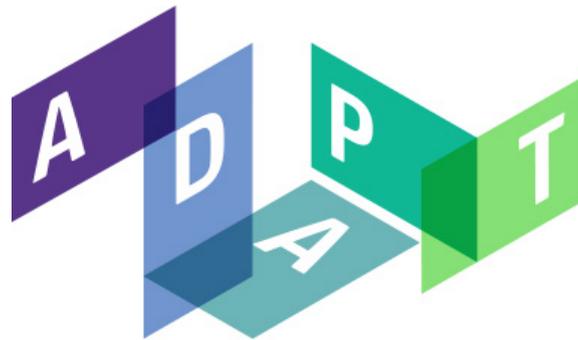


- White Paper -

THE ETHICS OF ADAPT



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The ADAPT Centre for Digital Content Technology is funded under the SFI Research Centres Programme (Grant 13/RC/2106) and is co-funded under the European Regional Development Fund.

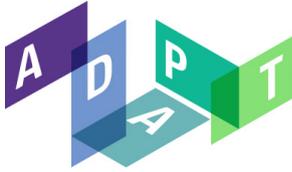


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2 INTRODUCTION

Aim of the paper: This white paper aims at providing a concise and comprehensive overview of the ethical challenges that can be identified in the research being done at the ADAPT Centre¹. Moreover, it discusses ways in which these challenges can be dealt with within the Centre and provides an informed overview of best practices of integrating ethics in large research projects. The leading research question of ADAPT as explicated in its full research programme proposal, is: “how can enterprises, institutions and individuals easily assimilate, reuse and interact with the global torrent of digital content, flowing on a myriad of different subjects, across languages, media and context?”². We will use this question and the ADAPT Centre research programme in which it is embedded as the basis for identification of the ethical challenges.

Who should read this paper? Although this white paper revolves around the research done at the ADAPT Centre, it reaches out to academic, public and corporate organisations that work in the field of research and innovation of digital content technologies. Whereas the ADAPT Centre incorporates the entire pipeline of digital content innovations, ranging from the fundamental academic research to commercial applications, this paper on the ethics of the work in ADAPT similarly incorporates this broad range of activities. Thus, we invite academics, corporate and public policy makers as well as entrepreneurs to engage with the contents of this paper. It can help clarify the diversity of ethical issues in research proposals on complex data analytics for ethics approval boards. Moreover, it can provide ethical guidelines for engineers and practitioners in the field of digital content innovations who are interested in the ethical issues that revolve around their everyday work. Also, corporations and entrepreneurs can use this paper to get insights in the ethical impacts of the technologies they develop for the users of the technologies and at the societal level.

The background of this paper: Creating overviews of ethical issues within large research projects is becoming a vested practice, notably in Europe. The European Commission is an important agenda-setter in this respect, as it establishes guidelines for prominent ethical issues in the context of research: data protection and privacy, informed consent, research on human embryo’s and fetuses, dual use, animal research and research involving developing countries³. For ADAPT, the issues of data protection and privacy, informed consent and dual

¹ The ADAPT Centre is introduced as “a dynamic research centre that combines the world-class expertise of researchers at four universities (Trinity College Dublin, Dublin City University, University College Dublin and Dublin Institute of Technology) with that of its industry partners to produce ground-breaking digital content innovations” (<http://adaptcentre.ie/>)

² Wade, V., Way, A., Campbell, N., Liu, Q., Jones, G., Conlan, O., ... Lewis, D. (2013). *ADAPT: Centre for Digital Content Platform Research - Adapting Global Content to Enhance the User Experience*. P.5

³ European Commission. (2013). *Ethics for researchers*. Retrieved from http://ec.europa.eu/research/science-society/document_library/pdf_06/ethics-for-researchers_en.pdf



use appear to be relevant areas for ethics assessment indeed. Privacy and data protection are specific focus points of the Centre because its research extensively deals with user-generated, personalised digital content. However, as will become clear in the course of this paper, we have identified a wider range of ethical challenges in the ADAPT research.

The rationale for attending to ethics in ADAPT arises out of the increasing significance ICTs have in people's daily lives, as well as out of the growing interdependencies between humans and technologies that ICTs create at the societal level. Social networks, e-mail services, digital financial services and the like have become integral parts of people's activities, identities and social relations. As such, they have the potential for bringing about profound ethical implications (causing harm, alienating people from one-another, limiting people's civil liberties). The abovementioned rationale is progressively acknowledged in vested research practices, as can be observed in large ICT research projects that frequently include discussions on ethics in their work. For example, the "Butler" project⁴ that focuses on developing technologies in the context of the Internet of things, discusses specific research-related ethical issues like the risk of social divides, the isolation of human beings and property rights infringements⁵. Another example, the "IPerG" project⁶, focuses on the creation of pervasive games; it discusses ethical concerns like virtual harm and power disparities between agents in games⁷.

The structure of this paper: In the ADAPT Centre, we focus on contributing to the state of the art research in ethics and on integrating ethics into the work of the researchers. In order to come up with a general structure that will guide the identification of ethical issues we have distinguished different loci of innovation of the research, as explicated in the ADAPT Centre research programme. With a "locus of innovation", we indicate the focus area where the research is meant to lead to new insights and applications. The scope of the ADAPT Centre as explicated in its research programme, comprises: creating understanding of digital content through advances in multilingual natural language processing, dynamic transformation of content, personalisation of the user experience, and multimodal interaction with global content⁸. Because the scope of the research indicates where the innovation is being advanced, we apply it to structure this white paper. We add one extra locus of innovation, which is the locus of *application*, for the application of the general innovations in ADAPT is a specific activity within the Centre. Brought together, we identify the following loci of innovation within the ADAPT Centre:

- *Application*: this locus of innovation concerns the construction of specific ICT applications for a delineated use, for example an online payment application for transferring money on the Internet.

⁴ See <http://www.iot-butler.eu/>; retrieved on 13-09-2015.

⁵ Liebrand, K., Moser, K., Kusli, S., Copigneaux, B., Gall, F. Le, Smadja, P., ... Melakessou, F. (2013). *BUTLER: Ethics, Privacy and Data Protection in BUTLER*.

⁶ See <http://www.pervasive-gaming.org/index.php>; retrieved on 13-09-2015

⁷ Montola, M., Waern, A., Kuittinen, J., & Stenros, J. (2006). *IPerG - Deliverable D5.5: Ethics of Pervasive Gaming*.

⁸ Wade, V., Way, A., Campbell, N., Liu, Q., Jones, G., Conlan, O., ... Lewis, D. (2013). *ADAPT: Centre for Digital Content Platform Research - Adapting Global Content to Enhance the User Experience*. P.83



- *Interaction*: this locus of innovation concerns the communication between people, devices and software, which could apply to many different applications; for example interaction in a system for conference calls, or interaction through face recognition software.
- *Personalisation*: this locus of innovation concerns the tailoring of a program to the specific needs of the human user, which could apply to any form of application or interaction. For example, textual information can be summarised in order to fit the specific needs of a user, or the environment of a user can be tuned in such a way that he can always call upon the service of computational devices (for example by having a device that constantly monitors your health status).
- *Understanding*: this locus of innovation concerns the tuning of information in a way that a user can understand it, notably by translating it from one natural language into another. For example, the information on a website could be translated from one language to another or the speech of a user in one language could be translated into speech in another language for another user.
- *Transformation*: this locus of innovation concerns the structuring of digital content, both through linking heterogeneous data sets on the Internet and through improving semantics that allow for interaction between natural languages and computer programming language. For example, data sets about the weather and certain disease statistics could be linked in order to find correlations between the prevalence of a certain disease and the weather in certain areas of the world.

Although considerations of applying, understanding, transforming, personalising and interacting with digital content often overlap in the ADAPT research, any specific instance of the research typically aims at being innovative in one of these areas. The loci of innovation are based on a conceptual spectrum between user engagement with a specific application for a specific purpose on the one hand and a general architecture that governs the structuring of the digital content feeding into all kinds of technological applications on the other hand.

In this white paper we will first of all identify the ethical challenges connected to the research domains that are parts of the main loci of innovation in ADAPT. This part will include a section on terms and definitions most relevant in computer ethics. Secondly, we will discuss ethical frameworks, ethical focus points and educational aspects that will help integrating ethics with the research done at the ADAPT Centre and provide an overview of the state of the art of integration of ethics in large research projects. Thirdly, we will formulate a general conclusion and discuss future steps that can lead to advancements in the understanding of ethical challenges in the Centre and ways in which these challenges can be dealt with.

3 TERMS AND DEFINITIONS

In order to make the reader acquainted with the most prominent terms that guide the following analyses and discussions, we provide for some working definitions. Although this list is not exhaustive, it might prove to be a helpful starting point.

Ethics: Ethics is a field of research that is considered to be a branch of philosophy, though in some instances (notably in the field of applied ethics) it might borrow from fields like



psychology, anthropology and sociology. Its general aim is to systematise, defend and recommend or advise against certain conceptions of right and wrong conduct, the common good or the good life. Ethics can be divided in three main areas of study: meta-ethics, which studies how we know about and communicate concepts of right and wrong and how we can know their meaning; normative ethics, which studies how one ought to act; and applied ethics, which studies how ethical theories can be applied to practical, specific situations, for example to certain fields of research. In this paper, we mostly argue within the framework of applied ethics.

Bias: A bias involves “inaccurately identified traces of past experience that mediate favourable or unfavourable feelings, thoughts or actions towards social objects”⁹. In other words, biases are reasons that are not explicitly experienced or expressed by people but nonetheless influence their behaviour. A researcher might be biased in his work due to his socio-cultural background or the technical paradigm of his work.

