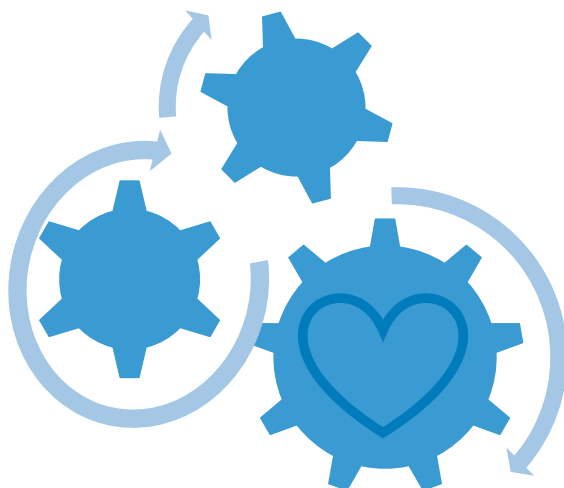




Eila-Sisko Korhonen

# Technology and its Ethics





## Eila-Sisko Korhonen

Registered Nurse 1980, specialized in acute care 1982

Nurse teacher 1987

Master in Nursing Science in Turku University 1994

The writer has worked as nurse, specially trained nurse, staff nurse and in the last 30 years as senior lecturer of nursing. During that period, she has also worked in administration, research and development tasks in health and nursing education. She has been a member of Hospital district of Helsinki and Uusimaa's and Åbo Akademi's joint EVO research group: The Patient's World 2009–2014.

Cover picture: the writer



# Technology and its Ethics

Eila-Sisko Korhonen

Caring Science

Faculty of Education and Welfare Studies  
Åbo Akademi University  
Vaasa, Finland, 2017

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To my loved ones



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Hämeenkylä, Vantaa March 2017

*Eila-Sisko Koskunen*



## ABSTRACT

Eila-Sisko Korhonen. 2017. Technology and its ethics

Supervisors: Professor, emerita, Katie Eriksson and PhD, Tina Nordman  
Department of Caring Science  
Department of Social Sciences, Åbo Akademi University, Vaasa

This research represents basic research in the field of caring science. The purpose of this research is to develop an ideal model for the preconditions of the ethics of technology, and the aim is to gain knowledge and new evidence of the concept of technology and its ethics in caring science. The starting points of the research were in caritative caring science and its value basis and tradition, which formed the interpretation horizon in this hermeneutic research. The human good and the dignity of human being are the fundamental values in the ethics of caring science and in this research.

The main research questions were: What is the concept of technology? What is the ethics of the concept of technology? What is the ideal model of the ethics and caring of technology in caring science?

The methodology used to search for answers to the research questions were hermeneutic interpretation and hermeneutic concept determination. The research comprises four sub-studies and a summary section which answers the main study questions. The purpose of the first sub-study was to determine the ontology of the concept of technology. The purpose of the second sub-study was to describe and summarise the concept of technology and its ethics in previous nursing and caring literature. The third sub-study was carried out to describe patients' experiences of technology in care in previous nursing and caring literature, aiming to highlight and emphasise the patient's perspective to technology in care. The fourth sub-study was carried out to gain new knowledge of ethics in the context of technology. The sub-studies two, three and four formed the contextual determination of the concept of technology, while sub-study one determined the ontology of the concept of technology. The ideal model of the ethics of technology was developed on the basis of the new evidence gained from the sub-studies and its reflection with the knowledge from the pre-understanding and the interpretation horizon of the research at the end of the hermeneutic research circle.

The core of the ideal model of technology and its ethics is the idea of technology, which is to serve, fulfil the purpose and ethos of the substance matter. The purpose of technology is to promote the human good. The basic of serving is to

dignify the unique, whole and autonomous human being. Technology is universal but also unique. Technology is universal but it needs to be tailored in the service of unique human being. Technology in itself has an ethical dimension. The idea of technology and its ethics are linked to human good, human being's freedom, and the freedom to choose and realise self-determination. Technology is related to the substance where it is used, and the substance is the priority. Caring communion and patient education are the means to realise the ethics of technology in caring science. Technology is knowledge, art, devices, processes and services which serve for the good of human being. The human good is *arête*. It is important to know patients' experiences of technology and its good and caring from a patient centred-perspective. Together with the theoretical knowledge of the concept of technology and its ethics, knowledge of patients' experiences of technology form the basis of good and well-serving technology. The common understanding of the concept of technology, i.e., what it is, what its ethics is and what are the preconditions to realise the ethics, the human good, in the context of technology in caring science formed the theoretical basis to develop the technology of caring as a subarea of caring science. Knowledge of the concept of technology and its ethics and also of the preconditions of the ethics of technology can serve both the development of technology and caring practice.

**Keywords:** caring science, basic research, caring, nursing, technology, ethics, ethos

## ABSTRAKT

Eila-Sisko Korhonen. 2016. Teknologi och dess etik

Handledare: Professor, emerita Katie Eriksson  
FD Tina Nordman  
Åbo Akademi, Vasa, Enheten för vårdvetenskap

Det övergripande syftet med denna grundforskning är att skapa en ideal modell av teknologins etiska villkor, och målet med forskningen är att uppnå ny kunskap och evidens om begreppet teknologi och dess etik inom vårdvetenskap. Forskningens teoretiska utgångspunkt är i karitativ vårdvetenskap, dess etik och tradition, som utgör tolkningshorisonten för denna hermeneutiska forskning. Det goda för människan samt värdighet är de fundamentala värdena i karitativ vårdvetenskap och i denna forskning.

Huvudforskningsfrågorna var: Vad är begreppet teknologi? Vad är det etiska i begreppet teknologi? Vad är den ideala modellen av etik och vårdande i teknologi inom vårdvetenskap?

Forskningsmetodologin bestod av Gadamers hermeneutiska tolkning och Erikssons hermeneutiska begreppsbestämning. Forskningen är en sammanläggningsavhandling med fyra vetenskapliga artiklar som delstudier. Syftet av den första delstudien var att bestämma ontologi av begreppet teknologi. Syftet av den andra delstudien var att beskriva och summera begreppet teknologi och dess etik i tidigare vårdlitteratur. Den tredje delstudien belyste hur patienter och deras familjer upplever teknologin i vården i tidigare vårdlitteratur. Målet av den tredje delstudien var att betona patienternas upplevelser och deras värd. Den fjärde delstudien genomfördes för att få ny kunskap och nytt vetande om etik hos begreppet teknologi. I forskningssammanläggningsdelen besvarades huvudforskningsfrågorna på basen av delstudiers resultat och deras reflektion utifrån forskningens tolkningshorisont och förståelse. På basen av denna hermeneutiska spiral som genomfördes som induktiv-deduktiv reflektion i slutet av forskningen samt det vetande som utvecklats var det möjligt att göra ett abduktivt språng och skapa en ideal modell av teknologi och dess etik.

Denna ideala modell består av fem villkor som beskrivs i följande teser: 1. Idén av teknologi är att betjäna och fylla sitt syfte och etos. Grunden att betjäna är att uppskatta den unika, hela och autonoma människan. 2. Det goda för en människa är både universalt och unikt. Teknologin är universal, men den måste skräddarsys för att betjäna den unika människan. 3. Teknologin i sig själv har en etisk

dimension. Idén av teknologi och dess etik är anknuten till det goda för människan, frihet och autonomi. 4. Teknologi är anknuten till substans och substansen är prioritet. Vårdande relation och patienthandledning är medel för att förverkliga etisk och vårdande vård inom en teknologisk kontext.

Teknologi är kunskap, konst, apparat, process och betjäning. Teknologi betjänar det goda för människan. Det goda för människan är arête. För patientcentrerad vård är det viktigt att ha vetande om patienternas upplevelser i teknologisk vård, vad det är som är vårdande och det som är det goda för människan. Kunskapen om patienternas upplevelser tillsammans med teoretisk kunskap om begreppet teknologi och dess etik utgör grunden till god och väl betjänande teknologi.

Detta vetande om begreppet teknologi, med andra ord, vad teknologi är, vad dess etik är och vilka är de villkor som ska uppfyllas så att etiken och det goda för människan ska realiseras utgör den teoretiska grunden för att skapa och utveckla en teori av teknologi inom vårdvetenskap. Denna kunskap och detta vetande kan dock också utnyttjas då teknologi och vård utvecklas i kontext av teknologi.

**Sökord:** vårdvetenskap, grundforskning, vård, sjukvård, teknologi, etik, etos

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## **LIST OF ORIGINAL PUBLICATIONS – SUBSTUDIES I – IV**

This dissertation includes the following publications and extended summary. The summary is based on the publications and they are referred to in the text by their Roman numerals from I to IV.

Article I: Korhonen E-S, Nordman T, Eriksson K. 2014. Determination of concept technology – the ontology of the concept as a component of the knowledge development in caring science. *Scandinavian Journal of Caring Science*. 28(4), 867-877.

Article II: Korhonen E-S, Nordman T, Eriksson K. 2015. Technology and its ethics in nursing and caring journals: An integrative literature review. *Nursing Ethics*. Article first published online 22.10.2014. <http://nej.sagepub.com/content/early/2014/10/16/0969733014549881>. DOI: 10.1177/0969733014549881 and on paper Aug 2015, Vol. 22 Issue 5, 561- 576.

Article III: Korhonen E-S, Nordman T, Eriksson K. 2016. Patients' Experience of Technology in Care: A Qualitative Meta-Synthesis. *Archives of Nursing Practice and Care* 2(1): 001-009. Published Online 25.1.2016. <http://www.peertechz.com/Nursing-Practice-Care/pdf/ANPC-2-106.pdf>

Article IV: Korhonen E-S, Nordman T, Eriksson K. Searching for the ethics of technology in caring science: Interpretation of Gadamer's literature (Submitted manuscript)

The original publications have been reprinted with the kind permission of the copyright holders. The summary also includes previously unpublished material.



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## 1. INTRODUCTION

### *The need for a new horizon of technology*

The task of basic research and theory development in science is to give tools to people to understand and manage the world and its 'things', or 'die Sachen', as described by Gadamer. A precondition for performing this task is that the concepts that describe the real-world 'things' with words in language are described, expounded, anticipated and well-defined. Concepts are key elements in humanistic sciences, research and theory formation when describing knowledge, publishing it and opening it for critique and debate; i.e., well-analysed and well-defined concepts form the basis for study and theory development. In any discipline, the way of using concepts describes the philosophical foundation of the science. The concept application in theory and the use of concepts need to be consistent with the philosophical basis of the discipline.<sup>1</sup> Ontology is defined as a branch of philosophy that deals with the nature of existence and the concept's core, which is the most important quality or feature of something. The core of the concept describes 'the thing', what it is, and it considers the most important part of 'the thing' and the knowledge of it.<sup>2</sup> According to Burns & Grove<sup>3</sup> and Walker & Avanti<sup>4</sup>, the concept's content describes the substance matter of the concept. In line with this, in this research it is seen that by determining the concept of technology, its ontology and

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<sup>1</sup> Burns & Grove 2005, 93-95: "what are the characteristics of the key concepts.." and "Then the findings are combined to reflect the current knowledge of the phenomenon." and "Table 6-3 p.98: Clarifying a research topic with synonymous terms." 121-155;" terms and the way they are used come from the philosophy of science the main concern of which is the nature of scientific knowledge." Eriksson 2006, 50-75, Eriksson 2010a, Gadamer 2006.

<sup>2</sup> Craig 2015, Niiniluoto 1997, Wehmeier & al.2005, Eriksson 2010a

<sup>3</sup> Burns & Grove 2005, 121-155: "A concept is a term that abstractly describes and names an object, a phenomenon, or an idea, thus providing it with a separate identity or meaning."

<sup>4</sup> Walker & Avanti 1992.

contextual use in nursing and caring science<sup>5</sup>, the knowledge of the substance of the concept of technology increases; together with the knowledge of the ethos of caring science and its basic values of human dignity as the interpretation horizon of the research, the basis of creating an ideal model of the ethics and caring of technology in caring science in the form of theses will be achieved.

The purpose of this research, which falls within basic research in caring science, is to develop an ideal model of the ethics and caring of technology, and the aim is to gain knowledge and new evidence of the concept technology and its ethics in caring science.

In the Western world, there is a political view that technology is a means that can help societies to solve financial problems and the lack of labour in health care, as well as to improve productivity in health and social services. Technology has been used to support or to compensate daily living functions, to help with interaction, to educate patients, and also to make it possible to use health care services<sup>6</sup>. All in all, it is clear that technology has many advantages, but it is also equally clear that in many cases, technology is frightening, complicated and causes suffering<sup>7</sup>. In these cases, the ethos of caring, i.e., the human good and human dignity, are not realised. In literature, the concept of technology is used in various ways, such as caring technology<sup>8</sup>, nursing technology<sup>9</sup>, wellbeing technology, information technology<sup>10</sup>, telenursing<sup>11</sup> and technology in care,

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<sup>5</sup> Eriksson 2010a.

<sup>6</sup> Kuusi 2001, Faulkner 2009, ETENE 2010.

<sup>7</sup> Rauhala & Topo 2003, Rauhala 2007.

<sup>8</sup> Eriksson & al. 1993.

<sup>9</sup> Alexander & Kroposki 2001.

<sup>10</sup> Magnuson & al. 2004.

<sup>11</sup> Jones & al. 2012.

named by a specific device or area of nursing or medicine<sup>12</sup>. The use of the concept of technology in nursing and caring science is multiple and equivocal.

In caring science, technology of care is seen to be a subarea of caring science<sup>13</sup>. Basic research of the concept and its ethics is needed for increasing understanding of the concept and to develop further the theory of technology in caring science. The ethos, the ethical foundation of caring science, including the basic values of the science, becomes visible in language and in concepts that are used in theory formation and later in theory application. In caring science, hermeneutic text interpretation has evolved as a research method in which written language and concepts are in focus<sup>14</sup>. According to Gadamer<sup>15</sup>, it is language that integrates 'I' and 'the world'. Language and its words, named concepts in science, are manifested as some kind of tool enabling a human being to understand the fundamental nature, i.e., the ontology of the concept and its meaning. By determining the ontology of the concept, the world and its 'things' can be understood in a deeper and more comprehensive way compared to spoken language. Deeper understanding is needed because concepts and their connotations have an impact on people and their actions, and also on theory formation. Diverse and unconscious use of concepts and their connotations can cause contradictions, suffering related to care<sup>16</sup> and unethical caring, which is defined as uncaring care<sup>17</sup> or non-caring care<sup>18</sup>. In theory formation and when developing scientific knowledge, it is fundamental that the ontology of a concept is written open and determined from the philosophical and ethical viewpoint of

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<sup>12</sup> O'Keefa-McCarthy 2009, Hermsen & van der Donk 2009.

<sup>13</sup> Eriksson 1992 and 2001.

<sup>14</sup> Eriksson 2010a.

<sup>15</sup> Gadamer 2006, 102-171.

<sup>16</sup> Eriksson 1994, Toivanen 2009.

<sup>17</sup> Hallsdórsdóttir 1996.

<sup>18</sup> Nyström & al. 2003, Article III.

the discipline<sup>19</sup>. In caring science, the ontological evidence, or as Eriksson<sup>20</sup> also describes it, the great evidence, together with ethos of caring science, forms the basis for a hermeneutic epistemology of the discipline. The study of the etymology and semantics of the concept provides ontological evidence of the concept. Ontological evidence consists of the dimensions “to see and realise, to know, to attest, and to revise”. It means that the core of caring, ethics, and its substance become visible and true. Ontological evidence is meaning-bearing and lasting truth. In this research, the ontological evidence is complemented and deepened with studies of contextual evidence by studying the use of the concept of technology and its ethics in earlier studies of nursing and caring science and in the classical, philosophical and historical literature of Gadamer by applying the theory of caring science and its evidence<sup>21</sup>. Basic research is a systematic search for new knowledge, ideas and development of the core concept of the science in order to develop the science itself without the immediate aim of applying the results into practice.

For these reasons, the strategy of this research was based on basic research<sup>22</sup>, and the research material included texts and literature.

### ***The motivation and progress of the research***

The motivation, starting point and basis of this research was to increase knowledge and understanding, in other words the “knowing” of the concept of technology and its ethics and caring, and also to visualize what added value and human good, such as dignity, healthy, and alleviation of suffering, caring science and its hermeneutic research tradition could provide to the prolific technology

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<sup>19</sup> Burns & Grove 2005, Eriksson 2012a.

<sup>20</sup> Eriksson 2010b.

<sup>21</sup> Eriksson 2010b, Eriksson 2009.

