internet itself: we are currently using it in a way it was never designed for. Still it works, for better and worse.

Controversies in the use of ICT are therefore inevitable, as both providers and users change its use continuously. Small incidents grow out to broader debates on how and why we use IT. Doing research in TA, I see three controversies continuously emerge in debates: privacy, cybersecurity and freedom of choice.

The privacy debate dates back to the post WWII period, in which citizens and governments reconsidered the use of public registration. Registers with personal data were first use for general policy making, but also served the Nazi's to track down Jewish citizens. Laws were made to prevent such a function creep in the future but remain under constant debate. With the growth of the internet in the nineties, personal data being gathered by companies also entered the public debate. The black box of personal registration was opened, posing the question: why do you need to know these details about me? Here we can distinguish between negative privacy, which means the right to be left alone and positive privacy, which is the right to determine how you are known. More on that later.

Debates on cybersecurity generally deal with what is known as the CIA triangle: confidentiality, integrity and availability of information. When it comes to confidentiality, security may seem similar to privacy, but it's not. Take for example monitoring of data use within an organisation, protecting the privacy of the data subject, but infringing on the privacy of the person processing the data. Integrity means: can you trust the data to be true? Availability means access from a user perspective, while form a company's perspective it means business continuity. Needless to provide examples of controversies in cybersecurity, as they are in the news on a daily basis.

Freedom of choice is a third and perhaps lesser-known debate in ICT, but still even more fundamental in the relation between humans and technology. All information technologies have choices already embedded in them. Each button you push triggers algorithms that carry out work for you, as well as for the provider of the technology. The workings are hidden in the black box of ritualised behaviour. And how about the buttons which are not there? These are choices taken from you. Still, if you had all the freedom to choose, there would be too many options and the device would become impossible to use. Take for example cookie laws: they serve our right to choose to be tracked or not, but in the end only leads to click tunnels and annoyance. Douglas Ruskoff (2011) provides us a sound warning in his book with the suitable title: Program or be programmed. In order to make our own choices, we need to know how algorithms enforce them. Pariser (2011) in The Filter Bubble: What the internet is hiding from you describes how our online profile may serve to feed us useful information, but also blocks alternative opinions.

These concepts can be interesting for general debate on technological developments. For students, these concepts will also be of help in doing their business more responsible. A way to implement them is doing case studies.

4. Case Studies: putting concepts into practice to prevent controversy

A case study can be defined as qualitative research focussing on a limited number of actors, defined in space and time. In TA, a case study typically deals with the implementation of a certain technology by a certain organisation with specified users, describing how opinions of its use change over time. Although the case study method is limited in means of scientific generalisation, it is an ideal method to implement the more abstract concepts in a concrete setting, providing practical use for students and survey how others may perceive their use of technology.

During the workshop series "A New Vision for Economics Education" Joris Tieleman and Sam de Muijnck, gave a presentation on "Economy Studies: A New Vision for Economics Education" (18 November 2020). They claimed that business education relies heavily on abstract classical economic models, which limits the aim to use economics for a better world. At the Staff Day of the International Business program of The Hague University of Applied Science (January 11, 2021) professor of New Finance Martijn van der Linden also stated economic studies are too much focussed on macro models based on humans as merely rational actors. Meso and micro level are needed to deal with real world problems.

The case study method, focussing on the economic workings of a specific company in a defined timeframe, can fulfil such a need. In the second edition of the workshop series, professor of Change Management Jacco van Uden and I tested the case study method on the audience of business teachers, using three cases with different approaches.

The first case study dealt with a fitness app, in which we focus on controversies on freedom of choice. The app itself is a clear example of Persuasive Technology: all sort of options are used to seduce, help, stimulate, but also manipulate users into certain behaviour, may it be to do more exercises, or buy more services. The app provides continuous feedback on its user's behaviour, while the algorithms behind it remain a mystery to its users. This is the micro level of our Technology Assessment: deconstructing the user interface in the options it gives and takes from its users.

At the meso level, we see that the app is not developed by the gym itself, but a software company called Virtual Gym, which provides the app for several gyms. They have shareholders and investors, who want this provider to compete with other upcoming platforms internationally. The persuasive effects of the app then not only serve users to exercise more, but also as a lock-in and grow its user population. The lock-in effect is enforced by the phone providers, as it only works on Apple and Android. Still, without the app, you cannot enter the gym as you need it to book a time slot. At the same time, both the providers and the fitness club are bound by local legislation and consumer groups.

At the macro level, these kinds of fitness apps fit well into the broader concepts on how ICT steers human behaviour. Rushkoff would urge one to ask oneself whether you follow the training program or are being programmed by it. The broader trends of health apps also fit into what Harari (2015) described as datafication: the belief in data as the source of truth and a means to better ourselves. Still, who decides what is better or not?