Privacy: Privacy is an ambivalent notion that is nonetheless very frequently used in discussions on computer ethics. A reasonably well-argued working definition is “a right to control access to places, locations, and personal information along with use and control rights to these goods”¹⁰. In online environments, this means that individuals are supposed to have a right to control personal content *about* them. An account of privacy concerning a negative right is also often used, by conceptualising the right of non-intrusion; the right to be “left alone” in certain online zones of activity¹¹.

Responsibility: A situation in which a response to either the presence or the absence of a morally significant action can be reasonably expected, from an individual or from a social group. Two conditions determine the state of being responsible for a certain action. First of all, an agent must have knowledge about the situation and about the consequences of his actions. Secondly, an agent must have a certain level of control over the course of events¹². Only in case these two conditions are satisfied, an agent can be held responsible for the presence or absence of a morally significant action.

Rights: One should distinguish positive and negative rights. Positive rights are justified privileges or claims of an individual that others do something for them or provide them with something (the privilege to speak out your mind, the claim to be paid by your employer if you work). Negative rights are justified privileges or claims not to have anybody do interfere with your actions, freedom or property (not to steal your private property, not to make you feel discriminated against). A complicated aspect of rights is that they might often conflict with one-another.

⁹ Greenwald, a G., & Banaji, M. R. (1995). Implicit social cognition: attitudes, self-esteem, and stereotypes. *Psychological Review*, 102(1), 4–27. P.5 <http://doi.org/10.1037/0033-295X.102.1.4>

¹⁰ Moore, A. (2008). Defining privacy. *Journal of Social Philosophy*, 39(3), 411–428. P.425 <http://doi.org/10.1111/j.1467-9833.2008.00433.x>

¹¹ Ibid. P.423

¹² Meyer, S. S. (1998). Moral responsibility after Aristotle. *Companions to Ancient Thought*, 4, 221–240. P.224



Risk: In technical terms, a risk is the product of the probability of an unwanted event and the harm inflicted by the event. In ethics, the discussion is not framed in terms of whether a risk is actually present, but in terms of whether it is morally right or wrong to take a certain risk. Especially the *right* not to be exposed to certain risk is a point of ethical deliberations (e.g. when using the Internet, one might have the right not to be exposed to the risk of having ones personal information made public).

Value: An established working definition for value is: "an enduring belief that a specific mode of conduct or end-state of existence is personally or socially preferable to an opposite or converse mode of conduct or end-state of existence"¹³. Values are not solely morally defined, but can depend on cultural traditions, for example in the sense that one could consider "being a Christian" or "speaking ones native language" values. In software design, values can play a role in determining whether individuals or social groups can see their preferred modes of conduct or end-states of existence as being integrated or absent in their user-experience.

4 LOCI OF INNOVATION AND THEIR ETHICAL CHALLENGES

At this point, let us "zoom in" on the actual research that is being done at ADAPT. Although the general conceptual loci of innovation of application, interaction, personalisation, transformation and understanding give us anchor points for fathoming the general structure of the ADAPT Centre, the different areas of actual research are captured by what we will designate as domains. That is, whilst no researcher is likely to be working on "personalisation" in general, her research might be rightly characterised by stating that she works on "user-activity modelling" or "information retrieval". The characterisations of these domains are open to discussion, for at this point the required general overview engendered by ethicists will constantly need to be updated in accord with the state of the art of the domain and the actuality of the research. In this section, we will provide a schematic overview of the main ethical challenges for each locus of innovation and its domains in ADAPT. The domains displayed in **bold** are ones that are already surrounded by an extensive ethical discussion. Domains in *italics* on the other hand, are ones that have not triggered any substantive ethical debates yet. Domains in plain text are ones that are moderately taken up in ethical deliberations. This classification might be useful for identifying niches in the ethical discourse that are worthwhile inquiring into.

4.1 DIVERSE ETHICAL CHALLENGES: APPLICATION OF ADAPT RESEARCH

The locus of innovation of application in ADAPT's research is concerned with a context of use, with the application of digital content technologies in the everyday lives of the people using them. This context of use is made explicit in ADAPT by categorising the realm of use of technology into specific types of applications; being ICT, localisation, eCommerce & financial services, life sciences and pharmaceutical industry, learning technology industry and e-learning platforms and media, entertainment and games. The types of applications do

¹³ Rockeach, M. (1973). *The nature of human values*. Free Press. P.5



not constitute separate domains of research, for different research domains might be involved in the design of an IT application.

Since research aimed at creating applications can “branch” into a myriad of different, mostly commercial, technologies, the ethical challenges can be very diverse. For geo-localisation applications, challenges can arise from a balancing between personal privacy and freedom and security concerns¹⁴. Localisation applications (a different type of applications that use language technology for content localisation) can affect national or regional cultures and values¹⁵. For eCommerce & financial services, ethical challenges are connected to the changing moral relations between people in dealing with new monetary phenomena¹⁶. Applications in the life sciences and pharmacy industry have to deal with questions of trust and responsibilities that have to be embedded in the technologies¹⁷. E-learning applications have to deal with matters of balancing the merits and disadvantages of the classical modes of education with those of digital e-learning technologies¹⁸. Applications for media, entertainment and games deal with the question how morality shaped by virtual worlds can have consequences for the morality of real human agents¹⁹. A typical characteristic of innovations that are concerned with concrete applications is that the related ethical issues arise out of interplay between corporations, investors, researchers, policy makers and many other stakeholders. Therefore, when we aim at identifying ethical issues for technological applications, we will need to include a stakeholder analysis in order to show whether there are moral claims that remain underrepresented or unacknowledged²⁰. This also means that ethical considerations ought to play a role in the creation of academic-corporate partnerships. In case certain application domains show very high risks for ethical issues to arise (e.g. in health care), these considerations should play a role in determining the level of cooperation between academic and corporate partners in these domains (for instance by discussing what aspects of the developed technologies should and should not be shared between the partners)

4.2 MEDIATION BETWEEN PEOPLE AND DEVICES: INTERACTION

ADAPT also engages with the *interaction* between users, devices and software. This involves the interaction of different modalities (like text, video, figures etc.) on the Internet, human-computer interaction and also the interaction between hardware sensors, software and humans (e.g. through face recognition). General challenges in this locus of innovation are

¹⁴ Michael, K., Mcnamee, A., & Michael, M. G. (2006). The Emerging Ethics of Humancentric GPS Tracking and Monitoring. *Cultural Values*, (July), 25–27.

¹⁵ Bermann, S., & Wood, M. (2005). *Nation, Language, and the Ethics of Translation*. Princeton: Princeton University Press. P.200

¹⁶ Pryke, M., & Allen, J. (2000). Monetized time-space: derivatives – money’s “new imaginary”? *Economy and Society*, 29(2), 264–284. <http://doi.org/10.1080/030851400360497>

¹⁷ Davies, M. J., Collings, M., Fletcher, W., & Mujtaba, H. (2014). Pharmacy Apps : a new frontier on the digital landscape?, *12*(3), 1–11.

¹⁸ Greenhow, C., Robelia, B., & Hughes, J. E. (2009). Learning, Teaching, and Scholarship in a Digital Age: Web 2.0 and Classroom Research: What Path Should We Take Now? *Educational Researcher*, 38(4), 246–259. <http://doi.org/10.3102/0013189X09336671>

¹⁹ Søraker, J. H. (2012). Virtual Worlds and their Challenge to Philosophy. *Metaphilosophy*, 43(No. 4).

²⁰ Introna, L. D., & Pouloudi, A. (1999). Privacy in the Information Age: Stakeholders, Interests and Values. *Journal of Business Ethics*, 22(1), 27–38. P.36.



computer program bias²¹ (i.e. including racial traits in face recognition used for surveillance), privacy issues²² and the delegation of responsibilities to non-human actors²³. A more detailed picture arises by means of the focus on the domains involved:

- *Multimodal interaction* concerns the design of interaction between different modalities on the Internet. Modalities designate ways in which human-computer interactions are shaped; the way in which information is addressed to humans by computers. These modalities involve vision (video, pictures), audio (music, speech), and also touch (vibrations). Although not many ethical inquiries have been targeted at the modality dimension of human-computer interaction (multimodal interaction in a way being a sub-species of that domain), some authors talk about the importance of considering modality as an area of concern. It is claimed that discourses about events are shaped by the modality through which humans gain the information about those events (as the modality of *video* shaped the normative dimensions of the events on 9-11²⁴) and are therefore morally significant. While manipulation normative discourses can shape political debates and morally direct human beings²⁵, the design of multimodal interactions is laden with ethical concerns. Moreover, modalities might be targeted at certain societal groups, which might cause them to exclude groups as well. The detection and analysis of affect (incorporating knowledge about human emotions in order to make programs interact in a symbiotic way with the users) also plays an important role in multimodal interaction research. Researchers acknowledge the need for discussing the limits of technologies that deal with human emotions, notably with regard to the risk of losing a sense of “wonder” when reducing human feelings to automated processes²⁶. Similar concerns arise in the domain of sensory machine learning that will be subsequently discussed.
- *Sensory machine learning* is concerned with the interaction between hardware sensors, computer software and humans. This interaction is either being brought about actively (recording speech through a microphone, using touch to operate a computer) or passively (through automatic speech of face recognition). A challenge that has been identified in this discipline is the loss of responsibility in the case of passive sensory machine learning. If a system recognises a person and derives certain actions from

²¹ Friedman, B., Brok, E., Roth, S. K., & Thomas, J. (1996). Minimizing bias in computer systems. *ACM SIGCHI Bulletin*, 28(1), 48–51. <http://doi.org/10.1145/249170.249184>

²² Iachello, G., & Hong, J. (2007). End-User Privacy in Human-Computer Interaction. *Foundations and Trends® in Human-Computer Interaction*, 1(1), 1–137. <http://doi.org/10.1561/11000000004>

²³ Moon, Y., & Nass, C. (1998). Are computers scapegoats? Attributions of responsibility in human-computer interaction. *International Journal of Human-Computer Studies*, 49(1), 79–94. <http://doi.org/10.1006/ijhc.1998.0199>

²⁴ Wang, S. (2007). *Discourse and Technology: Multimodal Discourse Analysis (review)*. *Language* (Vol. 83). <http://doi.org/10.1353/lan.2007.0050>

²⁵ Poyraz, H. (2011). Seeking Morality in Media. *Turkish Journal of Business Ethics*, 4(8), 124–127.