<sup>22</sup> Eriksson 2006.

of care. Ethos and ethics are the core of caring science. That is why it is essential to study technology and its ethics in conjunction with each other<sup>23</sup>. Also when studying the etymology of the concept of technology it was noticed that the concept of technology itself was found to have an ethical dimension (Article I). When studying scientific knowledge, it is important to be thoroughly familiar with the existing knowledge<sup>24</sup>. In this research the substance of the concept was first opened by studying the use of the concept in earlier studies in caring and nursing science (Article II). It was noticed that the concept of technology was used diversely and there were very few conceptual studies of the concept of technology in nursing and caring sciences. In caring science, the human being, the patient and his/her experiences of care, health and suffering are in the focus; the patient is the subject of the care. Because the integrative literature review of the concept of technology and its ethics did not describe and open the patients' perspective and experience of the concept of technology and its use, another literature review, of earlier studies in caring and nursing science, with a qualitative approach was needed to highlight the patients' perspective and experiences (Article III). Also Booth<sup>25</sup> has expressed a claim that more knowledge and research should be invested in patients who use technology in their self- care. By the means of basic research, two different kinds of literature reviews aimed to create a comprehensive description of the concept of technology and its ethics in nursing and caring science. The contextual part of Eriksson's concept determination method was realised by this. Based on the integrative literature review (Article II), it was noticed that the ontology and the ethical dimension of the concept of technology were not determined in caring science, and research was carried out based on ontological concept

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<sup>23</sup> Eriksson 1990, 2007, Lindström & al. 2014.

<sup>24</sup> Burns & Grove 2005.

<sup>25</sup> Booth 2012.

determination. To understand and describe the substance of ethics deeper in the context of technology, a hermeneutic interpretation was done using

Gadamer's philosophical literature of technology. Gadamer's literature was chosen because he emphasises the meaning of language and interpretation of the text as a means of adding understanding and knowledge. This choice of material and the method of research supports the cohesion of the substance and methodology.<sup>26</sup> Choosing Gadamer's literature is also based on the finding that earlier studies have not used his literature as material to the same extent as texts by Heidegger<sup>27</sup>, Mannheim<sup>28</sup>, and Borgmann<sup>29</sup>. Gadamer's literature leads to the origin of the concept of technology, which is found in ancient Greece. The concept of 'techne', which is the origin of the concept of technology, was already used by the ancient Greeks (Article I).

At the beginning of the research process, this research was part of Åbo Academi University's and Hospital District of Helsinki and Uusimaa's co-operation project entitled: "In Patient's World", and the aim was to shed light on ethics in caring science and in clinical practice and to make the basic values more visible and evident in care. In that phase, the research belonged to the clinical contextual research in the caring science research programme at Åbo Academi University. Later, the research was incorporated into the caring development and research project of Åbo Academi University caring science faculty, and the focus of the research shifted to clinical basic research, emphasizing the meaning and clarity of the basic and core concept's ontology in caring science and the ontological knowledge and evidence which can be utilised in theory formation.<sup>30</sup> This

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<sup>26</sup> Eriksson 2010a, Eriksson & al. 2011, Gadamer 2006.

<sup>27</sup> Arthur 2009, Ellul 1964, Feenberg 2010.

<sup>28</sup> Feenberg 2002.

<sup>29</sup> Feenberg 2002, Higgs 2000.

<sup>30</sup> Eriksson 2001, Eriksson & al. 2007, Lindström & al. 2014, Eriksson & al.2011, Eriksson 2012b.



research comprises four sub-studies published in international journals and a summary section which answers the main study questions and was drawn up based on the knowing reached in the sub-studies.

## **2. DEPARTURE – THEORY AND SCIENCE OF CARING SCIENCE AS AN INTERPRETATION HORIZON OF THERESEARCH**

Most scientific work begins with concept clarification. The reality or the world and its 'things', which are the target of interest, can be described and understood by various concepts<sup>31</sup>. The world of caring is the interest of knowledge and understanding, and in this research, the concept of technology in caring science. The determination of the concept technology is done by analysing and interpreting texts and studies of technology and studies of patients' experiences of technology. The text interpretation has been done from the perspective of caring science: ethos and ontology. In the caring world, technology represents 'a thing' and a concept, which has not been determined from the perspective of caring science. Also, the ontology of the concept is unknown. According to Gadamer<sup>32</sup>, 'a thing' can be understood through language and concepts. The hermeneutic interpretation can reveal the origin of the concept based on language. The constant hermeneutic knowledge searching opens the essence and meaning of the concept in a new and comprehensive way by determining the ontology of the concept and its contextual use. The context of technology in this research means the meaning-carrying caring situation or process of which technology has been apart.

### ***Ethos and ontology of caring science***

The interest to start the research arose from the question of what is caring in the context of technology. The 21<sup>st</sup> century has changed the world and this also applies to the world of caring, changing it into a world of technology<sup>33</sup>. This remarkable change in the world has led to a new situation in caring science. The

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<sup>31</sup> Burns & Grove 2005, Eriksson 2006, Eriksson 2010a and 2012b.

<sup>32</sup> Gadamer 1977 & 2006.

<sup>33</sup> Witt & al. 2003.

constantly recurring and open tradition of humanistic caring science has faced new questions and has searched for fresh knowledge and evidence, in this case a new horizon to the research of the concept of technology. The tradition of humanistic caring science is to study the caring world and its concepts within its own starting points consisting of ethos, ethics and ontology.

The caring ethics is the core of caring, nursing and tradition of caring science. The caring ethics is derived from the ethos of caring which focuses on the dignity, charity and love of human being and the fundamental will to do good. The core of caring ethics is determined by the *caritas* motive. The *caritas* motive is to love, show charity, respect and honour the holiness and dignity of the human being. The caring ethics deals with the way nurses encounter patients and it forms the basis of the nurse-patient relationship. According to the caring theory, caring ethics and ethos belong together and they deal with the basic values and philosophical foundation of caring science and acts of caring. Ethics and ethos give roots and philosophical bases to the science. The origins of the caring theory are founded on philosophy, history, theology and humanistic sciences. Ethics stand out as a priority in all human action, including caring. Caring is human by its nature and it is realised in love for one's neighbour, or in other words, *caritas*. The roots of caring originate in natural caring and further, in maternal care. Caring is unconditional caring for a human being's basic needs, and it is provided for as long as the human being cannot manage the basic needs satisfaction independently, in the way that mothers care for their children. The dignity of human being is the basic category of caring ethics, and it becomes true in love for one's neighbour and in charity. The *ethos* of caring science claims that the respect of human dignity and wholeness is unconditional and that people should be treated as unique human beings. Fundamentally, the human being is an entity of body, soul and spirit. Another basic category of caring is suffering. The focus

of caring is on the suffering of human being and in the alleviation of this suffering and promotion of health.<sup>34</sup>

The research of ontology opens the core of the substance and questions about truth and evident in the world view. The ontology of caring science describes the world of caring and what truth and reality mean in it. The ontological starting points are not absolute, but they have a potential to develop new knowledge, evidence and understanding.<sup>35</sup> The ontological starting points of caring science contain the basis to determine and organize the main concepts of the caring theory. The main ontological concepts structuring the caring theory include the main concepts human being, health, suffering, and caring<sup>36</sup>. In this research, the focus of interest of caring science also includes the concept of technology, which is seen to be one of the main concepts as a subarea of caring science.<sup>37</sup>

Ontology describes the starting points of the theory of science. In this research, it deals with the view of the origin, nature, and development of knowing, and further, the theory development on this basis in caring science. In the caring science tradition, the view is that caring science is a humanistic science, which is composed of systematic and clinical caring science. In addition to these, it is divided into sub-sciences such as caring technology.<sup>38</sup>

In caring science research, the core concepts and theory development of the discipline have been studied. The results of that research show that when a human being suffers, he or she wants to be seen, understood and taken seriously. In the caring communion, the suffering human being and a caring person encounter each other. The caring motive drives the carer to the act of

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<sup>34</sup> Eriksson 2001, Lindström & al. 2006, Lindström & al. 2014

<sup>35</sup> Eriksson & Lindström 2000.

<sup>36</sup> Lindström & al. 2006.

<sup>37</sup> Eriksson 1992, 2001, Eriksson & al. 1993.

<sup>38</sup> Eriksson & Lindström 2000, Eriksson 2001, Lindström & al. 2014.

caring, which is “the art of making something very special out of something less special”. The art of caring means the ability to realise the care and encounter the suffering human being without prejudice, with respect and dignity, as well as to alleviate suffering in communion with a suffering human being.<sup>39</sup> According to Nåden<sup>40</sup>, the concept of art has been used in nursing and caring since the days of Nightingale. Art as a concept is related to the patients’ expectations of high standard of nursing and caring. Nursing and caring as an art have been defined to have fundamental characteristics, such as identification of values, the caring communion and caring process of patient and nurse which is fundamentally communicative, the caring as an art is innovative, searching and involving, and there is courage but also freedom. The art of caring and nursing and the knowledge of aesthetics are realised in the actions, attitudes, and interaction of the nurse with the others. The recognition of aesthetics can transform nursing and the act of caring to deliver a potential caring moment, so that the encounter between the person who cares and the human being who is the patient transforms their response from conventional to something that is significant. Since the suffering human being is unique, the act of caring needs to be tailored to meet the needs of a unique human being. The precondition of understanding the unique needs of a human being means that the person who cares and the human being who suffers encounter each other in a significant, caring way. The caring encounter with the person who cares and the suffering human being cared for requires time and space so that the autonomous and dignified individual as a patient feels that he or she is treated with respect and taken seriously so that a caring relationship can develop.<sup>41</sup> Cohen<sup>42</sup> states that technology and the new knowledge, skills and tasks it requires consumes so much of nurses’ energy that the foundational elements of nursing which make nursing an art have been put

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<sup>39</sup> Lindström & al. 2006, Lindström & al. 2014.

<sup>40</sup> Nåden 1998.

<sup>41</sup> Eriksson 1994, Kasén 2002, Lindström & al. 2014.

<sup>42</sup> Cohen 2004.

aside. Similar results have been presented by Sandås and Koskinen<sup>43</sup> in their research of caring personnel's experiences of computer technology.

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<sup>43</sup> Sandås & Koskinen 2015.

### 3. PURPOSE AND RESEARCH DESIGN

The purpose of this research, which falls within basic research in caring science, is to develop an ideal model – the preconditions of the ethics and caring of technology, and the aim is to gain knowledge and new evidence of the concept of technology and its ethics in caring science.

The research questions are:

What is the concept of technology?

What is the ethics of the concept of technology?

What is the ideal model of the ethics and caring of technology in caring science?

The way to answer the research question is by searching for answers to the following sub-study questions:

1. What is the concept of technology and its ethics and caring?
  - 1.1. What is the ontology and theoretical basis of the concept of technology? (Article I)
  - 1.2. What is ethics in the context of the concept of technology? (Articles II & IV)
2. What is the concept of technology and its ethics in the light of earlier studies?
  - 2.1. What is the concept of technology in nursing and caring literature? (Article II)
  - 2.2. What does ethics mean in the context of technology in nursing and caring literature? (Article II)
  - 2.3. What are patients' experiences of technology in care? (Article III)

The research design (Figure 1) of this basic research describes the hermeneutic spiral of interpretation, starting from caring science and its ethos as the interpretation horizon of the research and an overview of the literature of technology as the pre-understanding of the research, proceeding to the different

phases of concept determination of the concept of technology, and ending in an abduction of an ideal model of ethics and caring of technology in caring science in the form of theses. The concept of technology has been determined by using the concept determination method and hermeneutic interpretation.

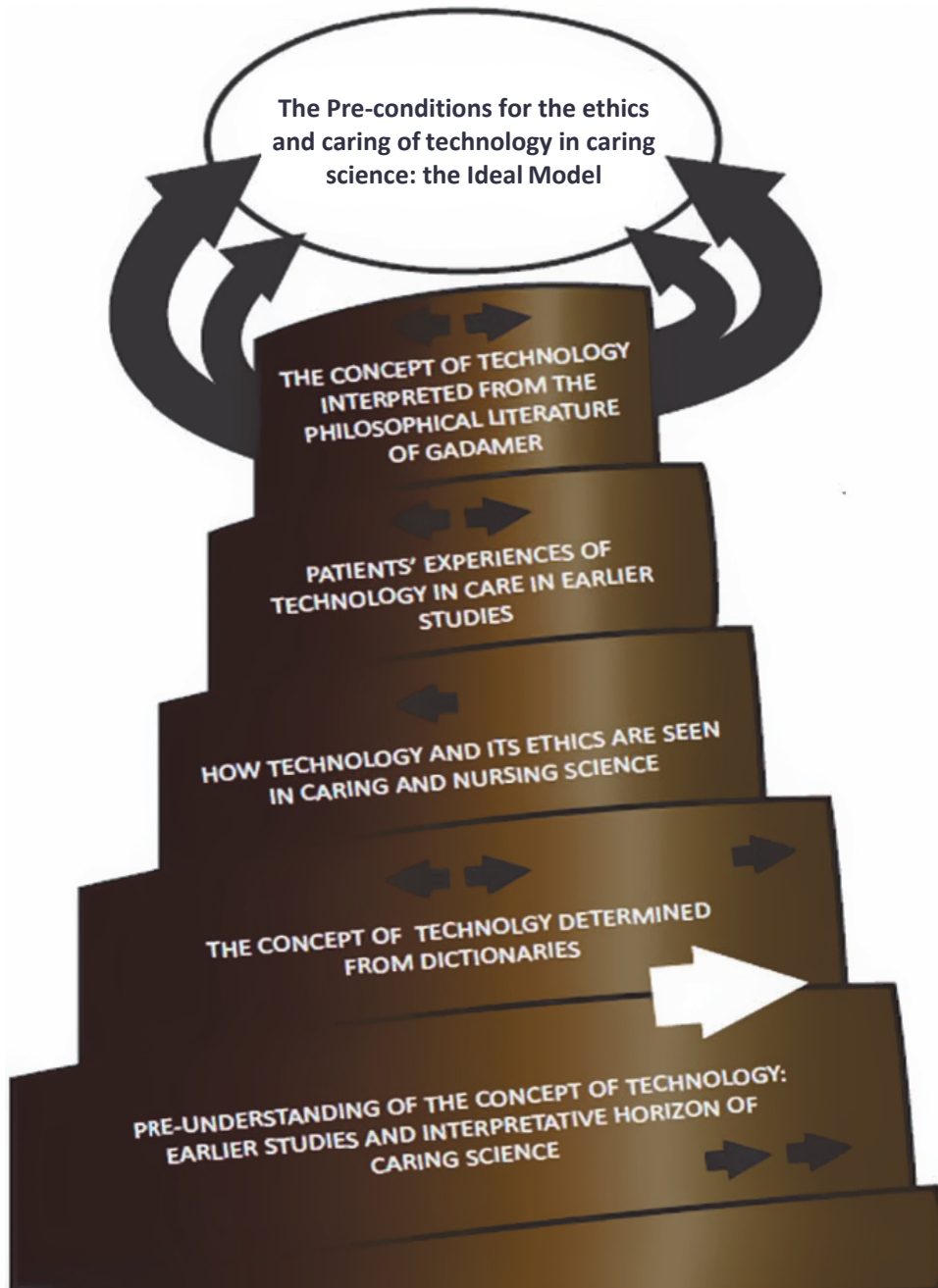
The first phase of the concept determination was to determine the ontology of the concept of technology; the results were interpreted from the perspective of caring science and pre-understanding of the research. In the second phase, an integrative review of past nursing and caring studies was conducted to describe the concept of technology, and its ethics and the results were interpreted. In the third phase, a qualitative meta-synthesis was done to describe patients' experiences of technology; once again, the results were interpreted and reflected with the wholeness. In the fourth phase, a hermeneutic interpretation of Gadamer's philosophical literature was done in order to describe the substance of technology and its ethical and caring dimensions.<sup>444</sup> As an end result of the ontological concept determination and the interpretation of earlier

studies and Gadamer's philosophical literature of technology that formed the contextual part of the concept determination, the idea of technology was determined and the preconditions of the ethics and caring of technology were created based on the ontological and contextual foundation of the concept of technology in caring science by using abduction. The preconditions of its ethics and caring have been described in the form of theses or statements as an ideal model.

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<sup>44</sup> Eriksson 2001, Eriksson 2003, Eriksson & al. 2007.