The second case study dealt with the Dutch public transport card OV-chipkaart, an ideal case to study controversies on privacy. Other than the former paper tickets, users of this electronic card leave data on time and place every time they check in or out of the public transport system. At this micro level, most travellers first had to get use to the new system, but quite easily adopted it as they also saw many advantages as they didn't have to buy a ticket for each trip.

At the mesolevel, the system helped several public transport companies to share costs and profits more fairly, but it also triggered a societal debate on privacy verses safety. One part of the travellers stated they did not want to be tracked, while others saw it as an advantage as the gated system could ban fare dodgers, homeless and other unwanted people from the train stations or even help criminal investigation. Journalists, activists and politicians got involved and a societal controversy was born. The controversy was solved by implementing an Identity Management schedule, using pseudonyms instead of real names to identify travellers. Transactions performed by transport companies are connected to a 16-digit number on your card and managed by an independent third party.

At the macro level, the OV-chipkaart can be seen as one of many examples of the digitalisation of public spaces. We increasingly find ourselves surrounded by digital devices which both show us the way, as well as track our whereabouts. Our physical presence is increasingly accompanied with a virtual counterpart, our personal and digital identity merging into one. Question is: who manages our digital identity?

The third case was a fictitious case we use as a simulation for crisis management. A company called SAASlaris, which provides a salary application as a service, appears to be hacked. In a series of dilemma's, the participants of the workshop were provided with several options on how to proceed and prevent controversy. In these dilemma's, we used concepts as the availability, integrity and confidentiality of data from the cyber security triangle. We also drew on real life examples of legacy systems, function creep, data breaches and workarounds that are very common today.

This workshop provided a good testing ground for our TA approach in business education. The teachers liked to case study approach, as it brings the more abstract concepts closer to the daily lives of their students. Especially the crisis management case was perceived as creating more engagement. Based on the feedback, we modified the workshop for teachers in the International Business program at The Hague University of Applied Sciences. For example, to them three different cases was too much for one workshop, so they advised us to do just one case, the fitness app, and apply it the three controversies: a demonstration on freedom of choice and datafication, how the use of the app led to privacy concerns and a cyber crisis management simulation.

In the discussion after the simulation, we could see a broad variation of perspectives among the teachers: ranging from one taking a more macro level perspective on how our society is changing under the power of large tech companies, while others elaborated on how our approach can even help in looking critically at the apps we use on a daily basis, the microlevel. The participants supported our proposal to use

the case study approach to give students more practical insight into how the real economy works, supplementing the abstract economic models, using real examples of companies to enrich the curriculum. Especially the cyber crisis management simulation was welcomed by the teachers to create more interaction with and amongst students. It brings Technology Assessment closer to them, as it not only serves the common good, but it is also necessary to prevent controversies and save your company.

5. Curriculum: TA tools in the classroom

Would teachers and students in business education want to question technology? We believe some of them do and TA can help them. Still, this project is not aimed at changing their curriculum, but rather to provide teachers who are open for a TA approach a framework to select elements that may suit their programs.

The description of the three big controversies in ICT can be used as a background for doing case studies together with students and let them compare each other's cases to stimulate discussion on controversies. Here, we gave three example cases, but there are plenty of other examples to be taken from their daily life. For example, electronic share scooters from Felyx, Check and Go-Sharing, dating apps, parking payment systems or voting support for elections. Also, they could build a case on a fictitious company to implement TA concepts.

Simulation of a case into a crisis management training may bring Technology Assessment perhaps even closer to their personal lives as potential managers. Some teachers also proposed to collaborate with ICT students, so they can form more realistic teams in dealing with the crisis. But perhaps even more than business students, we will have to see whether these students are open to questioning technology.

The concepts described here are just a few of many and can be supplemented with those from the literature list below. During the workshops it was mentioned there is also a growing body of popular books, movies and series we can draw from too to bring the controversies and concept to live. Books such as *The Circle* form Dave Eggers, on a company which is a sort of Google, Apple and Facebook in one. Facebook itself is lively portrayed in *The Social Dilemma*. Perhaps the best movie on freedom of choice is *The Matrix*, a science fiction trilogy in which our lives appear to be just a computer simulation. The series *Black Mirror* deals with each of the controversies in ICT, with each episode on the social consequences a particular new technology. Especially because of these kinds of what-if-scenario's, the use of science fiction is quite common in TA to stimulate debate.

For now, it is safe to state TA is one of many ways to prepare students for a future in which they view the business world not only from an entrepreneurial perspective, but also from a social and communal perspective. For the further development of the curriculum, more research and above all, the commitment of more teaches is needed. As a form of persuasive technology, a list of recommended literature is provided below.

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