²⁶ Hudlicka, E. (2003). To feel or not to feel: The role of affect in human-computer interaction. *International Journal of Human Computer Studies*, 59(1-2), 1–32. P.28 [http://doi.org/10.1016/S1071-5819\(03\)00047-8](http://doi.org/10.1016/S1071-5819(03)00047-8)



this recognition it seems unclear where the responsibility for these actions lies²⁷. Moreover, the “reading” of emotions by computer systems leads to specific privacy concerns²⁸. Emotions that have personal significance might be read without a user being aware of that. Additionally, computers might “write” emotions: they might react on human emotions in a favourable way, through an ability to persuade people of wanting things they would not want in the absence of nudging technologies²⁹.

- **Human-computer interaction** focuses on the interface through which humans access software processes. The features of computing systems through which the hardware and the software interact define interfaces. Multiple ethical challenges are connected to the ways in which interfaces are designed in order to bridge the gap between human and computer (software). Most notably, ethical inquiries focus on privacy concerns: on the access to sensitive personal information³⁰. Other ethical challenges have to do with the responsibility shaped by interfaces, as it is argued that the way interfaces are designed influence whether or not people assign responsibility to the computer or to themselves³¹. Finally, interfaces might instantiate certain biases resulting from cultural settings, technical restraints or from a certain use-context³². For example, an interface might be inaccessible for people with a lack of certain technical skills, causing a situation of social exclusion.

4.3 TUNING THE DIGITAL PERSON: PERSONALISATION

Going from the inter-personal level captured by interaction to the individual level, ADAPT focuses on the ways in which applications are used and the extent to which they can be personalised. This locus of innovation is concerned with customising applications in order to match the *preferences* of the user and with creating *personalised experiences*. Personalisation differs from the research field of interaction while it takes the individual person, or rather the user, as the focal point of research instead of the relation between people and devices. Also, personalisation is not to be confused with personal experience, while personal experience designates a first-person perspective and personalisation attempts to fit design to a user as conceptualised from a third-person point of view. One of the major ethical issues here

²⁷ Brignell, J. E. (1996). Future of intelligent sensors: A problem of technology or ethics? *Sensors and Actuators, A: Physical*, 56(1-2), 11–15. [http://doi.org/10.1016/0924-4247\(96\)01281-2](http://doi.org/10.1016/0924-4247(96)01281-2)

²⁸ Reynolds, C., & Picard, R. (2004). Affective sensors, privacy, and ethical contracts. *Extended Abstracts of the 2004 Conference on Human Factors and Computing Systems - CHI '04*, 1103–1106. <http://doi.org/10.1145/985921.985999>

²⁹ Picard, R. W., & Klein, J. (2002). Computers that recognise and respond to user emotion: Theoretical and practical implications. *Interacting with Computers*, 14(2), 141–169. [http://doi.org/10.1016/S0953-5438\(01\)00055-8](http://doi.org/10.1016/S0953-5438(01)00055-8)

³⁰ Brey, P. (2005). Freedom and privacy in ambient intelligence. *Ethics and Information Technology*, 7(3), 157–166. <http://doi.org/10.1007/s10676-006-0005-3>

³¹ Moon, Y., & Nass, C. (1998). Are computers scapegoats? Attributions of responsibility in human–computer interaction. *International Journal of Human-Computer Studies*, 49(1), 79–94. <http://doi.org/10.1006/ijhc.1998.0199>

³² Friedman, B., Brok, E., Roth, S. K., & Thomas, J. (1996). Minimizing bias in computer systems. *ACM SIGCHI Bulletin*, 28(1), 48–51. <http://doi.org/10.1145/249170.249184>



concerns the penetration of personalised technology into people's real-time activities and behaviour³³. Such intrusions of personalisation technology in people's lives can lead to tracking and surveillance practices without people's consent, leading to privacy concerns. Another issue concerns the way digital "persons" (more commonly referred to as "avatars") are constructed³⁴. Since avatars can harm each other (e.g. in the form of virtual theft), the ways they are constructed can yield moral consequences. A third major concern for personalisation is the scrutability of features of a program, which relates to the extent to which users are capable of controlling their user-experience. A lack of scrutability, it is argued, can lead to a sense of disempowerment³⁵. Finally, intersections of personalisation and commercialisation of data in cyberspace result in issues concerning the nature of online intellectual property³⁶.

- *Language simplification* is concerned with transforming digital contents in such a way that vast amounts of data become within easy grasp of a user. In other words, it refers to the ability of computers to simplify data in a meaningful way. In this area, ethical inquiries seem to be very rare. However, some authors reflect on the ethical implications of "simplification" in general, as a principle in the modelling of processes. These challenges can come from two ways: from the human who interprets simplified information wrongly and from the potential misuse of condensing information in a computing environment³⁷. For example, a system providing simplified information might be "blamed" in case this simplified information leads to erroneous decisions.
- **Ubiquitous computing** has drawn a lot of attention of ethicists despite the complexity of the concept (vaguely referring to computing being "everywhere"). It is closely related to the idea of the "Internet of things", which refers to a situation in which physical objects (electronic devices like TVs and coffee machines) are all interconnected through the Internet. Ubiquitous computing adds another layer to this idea by relating it to a user experience in which connected devices are "everywhere", by which they form an artificial environment. Ethical challenges that are identified in the literature are privacy concerns connected to overwhelming possibilities for surveillance and the disturbance of the connection between humans and their environment³⁸. If all devices surrounding us are connected to the Internet, they could

³³ Loch, K. D., Conger, S., & Oz, E. (1998). Ownership, Privacy and Monitoring in the Workplace: A Debate on Technology and Ethics. *Journal of Business Ethics*, 17(6), 653–663.

³⁴ Wolfendale, J. (2007). My avatar, my self: Virtual harm and attachment. *Ethics and Information Technology*, 9(2), 111–119. <http://doi.org/10.1007/s10676-006-9125-z>

³⁵ Ashman, H., Brailsford, T., Cristea, A. I., Sheng, Q. Z., Stewart, C., Toms, E. G., & Wade, V. (2014). The ethical and social implications of personalization technologies for e-learning. *Information Management*, 51(6), 819–832; p.824 <http://doi.org/10.1016/j.im.2014.04.003>

³⁶ Koepsell, D. (2003). Authorship and Artifacts : Remaking IP Law for Future Objects. In *Ontology of cyberspace* (pp. 127–175). Open court.

³⁷ Barlow, J. (2009). Simplification : ethical implications for modelling and simulation. *Complexity*, (July), 432–438.

³⁸ Bohn, J., Coroama, V., Langheinrich, M., & Mattern, M. (2005). Social, economic, and ethical implications of ambient intelligence and ubiquitous computing. *Ambient Intelligence*, 10(5), 5–29. http://doi.org/10.1007/3-540-27139-2_2



be used to monitor our actions: thereby greatly increasing surveillance opportunities. On a higher level of abstraction, ubiquitous computing is interpreted in light of geopolitical and social-economical features of our lives; stating that ubiquitous computing devices are aimed at overtaking many aspects of our daily lives³⁹. In that way, ubiquitous computing devices could turn humans into passive participants of a world designed to automatically respond to their needs. The primary ethical issues connected to this development are the loss of engagement and trust of humans in and with their environment. It is argued that more attention ought to be paid to underlying cultural and political assumptions in academic writings about ubiquitous computing⁴⁰.

- **User-activity modelling** designates the modelling of behaviour of users of computing devices in certain environments. In many different ways, devices can monitor the behaviour of individuals (their location, their movements etc.). The data from this can be used for modelling the behaviour and creating a generalised blueprint for certain groups (e.g. the behaviour of elderly people for health control⁴¹). Privacy concerns are amongst the main ethical problems because information about people's behaviour can be accessed without a person's consent⁴². In a situation of health care monitoring, questions are raised with regards to the balance between safeguarding privacy and receiving care⁴³. Moreover, monitoring can be used within a corporate environment, possibly leading to situations of alienation.⁴⁴ In the context of the research done at ADAPT, ethical issues arise out of methods that are developed to track the activity of human translators; for this form of tracking might lead to individuals being pressured in a professional environment (if their activity is constantly monitored) as well as to a misuse of intellectual effort of the human translators if they are not rewarded for their work.
- *Information retrieval* refers to methods used to gather information for a certain purpose from a collection of information resources. Ethical reflections on this practice are not numerous. Privacy issues are again a concern^{45,46}. Moreover, information bias

³⁹ Araya, A. a. (1995). Questioning ubiquitous computing. *Proceedings of the 1995 Computer Science Conference*, 230–237; p.237 <http://doi.org/10.1145/259526.259560>

⁴⁰ Dourish, P., & Bell, G. (2014). Reading Science Fiction Alongside Ubiquitous Computing. *Personal and Ubiquitous Computing*, 18(4).

⁴¹ Hine, N., Judson, A., Ashraf, S., Arnott, J., Sixsmith, A., Brown, S., & Garner, P. (2005). Modelling the behaviour of elderly people as a means of monitoring well being. *User Modeling 2005*, 151–151. http://doi.org/10.1007/11527886_32

⁴² Michael, K., Mcnamee, A., & Michael, M. G. (2006). The Emerging Ethics of Humancentric GPS Tracking and Monitoring. *Cultural Values*, (July), 25–27.