**Figure1: The research design - the ontological and contextual determination of the concept of technology and its ethics and caring as a hermeneutical spiral of dialogue and interpretation with different phases of the research; at the end of the process, the pre-conditions for technology's ethics and caring in caring science, as an ideal model, are created. The arrows in the figure symbolise the circular movement of interpretation during the research process.**

#### **4. OVERVIEW OF LITERATURE ON TECHNOLOGY; PRE-UNDERSTANDING OF TECHNOLOGY**

Over the past two or three decades, technology in caring has increased. Caring and nursing literature has identified the phenomenon and concept, and many journal articles have discussed it. This chapter is based on two literature searches. The first literature search was made at the beginning of this research process in the health scientific databases Medic, Medline and Cinahl. The search terms used were caring, caring scale and technology. The search yielded 37 journal articles that represented nursing and caring studies of instruments that measure the caring dimensions in care and describe caring and technology. The articles were selected by applying the phases of systematic data selection method<sup>45</sup> with restriction to “full text” and Cumulative Index to Nursing & Allied Health Literature 1982–2007. Nine of the articles presented twelve different instruments of caring. The second data search was made in the databases Medline and Cinahl. The search terms used were technology, technolog\*, nursing, nurs\*, and caring, including related terms. The search strategy was advanced search, restricted to the years 2000–present (March 2013) and to material published in English. The result of the search was 126 articles. Twenty of the articles were selected on the basis of how the article answered the question: what is caring in the context of technology. Two of the selected articles described the caring dimension in the context of technology with the means of quantitative research, six of the articles were qualitative studies, and 12 of the articles were different kinds of descriptions of the phenomenon or concepts. During the entire research process, and based on tips from experts of caring science, manual searches were also performed across the research material and its references. In the reporting phase of this research, the material of the two

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<sup>45</sup> Coughlan & al. 2013, Kääriäinen & Lahtinen 2006.

literature searches described above was used in this chapter according to the principle of appropriateness to the purposes of this research.

In literature, the concept of technology has been defined in diverse ways.<sup>46</sup> Booth<sup>47</sup> criticised the use and determination of the concept of technology. He claimed that the concept of technology and its sub-concepts, such as information and computer technology, are usually poorly defined. On the basis of the literature review carried out by Booth, he presented that the evaluation and the study of evaluation of technology in caring require more theoretically driven underpinning, especially from a caring perspective, because theories that are borrowed from other disciplines must address their relevancy, applicability and congruency to examine the caring phenomenon. He also saw that more knowledge and research should be invested in clients and patients who use technology in caring. It is noteworthy that this same worry was presented already in the 1970s when, for example, Chinn & Kramer<sup>48</sup> and Fawcett<sup>49</sup> discussed how the theories of other disciplines are applicable and how they influence nursing and caring science and how they describe, explain, predict or evaluate the caring world.

At the beginning of this research, the concept of technology was defined on the basis of the literature search and pre-understanding of the concept of technology to be those technological applications which are used in patient care and which the patient can also use independently after patient education. Technology and

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<sup>46</sup> Eriksson & al 1993, Alexander & al.2001, Magnusson & al. 2004, Jones &al. 2012, O'Keefe-McCarthy 2009: In literature the concept of technology has been defined diversely such as caring technology (Eriksson & al. 1993), nursing technology (Alexander & al. 2001), wellbeing technology, information technology (Magnusson & al. 2004), telenursing (Jones &al. 2012) and technology in care named by a specific device or an area of nursing or medicine (O'Keefe-McCarthy 2009).

<sup>47</sup> Booth 2012.

<sup>48</sup> Chinn & Kramer 1999.

<sup>49</sup> Fawcett 1989.

technological applications are seen to be technical systems, devices and machines, so-called hard technology<sup>50</sup> by which the patient's daily basic needs and caring needs, vital functions and communication needs can be supported, or devices that can be used for patient education or information. Moreover, the devices could be used to ease the use of health care services.<sup>51</sup> With the use of technology, it has become possible to replace daily living functions that have been lost due to disease or to compensate for a lost ability<sup>52</sup>. Different kinds of computer programs and applications for documentation or aimed to improve the quality of nursing have been excluded from this research as they are only used by health care personnel<sup>53</sup>.

In present-day literature, when talking about technology in caring, the most commonly used concepts are wellbeing technology and health technology, referring to the technologies used in the wellbeing, social and health care sectors<sup>54</sup>. Wellbeing technology is seen to consist of subareas such as aid instruments, communication and information technology, social and safety technology as well as health technology, accessible environment planning, design-for-all approach, and client or patient data systems. It can also be seen that gerontechnology is a subarea of wellbeing technology. Gerontechnology assists, supports and makes it possible for elderly persons to cope independently in modern society.<sup>55</sup> It has been presented in literature that the new millennium has brought about a change of the world in the world of technology. The next chapters provide an overview on the concept of technology before and after the new millennium<sup>56</sup>.

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<sup>50</sup> cf. Eriksson & al. 1993 and Eriksson 2001.

<sup>51</sup> Törmä & al. 2001, Article I.

<sup>52</sup> Eriksson 2001.

<sup>53</sup> Estabrooks & al. 2003, Kirkley 2004.

<sup>54</sup> Suhonen & Siikanen 2007, Miettinen & al.2002.

<sup>55</sup> Ahtiainen & Auranne 2007.

<sup>56</sup> Witt & al. 2003.

### ***Technology in the light of caring and nursing science before the turn of the new millennium***

From the days of Florence Nightingale, the task of trained nurses has been watchful caring, which has meant the systematic looking for the signs of health and sickness, and looking after patients' wellbeing, comfort and safety. This systematic looking is observation, which Nightingale developed to an aware and artful level. The metaphor of this observation is "the lady with the lamp", where the lamp represents technology, the tool which helps the nurse to see.<sup>57</sup> Later, the tools and technology have developed from a lamp to simple technologies and to various advanced technologies. In the 19<sup>th</sup> century simple technology, such as thermometers, stethoscopes and sphygmomanometers, were first used by nurses in the service of physicians' observation and medical interventions, meaning that the use of these devices was delegated to nurses to serve the physician's diagnosis. Nurses took care of the technology and carried out the observation, but they did not interpret the results of the measurements.<sup>58</sup> In the 1960s, advanced machine monitoring evolved, and the technology of intensive care units was established in hospitals. The new monitoring technology and intensive care devices, such as ultrasonography, cardiac monitoring, haemodialysis devices and respirators, offered a new way to look and observe the human being. The technology also made it possible to see new things. Furthermore, the technology made it possible to compensate for disturbed vital functions of human beings and to care for patients with new methods and devices. This development of technology also meant a new kind of nursing practice, which was dominated by instruments and technology. "Knowing the patients" no longer only meant listening to the patients and knowing them "by heart" and "by sight"; instead, it meant gathering information, interpreting

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<sup>57</sup> Sandelowski 1998.

<sup>58</sup> Nagel & Pomerleau & Penner 2013, Martin & Coyle 2006, Hardwick & al.2007, Caligtan & Dykes 2011, Kidd & al. 2010, Sandelowski1998.

different kinds of technical data, relationships between human beings and machines, and hands-off caring. This continuous observation and surveillance of human beings and the use of technology have caused concern and scholarly critique of individual's good, common good, humanity, art of nursing, holistic caring, and patients' experiences of being constantly observed and surrounded by various technologies.<sup>59</sup>

Pelletier<sup>60</sup> has studied patients' experiences of technology in bedside care in hospital. The technology studied was an intravenous infusion control device, which is a type of widely used clinical hardware controlled by nurses. The data were collected from 150 patients by a 22-item questionnaire. The questionnaire contained themes of patient's understanding of the device, fears, concerns and degree of comfort with the device, perceived relationship of the device to illness and safety, response to alarms and noises, and perceived focus of nursing attention. Most of the patients (85%) were aware of the purpose of the device and were satisfied (73%) with the information offered of its use. However, 21% of the patients reported they had not received any explanation of the purpose of the device. Also Sandelowski<sup>61</sup> has stated that when using technology, nurses undermine the informed consent process. For example, ultrasonography is compared to photography, and the effects of possible knowledge gain with the technology are thus underestimated. Before the turn of the millennium, it was already seen that new technology gives a different aspect to caring and to the nurse-patient relationship, reshaping the questions of ethics in caring.

Technology depending on patients' suffering and vulnerability is an offence against the integrity and privacy of a human being. Technology and its ethics are a complex phenomenon in caring, and moral blurring and blindness of caring

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<sup>59</sup> Sandelowski 1998, Barnard & Sandelowski 2000, Harris & Chaboyer 2002.

<sup>60</sup> Pelletier 1992.

<sup>61</sup> Sandelowski 1998.

persons can increase patients' suffering and vulnerability<sup>62</sup>. On the other hand, when the nurse-patient relationship is significant and the dialogue between patients and nurses values the patients and encourages them to be active participants in their care even with technical devices, the patients can increase their knowledge of the care, their self-care competence develops and activities of daily living increase<sup>63</sup>. Hence it was highlighted that it is important that nurses participate in the development, critical assessment and control of operation processes of new technology and increase their understanding of caring and ethics in the context of technology, and are able to realise ethical caring in the context of technology in alliance with patients.

### ***Technology in the light of caring and nursing science after the beginning of the new millennium***

In this millennium, the tools and technology have developed from the lamp and the simple technologies to various advanced technologies and furthermore, to technologies used also by the patients, even with remote access. The use of advanced technologies by patients or their significant others has increased at the beginning of this millennium. In the Western world, the prevailing health policy has been to encourage people to self-care and to live at home for as long as possible. An array of complex equipment in caring has emerged, and both patients and nurses are expected to use it<sup>64</sup>. Utilizing technology in self-care is part of a health policy where people are encouraged to activity, independence and responsibility in relation to their health and caring needs<sup>65</sup>. Information communication technology (ICT) and its applications are seen to be important

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<sup>62</sup> Ray 1998.

<sup>63</sup> Schoenhofer & Boykin 1998.

<sup>64</sup> Brown & Cook 2011, Wolpin & Stewart 2011.

<sup>65</sup> Russo 2001, Fitzsimons & al. 2011.

tools enabling patients' self-care<sup>66</sup>. A great deal has been written about technology in nursing and caring literature at the beginning of this millennium. Many of the journal articles have been editorial, pictorial or commentary journal articles<sup>67</sup>, or the interest of knowledge has been on nurses' or nursing students' experiences or competence to use technology<sup>68</sup>.

One of the remarkable lifesaving devices is the ventilator. It is used in intensive care as well as in homes. Lahtinen & Joronen<sup>69</sup> have conducted a review of parents' experiences of caring for a ventilator-dependent child. There were eighteen articles from different databases, and the material was analysed by qualitative content analysis. The results showed that the parents experienced the caring for their ventilator-dependent child to be a constant battle of survival, consisting of struggle with life management, balancing acts with maintaining the functioning of the family, and using the resources of everyday life. The struggle with life management had elements of unexpected circumstances in everyday life, fatigue, mental distress and a feeling of isolation. The care with the ventilator required new skills from the parents and they found it demanding to take care of the ventilator-dependent child at home. Some of the parents experienced that the medical devices were intricate and frightening and that the caring required a lot of time and financial resources. According to Locsin & Purnell<sup>70</sup>, the threats in the context of technology which are related to patient's suffering are the objectification of the patient, lack of personal encountering, lack of understanding that a human being is a whole, and an active, autonomous participant in the caring process. The threats which are related to the use of technology in care are that the patients become dependent of the technology,

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<sup>66</sup> Caligtan & Dykes 2011, While & Dewsbury 2011.

<sup>67</sup> Cohen 2004, Simpson 2004, Lesniak 2005, Milton 2007, Barton 2010a & b, While & Dewsbury 2011.

<sup>68</sup> Smedley 2005, Zuzelo & al. 2008, Jackson 2012, Sandås & Koskinen 2015.

<sup>69</sup> Lahtinen & Joronen 2013.

<sup>70</sup> Locsin & Purnell 2007.



or develop a phobia towards technology. Their autonomous will becomes lost or is not respected. These experiences of the use of technology in caring demonstrate non-caring care and suffering, and highlight the need to develop ethical and truly caring care in the context of technology.

According to Flaming<sup>71</sup>, nursing excellence, the art of nursing, is usually understood to be more and more about knowledge and its application; especially from the point of view of science, it is seen that the more nurses know, the better their practice is. This conceptualization of nursing practice has similarities with the ancient Greek concept and mode of reasoning called 'techne' and with today's rational and technological way of doing something. However, the problem in caring and nursing is that it cannot adequately deal with the ambiguities of everyday caring and nursing. Nursing excellence as art of nursing occurs with 'phronetic'. From the ontological basis of caring, in which a nurse's knowledge as well as ethics and values and dispositions are realised in practice in communion with the patient, the caring is realised with 'phronetic', in other words, caring in an ethical way. That is why the preconditions of the ethical and caring use of technology are required of the ontological basis of caring science. 'Techne-ical' practice leads to competent nursing, but only 'phronetic' practice with advanced methods of technology in caring and nursing results in nursing excellence and art of caring. This very same challenge has been identified by Locsin and Purnell<sup>72</sup>, who have stated that it is an imperative in nursing to recognize the problems and prospects connected to the technology in caring and create a framework which can guide to good and competent caring.

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<sup>71</sup> Flaming 2002.

<sup>72</sup> by Locsin and Purnell 2007.

### ***Technology from the viewpoint of other disciplines***

Technology as a phenomenon and its influence on human life, culture and society has widely interested researchers<sup>73</sup>. Arthur<sup>74</sup> reflected on the phenomenon of technology and its evolution. He started his study from the aspect of natural science, which defines technology to be the application of natural science, the study of the devices and methods used in economy, and the knowledge of the industrial processes and the practicing of the profession of engineers. Arthur stated that these classical definitions did not open and clarify the technical nature of the phenomenon of technology, which is why he presented three new definitions. He defined the phenomenon of technology as a tool to satisfy and supply the needs of human beings. As a tool, technology can be a method, a process or a device. It can be simple or complicated, and it can be either material or immaterial. The second definition views technology as a collection of practices and components, and the third definition of the concept of technology claims that it is a collection of all devices and technical methods which are in the use of culture. This whole collection originates from the use of the natural phenomena and it grows in an organic way when new devices are made up from the components of older devices. Technology is doing, it realises its own purpose, and it is functional. Various technologies can be multiple, such as devices, methods, processes, and they can show themselves in many different ways. Arthur stated that the use of concepts when discussing technology is inaccurate and he saw that this was the reason for the difficulties to envision and understand technology. This statement emphasises the need to determine the concept of technology and increase knowledge of it.

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<sup>73</sup> Arthur 2009, Ellul 1964, Estabrooks 2003, Feenberg 1999, 2002, 2010, Higgs & al. 2000.

<sup>74</sup> Arthur 2009: According to Arthur technology creates itself, in other words, it is autopoietic, and it repeats itself and for this reason, it has a so-called recursive nature.

Feenberg<sup>75</sup> states that in humanistic sciences, interest in technology has arisen rather late. He refers to the humanistic tradition which from the times of the ancient Greeks has been interested in social, political and theoretical matters rather than in technology. Technology has been seen as a neutral phenomenon or as progress of human beings, or a phenomenon which overpowers humanity in society. Feenberg<sup>76</sup> argues that the design of technology is an ontological decision that has political consequences. The idea of technology is not just that of a tool, as a neutral phenomenon, but also as a phenomenon which has an effect on the human good or bad, freedom, and equality of human beings.

Feenberg argues that earlier studies regarded technology as a dichotomy: either as a utopian salvation of humanity or a pervasive hegemony of technology which overran humanity. Feenberg<sup>77</sup> approached technology from the viewpoints of different philosophers and theories. He classified the approaches into two opposite categories: instrumental and substantive categories.

Instrumental theory defines technology as “a neutral tool” that is ready to serve the user and is useful to human beings as such. The substantive theory<sup>78</sup> sees technology as a subservient to values. Because these different theoretical approaches have not provided a comprehensive understanding of the phenomenon of technology Feenberg created his own theory: “a critical theory of technology”, in which he synthesized the impression of earlier studies and theories from the social science point of view. Feenberg stated that “there is the dilemma of development”, meaning that there are “coherent configurations of human and technology” that would support the good of human beings by liberating and connecting both nature and humanity. According to the critical

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<sup>75</sup> Feenberg 1999.

<sup>76</sup> Feenberg 2002.

<sup>77</sup> Feenberg 1999, 2002.

<sup>78</sup> cf. Ellul 1964 and Feenberg 2002.

theory of technology, it is crucial that when planning technology, the technical codes, values and culture of the society are taken into account. In the critical theory of technology, Feenberg<sup>79</sup> emphasizes the multiplicity of cases, cultures, societies and life. The seeing of possibilities when using technology is important. Technology is not a 'thing'; it is considered a 'procedure' of looking for a harmony between the natural and humanistic sciences and politics.