⁴³ Essén, A. (2008). The two facets of electronic care surveillance: An exploration of the views of older people who live with monitoring devices. *Social Science and Medicine*, 67(1), 128–136. <http://doi.org/10.1016/j.socscimed.2008.03.005>

⁴⁴ Andrejevic, M. B. (2011). Surveillance and Alienation in the Online Economy. *Surveillance & Society*, 8(3), 278–287.

⁴⁵ Goodman, K. W. (1995). Ethics, genomics and information retrieval. *Forum for Bioethics and Philosophy*, 26(3), 223–229.

⁴⁶ Lamming, M. G., & Newman, W. M. (1992). Activity-based Information Retrieval: Technology in Support of Personal Memory. *IFIP Congress*.



is an important issue, while it is argued that the method of information retrieval can discriminate between different sources of information in such a way that for example journalists are ill-informed⁴⁷. Certain ways of gathering information on the Internet (e.g. using certain search engines) can lead journalists to informational structures with a certain bias. For example, journalists can find information from a specific political party or from a specific country ranked highest in the search results when searching for “political scandal”.

4.4 TRANSLATING CONTENT: CREATING UNDERSTANDING

Moving away from the applications and into the ICT architecture that enables a myriad of applications to feed into the data they can process, ADAPT focuses on the *understanding* of global digital content, which predominantly revolves around the development of machine translation. This involves the translation of a human natural language into another human natural language through a computer program⁴⁸. An ethical issue that has been identified in the literature is the impact of machine translation on the process of globalisation as it might lead to a global culture of “sameness” in which cultural norms embedded in languages are translated through invisible automatic processes⁴⁹. Moreover, in case a program wrongfully translates value-sensitive information from one language to another, no translator can be held responsible⁵⁰. Another issue is the dominant role the English language plays in machine translation, while it creates a linguistic discrimination between the English language as a dominant factor vis-à-vis all other languages⁵¹. Focusing on the sub-fields of the field of understanding will provide a more comprehensive picture:

- *Machine translation* is concerned with optimising the automated, computerised process of translating one human natural language into another⁵². One of the problematic issues when trying to identify the ethical challenges of machine translation is the intimate relation between the ethical questions that can be raised and the very fundamental question: can it succeed? That is, the ethics relates to the feasibility of a machine translation that can adequately translate one natural language into another. It is argued that machine translation systems necessarily leave room for translation errors⁵³ due to their inability to relate to human practical life and to deal with hermeneutic elements in language like metaphors. The errors in the translations trigger the ethical issues, while they can incorporate cultural bias and cause situations of misunderstanding. Moreover, ethical concerns revolve around the question whether

⁴⁷ Garrison, B. B. (2000). Journalists’ Perceptions of Online Information-Gathering Problems. *J&MC Quarterly*, 77(3).

⁴⁸ Slocun, J. (1985). a Survey of Machine Translation : Its History , Current Status , and Future Prospects. *Computational Linguistics*, 11(1), 1–17.

⁴⁹ Cronin, M. (2003). *Translation and globalisation*. London: Routledge.

⁵⁰ Pym, A. (2003). Translational ethics and electronic technologies. In *VI Seminário de Tradução Científica e Técnica em Língua Portuguesa A Profissionalização do Tradutor*.

⁵¹ Raley, R. (2003). Machine Translation and Global English. *The Yale Journal of Criticism*, 16(2), 291–313. <http://doi.org/10.1353/yale.2003.0022>

⁵² Delavenay, É. (1960). *An Introduction to Machine Translation*. Library. Southampton; Camelot Press LTD. <http://doi.org/10.2307/3721978>

⁵³ Madsen, M. W. (2009). The Limits of Machine Translation.



machine translation systems can incorporate ethical decisions that human translators have to make in translating texts (e.g. they have to be sensitive to certain cultural interpretations)⁵⁴. In extreme cases, machine translation could also be used for criminal purposes if it is deployed to deliberately create distorted translations (for example by translating contracts and thereby altering the contractual clauses). At a more specific level, it is seen as an ethical concern that the input of human translators for the functioning of machine translation is not acknowledged, which leads to practices of exploitation of translators⁵⁵. Translators contribute to the proper functioning of machine translation systems without being recognised or compensated for it. Moreover, the use of machine translation systems by organisations that do not acknowledge the social context of these systems can lead to the reduction, or alienation of human translators, which means that they merely service these systems or are even completely replaced by them.

- *Multilingual information retrieval* invokes many of the same ethical considerations as information retrieval in general as discussed above under the heading of *personalisation*. Most of the ethical discussions in the area of multilingual information retrieval focus on the perceived benefits of the technology in overcoming the digital divide (the gap in ability between users of digital services of different cultural backgrounds)^{56 57}. However, some ethical issues are raised with regards to the perceived “neutrality” of the application of multilingual technologies. Morozov emphasises that we might falsely believe to tap into the cultures of other people while translated texts are still subjected to the “telephone game” effect in which some of the essence of the initial message gets lost in the transmission process⁵⁸.

4.5 DEALING WITH THE LANGUAGE: TRANSFORMATION OF CONTENT

Finally, ADAPT deals with the *transformation* of data structures. Research activities in line with this locus of innovation of the Centre deal with “a set of best practices for publishing and connecting structured data on the Web”⁵⁹ (Bizer, Heath & Berners-Lee, 2009). Basically, this involves a transformation of the established Internet paradigm of documents being linked to each other (a webpage containing hyperlinks to other webpages) to a new paradigm that includes the linking of heterogeneous data sets from different domains. For example, it enables the linking of data about people’s online behaviour to scientific data. Ethical issues linked to the transformation of data are issues of *accountability* of computational

⁵⁴ Kenny, D. (2010). The ethics of machine translation. *Proceedings of the XI NZSTI National Conference*, (1). P.5

⁵⁵ Ibid. p.9

⁵⁶ Abdelaziz Abid, & Radoykov, B. (2002). Access and Preservation in the Information Society. *Museum International*, 54(3), 64–72. P.68 <http://doi.org/10.1111/1468-0033.00390>

⁵⁷ Vikas, O. (2005). Multilingualism for Cultural Diversity and Universal Access in Cyberspace : an Asian Perspective. *UNESCO, 6-7 May 2005*, (May), 6–7. P.48

⁵⁸ Morozov, Evgeny. (2009). Iran: Downside to the “Twitter Revolution.” *Dissent*, 56(4), 10–14. P.11 <http://doi.org/10.1353/dss.0.0092>

⁵⁹ Bizer, C., Heath, T., & Berners-Lee, T. (2009). Linked data-the story so far. *International Journal on Semantic Web and Information Systems*, 5(3), 1–22. <http://doi.org/10.4018/jswis.2009081901>



procedures⁶⁰. Moreover, this field deals with semantics. Semantics involves the study of meaning of programming languages, the study of *what* it is programming languages represent (e.g. what actually happens when a program is executed on a real computer⁶¹). This can result in ethical challenges because formal semantic systems are liable to manipulation, which can cause them to create dangerous behaviour of computer systems⁶².

- *Deep learning* refers to a type of machine learning, which in turn designates the ability of a certain type of algorithms to engage in a learning process by making predictions on input-data. Although *ethical* reflections in this area are quite rare (in contrast with writings in philosophy about AI⁶³), some existing ethical discussions focus on the *ethics* of the machine learning process itself: on whether the decisions machines make can be considered to be ethical⁶⁴. An interesting question in this domain is concerned with the intersection of epistemology and ethics, namely: if machines are expected to act ethically, how can we make sure that the concepts a machine uses to base its actions on are compatible with human understanding of those concepts in ordinary language?⁶⁵ This consideration leads to ethical concerns, while a program might get to “learn” ethical principles that nonetheless inadequately work in practical situations (for example, the principle of “do no harm” can only be applied when a program can understand what constitutes harm in the real world).
- *Natural language processing* refers to the methods used to bring about interaction between computers (computer languages) and human natural languages (e.g. English). One of the main ethical issues with regards to natural language processing is the application of the technology in the context of human-computer cooperation (for example in a dialogue between humans and computing systems). It is argued that essential ethical features of inter-human dialogues like obligation and trust need to be incorporated in the design of dialogical systems using natural language processing⁶⁶, in order to avoid ethical issues. Moreover, in the creation of realistic interactions

⁶⁰ Diakopoulos, N. (2014). Algorithmic Accountability. *Digital Journalism*, (December), 1–18. <http://doi.org/10.1080/21670811.2014.976411>

⁶¹ Mosses, P. D. (2006). Formal Semantics of Programming Languages. *Electronic Notes in Theoretical Computer Science*, 148(1), 41–73. <http://doi.org/10.1016/j.entcs.2005.12.012>

⁶² Abramson, D., & Pike, L. (2011). When Formal Systems Kill: Computer Ethics and Formal Methods. *APA Newsletter on Philosophy and Computers*, 11(1), 1–19.

⁶³ Innovations in the context of new methods of data analysis and machine learning, as is at stake in this locus of innovation, are related to what is generally referred to as “Artificial Intelligence”; though they differ from AI research in the sense that they do not aim at simulating general intelligence. Nevertheless, some of the ethical concerns related to AI research are equally relevant. See also: Ahuja, P. (2013). Man and Machine: Questions of Risk, Trust and Accountability in Today’s AI Technology. *Indian Institute of Technology Delhi*.

⁶⁴ Anderson, M., & Anderson, S. L. (2007). Machine Ethics : Creating an Ethical Intelligent Agent. *AI Magazine*, 28(4), 15–26. <http://doi.org/10.1609/aimag.v28i4.2065>

⁶⁵ Moor, J. H. (2006). The Nature , Importance , and Difficulty of Machine Ethics. *IEEE INTELLIGENT SYSTEMS*.