Feenberg's theory of democratic transformation of technology comprises the ethical dimension because values such as human good, good life, individuality, free choice, equality, and responsibility are part of the democratic process of transforming technology. In Feenberg's theory, it can be seen that technology is related to the social dimension of humans. As for the caring theory, communion is seen to be the basis for all humanity. The human being is seen to be fundamentally dependent on other human beings. In caring science, this dependence is called communion.<sup>80</sup> To conclude, it can be seen that the theories of both Feenberg and Eriksson defined the human being as social by nature.

Higgs & al.<sup>81</sup> have used Albert Borgmann's philosophy of technology as a starting point in their philosophical development work. They classify that Borgmann's philosophy of technology belongs to the tradition of substantive philosophy of technology. The interest of knowledge lies in the shift from 'things' to 'devices' and in the relation of devices and the human being. In caring tradition, we can regard this as an example of the change from the candle to vital signs monitoring. According to Higgs & al. the basic question in Borgmann's philosophy of technology is "how technology affects our assessment of good life". The problems that technology creates are viewed to exist in the relationship between

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<sup>79</sup> Feenberg 2002, 2010.

<sup>80</sup> Eriksson 2001, Lindström & al. 2006, Lindström & al. 2014.

<sup>81</sup> Higgs & al. 2000.

the human being and technology. Technology is seen to be devices, and its ethical dimension is related to the good life of humanbeings.

The dialogue between the technological rationality and technological society thinking has brought up the question about the ethics of technology in human sciences and medicine. Faulkner<sup>82</sup> has presented empirical material on the mundane technology used in everyday clinical practice such as infusion pumps, laboratory tests, and coagulometers, i.e., the kind of technology that is widely used around the world that does not demand much familiarity. Technology is regarded as devices and innovative products such as tissue engineering.

Technological innovations are seen to be developing modifications. Faulkner presented that technology in health care is a challenge. Technology is heterogeneous, and connected to, for example, politics, economy, industry, healthcare state, technological knowledge and safety. Faulkner<sup>83</sup> and Hofmann<sup>84</sup> criticized the health technology assessment (HTA) science and its role in the health technology assessment policy. According to Faulkner, health technology assessment emphasizes the technical safety of devices, with effectiveness and cost-effectiveness evaluated with positivistic research methods, meaning that the patients' experiences are not taken into account.<sup>85</sup> When developing new technical systems, such as information technology (IT) based services, devices and robots used in health care, the focus of the documentation has been on technical solutions and processes. Patients' experiences of the use of technology, such as robots and video conferencing systems, have been described as "exciting". Patients and families have reported to be pleased with the possibility to discuss with health care personnel in a timely fashion<sup>86</sup>, but comprehensive

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<sup>82</sup> Faulkner 2009.

<sup>83</sup> Faulkner 2009.

<sup>84</sup> Hofmann 2013

<sup>85</sup> Cf. Article II.

<sup>86</sup> Petelin & al. 2007.

knowledge of the good and ethical care and patients' experiences in the context of technology is lacking.

## 5. ETHICAL CONSIDERATIONS OF THE RESEARCH

“It is still true that the good must be separated out of everything that appears good and seen in distinction from it. But it is in everything and is seen in distinction from everything only because it is everything and shines forth from it”. According to this quotation from Gadamer<sup>87</sup>, it is good and true that the good stands out of the otherness and the good manifests itself and can be seen separately from the otherness. The good is a part of everything, but it can be segregated from that otherness. In this research, the good is seen to be ethical and caring care in the context of technology, and the aim was to highlight the good and separate it from the otherness and through this, create an ideal model of ethics and caring of technology in caring science in the form of theses. The study ethics combines the ethics and ethos of caring science by realizing the responsibility of the researcher and the caring human being by making visible the evidence of the significant and meaning-carrying substance of caring. The ethics of the research started with the identification of the topic. In this research, the topic arose out of the discussion of the possible advantages or disadvantages that technology has brought to human life, health, suffering and caring. Searching for the knowledge and evidence started with the following question: what is technology in relation to caring science and its ethos? The questioning continued and evolved to the following questions: what is technology in caring science and what makes the technology ethical and caring; finally, the study questions took shape. The ethos of caring science consists of searching for a deeper appreciation of human being, his/her relation to health, suffering and to the truth, the beautiful, good and evident in human life and caring, in this research, in the ideal of caring in the context of technology. The ideal in this

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<sup>87</sup> Gadamer, 1986, 116.

research is built on the ontological and contextual evidence. In caring science as well as in this research, ethics is the core of ethos.<sup>88</sup>

The research strategy in this research was basic research. As a result of this strategy selection, there was no need to contact vulnerable patients and informants to obtain material for this research. During the research process, text interpretation was the main method. From the research ethics point of view, it has been demanding to be open and receptive for the text and its truth as well as its otherness. The focus of the process has been to keep to the truth and respect the references and data authors' work when quoting and interpreting their texts<sup>89</sup>.

This research process was guided by the general principles of good scientific practice<sup>90</sup> and research ethics<sup>91</sup>. The principles were followed during the whole study process. In particular, the authors' rights concerning the study material were taken into account by careful reference marking<sup>92</sup>. The research process was guided and critically inspected by the community of caring science, and the sub-study articles went through an inspection process by two unknown peer reviews and editorial boards. This research is a part of Åbo Akademi's and The Hospital District of Helsinki and Uusimaa's co-operation research project: In the Patient's World. The aim of the project is to promote the ethics of caring in everyday clinical care. The plan of the research project has been inspected in the committee of ethics in both organizations.

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<sup>88</sup> Eriksson 2009

<sup>89</sup> Coughlan & al. 2013.

<sup>90</sup> ETENE 2002, 2009 and 2010, TENK 2014.

<sup>91</sup> Polit & Beck, 2004, Leino-Kilpi & Välimäki, 2003, Polit ym. 2001, LoBiondo-Wood & Haber, 1990.

<sup>92</sup> Coughlan & al. 2013, TENK 2014.



The results in article two indicated that ethics is not self-evident in the light of past studies in nursing and caring journals, which highlighted the need to study this topic. Today, patients want increasingly to be in their homes regardless of their illness and poor condition, and the health strategy of many countries is that people should take more and more responsibility for their health and care. This is one of the reasons that has led to increased use of technology in care, in hospitals as well as in homes. The identified risk of this is that patients are left alone with different kinds of technology but in reality, without care.<sup>93</sup> The social and ethical responsibility of caring science and the caring profession is to highlight and add knowledge of the remarkable changes and their consequences in caring and to increase awareness of the preconditions of ethical and truly caring care on all levels of society. This research is one exercise to add to the knowledge of the ethics and good of human being in the context of technology in caring.

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<sup>93</sup> Kidd & al. 2010.

## 6. SUMMARY OF THE INTERPRETATION HORIZON AND PRESUMPTIONS OF THE RESEARCH AND ITS ETHICS

The tradition of caring science in connection with the interest of finding a deeper understanding to the question of what is the concept of technology and its ethics in caring science has led to the hermeneutics of Gadamer. The circle of interpretation, which is guided by the very same elements and principals as the philosophy of caring sciences, instructs the interpretation of the text, the understanding of it and finally, the finding of the meaning.<sup>94</sup>

The philosophical hermeneutics of Gadamer<sup>95</sup> is based on the idea of understanding and interpretation. The fundamental concepts are the existence of human being, human history, human experience, dialogue, interpretation horizon, hermeneutic circle, language, interpretation and understanding. According to Gadamer<sup>96</sup>, the task of hermeneutics is to repair the incomplete and disturbed understanding. As the use of technology is increasing in care, it is possible to see that the core of caring is obscured: the dignity and wholeness of human beings and the respect of them in care, alleviation of suffering, health and the understanding of the caring world are not clear and self-evident<sup>97</sup>. By applying the hermeneutic interpretation method, research of the caring science and knowing of the concept of technology<sup>98</sup>, a new understanding and knowledge has been found to this incomplete and disturbed understanding of technology in caring science. It has also enabled addressing the research questions set for this research and answering them.<sup>99</sup>

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<sup>94</sup> Eriksson & al. 2007, Gadamer 2005, Standing 2009.

<sup>95</sup> Gadamer 2005, 2006.

<sup>96</sup> Gadamer 2005.

<sup>97</sup> Eriksson 2001, Tontti 2005.

<sup>98</sup> Eriksson & al. 1993, Eriksson 2001, Tontti 2005.

<sup>99</sup> Gadamer 2005, Tontti 2005, Oesch 2005.

Caring science as an interpretation horizon is founded on the ethos of caring and its ethics. This is described in chapter 2. The basic motive of caring is love and charity, and it presents itself as goodness and pursuing truth and beauty. The dignity of a human being is the basic category of caring ethics and it becomes true in love for one's neighbour and in charity. The second basic category of caring ethics is to prevent and alleviate the suffering of human being. The focus of this research is on the dignity and good of human being in caring science and in the prevention and alleviation of suffering of human being in the context of technology.

The human being as the main ontological concept in the caring theory is seen to be a unique wholeness of body, soul and spirit. The basic assumption is that a human being is spiritual by nature. The human being is holy and dignified. This basic nature of the human being is permanent and unchangeable, and no one can take it away from anyone, and it belongs equally to all. The understanding of this ontological basic nature of human being is essential in caring theory.<sup>100</sup> Edlund<sup>101</sup> has studied the concept of dignity as a basic category of caring ethics. She presents that dignity is absolute but also relative. Absolute dignity is part of the origin of human being and his/her holiness, and that is why it cannot be taken away from her/him. Absolute dignity is related to human's spiritual dimension as a free and responsible being who realises his/her humanity by serving others. Relative dignity is shaped as part of culture and society and it can change. Relative dignity is related to human's inner ethics and eternal ethics. Relative dignity is realised in human being's actions and activity. Dignity is described as an ability to be independent, cope by oneself, to be free to do what one wants and to be responsible for that. Dignity is also described as the experience of being seen, heard, believed and taken into account. The experience of human dignity

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<sup>100</sup> Eriksson 2001, Lindström & al. 2006 and 2014.

<sup>101</sup> Edlund 2013.

is related to the feeling of being someone precious. This experience is something a human being can get in communion with others. Dignity as an ethical stance is to know what is right, honourable, and good for a human being. Dignity has also an aesthetic dimension which manifests itself in cleanliness, convenience, beauty and mastery of things. In this research, this substance can be seen, for example, in the convenience of technology and the mastery of processes of technology and caring. That is to say, in how the good of human being is realised in the context of technology in caring. (See also Chapters 2, 4 and 5.)

As a main ontological concept, caring in the tradition of caring science is seen to express the love for one's neighbour, which is *caritas*. Caring exists everywhere and it is natural to a human being. The core of caring, its substance, can only be understood by familiarizing oneself with and studying the origin of the concept. The historical roots of natural caring are in caring, which expresses maternal love. The basic category motivating to care is suffering. If the dignity and wholeness of human being does not come true in care, it will cause suffering and decrease health, which in turn increases the need for caring<sup>102</sup> In Näsman's<sup>103</sup> study, the concept of 'virtue' was determined as a synonym for human good as a fundamental part of caring ethics and ethos. The ethos of caring theory is defined to be the ontological goodness. In the results of the study the human good is described to be primarily functional. The ethics of human good emerges in human communion and when something, in this research technology, functions and fulfils its task well. 'Virtue' is seen to be a power which is related to values, human's responsibility and caring motive to love, show charity, and respect and honour the holiness and dignity of the human being. (See Chapter 2 and 5.)

The concept of technology and its various synonyms are used in multiple and equivocal ways. Technology in caring has increased during the last decades and

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<sup>102</sup> Eriksson 2001, Lindström & al. 2006 and 2014.

<sup>103</sup> Näsman 2012.

it is clear that technology has many advantages, but it also has many disadvantages which threaten the human good. In caring and nursing literature, there is a tendency to see technology as either good or bad. As Feenberg<sup>104</sup> states, it is critical to see the multiplicity of human life and technology and search for new ways to look at technology as a part of harmonious human life. (See Chapter 4.)

The concept of caring as a core of caring science means doing with, tending, playing and learning; this comes true in the spirit of love, faith and trust. The caring theory and its ethos formed the interpretative horizon of the text materials of this research. To summarize the pre-understanding and interpretation horizon of the research the following basic assumptions are made:

**1. *The ethos and ethics of caring science:***

*Caring science and its caring theory with the core of ethos and ethics of caring is the foundation of the research. The ethos is the fundamental motive, the goal and will to make good. The core of ethos is ethics. The ethics of caring focuses on dignity of human being, charity, love, and is related to the fundamental will to make good. The dignity of human being is a basic category and value of caring. The dignity of human being is absolute. The dignified human being is free and responsible, autonomous, unique and whole. The human's fundamental will to do good to another human being and to alleviate suffering is the basic motive of caring and the ethics stand out as a priority in all human action, such as in caring.*

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<sup>104</sup> Feenberg 2002.

2. *Caring and alleviation of suffering:*

*Caring is unconditional caring for human being's basic needs, and it is provided as long as the human being cannot manage the basic needs satisfaction independently.*

*Another basic category of caring is suffering. The focus of caring is on suffering of human being and on the alleviation of this suffering and promotion of health. The human being suffers if his/her dignity is not respected.*

*The caring motive drives the carer to the act of caring, which is "the art of making something very special out of something less special". The art of caring means the ability to realise the care and encounter the suffering human being in a unique way, without prejudice, with respect and dignity, as well as to alleviate suffering in communion with a suffering human being.*

3. *The concept of technology in caring:*

*In the caring world, technology has not been determined from the perspective of caring science as a concept and the ontology of the concept has been unknown. Technology is seen to be those technological applications which are used in patient care and which the patient can also use independently after patient education.*

*Technology and technological applications are seen to be technical systems, devices and machines, so-called hard technology, by which the patient's daily basic needs and caring needs, vital functions and communication needs can be supported, or the devices can be used for patient education or information. Moreover, the devices could be used to ease the use of health care services. Technology is seen to be bipartite: good or bad, caring or non-caring, but it is also a 'thing'*

*which has an effect on the human good or bad, freedom, and equality of the human beings. The seeing of possibilities of the good and bad when using technology is important.*

These assumptions form the theoretical basis of the research and searching for answers to the research questions, proceeding from caring science to the main research questions and single sub-study questions, and answering them by interpreting the material and returning back to caring science, and by creating the ideal model of the ethics and caring of technology in caring science in the form of theses in the light of the new horizon based on the new understanding and knowing of the concept of technology and its ethics.

After the planning phase of this research it was evident that the concept of technology was unclear and its ontology unknown. The ethics of caring, the human good and human dignity as the core of caring science in the context of technology were seen in diverse ways. The knowledge of patients' experiences of the human good and caring care in the context of technology was scattered. Based on this, the research questions and sub-study were confirmed.

## 7. WAYS TO TRAVEL – METHODOLOGY

### *Hermeneutic research and interpretation*

In caring science tradition, Gadamer's hermeneutic research and interpretation methodology have been one way of living out this task of basic research and of answering research and sub-study questions. According to Gadamer<sup>105</sup>, 'a thing' as it appears in reality can be understood through language and concepts. The hermeneutic analysis and interpretation can open the origin of the 'thing' and its essence. The analysis and interpretation are based on language. Throughout this research, hermeneutic interpretation methodology will be used as the main methodology. The wholeness of this research consists of four sub-studies, which have been offered to publication in international journals. These sub-studies are discussed and interpreted in the summary section in chapter eight. The methods of the sub-studies are analytic and interpretative by their nature. The summary and interpretation of the results of the sub-studies in chapter eight form the basis for the creation of the ideal model of the ethics and caring of technology in caring science in the form of theses, which is presented in chapter nine.

### **The beginning of hermeneutic research**

According to Gadamer<sup>106</sup>, it is essential to have the ability to see the open questions when starting the research process. The questions that change or break established conceptions, as opposed to questions controlling or ruling our thinking, make it possible to find new answers and perspectives to 'things'. In this research, the traditional area of technology and engineering is approached from the world of caring and its caring science tradition. The aim

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<sup>105</sup> Gadamer 1986, 2005 & 2006.

<sup>106</sup> Gadamer 2005, 23.



is to gain knowledge and new evidence of the concept of technology and its ethics in caring science.

The presentation of the research and sub-study questions was related to the pre-understanding on research carried out within the topic and knowledge of interest. At the beginning of the research process, the researcher began to inspect and interpret the topic; this inspection continued through the research circle. The constant task of the researcher was to ensure that the topic was inspected in a scientific manner by considering the prejudices and pre-understanding she might have had. The researcher who wants to understand does not cling to his or her pre-understanding, but widens the questioning to history and back to the present. The researcher has been open and receptive to the otherness of the texts during the whole research project. The receptive attitude did not mean that the researcher was neutral in relation to the topic; however, she needed to separate her pre-understanding from the otherness of the text. The precondition for the interpretation is that the researcher is conscious of his or her own pre-understanding. This makes it possible for the text material to open and present its own otherness, so it can answer the research and sub-study questions with its own 'truth'.<sup>107</sup>

The research question on the concept of technology and its ethical and caring dimensions has evolved over many years of work experience in technology-intensive caring units and as a lecturer of nursing as well as during my doctoral studies in discussions on the essence of caring in technology-intensive caring contexts with nursing students, fellow students and researchers. Over the years, the topic has focused on the basic study and its What questions: "What is the concept of technology, what is the ethics of the concept of technology and what is the ideal model of the ethics and caring of technology in caring

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<sup>107</sup> Gadamer 2005, 30-35 and 2006, 268-269.

science". The need to increase understanding and find a meaning to the concept of technology in caring science took its shape and the need to study questions arose.

### **Pre-understanding**

The researcher's pre-understanding of the technology in care has developed in working as a nurse and as a lecturer of nursing and health care and as a doctoral student in discussions with fellow students and researchers. In technology-intensive caring units, technology comprised products and devices of engineering science which were utilized in care. Nurses took care of both patients and technology. The human good in technology intensive care was undeniable. When the use of technology spread to patients' self-care, the impression of technology widened to assistive technology and the use of information and communication technology and devices used in home care. Questions of usability, safety and lack of knowledge arose. All this resulted in the contemplation of the subject of technology and the questions what is technology in caring and what makes it caring.

By reading literature and studies of technology, the pre-understanding of the concept and its substance broadened. At the beginning of the research, in the planning phase, the concept of technology was defined on the basis on the pre-understanding. Later, the pre-understanding of the concept of technology has been developed further by overviewing literature (Chapter 3) which provided the theoretical perspective for the research of the concept and 'the thing'. The view of 'the thing' and its meaning proved to be a triune. On the one hand, technology itself was regarded as neutral, but on other hand, it was seen to be very value-laden. The value-laden conception of the concept of technology was also divided into two; on the one hand, technology was seen as deliverance of mankind and on the other, it was seen to overrule everything, to spoil the environment and

destroy humanity. Feenberg's<sup>108</sup> theory combined these viewpoints and supported also the presentation of the research question and sub-study questions in this research. When researching and learning more about the concept, the dimensions that had been forgotten could be found again and could be taken into account and used as evidence when aiming at ethical and truly caring care in the context of technology.

### **The spiral of understanding, induction, deduction, abduction**

The circular nature of understanding is based on the rule of hermeneutics, according to which the wholeness is understood by the individual parts and the individual part is understood from the wholeness<sup>109</sup>. The vision was that when researching and aiming at apprehension, the relation between the parts and wholeness was like a circle. The precondition for the researcher to step in to the hermeneutic circle of interpretation, where the two-way founding on individual parts and wholeness could start, was that the researcher was conscious of her pre-understanding and possible prejudices. The pre-understanding was a "*sine qua non*", imperative to the interpretation.<sup>110</sup> Gadamer's hermeneutic circle of interpretation was based on the reading of the text where the researcher entered into a dialogue with the text and her pre-understanding by reflecting on different viewpoints, having a dialogue with the text material by using induction and aiming to a new understanding, and further, moving on to deduction and thus aiming to the comprehensive wholeness. By repeating the induction and deduction process, the vision of the wholeness and its interpretation reached a new level of understanding. The new understanding and the new horizon elided together, and with this so-called abduction the understanding was reformulated as a new statement and

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<sup>108</sup> Feenberg's 2002.

<sup>109</sup> Gadamer 2005, 29-76, Tontti 2005, 14-17, Debesay & al.2008

<sup>110</sup> Gadamer 2005, 34, Tontti 2005, 60-61.

new understanding.<sup>111</sup> When aiming at new understanding and knowing, at its best the circle of induction and deduction, back and forth, step by step, led to a synthesis of the whole, enabling the new level of understanding to be conveyed in the ideal model of the ethics and caring of technology in caring science in the form of theses.<sup>112</sup> In this research, each of the sub-study materials were first analysed and interpreted inductively. The statements of the text of the material, which answered the study questions, were analysed and tabulated. After that, each of the statements was interpreted from the perspective of caring science (see Ch. 2), which was the interpretation horizon of the research. This first interpretation was the deduction, in which the induction of the research material was connected to the large wholeness, and thus the first deduction was done. This circulation of induction and deduction was carried on in each of the sub-studies; furthermore, the results of each sub-study were examined inductively, and by deduction, connected to the results of other sub-studies and preunderstanding of the research, and to caring science as the interpretation horizon of the research. For example, this circular induction and deduction was carried out in sub-study two where the answers to sub-study questions were collected inductively from the material into a table (Appendix 1). The answers were interpreted and themed from the perspective of caring science (the results of sub-study two) and thus the first deduction was realised. The second circle of the interpretation was carried out by inspecting inductively the results of each sub-study and interpreting them from the viewpoint of the research questions and caring science, and the result was described in the summary in Chapter eight. On the basis of these means and the understanding and knowing reached, the ideal model of the ethics and

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<sup>111</sup> Gadamer 2006, Eriksson & Lindström 1997 and 1999, Niiniluoto 1999, Kärkkäinen 2005, Lassenius 2005, Lindholm 2008, Nurminen 2009, Haho 2014.

<sup>112</sup> Eriksson & Lindström 1997.

caring of technology in caring science in the form of theses was created as an abduction.

### **Interpretation of the material**

The interpretation of the material in the summary as well as in the sub-studies – dictionary material, nursing and caring study material of technology, its ethics and patients' experiences of technology, and Gadamer's philosophical literature of technology and its ethics (Table 1: Study Questions, Materials, Methodology and Expected Results, p.32) – was done from the viewpoint of caring theory, which has been described in Chapter 2. The caring theory and tradition of caring science formed the basic foundation, which provided familiarity to the researcher and enabled encountering a new and somewhat strange 'thing' within the substance of technology. The opposite of the familiar and the strange opened the dialogue between the researcher and research materials, leading to interpretation and understanding. The hermeneutic interpretation was guided in accordance with caring tradition. The nature of the circle of interpretation was such that it allowed prejudices to break down and offered a possibility for the old and new horizon to become assimilated. The interpretation process was the path to understanding of the meaning.<sup>113</sup> In this research, the interpretation of the materials aimed to understand the concept of technology and its ethics and caring in caring science, and further, to create the preconditions of the ethics and caring of technology as an ideal model.

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<sup>113</sup> Gadamer 2005, 3-39, Oesch 2005.

### The path of the research

In the first sub-study the ontological concept determination was done by applying Koort's<sup>114</sup> and Eriksson's<sup>115</sup><sup>115</sup> hermeneutic concept determination method (sub-study question 1.1. Article I). Scientific work begins with concept clarification. In the caring world, technology has not been determined from the perspective of caring science as a concept and the ontology of the concept has been unknown. Eriksson's model of concept determination is one method for caring science to take up the challenge of opening the concept's ontology in a comprehensive way. Eriksson's model of concept determination is based on Gadamer's hermeneutic philosophy and Koort's semantic analysis. Gadamer points out that a human being can understand the universal ontological structure by the means of language and it also enables the understanding of the substance of 'the thing'<sup>116</sup><sup>116</sup> Eriksson's concept determination model comprises an ontological and a contextual determination.

The knowledge of the concept of technology and its ethics in earlier studies has been described in the summary section of the research in Chapter four and more precisely in sub-studies two (article II) and three (article III). These sub-studies described the concept of technology in the context of nursing and caring science and thus offered the contextual determination of the concept of technology and added to the contextual understanding of the concept. The research method of the second article was integrative literature review<sup>117</sup>, whereas the method of the third sub-study was a meta-synthesis of qualitative studies<sup>118</sup>. The qualitative synthesis of patients' experiences of technology in care was done because the focus of attention in caring science is on human beings and their experiences of

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<sup>114</sup> Koort's 1975.

<sup>115</sup> Eriksson's 2006, 2007 & 2010a.

<sup>116</sup> Eriksson 2010a, Gadamer 2006.

<sup>117</sup> Whittemore & Knaf 2005.

<sup>118</sup> Sandelowski & Docherty 1997, Sandelowski & Barroso 2003 & 2007.

health, suffering or care (study question 2.3.) It was also observed that in the integrative review material, in sub-study two, the focus of interest in most of the studies published in caring and nursing journals was not on patients' experiences. The philosophical literature on technology written by Gadamer has been interpreted from the horizon of caring theory by using Gadamer's hermeneutic interpretation methodology aiming to describe the substance of the ethical dimension in the context of technology and to gain a comprehensive understanding of the human good in the context of technology in caring science (study question 1. 2.). The results of these articles are described and interpreted by hermeneutic methodology in the conclusion of the articles and reflected and discussed again in the results section in chapter eight in the summary of the research.

Based on the knowledge gained in different phases of the research, the ideal model of the ethics and caring of technology in caring science in the form of theses, including the determination of the idea of technology and preconditions of the ethics and caring of technology has been created and described in chapter nine. In this hermeneutic basic research, the new understanding of the concept of technology in caring science has been gained by using induction, deduction and abduction.

The summary of the research and sub-study questions, materials, methodology and expected results (Table 1) shows how the interpretation of the sub-studies and their materials proceeded step by step. First, the concept of technology and its ethics was researched and described from the published caring and nursing science articles. The results confirmed that in earlier studies, the concept of technology was defined in various ways and the ethics was not a truism (Article II). Second, the concept of technology was opened and the ontology of the concept determined (Article I). This result was reflected with the pre-understanding and interpretation horizon of caring science and the results of

Article II and the third sub-study were seen to be necessary to highlight the authentic voice of patients. Article III: "Patients' experiences of technology", opened the patients' perspective to the technology and its caring or non-caring, or in other words, its good and ethical or suffering-increasing dimensions. The results were reflected with results from earlier phase and interpreted. The need to gain a more comprehensive understanding of the ethics and good in the context of technology led to the fourth sub-study to search for the ethics of technology by interpreting Gadamer's literature of technology and its good (Article IV). The results were again reflected and interpreted, and at the end of the constant reflecting and circles of interpretation, the understanding of the wholeness enabled creating the preconditions as an ideal model of the ethics and caring of technology in caring science in the form of theses.



**Table 1:** The summary of the research and sub-study questions, materials, methodology and expected results

Research and Sub-Study Questions	Material and Methodology	Expected Result
<p>1. What is the concept of technology?</p> <p>1.1. What is the ontology and the theoretical aspect of the concept of technology? (Article I)</p>	<p>Data: eight dictionaries in English, Methodology; Eriksson's Concept determination methodology (Eriksson 2010)</p>	<p>Determining the concept of technology – the ontology of the concept from the perspective of caring science.</p>
<p>2. What is the concept of technology and its ethics in the light of earlier studies?</p> <p>2.1. What is the concept of technology in nursing and caring literature?</p> <p>2.2. What is ethics in the context of technology in nursing and caring literature? (Article II)</p>	<p>Data: Published caring science articles which answer the study question and which can be found with the key words technology and/or care and/or nursing. (36 articles)</p> <p>Methodology: Integrative literature review.</p>	<p>Integrative literature review of the concept of technology in care and its ethics. Description of the use of the concept of technology and its ethics in nursing and caring journals.</p>
<p>2. What is the concept of technology and its ethics in the light of earlier studies?</p> <p>2.3. What are the patients' experiences of technology in care? (Article III)</p>	<p>Data: Published caring science articles which answer the study question and which can be found with the key words patient and/or experience and/or technology. (11 articles)</p> <p>Methodology: Qualitative meta-synthesis.</p>	<p>Describing patients' experiences of the use of technology in care. How do patients perceive the technology? What experiences are caring and what experiences are non-caring?</p>
<p>1. What is the concept of technology and its ethics?</p> <p>1.2. What are ethics and caring in the context of the concept of technology? (Article IV)</p>	<p>Data: Gadamer's philosophical literature, <b>The Idea of the Good in Platonic-Aristotelian Philosophy</b>. Yale University Press. 1986. USA.</p> <p><b>The Enigma of Health</b>. Polity Press in association with Blackwell Publishers Ltd, 1996.</p> <p>Methodology: Hermeneutic interpretation</p>	<p>The ethical dimension and substance of the concept of technology: what is good, ethical and caring in technology?</p>
<p>The Research Question:</p> <p>What is the ideal model of the ethics and caring of technology in caring science in the form of theses (Summary)</p>	<p>Data: The concept of technology, previous phases and their data.</p> <p>Methodology: The Interpretation of the concept of technology and imposing ethical preconditions for caring use of technology.</p> <p>Methodology: Abduction</p>	<p>The preconditions of ethics and caring of technology determined from the perspective of caring science.</p>

### ***Concept determination – method and material of the first sub-study***

The concept determination method of the research was based on Eriksson's<sup>119</sup> model of concept determination founded on Gadamer's<sup>120</sup> hermeneutic interpretation methodology and Koort's<sup>121</sup> hermeneutic semantic analysis. The ontological determination included an etymological and semantic analysis<sup>122</sup> as well as a determination of the essence of the concept and basic category of the concept. These four phases of determination composed the unity of hermeneutic circuits in concept determination. The focus of interest and knowledge was on the essence of the concept, i.e., the substance of the concept of technology<sup>123</sup> In the interpretation process of the dictionary material, the researcher engaged in a dialogue with dictionary texts and determined the ontology of the concept.

In the sub-study “Determining the Concept of Technology – The Ontology of the Concept as a Component of the Knowledge Development in Caring Science”, the material for determining the concept included eight English dictionaries. English dictionaries were chosen because they have general, descriptive and historical perceptions of the concept and its development<sup>124</sup> and because English is a universal language of science<sup>125</sup>. The chosen dictionaries represented both British English and American English dictionaries with a global English-speaking target group. The advisory boards of the dictionaries or editorial teams of the dictionaries had members from different continents embracing universal and general definitions of the concepts. (Article

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<sup>119</sup> Eriksson's 1997, 2010a.

<sup>120</sup> Gadamer's 2005, 2006.

<sup>121</sup> Koort's 1975.

<sup>122</sup> Eriksson 2010a, Sivonen & al.2010, Sivonen 2012.

<sup>123</sup> Eriksson 2010a.

<sup>124</sup> Durkin 2009.

<sup>125</sup> Eriksson 2006.

l) Furthermore, the concept of technology as such is universal in nature<sup>126</sup>. The chosen dictionaries represented established academic and university dictionaries and they described the content, structure, nuances, meaning, use, synonyms, origin and development of the concept. The dictionary material was found by using the electronic database Nelli Portal with the keywords: etymology? word? and ontology? word? (Article I).

To describe the dictionary material as a whole, it was tabled to five columns comprising: 1. dictionary, 2. concept of technology, its synonyms and immediate concepts, 3. etymology, 4. use of the concept in different contexts, and 5. interpretation of the elements of the concept from the perspective of caring science. The first hermeneutic circuit provided the first result of the etymology of the concept and highlighted the nuances of the concept of technology which have been forgotten but could be found again<sup>127</sup>. The essence of the concept and its basic category were also determined. The second circuit was to table the synonyms of the concept of technology, resulting in the description of the synonyms<sup>128</sup>. Based on these two circuits, the development of the concept was described throughout history; its nuances, characteristics and construct were analysed and written open in more detail. Synonymous concepts were categorized into areas of common comprehension and named according to their essential content and nuances of the concepts. At the beginning of the third circuit, the inclusion of the synonyms was carried out, depending on how often the synonym featured in the material. The selected synonyms were tabled to describe the relationship of the synonyms and to perform the discrimination analysis. The result of the third circuit and the discrimination analysis of the concepts provided knowledge of the concept of technology and its immediate concepts, their degree of synonymy opening

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<sup>126</sup> Feenberg 2002.

<sup>127</sup> Eriksson 2010a, Karlsson & al. 2007, Article I figure 1.

<sup>128</sup> Article I table 1.

the construct of the concept of technology<sup>129</sup><sup>129</sup>. In the fourth circuit, interpretation of the deep construct and the meaning of the concept was implemented by the horizon of caring science and the material as a whole. At the end of the process, the ontological substance of the concept of technology was determined.<sup>130</sup>

### ***Integrative literature review - method and material of the second sub-study***

In the second sub-study “The Concept of Technology and its Ethics in Nursing and Caring Journals”, an integrative literature review methodology was applied according to Whittemore and Knaf<sup>131</sup> and Coughlan & al.<sup>132</sup>. The integrative review method was chosen because it permits to summarize past studies conducted by using different methods and thus provides a comprehensive description and understanding of the concept of technology and its ethics in previous nursing and caring science studies (Article II).