⁶⁶ Allwood, J., Traum, D., & Jokinen, K. (2000). Cooperation, Dialogue and Ethics. *International Journal of Human-Computer Studies*, 53, 871–914; p.910



between humans and computing systems through natural language processing it is argued that the possibility of deception (falsely treating the system as an actual human being) and psychological damage by replacing humans with computing systems⁶⁷ pose ethical challenges.

- **Linked data** refers to “using the web to create typed links between data from different sources”⁶⁸. The technology can therefore be used to link different databases with heterogeneous sets of information in order to create new informational insights. It is able to do so by introducing the RDF (resource description framework) protocol in the architecture of the web next to the HTTP and URI technologies. One of the ethical challenges of this new fundamental aspect of the web is related to the universal openness and accessibility inscribed in its architecture at the cost of identification and authorisation of users⁶⁹. The linked data technology might amplify this architectural feature, which could lead to restrictions of people’s freedom by non-governmental parties that need to overcome the openness to operate (i.e. doing business). Other ethical challenges relate to the upcoming fields of data-mining and big data ethics. Big data technologies amplify the risk for individuals to lose grip on their personal data while all open personal data can be accessed through the new architecture; which creates great privacy issues⁷⁰. Moreover, linked data technology can amplify data mining techniques that allow for third parties to gather and structure personal data of users without the users being aware of it⁷¹.

By way of summary, a schematic overview is provided below of the different loci of innovation, the domains that operate within those and the main ethical challenges they present. Recall that the domains displayed in **bold** are ones that are already surrounded by an extensive ethical discussion. Domains in *italics* on the other hand, are ones that have not triggered any substantive ethical debates yet. Domains in plain text are ones that are moderately taken up in ethical deliberations.

Locus of innovation:	Domain:	Ethical Challenges:
a. Application	ICT, (Geo-) Localisation, Finance, Life sciences, Learning technology,	Privacy, freedom, trust, responsibility, novel moral relations, virtual morality

⁶⁷ Sharkey, N., & Sharkey, A. (2010). The crying shame of robot nannies: An ethical appraisal. *Interaction Studies*, 11(2), 161–190. <http://doi.org/10.1075/is.11.2.01sha>

⁶⁸ Bizer, C., Heath, T., & Berners-Lee, T. (2009). Linked data-the story so far. *International Journal on Semantic Web and Information Systems*, 5(3), 1–22. P.2 <http://doi.org/10.4018/jswis.2009081901>

⁶⁹ Naughton, J. (2000). *A Brief History of the Future: The Origins of the Internet* (Vol. 7). London: PHOENIX PAPERBACK. P.269 <http://doi.org/10.1177/1744935912438311>

⁷⁰ Richards, N. M., & King, J. H. (2014). Big Data Ethics. *Wake Forest Law Review*, 1881(January). P.426 <http://doi.org/10.1177/2053951714559253>

⁷¹ Van Wel, L., & Royakkers, L. (2004). Ethical issues in web data mining. *Ethics and Information Technology*, 6(2), 129–140. <http://doi.org/10.1023/B:ETIN.0000047476.05912.3d>



	Entertainment media	
b. Interaction	<i>Multimodal interaction,</i> Sensory machine learning, Human-computer interaction,	Privacy, responsibility of technological systems, bias in computing
c. Personalisation	<i>Language simplification,</i> ubiquitous computing, user-activity modelling, <i>information retrieval</i>	Intellectual property rights, virtual harm, surveillance, scrutability
d. Understanding	<i>Machine translation,</i> <i>multilingual information retrieval</i>	Ethics of translation, responsibility, information bias
e. Transformation	<i>Deep learning,</i> natural language processing (semantics), linked data	Program accountability, risk for manipulation, harmful computer behaviour

Table 1: Overview of the ethical challenges in ADAPT, organised according to the different loci of innovation and research domains.

4.6 PRIVACY & INTELLECTUAL PROPERTY RIGHTS

The abovementioned analysis is concerned with identifying ethical challenges according to the specific research domains in ADAPT. Some of these challenges are *horizontally* present in specific domains, in the sense that they belong to one domain but not to another (e.g. the ethics of translation in the domain of machine translation). Some challenges, however, can be said to be relevant for all the research in the ADAPT Centre; the most prominent ones being privacy and intellectual property rights. These issues can be said to be present *horizontally* throughout the project. That is, irrespective of the locus of innovation all research undertaken by ADAPT needs to take these issues into account. We will shortly discuss the relevance of these issues and ways in which ADAPT deals with them in particular.

Privacy is a main issue for ADAPT since the research focuses on user engagement, on the engagement of *people* with digital content. The research generally deals with digital content that is user-generated: that originates at some point from a human input (either as text, pictures, video or audio). User-generated content frequently contains *personal* information: information about ones location, activities, feelings, etc. This specific kind of information, unlike other information on the web like stock market fluctuations, weather forecasts and journalist reports, is especially likely to involve privacy issues. For example, third parties might misuse information about ones personal location (robbing a house when the owner is not at home), about ones personal activities (checking on one’s social media pictures before interviewing him or her for a job) or about ones feeling (checking whether your kids are lying to you). The ADAPT Centre deals with the issue of privacy in two ways. First of all, privacy is the topic of a conceptual and normative debate within the Centre. Questions like: “what is privacy?”, “what are the ethical consequences of privacy breaches?”, “how can we integrate privacy concerns in the education and the work of the researchers?” will guide this debate. Secondly, the ADAPT Centre aims at integrating privacy issues with technological solutions by investigating ways in which to “hard-code” privacy. For example,



it investigates ways in which privacy policies can be made part of authorisation protocols so privacy rights of users can automatically be protected⁷².

Intellectual property (IP) rights are closely related to the issue of privacy, for they concern the control and ownership of user-generated content by the people who create it. Although IP rights issues are generally discussed in the legal sciences, they have regained momentum in philosophy and ethics in the recent years; notably due to advances in ICTs (a prominent example is David Koepsell's book *Ontology of Cyberspace* (2003)). Issues that relate to IP rights are the status of online labour of the users of ICTs (whether one is entitled to the fruits of one's online work), consequent issues of online inequality (can the "free" work of Internet users be indefinitely exploited by large companies) and the just organisation of the online economy. Because the ethical discussion of IP rights is not merely concerned with existing laws (what *is*) but more importantly with making sense of the idea of intellectual property on the Internet (what *ought to be*), it relates not just to regulations but also to economic, political and technological concepts. For instance, it is concerned with the status of the digital commons as opposed to online property⁷³ and with balancing information privacy with strengthening the information economy⁷⁴.

⁷² Chadwick, D. W., & Fatema, K. (2012). A privacy preserving authorisation system for the cloud. *Journal of Computer and System Sciences*, 78(5), 1359–1373.

<http://doi.org/10.1016/j.jcss.2011.12.019>

⁷³ Greco, G. M., & Floridi, L. (2004). The tragedy of the digital commons. *Ethics and Information Technology*, 6(2), 73–81. <http://doi.org/10.1007/s10676-004-2895-2>

⁷⁴ Samuelson, P. (2000). Privacy As Intellectual Property? *Stanford Law Review*, 52(5), 1125–1173. <http://doi.org/10.2307/1229511>



5 DEVELOPING ETHICS RESEARCH IN ADAPT

Building on the previous analysis, this section discusses ways in which the ethical issues in ADAPT can be examined and presents contemporary methods to deal with ethics in large research projects. Firstly, we will frame the discussion about ethics as it might take place in ADAPT by briefly discussing the possible theoretical frameworks that allow for judging *why* an identified issue is ethically problematic and by discussing the public and education dimension of the ethics research. Secondly, we will briefly reflect on the current state of the art in ethics assessment in large research projects and on ways in which ADAPT could differentiate itself to bring new ethical insights and practices to the fore.

5.1 DEALING WITH THE ETHICAL CHALLENGES IN ADAPT

In the previous section, we discussed the different loci of innovation in the ADAPT Centre and the related ethical challenges that might need to be addressed. However, we have not yet indicated *why* these are actually *ethical* challenges; why they concern normative questions of right and wrong. Although privacy and responsibility easily call upon our common sense as issues that might be either rightfully or wrongfully dealt with, one of the purposes of doing ethics is to show why, if at all, this can be said to be the case. In this section, we will lay down the groundwork for the future discussions within the Ethics and Privacy Working Group (EPWG) of the ADAPT Centre.

5.1.1 THEORETICAL FRAMEWORKS

In recent years, a number of theoretical frameworks have recurrently been applied to ethical issues in technology, or specifically in information technologies. Six frameworks might be said to dominate these ethical debates. We will shortly discuss these frameworks by considering their main approaches and stipulating the ways in which they allow for investigating the ethical significance of certain issues related to the technological innovation. In ADAPT, these frameworks will function as frames of reference for the continuous deliberations of ethical issues arising out of the technological innovations that are developed in the Centre. Moreover, they will be used as groundwork for bringing about methodological innovations in the ethics research.

Classical ethical theories: Two main classical ethical theories that are frequently applied to ethical issues concerning technological innovations are *consequentialism* and *deontology*. In the framework of consequentialism, one tries to balance the beneficial and harmful consequences of a technology in order to arrive at the greatest good for the greatest number of people. In the framework of deontology, one tries to reason from the idea of duties that are conceptually defined and that ought to inform any action performed by and through a technology. Often, a combination of these theories informs a framework for investigating technological innovations, as is the case in Moor⁷⁵ (1999) who argues that a framework of consequentialism that is kept in check by a deontological conception of justice is most suitable for reasoning about the ethical impact of computing technologies.

⁷⁵ Moor, J. H. (1999). Just consequentialism and computing. *Ethics and Information Technology*, 1(1), 61–65. <http://doi.org/10.1023/A:1010078828842>



Actor Network Theory: In the field of Science and Technology Studies, which combines a philosophical approach to technological innovations and historical and sociological studies of technology, actor network theory (originating from the works of Bruno Latour (reference)) is the most used theoretical framework. The ethical issues identified by actor network theory are the result of detailed descriptions of so-called sociotechnical systems. By analysing how networks of “actors” are constituted, which includes both humans (engineers, policy makers) and technologies (infrastructures, code), underlying relationships are revealed which can form the basis for constructing an ethical critique of the sociotechnical system⁷⁶.

Capability approach: The capability approach originates from the work of economist and philosopher Amartya Sen⁷⁷ and has been further developed by Martha Nussbaum⁷⁸. It is a theoretical framework that allows for investigating “computer technologies in terms of their contribution to people’s abilities to define and lead lives that they value”⁷⁹. The starting point for any analysis lies in defining a set of basic capabilities (e.g. being able to live to the end of a human life of normal length, being able to be involved in political decision-making), conceptualised as minimum requirements that need to be taken into account for people to be able to live good and fulfilled lives. One can analyse issues related to information technologies by scrutinizing their effect on human capabilities.

Principlism: The method of principlism provides for a way of ethical reasoning that is based on a core set of ethical principles that are not limited by any particular case or by theoretical constraints⁸⁰. Principles that are used in order to analyse the ethical implications of a technological innovation are for example “beneficence” and “respect for persons”. These principles can guide the ethical analysis in the sense that one can judge for example whether “respect for persons” is warranted in the context of use of a certain technology. With regards to technological innovations in ICT, a reflexive approach to principlism can be said to be most fruitful, which implies that a researcher cultivates the habit of reflecting on both the technological case at hand (the technology she develops) and the ethical framework (the principles she ought to take into account)⁸¹.

⁷⁶ Doolin, B., & Lowe, A. (2002). To reveal is to critique: Actor-network theory and critical information systems research. *Journal of Information Technology*, 17(2), 69–78.

<http://doi.org/10.1080/02683960210145986>

⁷⁷ Sen, A. (2007). Capability and Well-being. In D. M. Hausman (Ed.), *The Philosophy of Economics* (pp. 270–285). Cambridge: Cambridge University Press.

<http://doi.org/10.1017/CBO9780511819025>

⁷⁸ Nussbaum, M. (2003). Capabilities As Fundamental Entitlements: Sen and Social Justice. *Feminist Economics*, 9(2-3), 33–59. <http://doi.org/10.1080/1354570022000077926>

⁷⁹ Johnstone, J. (2007). Technology as empowerment: A capability approach to computer ethics. *Ethics and Information Technology*, 9(1), 73–87. P.86 <http://doi.org/10.1007/s10676-006-9127-x>

⁸⁰ Beever, J., & Brightman, A. O. (2015). Reflexive Principlism as an Effective Approach for Developing Ethical Reasoning in Engineering. *Science and Engineering Ethics*.

<http://doi.org/10.1007/s11948-015-9633-5>

⁸¹ Ibid. p.7



Postphenomenology: One of the upcoming approaches in the philosophy and ethics of technology is the postphenomenological approach aimed at understanding the relation between humans and technology^{82 83}. Instead of taking an ethical theory or certain ethical principles as starting points, this approach departs from conceptualising the *kind* of relation that is constituted by the use of a technology. For example, it is claimed that glasses constitute an *embodied* experience (we experience the world *through* them as if they are a part of our body) and it is claimed that a thermometer constitutes a *hermeneutic* experience (we experience the world by *reading and interpreting* a technology). The ethical issues, according to this approach, arise out of the relation between humans and technology; rather than out of considerations of human actions. As such, technologies are not morally neutral in the sense that they can influence people's behaviour in ways that can be right or wrong.

Value sensitive design: "Value Sensitive Design assumes that values and normative assumptions can somehow be incorporated, embodied in designs"⁸⁴. This method, which is specifically aimed at the design of software, tries to trace values that are coded into the design of software (e.g. certain biases towards user-stereotypes) and to find ways to alter the design of the software to accommodate possible ethical concerns arising out of the presence or absence of values. The overall aim of Value Sensitive Design is to integrate the considerations of implicit values encoded in software into the design process of the software.

5.1.2 PUBLIC AND EDUCATIONAL DIMENSIONS OF ETHICS IN ADAPT

The purpose of embedding ethics research in a technological research centre is not solely to identify ethical issues and to discuss them within an ethical framework. Perhaps the most important aim of the ethics research is to *do* something with the information gained by scrutinising ethical concerns. The ADAPT Centre will aim at transforming knowledge about ethical issues into practical actions in two different ways: by engaging the public and by focusing on education; for students dealing with the ADAPT Centre research and for the ADAPT researchers.

With regards to the engagement of the public with ethical issues related to the research done at the ADAPT Centre, three main rationales can be distinguished: an instrumental, a substantive and a normative rationale⁸⁵. The *instrumental* rationale is related to a pre-defined goal of the Centre; for example gaining public trust in the research. If the public recognises that ethical issues are acknowledged and that the Centre tries to deal with them, this will create a greater trust in the researchers and the technologies that are developed at ADAPT. The *substantive* rationale relates to the argument that public engagement will actually improve the research itself, for example in the realm of decision-making (the implementation of technologies will find less resistance if the public has been involved

⁸² Ihde, D. (2009). *Postphenomenology and Technoscience*. New York: Sunny Press.

⁸³ Verbeek, P.-P. (2005). *What things do; philosophical reflections on technology, agency, and design*. Pennsylvania: Pennsylvania University Press.

⁸⁴ Hoven, J. van den. (2008). Moral methodology and information technology. In K. E. Himma & H. T. Tavani (Eds.), *The Handbook of Information Systems Research*. John Wiley & Sons, Inc. p.61 <http://doi.org/10.4018/978-1-59140-144-5>

⁸⁵ Delgado, a., Lein Kjolberg, K., & Wickson, F. (2011). Public engagement coming of age: From theory to practice in STS encounters with nanotechnology. *Public Understanding of Science*, 20(6), 826–845. P.5 <http://doi.org/10.1177/0963662510363054>



throughout the implementation process). Finally, the *normative* rationale relates to the idea that engaging the public is the *right* thing to do. Since emerging technologies can have a profound impact on people’s lives, involving them in these changes acknowledges their position as human beings that should be capable of influencing their life world. With the abovementioned reasons in mind, the ADAPT Centre will put effort into engaging the public with the ethical issues connected with the work in the Centre.

The other way in which ADAPT aims at translating ethical research into actions is by engaging the researchers with the ethics of their work. This can be done by integrating ethical aspects in the formal education of students as well as in the work of the researchers. Research shows that teaching of moral reasoning skills can significantly improve ethical behaviour of engineering students⁸⁶. Moreover, it is argued that the input of engineers is crucial with regards to the inquiry into the ethical issues of ICTs⁸⁷. In order to engage students and researchers, ADAPT can play a role in designing and implementing components of ethics in computer science curricula. Additionally, it can explore ways in which dealing with ethical concerns can be made part of the everyday work of the researchers, for example by building on the methods that are stipulated by the Value Sensitive Design approach.

5.2 STATE OF THE ART ETHICS RESEARCH IN LARGE RESEARCH PROJECTS

In large research initiatives similar to the ADAPT Centre, different measures are taken to deal with the ethical issues embedded in the work of the researchers. In the following overview, we will specifically focus on research initiatives at the EU level that revolve around consortia of universities and research institutes involved in ICT research. Overall, the approaches to ethics in these projects can be divided into three different categories:

- The creation of codes of conduct, ethics manuals or codes of ethics
- The creation of an overview of the ethical issues within a project, often by following a specific theoretical framework
- Involving relevant stakeholders to identify and assess the ethical issues of the technology that is being developed.

In large research projects different combinations of these approaches to deal with the ethical issues can be found. We categorised the projects according to the main focus of the documents that are concerned with the ethics of the research. In the following section, we will present basic information about the projects we included in this inquiry. Based on this information, we will discuss the methods for ethics integration that are used in these projects. Furthermore, we will discuss criticisms aimed at these methods in order to find ways to advance these existing methodologies.

5.2.1 RESEARCH PROJECTS FOCUSED ON CODES OF CONDUCT AND ETHICS MANUALS

Project name:	Project Aim:	Example privacy statement:
Veritas	“To conduct research and	“The participants are told the

⁸⁶ Self, D. J., & Ellison, E. M. (1998). Teaching Engineering Ethics : Assessment of Its Influence on Moral Reasoning Skills. *Journal of Engineering Education*, (January). P.32

⁸⁷ Brey, P. (2000). Method in computer ethics: Towards a multi-level interdisciplinary approach. *Ethics and Information Technology*, 2, 125–129.
<http://doi.org/10.1023/A:1010076000182>



	development of an open framework for providing built-in accessibility support at all the stages of realisation of mainstream ICT and non- ICT technologies” ⁸⁸ .	extent to which their personally identifiable private information will be held in confidence” ⁸⁹ .
Bioshare	“Aims to facilitate data harmonisation and standardisation, data sharing and pooling across multiple bio banks and databases” ⁹⁰ .	“Comply with applicable privacy and data protection regulations at every stage of data sharing, and be in a position to provide assurances to citizens that confidentiality and privacy are appropriately protected when data are collected, stored, processed, and exchanged” ⁹¹ .
Promenpol	“Developing useful tools to assist relevant practitioners/professionals, in three settings, create mental health positive environments and activities with a view to promoting and protecting the mental health of participants in each context, i.e. schools, workplaces and residences for older people” ⁹² .	“At no stage will personal or health related data be stored on any of the clientele within the three settings of concern to the project” ⁹³ .
Biomedbridges	“To better enable researchers to access data, increasing its utility with the ultimate goal of benefiting society, for example by facilitating new discoveries in health research and by allowing re-analysis of expensive, rare or unrepeatable investigations, while continuing to protect the interests of research participants with regard to their privacy and confidentiality” ⁹⁴ .	“In some areas of the project, the level of detail of data held on a participant may be such that it will be unique to that participant and thus, if linked to other non-anonymised data, could potentially be used to identify the participant. This raises important privacy protection issues. As such, data held within the project

⁸⁸ Delahaye, M., Kolodyazhniy, V., & Graf, M. (2010). *Veritas Ethics Manual* (No. D414). P.5

⁸⁹ Ibid. p.12

⁹⁰ Bioshare website. <https://www.bioshare.eu/content/our-mission>, retrieved on 12-08-2015

⁹¹ Bioshare. (2014). *Ethico-legal code of conduct for research* (No. Deliverable 3.4).