To distinguish between technology and its ethics in caring and nursing, a material search was carried out with Medline<sup>®</sup> and CINAHL databases using the search terms: technology, technolog\*, nursing, nurs\*, caring and including related terms. As a search strategy, advanced search was employed with the restriction of limiting the material from the year 2000 to February 2013 and limiting it to journal articles published in English and evaluated as a five-star source by the database. In addition, a manual search was done during the research from journals and reference lists. (Article II.)

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<sup>129</sup> Article I figure 2.

<sup>130</sup> Eriksson 2010a, Sivonen & Kasén 2010, Sivonen 2012, Article I.

<sup>131</sup> Whittemore and Knaf 2005.

<sup>132</sup> Coughlan & al. 2013.

Based on the focus of this sub-study, articles describing the concept of technology and its ethics in caring science at general level were included. Technology used by patients or their significant others independently or together with a nurse and articles discussing the ethics of technology in past nursing and caring literature were accepted. It is noteworthy that the material selection focus was on the articles which discussed technology and experiences of technology, and thus the articles named or focused on nursing and nursing experiences were not included.

The material of the integrative review was assessed and analysed and the answers to the research questions were collected inductively and tabulated<sup>133</sup>. The tabulation was done in chronological order in the groups based on the research method according to Whitemore and Knaf<sup>134</sup> (Appendix 1). In the second phase of the analysis, the tabulated answers to both research questions were summarized and themed according to their content. The results were presented based on a summary of the whole material and as an answer to the research questions. The answers to the research questions were themed based on their content, resulting in 16 themes on the concept of technology and four on ethics. In the discussion section, the 16 themes on the concept of technology and the four themes on ethics have been synthesized into three categories.<sup>135</sup>

### ***Qualitative meta-synthesis of patients' experiences - method and material of the third sub-study***

The aim of the third sub-study, "Patients' experience of technology in care", was to provide new insight into technology in caring science and care, value and

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<sup>133</sup> Article II Table 1. Technology and its ethics in past research using chronological order.

<sup>134</sup> Whitemore and Knaf 2005.

<sup>135</sup> Whitemore & Knaf 2005, Coughlan & al. 2013, Vaismoradi & al. 2013, Article II.

emphasize patients' perspective and views on the use of technology in care, and form the basis for theory development. The synthesizing of qualitative research studies was used as a means to describe patients' experiences and needs. With the aim of ensuring patients' perspective and voice, patient-centredness and ethical care could be promoted in caring science and caring when using technology<sup>136</sup>. For the most part, the synthesis methods are concerned with interpretation. The data are first synthesized and then interpreted.<sup>137</sup> In this sub-study, the synthesizing of the results of the data was interpreted from the aspect of the theory of caring science by researching the dimensions of patients' experiences of technology in the past nursing and caring literature, which can be interpreted as caring or non-caring<sup>138</sup>.

To describe patients' experiences of technology in caring and nursing, a material search was carried out with Medline<sup>®</sup> and CINAHL databases using the search terms technology, technolog\*, nursing, nurs\*, caring, patient\*, experience\* and including related terms. The advanced search strategy was employed with the restriction of limiting the material from the year 2000 to December 2014 and limiting it to journal articles which were published in English, comprised empirical qualitative studies and were evaluated as a five-star source by the database. In addition, a manual search was done during the research process from journals and reference lists. The total number of included articles was 11.

When the aim was to emphasize patients' perspective and increase knowledge of patients experiences of technology in caring science as a basis of theory development the synthesizing of qualitative research studies was the method to

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<sup>136</sup> Ring & al. 2011.

<sup>137</sup> Coughlan & al. 2013, Sandelowski & al. 1997, Sandelowski & Barroso 2007.

<sup>138</sup> Eriksson 1990, 2006, 2010a, Halldórsdóttir 1996, Lindström & al. 2006 & 2014, Nyström & al. 2003.

do it. Through that it was ensured that patients' perspective and voice could be taken into account and patient-centredness and ethical care could be promoted in caring science in the context of technology.<sup>139</sup> By summarizing the findings of qualitative studies that described patients' experiences of technology and care (Appendix 2), by doing a conceptual thematic description of patients' experiences of technology and care, and by giving an interpretative explanation to them, the aim was to generate the foundation for theory development and add knowledge of technology in nursing and caring. When aiming at knowledge and theory development by utilizing the findings of past single qualitative studies the methodological path is that the findings are summarized and placed in a large context by means of interpretation.<sup>140</sup> In this research, the large context was caring theory, its conceptions of dignity of human being, and patients' experiences of caring or non-caring care, which is related to suffering. In the summary of the research, the knowledge gained is integrated into the ideal model of the ethics and caring of technology in caring science in the form of theses.<sup>141</sup>

### ***Text interpretation - method and material of the fourth sub-study***

Gadamer's<sup>142</sup> hermeneutic text interpretation approach is used in the fourth sub-study "Searching for the ethics of technology in caring science: interpretation of Gadamer's literature". The search for the understanding of the ethical dimension of the concept of technology was done by reading and interpreting the texts of Gadamer related to technology and good. When reading the literature of Gadamer it proved that from the research questions' viewpoint the books "The

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<sup>139</sup> Ring & al. 2011, Coughlan & al. 2013, Sandelowski & al. 1997, Sandelowski & Barroso 2003 and 2007.

<sup>140</sup> Sandelowski & al. 1997, Sandelowski & Barroso 2003 and 2007.

<sup>141</sup> Eriksson 1990, 2006 and 2010a, Nyström & al. 2003, Lindström & al. 2006 and 2014.

<sup>142</sup> Gadamer's 2005, 2006.

Idea of the Good in Platonic-Aristotelian Philosophy” and “The ENIGMA of HEALTH” answered the research question and were thus selected as research material. The interpretation was a circular process in which the researcher moved from the whole to the individual parts and back to the whole. In this research this was done by reading the books “The Idea of the Good in Platonic-Aristotelian Philosophy” and “The ENIGMA of HEALTH”, first as a wholeness in order to get a view of the wholeness. The second reading was done by picking up the statements which were interpreted to describe the substance of technology or ‘techne’ or the good of technology. The first interpretation was written down with the original statement in the table, and the third circle of the interpretation was done by reflecting on the statement and first interpretation and the wholeness of the books. The result of the third interpretation circle was described in the results of article number four. The interpretation was done through the horizon of caring theory, its ethics and view of caring and non-caring. The material of sub-study four comprised the 83 statements of technology and its goodness in Gadamer’s philosophical literature (Table 6. Gadamer’s texts of ‘techne’ and its ethics – interpretation from the caring science horizon. Appendix 3).

***Return to the wholeness at the end of hermeneutic research – abduction – creating a new horizon***

The spiral of understanding led through a dynamic, circular inductive-deductive process to abduction, which is a new level of understanding. The spiral started with ‘What’ questions on technology and its ethics, proceeding to the formulation of pre-understanding and basic assumptions of the research as interpretation horizon of the research. By reflecting on the research material and answers to the sub-study questions and reflecting on that knowledge together with the pre-understanding and basic assumptions of the research, a



new understanding of the concept of technology and its ethics gradually took shape. A leap to a new level of understanding was a synthesized abstraction. The new vision of the wholeness and its interpretation and old vision as an old interpretation horizon elided together and created a new understanding, which was reformulated as statements in this research as theses of the ethics and caring of technology in caring science<sup>143</sup> presented in Chapter nine. According to Eriksson and Lindström<sup>144</sup>, in the humanistic paradigm abduction is a way of developing an epistemology for caring science. The basis for the development of epistemology in caring science is in ontology, which emphasizes the need for deeper understanding and discovering of meaningful patterns and deep structures which can be formulated in a new way as new descriptions, models or theories of the world of caring. Eriksson and Lindström state that “Abduction is to recognize and create contexts of meaning, and thus the interpretation of underlying patterns is a fundamental idea.” In this research, the context of meaning was technology and the interpretation horizon, and underlying patterns and fundamental idea were formed from the theory of caring science. The hermeneutic circle is realised as a movement between the whole and the parts. In this research, there is movement and reflection between the caring theory, as a theoretical wholeness, and the empirical parts of the concept determination in the first sub-study, and in literature reviews in sub-studies two and three, and in interpretation of Gadamer’s literature in sub-study number four. Through the dialectic process of the hermeneutical spiral between the theory and the parts of knowledge, the ontology of the concept technology and contextual knowledge of the concept technology, a new understanding was gained and at the end of the process, in the abductive interpretation, new patterns and level of knowledge were reached and new 'maybes' found, so that a new ideal model of the

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<sup>143</sup> in Chapter nine.

<sup>144</sup> Eriksson & Lindström 1997.

preconditions of ethics and caring of technology in caring science in the form of theses was created.

## 8. ON THE WAY TO AN IDEAL MODEL OF THE ETHICS AND CARING OF TECHNOLOGY IN CARING SCIENCE

This chapter summarizes and discusses the results of the sub-studies (articles I-IV), as an answer to research questions: what is the concept of technology, and its sub-study question, what is the ontology and theoretical of the concept of technology (Article I & II), and also as an answer to the research question: what is the ethics of the concept of technology (Articles I & II & IV), and its sub-study question: what are the patients' experiences of technology in care (Article III). The knowledge gained of the concept of technology and its ethics and caring formed the basis for the creation of the ideal model. The gained universal ontological knowledge of the concept of technology and its ethics and the contextual knowledge of the concept of technology and its ethics in caring and nursing science was first summarized, and then it was interpreted and compacted from the viewpoint of ontological evidence to form a basis to the idea of technology and its preconditions as an ideal model of the ethics and caring of technology in caring science in the form of theses presented in chapter nine.

### ***The concept of technology***

The results of the sub-studies showed that the concept of technology is *multidimensional*. According to the etymological determination, the concept of technology has evolved and changed over the centuries. The etymological research of the concept of technology (Article I) and interpretation of Gadamer's literature (Article IV) indicated that the origin of the concept has been formulated from the Greek word 'techne', which has wider ontological dimensions: it is universal, it can be taught, and it depends on the substance. The meaning of the concept has been defined to be manual craft, or as Gadamer<sup>145</sup>

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<sup>145</sup> Gadamer 1986, 23-24.

described, *hand workers' knowledge* and work as *art* and *skill*. The concept of technology means *method* with the dimension of a mature way of doing something, being controlled and systematic, and also as a meaning of *a treatment*. Subsequently, the concept *an ethical dimension* was introduced, but the content of ethics was not described in the dictionary material. In the 18<sup>th</sup> century the concept evolved more to the direction of engineering, mechanics, equipment and technical know-how. (Article I). Gadamer describes (Article IV) the content and meaning of the concept of technology by using synonymous concepts: knowledge, science, method, know-how, art, applied science, treatment and service. He links the concept of technology to culture, history and freedom of thinking and its investigation in things.

The present-day conception of the concept technology (Article I) and the results of the article (IV) indicated that *technology is knowledge which is universal and based on general principles*. It is *science*, which is study, scientific knowledge, applied knowledge and branch of knowledge. The concept is also defined to be *a method or a system, art, engineering, treatment, intervention, process or means*. Similarly, the semantic determination revealed synonyms of the concept to be *art, equipment and knowledge*. These introduced the concept of technology with synonymous concepts such as *craft, skill, treatment, engineering, science, study method* and *way*. The nuances of the concept framed its nature. On the one hand, it stands out as practical, modern, progressive and advanced, but on the other hand, it is difficult, demanding, routine and conventional, and at the same time, it is *scientific and practical*. (Article I and IV) In Gadamer's literature and also in nursing and caring literature, the concept of technology also gets *a meaning of service*. The concept of service has its origin in the word *therapy*, which is also the origin of the concept *treatment*. In both concepts, *the treatment and the service have a dimension that the one who is served or getting the treatment accepts the service or treatment*. This dimension

links the concepts to ethics and human being's right to make decisions and be autonomous and free. (Articles II and IV)

From a caring science point of view, is critical to understand the multidimensionality of the concept of technology. Technology is not only neutral in its nature, nor is it a utopic salvation of humankind as is seen in instrumental theories<sup>146</sup>, but it also has dimensions such as routine, difficult and demanding, which can potentially threaten the good and the dignity of human being and the nature of the caring as an art. This dichotomy – technology as good or technology as bad – is also seen in patients' experiences of technology in care (Article III) where patients described the experience of technology in care to be both good, helping, making life and caring easier, and bad, by increasing their feelings of uncertainty, fatigue, frustration and even fear. The meaning of technology to patients is that technology is a necessity or a device making life and caring easier. It is important to understand the unchallenged *evidence of the good of the technology* such as advanced, modern and practical treatments, and progressive ways of doing something, but also to take into account *the unfavourable dimensions which threaten the human good*.

The concept of technology is determined to signify essentially doing according to Aristotle's ten categories. (Article I.) In caring theory, doing is seen to be the act of caring. When creating the preconditions to the act of caring in the context of technology in caring science this multidimensionality of the concept technology is the base.

### **The ontology and theoretical basis of the concept technology**

The ontological dimensions of the concept of technology from a caring science point of view are that *technology is universal, it can be taught and it depends*

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<sup>146</sup> Feenberg 2002.

*on the substance. Also, the ethical dimension of the concept*, which can be found in 16<sup>th</sup> and 17<sup>th</sup> century literature as well as in Gadamer's philosophical literature, is fundamental and connects the concept to the values of humanistic sciences, and in this research, to the values of caring science (Article I & IV). The *ontological dimensions – knowledge, art and engineering of the concept technology* – were confirmed by the etymological, semantic and discrimination analysis (Article I), but also by the interpretation of Gadamer's philosophical literature (Article IV). From a caring science perspective, the dimension of art and knowledge are the same as the dimensions of care as art and as knowledge. The analysis of the synonyms as part of the ontological concept determination opens the meaning of technology as a means, method, equipment and device. (Article I.)

### **The ethics of the concept of technology as part of the concept's ontology**

According to Gadamer (Article IV), the ethics of the concept of technology is related to the ethos of the concept and of human life. The ethos is defined to be the fundamental foundation for human practice<sup>147</sup>, which is to reach for *the human's good and harmony of life*. The good is a primary thing and it is a course of everything. The knowledge of human good and ethics gained from the classical, historical and philosophical literature revealed old and forgotten dimensions of human good in the context of technology; *the human good was seen from three different dimensions: aretē, phronēsis and virtue*. These dimensions gave theoretical and practical viewpoints to goodness and ethics, but they also opened the dimension of virtue as a human attribute. (Article IV) The ethical dimension of the concept of technology was already named in the 16<sup>th</sup> and 17<sup>th</sup> centuries, but its substance was not described in the dictionary material. When reflecting this to the knowledge of the ontology of the concept of

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<sup>147</sup> Gadamer 1986, 16.

technology, which revealed that technology is dependent on substance, in this case caring, it can be presented that *caring ethics and its substance is applicable in the context of technology* as, for example, Champers & Connor<sup>148</sup> and Suominen & al.<sup>149</sup> have done in their studies (Article II).

*Ethics is seen to be the human good, the goal, the motive and the reason to choose something. The goal and motive link ethics to the ethos of human life* (Article IV). This thinking is similar in caring science where the ethos of caring is seen to be the core of caring and caring ethics<sup>150</sup>.

Gadamer described ethics by using three different viewpoints: aretë, phronësis and virtue. Ethics as aretë is theoretical, universal knowledge, ethics as phronësis is practical and unique wisdom to do something in a high-quality and advanced manner, while ethics as virtue is human's responsibility to strive for the good and harmony of a unique human being who is dignified and free.<sup>151</sup> Technology is learnable and it depends on substance. Technology as knowledge and method can be learned as theory, rules and norms, and knowledge can develop into a mastered skill in practical training. The condition to learn is well-advisedness, which comes true via participation and in relation to other human beings. According to Gadamer, well-advisedness is an important dimension when realising the ethics and dignity of human being in the context of technology.

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<sup>148</sup> Champers & Connor 2002.

<sup>149</sup> Suominen & al. 2007.

<sup>150</sup> Eriksson 2003, Lindström & al. 2014.

<sup>151</sup> v. article IV figure 1: The concept of technology and its ethics – an interpretation of Gadamer's texts: The synonyms of the concept technology, the ethical dimensions, their meaning an appearance.

### **The concept of technology and its ethics in the light of caring and nursing studies**

In the past, nursing and caring literature technology as a concept was themed into three implications. *First, technology is devices and products*, including ICT and advanced, simple and assistive technology. *Second, technology refers to a process consisting of methods for helping people*. *Third, technology as a service indicates the production of care by technology*. (Article11.)

The concept of technology refers to modern information and communication technology, high-tech and advanced device technology, simple tool technology and assistive technology. IC technology and its applications have been described to be discussing web-based self-management exercise and intervention programs, applying telehealth services and interventions such as smartphone applications for sharing health and disease information, assisting in monitoring patients' condition and symptoms as well as increasing communication between outpatients and nurses with text messages and phone calls. E- learning devices and e-diary in health promotion, health behaviour-changing support and symptom monitoring were also included in IC technology. Lindberg & al.<sup>152</sup> reviewed 107 studies describing the use of ICT in home care. The results showed that 13 different concepts were used of ICT in the home care context. The concepts comprised telehealth, telemedicine, technology, telecare, ICT/ IT, telemonitoring, telenursing, eHealth, telehealthcare, telerehabilitation, e-rehabilitation, teleassistance and mobile phones. Fjeldsoe & al., Jacob & al. and Haze & Lynaugh<sup>153</sup> also used several concepts such as picture phone and smart phone services and short message services (SMS) when describing ICT. Repique's<sup>154</sup> study discussed the value of ICT and its significance to psychiatric nursing and presented the concept of 'psychotechnology'. Furthermore, Kidd &

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<sup>152</sup> Lindberg & al. 2013.

<sup>153</sup> Fjeldsoe & al. 2009, Jacob & al. 2013 and Haze & Lynaugh 2013.

<sup>154</sup> Repique's 2007.



al.<sup>155</sup> introduced the concept of 'e- hospice' in the context of seriously ill patients' home care. Suominen & al.<sup>156</sup> have applied natural language technology (NLT) to nursing purposes. (Article II)

The ethics of technology or the ethics of caring have not been established clearly as a guiding principle in the past nursing and caring literature. Some studies excluded ethical reflection completely (Appendix 2 table 5). On the one hand, many studies discussed *the ethics of technology as benefits*, such as improved communication and symptoms management and the simple use of e- health services, and on the other hand, some articles presented *criticism and discussed ethical problems* such as unwillingness and inability to use technology, or conflicts with human aspects or questions of inequality. Some of the articles presented *potential harms* which could cause ethical problems when using technology in care. For example, solving the potential harms technology causes when it is not available for everyone and everywhere. Similarly, how to guarantee the dignity, uniqueness and autonomy of patients, and how to deal with issues related to patients' privacy, confidentiality and informed consent.

The developed theories and models approached the issue from the viewpoint of safety or the client and did not attempt to solve the presented ethical challenges in care. *The conclusions were that technology as a concept is described diversely*, and that is a reason for confusion and a critical stance towards technology in humanistic sciences and in nursing and caring science. According to the results, it can be noted that *the relation between technology and ethics is not a truism*. Despite some evidence, more is needed to promote ethical care in the context of technology.

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<sup>155</sup> Kidd & al. 2010.

<sup>156</sup> Suominen & al. 2007.

The concept of technology as a product and device from a caring science point of view is used as a tool in care, whereas technology as a process refers to all methods helping people in caring relationships and promoting good in health, helping to care in sickness and alleviating suffering. Technology as a process is essentially interactive, with nurses acting as interpreters between patients and technology. Finally, technology as a service means producing care by using technology and its applications in the act of caring. When the act of caring comes true in an ethical and caring way, the human dignity and human rights as well as the human good of the patient are realised and the potential harms are prevented.<sup>157</sup>

### ***Patients' experiences of technology in care***

In general, technology was perceived as positive. Table 5 in Appendix 2 describes patients' and their families' experiences as a summation from the material of sub-study three. The patients and their families experienced technology in two different ways. *On the one hand, technology was seen to be a necessity, and on the other, a device making their life and caring easier.* These two different meanings of technology have been named in the material despite the experiences of technical problems and the difficulties encountered when using technology. It was also seen that the use of technology was demanding and required knowledge and skills.<sup>158</sup>

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<sup>157</sup> v. Article II, Figure 1.

<sup>158</sup> Anderson 2004, Fincher & al. 2009, Freitas 2002, Haze & Lynaugh 2013, Heaton & al. 2005, Ingadóttir & Jonsdóttir 2006, Kirk & al. 2004, Lindahl 2010, Lundberg 2014, Macduff & al. 2001, Mendes 2013 / Article III.

### **Patients' and families' experiences of technology as a necessity**

Technology as a necessity is seen to be those devices and caring interventions that *sustain life, compensate for lost body functions or postpone death*. These devices include ventilators, dialysis machines and peritoneal dialysis devices, gastrostomies and other forms of tube therapies, intravenous drug therapies, pumps and pacemakers. The vision of this technology is connected to the myth of technology as a miracle<sup>159</sup>. *The patients' descriptions of their body's relation to this technology is dichotomous: a must and on the other hand, a mixed blessing, or a lifesaving treatment, but on the other hand, meaningless exertion*. The dependency on technical devices places the patient between living and dying with more awareness than usually<sup>160</sup>. The experience of the patient is dichotomous, alternating between hope and despair and between bad and good. Patients experienced that technology eased unpleasant symptoms such as breathlessness, loss of consciousness, unstable heartbeat, fatigue and the inability to be active, increasing their feeling of self-worth. For patients, more energy meant independence and the ability to be more active and social.

Patients' depression subsided and the idea of ending the therapy and giving in changed to a feeling of life being worth living again (Article III). Technology-dependent patients have experiences and *feelings of uncertainty in relation to technology*. They *hope* that the technology works but they also have a *fear* that the electrical devices interact with other electrical devices and they will get an unexpected alarm or electric shock. The technology-dependent patients and families wish and *look for nice-looking, flexible, easy-to-use, safe and secure technology which can be used at home* instead of the hospital. They want good access to new and well-designed technology. The patients *want to have a spare device in reserve* and they also *hope for round-the-clock telephone support*. These

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<sup>159</sup> Anderson 2004, Heaton & al. 2005.

<sup>160</sup> Anderson 2004, Heaton & al. 2005, Ingadóttir & Jonsdóttir 2006.

expectations are important to take into account when building up patients' confidence in technology. (Article III.)

### **Technology as a device making life and caring easier**

*Technology as a device making life and caring easier* referred to devices that made patients' or families' everyday life easier or more convenient, or made the use of health care services easier and increased patients' ability to manage their own care. These devices were information and communication technology (ICT) devices such as telephone, videophone and smartphone, as well as information and communication technology applications that can be used by personal computer<sup>161</sup>. The patients experienced the use of this technology to be quick and easy, as it reduced the number and duration of visits and travelling. *The patients described that education by using telehealth technology was convenient, supportive and reinforcing.* The patients experienced that their self-care ability improved. The patients described that *the telemedicine services are easy and convenient, and they appreciated that the appointment with health care personnel was realised on time, and the staff had time for them, in contrast to what they experienced on their hospital visits.* In particular, the patients appreciated the videophone. (Article III)

### **Patients' and families' experiences and interpretation of good care in the context of technology**

According to Mendes<sup>162</sup>, good and ethical caring in the context of technology *requires technical competence and skills and also critical thinking skills.* In regard to nurses, *the patients expected professional behaviour, a holistic caring vision and the ability to encounter the patients and their family members with dignity and respect.* The patients and families expected the nurse to "fit in" when the

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<sup>161</sup> Fincher & al. 2009, Haze & Lynaugh 2013, Lundberg 2014, Macduff & al. 2001.

<sup>162</sup> Mendes 2013.

patient is cared for at home. The competent nurse with critical thinking skills was described to have a significant role in varying caring situations. Technical competence and skills are an important part of nursing competence, but the parents of technology-dependent patients emphasized *the importance of a holistic approach and skills of caring as art*. (Article III)

The patients and family caregivers experienced that it is crucial that they are *taken into account* in the initial stages of using technology in their or their family member's care, already when deciding on the use of technology. This stage also includes how successfully the purpose and implementation of the treatment is explained to the patient, and how the patient's dignity and unique needs are taken into account in the care plan. The health care personnel's compassion and understanding are an important foundation of good caring, testing and use of technology. The adjusting of the care according to the unique needs of the patients and their treatments are an important part of the foundation of good and ethical caring in the context of technology<sup>163</sup>. The help of the nurse when using technical equipment was essential. *The role of the nurse is to be an interpreter between the patient and the physician or between the patient and technology*. (Article III).

### **Patients' and families' experiences of non-caring and suffering in the context of technology**

The technology-dependent patients and their family caregivers described experiences of *powerlessness, frustration and even anger* because they felt that their expertise, needs and preferences *were not taken into account* when making decision on care, e.g. when starting a treatment with technology or ending a treatment when it no longer benefited the patient. The patients and their family caregivers found it vitally important that their experiences and needs are heard

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<sup>163</sup> Ingadóttir & Jonsdóttir 2006, Lindahl 2010.

and taken into account when making decisions on care. If patients' expectations and needs were not taken into account in decision-making, *patients found it difficult to commit and adapt to the treatment*. The patients and their families felt that it was an *insult against their human rights, freedom and self-determination when the health care staff ignored their experiences and needs*. The patients' view was that *they were treated disrespectfully when they were not heard*<sup>164</sup>. The studies of ITC services indicated that *technology was not mature and the use of it was difficult*.<sup>165</sup>

### **Summary of the results**

The ontological determination of the concept of technology opened the ontology of the concept to be that the concept is related to the substance where it is used, it is universal, technology has an ethical dimension and technology can be learned<sup>166</sup>. These same dimensions have been found in Gadamer's literature in contextual determination of the concept of technology. Moreover, Gadamer's literature highlighted the relation of technology and ethos; he saw that the good is a goal and motive of human life. Human being is seen to be dignified, a wholeness, a being who is free but also responsible for his or her choices. The ethics of human being is seen to be three-dimensional. Ethics is theoretical aretë, practical phronësis and virtue as human's responsibility to reach for the good<sup>167</sup>. Ethics in the context of technology in the caring science literature is not self-evident. It is seen as either good or bad, mainly as benefits, potential harms and unsolved problems, but an extensive and critical ethical approach is lacking.

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<sup>164</sup> Anderson 2004, Ingadóttir & Jonsdóttir 2006, Lindahl 2010, Mendes 2013

<sup>165</sup> v. article III table 1: the preconditions for the realization of dignity and good care in the context of technology based on patients' experiences.

<sup>166</sup> v. article I figure 2.

<sup>167</sup> v. article IV figure 1.

Technology as a concept has the meanings knowledge, science, study, applied science, know-how, method, means, art, skill, treatment, product, device, equipment, engineering, process, and service.

The ethical dimension of the concept of technology and its synonyms is related to human being's dignity, freedom and autonomy to make decisions concerning his or her own life. The research of the concept technology and its ethics in caring and nursing literature revealed patients' experiences of good and ethical care. They described that the care is good, caring and ethical when they felt that they were heard and taken into account, the informed consent in care was realised, the patients were able to make decisions on their care, tailored patient education was realised and gave the patients knowledge and skills to cope and make decisions, patients experienced that they were treated with empathy and were encountered with dignity as unique human beings. Patients expected nurses to be competent, trustworthy, prompt and timely, to have knowledge and skills in technology and a holistic approach to care, but also skills in critical thinking and skills to apply the care individually to the patient. Patients expected tailored support with care and technology and safety around the clock, and that technology is easy to use, flexible, nice-looking, easy to access and can be tested and that patients can choose the technology they use by themselves.<sup>168</sup> Patients who live with technology wish that they can live as normally as possible. Table 2 summarizes the new understanding of the concept of technology and its ethics gained by sub-studies I-IV.

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<sup>168</sup> Table 1 in Article III.

**Table 2:** The new understanding of the concept of technology and its ethics

<p><b>The Ontology of the concept of technology - new understanding - sub-study 1</b></p> <ul style="list-style-type: none"> <li>• Technology is related to substance and the substance is primary</li> <li>• Technology has an ethical dimension</li> <li>• Technology is universal</li> <li>• Technology is knowledge, science, study, method, applied science, know-how, art, skill, engineering, equipment, treatment, process and service, a systematic way of doing something, but it is also demanding, difficult, routine-like and industrial</li> <li>• Technology is capable of being taught</li> </ul>		
<p><b>The concept of technology and its ethics in earlier caring and nursing studies – new understanding of the sub-study 2</b></p>	<p><b>The concept of technology and its ethics seen as caring or uncaring from the patients’ point of view – new understanding of the sub-study 3</b></p>	<p><b>The concept of technology and its ethics interpretation of Gadamer’s texts – new understanding of the sub-study 4</b></p>
<p>Technology as a concept is described as products, devices, and processes</p> <p>The ethics of technology is not self-evident.</p> <p>The ethics of technology in caring science and care is mainly seen as benefits, potential harms and unsolved problems, as a dichotomy.</p> <p>From the perspective of caring science, products, devices and processes are the ones that offer health services and produce care to people by means of technology and its applications.</p>	<p>Human rights include that the patients experience that they are heard, taken into account, the informed consent in care is realized, the patients make decisions on their care, patient education is realized and gives knowledge and skills to the patient to cope and make decisions, patients experience that they are treated with empathy and are encountered with dignity.</p> <p>Patients expect that nurses are competent, which means that nurses are trustworthy, prompt and timely, and have knowledge and skills of technology, and a holistic approach to care, but also skills in critical thinking and skills to apply care individually to patients. In other words, the patients expect caring and nursing as an art with phronésis.</p> <p>Patients expect support with care and technology and safety around the clock, and that technology is easy to use, flexible, nice-looking, easy to access and can be tested, and patients want to choose the technology they use by themselves.</p> <p>Patients who live with the technology wish to live as normally as possible. This means that they wish to be comfortable and be cosy with technology and themselves.</p>	<p>The concept of technology is knowledge, science, method, know-how, applied science, art, skill, treatment and service.</p> <p>Technology as a concept has theoretical, practical and political dimensions.</p> <p>Technology is related to the substance where it is used and the substance is the priority; technology can be learned and it is both universal and unique.</p> <p>The ethics in the context of technology is three-dimensional: The good is: arête, phronésis and virtue.</p> <p>It is freedom to choose something at a certain moment to gain harmony in life.</p> <p>The good is related to ethos of life and care.</p> <p>The good is concretised in actual doing and it appears in truth, beauty and oneness.</p> <p>The good is the most important subject matter and it manifests itself via participation.</p>



When analysing and interpreting the results of the articles and the pre-assumptions of the research the following common meaningful themes arose:

*Ethos and ethics are the core of caring science in the context of technology.* According to Gadamer (Article IV), technology is good when it fulfils its purpose and ethos. The purpose of technology is to promote the human good and alleviate suffering in care. The basis of technology and its design in caring is to promote the human good and alleviate suffering and thus realise the ethos of caring (Article IV and basic assumptions of the research p. 21-22). The alleviation of suffering is the basic motive for care. The possible advantages are maximized and harms are minimized and evaluated together with the patient (Articles II-III). The dignity of human being is respected in the context of technology (The basic assumptions of the research p. 21-22, articles I-IV). When caring is seen to be an art, the technology in caring is planned and tailored individually for every patient according to his or her caring needs in alliance with him or her. It means that the patient makes the decision on the use of technology, he or she is able to do it according to patient education and after testing different types of technology in cases where the use of technology will be part of his or her self-care. (The basic assumptions of the research p. 21-22, articles I-IV.) The human good and dignity are both subjectively and universally indisputable fundamental values and the purpose of human life in caring science and caring. The realisation of the caring process and services is guided by the dignity of human being and its experience in relation to the technology in caring.

*Technology is related to substance and the substance is the priority.* The ethos and ethics of caring are the priority and the use of technology is guided by them in care. (Article IV and basic assumptions of the research p. 21- 22). Technology promotes the good of the human being and diminishes suffering. The use, selection and evaluation of technology is planned and realised in alliance with

the patient. Technology is planned and tested to be safe, reliable and easy to use, and the confidentiality of the patient is secured. (Articles II & III)

*The dignity of human being is the basis of encountering the patient and carer.*

The dignity of human is being realised when he or she knows the alternatives that technology offers and can make a decision of choosing to use the technology or not. Systematic patient education and support to the care of the patient and to the use of the technology is available in a timely fashion according to the patient's unique needs. The principle of informed consent is realised by patient education. According to the results of articles I and IV, technology can be learned, and in the results of article III patients highlight the need for knowledge, to be heard and taken seriously. Encountering means being respected, heard and taken into account as a unique human being. In the encountering the nurse realises the art of nursing by doing "something very special out of something less special".

*Technology can be taught; encountering and communion between patient and carer is the precondition for teaching.*

The dimension of the concept of technology that technology can be learned (Articles I & IV) emphasizes the meaning of patient education in the context of technology in caring science. The respect of the wholeness and uniqueness of human being is the basis for the view of the human in caring science and it needs to be the basis for the caring encountering. Technology in caring science is related to unique human beings' good and ethics of caring. The human good and ethics come true in caring communion with the carer and the one who is cared for and who is a unique, whole and autonomous human being. (The basic assumptions of the research p. 21-22, articles I-IV).