⁹² Work Research Centre. (2006). *ProMenPol Ethical Vision and Guidelines*. P.5

⁹³ Ibid. p.10

⁹⁴ BioMedBridges. (2014). *Ethical Governance Framework*. P.5



		must always be linked or unlinked anonymised” ⁹⁵ .
I2Web	To “develop prototypes in three application domains: Web 2.0, Ubiquitous and Mobile Web and IPTV/WebTV” ⁹⁶	“Treatment of data is governed not only by professional ethics, but by the data protection legislation and directives of the partner countries and the EU” ⁹⁷
Peerassist	“To develop a flexible platform will facilitate establishing on demand ad-hoc communities with friends, family, neighbours, caregivers, etc., based on shared interests and communication needs” ⁹⁸ .	“The system shall provide authentication and anonymity mechanisms ensuring users’ privacy and protecting from impersonation attacks” ⁹⁹ .
Sensation	To “develop technologies to monitor brain state and other bio-parameters unobtrusively through the development of novel sensor technologies, innovative signal processing and computational intelligence algorithms, with a special focus on sleep time/environment as well as real time applications (alertness monitoring, detection and prediction), including medical applications” ¹⁰⁰ .	“The second ethical issue concerns the proposed SENSATION novel tools, as well as the use of the research data, in a way that guarantees privacy and state of the art therapy according to local and European law” ¹⁰¹ .

Table 2: Overview of large research projects that integrate ethics by focusing on codes of ethics or setting up ethics manuals.

One of the common approaches for dealing with ethical challenges in large research projects is the formulation of a code of conduct, an ethics manual or a code of ethics. The abovementioned table provides an overview of seven research projects that deal with ethics in this way. Except for Veritas and I2Web, these projects are concerned with ICT applications in biomedical and health contexts. What is common to most of these projects is that (1) they generally do not include a consideration of ethical frameworks that could guide the formulation of principles, (2) they often conflate legal requirements with ethical guidelines and (3) they state their principles in the form of imperatives (“we shall...”, “we will...”, “this

⁹⁵ Ibid. p.11

⁹⁶ I2Web website. <http://i2web.eu/objectives.html>, retrieved on 12-08-2015

⁹⁷ Petrie, H., Collin, S., & Gallagher, B. (2011). *I2Web Ethics Handbook*. P.8

⁹⁸ Morales, B., Xenakis, C., & Christopoulos, E. (2009). *Ethical issues and Data Protection Plan* (No. D1.3.). p.4

⁹⁹ Ibid. p.7

¹⁰⁰ Bullinger, A., Senn, T., Bekiaris, E., Maglavera, S., & Kumar, A. (2007). *Ethics Manual* (No. D5.6.2) (Vol. 76). P.4

¹⁰¹ Ibid. p.4



must be...”). We extracted some central statements on the issue of privacy from the projects to provide for a basis for comparison. As can be observed, it is generally stated that the research will be in line with privacy legislation relevant in the EU, *that* certain privacy concerns will be taken care of and which actions are taken to deal with these concerns. The advantage of such codes of ethics and ethics manuals is that they can provide practical information and formal guidelines with respect to the rules that ought to be followed. This means that they can to some extent be used as a frame of reference for researchers, to validate whether their work complies with the relevant formal ethical requirements.

Criticism: The use of codes of ethics and ethics manuals receives a fair amount of critique. For instance, it is argued that such codes should be regarded primarily as “valuable *starting points*” for safeguarding ethical behaviour but should not be used as isolated check-boxes indicating that ethical issues are taken into account¹⁰². Moreover, it is argued that codes of ethics are very similar on an organisation-to-organisation basis; which suggests that they are often treated as legal requirements rather than as normative constructs¹⁰³. Indeed, it seems that stating *that* a project will adhere to privacy regulations appears to be partly redundant. Lastly, codes of ethics or ethics manuals typically don’t offer a rationale for *why* ethical standards should be formulated and implemented. It is commonly merely assumed that certain issues are ethically relevant. In some research projects, the inadequacy of codes of ethics as a sole instrument for the integration of ethics is explicitly acknowledged¹⁰⁴, which in such cases leads to an argument in favour of expanding the ethical analysis.

5.2.2 RESEARCH PROJECTS FOCUSED ON ETHICS OVERVIEWS

Name of the project:	Project aim:	Framework/Methods used:
Bridge	“The overall goal of this research is to enable qualitative improvement in large- scale multi-agency emergency response and to identify and mitigate negative impact” ¹⁰⁵ .	<ul style="list-style-type: none"> • Virtue ethics • Disclosive ethics¹⁰⁶ • Principlism

¹⁰² Wood, G., & Rimmer, M. (2003). Codes of ethics: what are they really and what should they be? *International Journal of Value-Based Management*, 16(1989), 181–195. Emphasis added; <http://doi.org/10.1023/A:1024089509424>

¹⁰³ Forster, M., Loughran, T., & McDonald, B. (2009). Commonality in codes of ethics. *Journal of Business Ethics*, 90(SUPPL. 2), 129–139. <http://doi.org/10.1007/s10551-010-0380-x>

¹⁰⁴ See for instance Casanovas, P. (2013). *CAPER: Ethical Best Practices guidelines. Collaborative Information, Acquisition, Processing, Exploitation and Reporting for the prevention of organised crime.*

¹⁰⁵ Büscher, M., Liegl, M., Wahlgren, P., Ausen, D., & Vlachogiannis, E. (2015). *BRIDGE Ethical, Legal and Social Issues : Current practices in Multi Agency Emergency Collaboration* (No. D12.02). p.12

¹⁰⁶ “Disclosive ethics” is a recently developed methodology, which focuses on identifying ethical concerns in a multidisciplinary setting. See also: Brey, P. (2000). Method in computer



CAPER	“The goal of the CAPER project is to create a common platform for the prevention of organised crime through sharing, exploitation and analysis of Open and private information sources” ¹⁰⁷	<ul style="list-style-type: none"> • Privacy impact assessment • Privacy by design
MIAUCE	“The project aims to investigate and develop techniques to analyse the multi-modal behaviour of users within the context of real applications. The multi-modal behaviour takes the form of eye gaze/fixation, eye blink and body move.” ¹⁰⁸	<ul style="list-style-type: none"> • Principlism
Surveille	“SURVEILLE systematically reviews the impacts of different surveillance systems, and also helps manufacturers and end-users better to develop and deploy these systems.” ¹⁰⁹	<ul style="list-style-type: none"> • Ethics matrix/principlism • Privacy by design • Scenario study
Humaine	“HUMAINE aims to lay the foundations for European development of systems that can register, model and/or influence human emotional and emotion-related states and processes - 'emotion-oriented systems'.” ¹¹⁰	<ul style="list-style-type: none"> • Principlism
IPerG	“The aim of IPerG has been the creation of entirely new game experiences, which are tightly interwoven with our everyday lives through the objects, devices and people that surround us and the places we inhabit.” ¹¹¹	<ul style="list-style-type: none"> • Principlism • Value sensitive design

ethics: Towards a multi-level interdisciplinary approach. *Ethics and Information Technology*, 2, 125–129. <http://doi.org/10.1023/A:1010076000182>

¹⁰⁷ <http://www.fp7-caper.eu/>, Retrieved on 20-08-2015

¹⁰⁸ http://cordis.europa.eu/project/rcn/79446_en.html, Retrieved on 20-08-2015

¹⁰⁹ http://cordis.europa.eu/project/rcn/102644_en.html, Retrieved on 20-08-2015

¹¹⁰ <https://www5.cs.fau.de/research/projects/humaine-human-machine-interaction-network-on-emotion/>, Retrieved on 20-08-2015

¹¹¹ <http://www.pervasive-gaming.org/index.php>, Retrieved on 20-08-2015



Ethicbots	“The ETHICBOTS project is concerned with the unifying features in the ethics of human interactions with intelligent systems which are themselves machines or comprise machine parts. Intelligent systems that are as a whole or in some of their parts identified as machines are a relatively recent acquisition of human scientific and technological undertakings” ¹¹² .	<ul style="list-style-type: none"> • Principlism • Hermeneutics
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Table 3: Overview of large research projects that integrate ethics by focusing on providing an overview of ethical issues according to frameworks or methods for ethics assessment.

An increasing number of research projects include a *reasoned* overview of ethical issues in their work, which is often followed by a code of ethics or by ethical guidelines. This means that ethical frameworks and methods are used in order to extract ethical challenges from the aspects of the technological research. As can be observed in the abovementioned overview, principlism is the most common approach in our sample of research projects. This might be so because of the practical nature of the principlism approach, in which the reasons for identifying ethical issues can be distilled from principles that are well-established; both in the academic literature and in common sense approaches to ethics. However, some of the innovative insights in the projects that we examined come from the application of different approaches, as for example in the Bridge project where the main question was “what virtues are right for disaster response?”¹¹³. Such investigations into personal virtues that need to be incorporated in a technology is not common but could lead to illuminating novel insights. The MIAUCE project is closely related to ADAPT in terms of the content of the research, which makes it into a valuable source for our ethics research in the locus of innovation of personalisation.

Criticism: With regards to presenting an overview of ethical issues, a broad range of problems can be identified. In the context of medical technology assessment, it is argued that ethics research has taken the form of another problem-solving technology (“this is the ethical problem, this is our method, this is our technological solution”) rather than a critical field of reflection. In addition, it is argued in a particular study focusing on empirical mapping in business ethics that often no clear methods are used and that the ethical concepts are poorly elaborated upon¹¹⁴. However, when ethical frameworks and methods are used properly, as is the case in some of the projects we examined, the identification of the ethical challenges can

¹¹² Tamburrini, G., & Datteri, E. (2006). *Ethicbots: D2: Methodology for the identification and analysis of techno-ethical issues. Ethicbots*. P.9

¹¹³ Büscher, M., Liegl, M., Wahlgren, P., Ausen, D., & Vlachogiannis, E. (2015). *BRIDGE Ethical, Legal and Social Issues: Current practices in Multi Agency Emergency Collaboration* (No. D12.02). p.59

¹¹⁴ Randall, D. M., & Gibson, a. M. (1990). Methodology in Business Ethics Research: A Review and Critical Assessment. *Journal of Business Ethics*, 9(6), 457–471. <http://doi.org/10.1007/BF00382838>



turn out to be well founded. It seems that a reflection on different methodologies can already strengthen the ethical analysis. Nevertheless, a major problem that remains with these approaches to ethics is the frequent lack of active translation of ethical issues into ethically responsible solutions. Often, a project states that researchers will do their best to avoid the ethical issues that are identified or that they will adhere to the code of ethics. This does not show any *active* approach to deal with the issues, but rather a two-sided approach in which ethicists examine the research and the researchers are expected to passively follow their lead to avoid the ethical issues in their work.

5.2.3 RESEARCH PROJECTS FOCUSED ON STAKEHOLDER ANALYSIS AND INVOLVEMENT

Name of the project:	Project aim:	Approach for stakeholder involvement:
Hermes	“The HERMES project will provide novel assistive technology for integrated cognitive care through intelligent and non-obtrusive systems and associated cognitive training games, with the aim of reducing age-related decline of the elderly cognitive capabilities” ¹¹⁵ .	<ul style="list-style-type: none"> • Interviews with project participants and relevant stakeholders
BUTLER	“The goal of the project BUTLER –as stated in the DOW- is an ubiquitous, secure internet-of-things with location and context awareness” ¹¹⁶ .	<ul style="list-style-type: none"> • MEESTAR (see below) • End user interviews
Accompany	“The proposed ACCOMPANY system will consist of a robotic companion as part of an intelligent environment, providing services to elderly users in a motivating and socially acceptable manner to facilitate independent living at home.” ¹¹⁷	<ul style="list-style-type: none"> • Interviews with 21 focus groups of potential users across 3 EU countries.
EU Robotics	“The general objective of this coordination action is to act and find ways to favour the development of European robotics. One of the task to reach this objective is to identify obstacles hindering the development of robotics with a specific focus on service robotics and to propose actions facilitating the developments of	<ul style="list-style-type: none"> • Workshop about societal issues with the robotics community • Survey for the general public

¹¹⁵ Dittenberger, S., Geven, A., Holler, N., & Tscheligi, M. (2008). *HERMES: D.8.2 Persuasive Ethics guide. HERMES – Cognitive Care and Guidance for Active Aging*. P.4

¹¹⁶ Liebrand, K., Moser, K., Kusli, S., Copigneaux, B., Gall, F. Le, Smadja, P., ...

Melakessou, F. (2013). *BUTLER: Ethics, Privacy and Data Protection in BUTLER*. P.10

¹¹⁷ <http://accompanyproject.eu/>, Retrieved on 20-08-2015



	robotics activity in Europe in terms of research, development, innovation, market or usage. ¹¹⁸ ,	
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Table 4: Overview of large research projects that integrate ethics by focusing on engaging relevant stakeholders in the ethics assessment process.

The integration of ethics in research projects is not always a purely theoretical exercise, because a number of projects we examined combine ethical theories and literature on applied ethics in their specific research fields with empirical data. Those projects often try to engage stakeholders in their research (e.g. by conducting interviews and monitoring user expectations). Some projects use empirical data from third sources like surveys of the European Commission and conduct consultations with experts. Other projects go even a step further and organise sessions with stakeholders to identify ethical issues according to a certain theoretical framework (Manzeschke, Weber, Rother, & Fangerau, 2013 - a project that deals with the ethical aspects of ambient technologies for elderly people¹¹⁹). Theoretical frameworks that are used in these kinds of projects are a valuable source of information for the ethics in ADAPT. Such frameworks are for example the MEESTAR model¹²⁰, which includes seven *dimensions* for the evaluation of technologies (e.g. care, safety,...) and the ETHICS model that includes methods for ethics consultation, representation of stakeholders and consensus-building in debates surrounding ethical problems¹²¹.

Criticism: Researchers reflecting on stakeholder engagement argue that engagement cannot be directly linked to responsible treatment of stakeholders¹²². By involving stakeholders in the design process of a technology changes in the design are by no means guaranteed, often due to the unspecific nature of stakeholder demands. Moreover, it is argued that stakeholder engagement cannot push for radical agendas that might be needed, due to the weight of organisational stakes¹²³. When internal design related goals and external stakeholders goals conflict, proposed design changes are likely to be insufficiently accounted for¹²⁴. This is to some extent the result of the issue that stakeholder engagement generally takes place after the design phase of a technology.

¹¹⁸ Leroux, C., & Labruto, R. (2012). *EU Robotics D3.2.1 Ethical Legal and Societal issues in robotics* (No. 248552). P.5

¹¹⁹ Manzeschke, A., Weber, K., Rother, E., & Fangerau, H. (2013). *Ethische Fragen im Bereich Altersgerechter Assistenzsysteme*. Druckerei Thiel Gruppe Ludwigsfelde.

¹²⁰ Ibid.

¹²¹ Leitch, S., & Warren, M. J. (2010). ETHICS : The Past , Present and Future of Socio-Technical Systems Design 2 History of Socio Technical Design, 189–197.

¹²² Greenwood, M. (2007). Stakeholder engagement: Beyond the myth of corporate responsibility. *Journal of Business Ethics*, 74(4), 315–327. <http://doi.org/10.1007/s10551-007-9509-y>

¹²³ Owen, D. L., Swift, T., & Hunt, K. (2001). Questioning the role of stakeholder engagement in social and ethical accounting , auditing and reporting *. *Accounting Forum*, 25(No 3), 264–282. <http://doi.org/10.1111/1467-6303.00066>

¹²⁴ O’Dwyer, B. (2005). Stakeholder democracy: challenges and contributions from social accounting. *Business Ethics: A European Review*, 14(1), 28–41. <http://doi.org/10.1111/j.1467-8608.2005.00384.x>



Although stakeholder analyses seem to be another step in the right direction, next to the earlier mentioned codes of ethics and reasoned overviews of ethical issues, the discussed methods leave two problems. First, none of the abovementioned ways of integrating ethics in research seems suitable for investigating the ethics of emerging technologies. In line with Brey¹²⁵, we argue that this would involve the engagement of the researchers in the identification of ethical issues and in finding ways to deal with them. This brings us to the second problem, being that the researchers and developers of the technologies are often left out of the picture. From a stakeholder theory point of view, the next step would be to involve *researcher engagement*.

6 CONCLUSION AND DISCUSSION

This white paper presents a brief overview of ethical challenges in the ADAPT Centre research. Moreover, it presents a perspective on ways in which the ethics research in ADAPT can be advanced by discussing different ethical frameworks and methods as well as the state of the art of ethics integration in large technological research projects. In the loci of innovation of application, interaction and personalisation we have found that some of the main ethical issues are *privacy* concerns (one of the main ethical focus points of ADAPT), *responsibility* concerns and computer *bias*. These problems are less explicitly present at the loci of innovation that concern the “deeper” aspects of the research: transformation and understanding. This might be the case because these loci of innovation are primarily concerned with architectural problems instead of problems that directly concern the interactions between devices, software and human beings. Nevertheless, some prominent ethical issues in these two loci are responsibility, understood as *accountability*, and *information bias*, resulting from systemic decisions (e.g. the dominance of one natural language in the research). Additionally, *harmful computer behaviour* and risks connected to the *misuse* of the software architecture (associated with the general concern of *dual use* of technologies) are important ethical concerns to pay attention to in ADAPT.

Next to pinpointing the particular ethical issues, we have identified some research domains in ADAPT where only little ethics research has been done so far. Notably in the domains of *multimodal interaction*, *language simplification*, *machine translation*, *multilingual information retrieval* and *deep learning*, the Centre has the potential to contribute to novel ethical insights. In domains in which the ethical debate has already advanced to a substantial level, like **ubiquitous computing**, ADAPT can specifically contribute by focusing on the main issue of privacy and significant ways in which *privacy by design* can be incorporated in the research.

Apart from focusing on the particular ethical issues and on the research domains, the Centre can focus on advancing methodological issues in ethics of ICT research. These methodological issues can aim at overcoming some of the difficulties identified in the discussion of the state of the art of ethics research in large research projects. Notably, this

¹²⁵ Brey, P. (2000). Method in computer ethics: Towards a multi-level interdisciplinary approach. *Ethics and Information Technology*, 2, 125–129.
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will involve an inquiry into the ways in which the ADAPT researchers can be better engaged in both identifying and dealing with the ethical issues of their work.

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