*Technology is universal and ethics is universal, but human being is unique and whole.* Technology is universal, the human good, alleviation of suffering and

human dignity are universal, and they all are related to human beings' equality. The realisation of ethical caring in the context of technology in society is a political question (Article I & IV and Feenderg 2002, 2010).

Decisions on legislation and the use of resources are made in political forums. On different levels of society and decision-making, reflective ethics in the context of caring technology as a systematic process ensures the circumstances that enable the realisation of ethics and caring in society.

*Technology is knowledge, art, device, process and services, and caring is an art.*

## 9. THE DESTINATION; THE IDEAL MODEL OF THE ETHICS OF TECHNOLOGY IN CARING SCIENCE

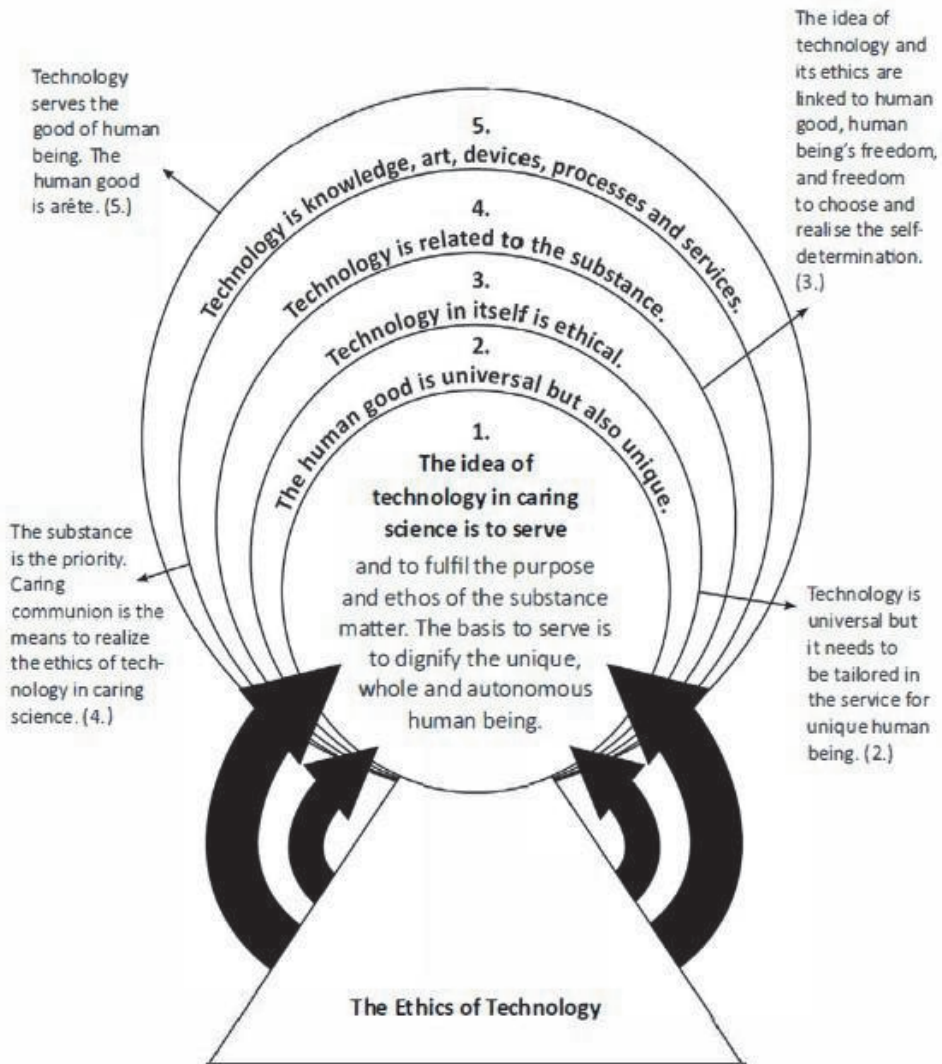
Gadamer (1996, 95) presents that once science has created general laws, causal mechanisms and principles, it must discover what is the right thing to do. In this chapter, on the basis of the ontology of the concept technology, the knowledge of the concept of technology in earlier studies, and the knowledge of human good and ethics in the context of technology in nursing and caring science and on the basis of knowing and understanding reached with these means, the preconditions of the ethics and caring in the context of technology are created, aiming to offer an ideal model of “the right thing to do” from a caring science viewpoint.

According to the knowing of caring science as the interpretation horizon of this research, the pre-understanding of the concept of technology and the results of the sub-studies, the following theses were formed on the basis of the common and meaningful knowledge presented of the concept of technology and its ethics at the end of previous chapter.

1. **The idea of technology in caring science is to serve** and to fulfil the purpose and ethos of the substance matter. The basis to serve is to dignify the unique, whole and autonomous human being.
2. **The human good is universal but also unique.** Technology is universal but it needs to be tailored in the service of unique human being.
3. **Technology in itself is ethical.** The idea of technology and its ethics is linked to human good, human being’s freedom, and the freedom to choose and realise self-determination.
4. **Technology is related to the substance and the substance is the priority.** Caring communion is the means to realise the ethics of technology in caring science.

5. **Technology is knowledge, art, devices, processes and services** which serve the good of human being. The human good is *ethos* and *arête*.

When determining the preconditions for caring and ethics in the context of technology in caring science the first task was to reflect the relation of human good and technology. In this reflection, dialogue was conducted with the elements of caring theory, the results of the determination of the ontology of the concept of technology, the contextual determination of the concept of technology in nursing and caring science, and the results of the interpretation of human good in the context of technology in Gadamer's literature. In the dialogue, the following was discussed: What is the human good and what is the dignity of human being when using technology in caring, and what is truly caring care when using technology? What are the threats that need to be eliminated and what are the possibilities and the good that needs to be maximized? This dialogue and reflection are described as a triangle by the name: "The ontological and contextual determination and evidence as a basis of the ideal model" in figure two of the ideal model of the ethics and caring of technology in caring science.



**Figure 2: The Ideal Model of the Ethics and Caring of Technology:  
The Idea of Technology is to serve the Good of Human Being.**

When aiming at the ethics and truly caring care in the context of technology it is fundamental to know the possibilities and good of caring and technology, but also the threats of the realisation of the good. With the ideal model of the ethics and caring of technology, the idea of the preconditions of the model is to confirm the good and eliminate the threats. The ideal model needs to be sensitive so that when circumstances change in the course of time the model guides to reflection on the new in relation to the core and ethos of caring. (Figure 2) In the ideal model the core is ethos and ethics of caring in relation to the purpose and idea of technology. The idea of technology is to serve dignified human being and alleviate suffering. The first precondition is that technology fulfils its ethos and purpose and thus realises the commitment to the human good and the fundamental values of human dignity and the meaning of caring. Secondly, the ideal model determines the dimension universality of technology, but at the same time, technology needs to be tailored because the human being is unique and the good of technology is both universal and unique by its nature. The universality of technology highlights that the ontology of the concept of technology and technology itself are applicable all over. The third precondition of the ideal model is that technology in itself is ethical. The caring encountering is the means of realising the dignity of unique human being and live out the ethics and truly caring care in the context of technology. Also, technology as an art and caring as an art have the dimension of uniqueness. The respect of the uniqueness and dignity of human being is an important part of the ethics of caring science. The ontological evidence of the concept of technology states that the substance is the priority. The fourth precondition is formed based on that evidence. The importance of the respect and dignity of unique human being is also confirmed by that precondition in caring science, but it also highlights the motive and meaning of caring as a foundation and starting point of the utilization of technology. The model ends up at the fifth precondition, which describes the synonymous concepts of the concept of

technology and thus highlights the multidimensionality of the concept of technology in the service of the good of human being. The good of human being is determinate to be ethos and arête.



## 10. DISCUSSION

### *Discussion of the results*

The purpose of this basic research was to develop an ideal model – the preconditions of the ethics and caring of technology in caring science. The aim was to gain knowledge and new evidence of the concept of technology and its ethics and caring in caring science. This research journey opened three new perspectives to the knowing of technology in caring science. The first of them is the ontological evidence and the ontology of the concept of technology, the second is that the evidence of patients' experiences of technology in care in caring and nursing literature supports the ontological evidence of the concept of technology, and the third is that the view of technology as either good or bad is not adequate today, but a new approach with the focus on human good, dignity and human's wholeness is needed. To quote Macdonald<sup>169</sup>: "There has been considerable debate surrounding the intrusion of technology in nursing care. These debates are healthy and need to continue; however, given the pervasiveness of technology in every aspect of the lives of human beings, it is important for nursing to get in front of technology and infuse it with the important theoretical work that our scholars have been producing for 50 years." This research is part of that work and represents one new ideal model to approach technology.

When we think about caring in the context of technology and approach the matter with the means of basic research, it is important to remember what caring is. The ontological nature of the world of caring and the ethos of it are the priority. The dignity of human being and alleviation of suffering are the basis, the imperative of caring, when we discuss ethics, the human good and caring. As

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<sup>169</sup> Macdonald 2008.

Cheek & al.<sup>170</sup> stated, a major concern and the goal when using new technology in caring is the need to design caring and its processes, the caring environment, and technology in such a way that they meet the needs of the patients. When caring for patients with technology, it is essential to ensure that these technologies result in positive outcomes for patients who rely on the carers and the technology. Part of the human good and caring ethics is that patients feel safe and master the technology and their self-care. When using technology in caring, the minimizing of potential unintended consequences is part of the ethical act in care<sup>171</sup>. The results of the concept determination highlight the ontological dimensions of the concept of technology. The ontology of the concept of technology opened four important dimensions. They are: The substance and the ontological quiddity of the subject are primary in the context where the 'techne' is used, technology in itself has an ethical dimension, technology can be learned, and technology is universal. The first ontological dimension of the concept of technology connects it to the core of caring science, the ethos of caring, and emphasizes ethics as a core of caring, but also as a core of technology. The meaning and priority of ethics emphasize the ontological dimension of the concept of technology that technology by itself is ethical and has the ethos. The ontological dimension "technology can be learned" opens the importance of caring communion, which includes systematic patient education and user support in the context of technology as a means to ensure the dignity, uniqueness and autonomy of the human being. Furthermore, some of the unintended consequences can be understood through the results of concept determination, such as the mechanistic and routine-like nature of the concept of technology, which is in conflict with patients' expectation of uniqueness and tailored care (Article III) as well as the major assumptions of the caring theory and its philosophical basis. The ethics of care and technology are both universal

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<sup>170</sup> Cheek & al. 2005.

<sup>171</sup> Marden 2004.

by their nature. When resolving the problem between caring and the nature and nuances of the concept of technology, it is essential to remember the ontological dimensions, ethos and idea of technology to serve the good of human being (Article I & IV).

As Ray<sup>172</sup> stated, the concept of reflective ethics and its use in caring represents the vision of caring ethics, which is more than the normative, traditional principles of biomedicine and positivistic sciences. The norms of beneficence, autonomy, justice and avoidance of harm or the preconditions of ethics of technology in caring science achieve a broader and deeper meaning when constant ethical reflection is made on the basis of the ethos of caring and technology and patients' experiences. This reflection highlights the art of caring, or as patients describe it, "tailored care". The ontology of the concept of technology and the knowledge of patients' experiences of technology and caring care support each other (Articles I & II & III). When studying the concept of technology in the light of Gadamer's philosophical literature, it can be found that the philosophical texts of Hellenistic Greeks (Article IV) highlight the dimension of the concept of technology with the adjective of the concept 'technical'. The concept 'technical' means, instead of the present-day meanings of mechanical and engineering, that doing is 'art and skilful'. 'Techné' as a concept consists of the dimensions of manual craft, artist skills as art, and medical skills. In light of this interpretation, technology in caring consists of the dimensions art and skilful, which means that universal rules and norms of technology are applied individually in a unique way. This evidence supports also the ontological and patients' experimental evidence.

The threats to realisation of ethics and caring when using technology are as follows: lack of commitment to the good, lack of knowledge and understanding

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<sup>172</sup> Ray 1998, 74

of the meaning of caring and ethics in caring on different levels of caring processes, but also in society<sup>173</sup>. Lack of knowing and skills in health services, and a lack of commitment to the fundamental values of human dignity and alleviation of suffering in the practice of care are the dimensions which patients described experiencing when using technology in care. Another threat is that the design of technology is not done according to caring purposes and motivation. Financial and industrial issues, and even questions of power and politics might be obstacles for the realisation of ethical and truly caring care in the context of technology.

Arthur<sup>174</sup>, who has studied the concept of technology from the natural sciences' viewpoint, stated that the concept of technology is not clear and comprehensive and that is why technology is hard to understand. According to the results of this research, it can be stated that the comprehensive understanding of the concept technology needs the humanistic sciences' viewpoint and knowing of the ontology of the concept. Also Feenberg's<sup>175</sup> impression is that the design of technology is an ontological question. Similarly, he saw that technology as a concept is not only a tool and neutral phenomenon, but it is a phenomenon that has effects to human life, human good and bad, freedom and equality. In addition, Feenberg shared the vision that new kind of theoretical approaches needed. The world and caring environment are in constant change. Technology is gaining ground in care. As Faulkner<sup>176</sup> presented technology in health care is a challenge, technology is heterogeneous, and it is connected in many ways to different levels of society. The technical safety of devices has been the focus of health technology assessment, but more and more patients as clients expect

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<sup>173</sup> Kitson 2003.

<sup>174</sup> Arthur 2009.

<sup>175</sup> Feenberg 2002.

<sup>176</sup> Faulkner 2009.

individual, human rights respecting and holistic caring<sup>177</sup>, causing a need to evaluate the ethics of the caring process and its realisation systematically. The created ideal model offers one possibility to conduct that evaluation and to reflect and develop ethics and caring in the context of technology on the basis of caring science.

### ***Reflection and limitations of the research***

From the beginning of the research, the choice of caring science and its caritative caring theory as the framework of research as well as the basic research strategy, hermeneutic analysis and interpretation, and concept determination method has been a conscious decision. This engagement with philosophy and theory gave a consistent basis to the interest of the knowledge, methodology of the research and material selection. It has been clear that these decisions limited the research and the results obtained. The theoretical bases and research strategy have guided the material search and the choice of adequate and comprehensive material.<sup>178</sup> In this research, this limitation was taken into account by describing the pre-understanding of the researcher, the choices made and the reasons for them, and also by discussing the results from the chosen viewpoint of caring science. Other disciplines have relevant knowledge and theories of technology, but the focus of interest in this research was limited to studies of nursing and caring science and its philosophical starting points, and the research interest was to advance caring science.

When evaluating the results of the concept determination, it is of importance to consider three evaluation questions of the outcome of the research. These key questions to be answered include whether the new concept determination is

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<sup>177</sup> Ingadóttir & Jonsdóttir 2006, Lahtinen & Joronen 2013.

<sup>178</sup> Debesay & al. 2008, Eriksson 2010.

precise and how fruitful it is from the viewpoint of the discipline, and finally, if the new understanding of the concept is nuanced. On the abstraction level of science, the picture of the concept is more fertile, deeper and evident after the ontological determination process despite the complexity of the method. The ontological determination process of the concept of technology gave four important dimensions: the concept is universal, technology is related to substance which is the priority, technology is teachable, and it has an ethical dimension. The results highlighted the nuances and synonyms of the concept. The results of the different phases of the ontological determination process supported each other, and the result of interpretation of Gadamer's classical, philosophical literature also supported the results of the ontological determination.

The purpose of the research was to determine the concept of technology and its ethics and create preconditions for the ethics and caring of technology in caring science. For this purpose, the basic research strategy is adequate because the ontology of the concept technology was unknown. The dictionary material was not restricted to a single continent or linguistic area, because the concept of technology is universal and the editorial teams of lexicographers are international. Dictionary material in Swedish and Finnish was only used to interpret the forestructure of understanding. From a cultural perspective, different languages could offer variety and new dimensions to the concept of technology. In this research, their use seemed to reflect the richness of the English language. The use of several languages can prove problematic if they cannot be translated and interpreted accurately into other languages. This is not usually recommended when using semantic analysis<sup>179</sup>. However, in this research, their use enabled a dialogue and conveyed the meaning of the words to the researcher. The material was challenging because its interpretation was

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<sup>179</sup> Sivonen 2012.

demanding. Close attention was required when interpreting the dictionary material without mixing the definitions of concepts, verbs, adverbs, nouns and adjectives<sup>180</sup>. This difficulty was overcome by concentrating on the nouns and adjectives because their number in the source material was high. The number of dictionaries in sub-study one was only eight, which was not high, but on the other hand, the text material was rich and the editions from other years of the chosen dictionaries did not enrich the material. By using different editions of the dictionaries their number would have been higher, but since they did not broaden knowledge of the concept they were left out.

The challenge of collecting relevant and useful source material in sub-studies one, two and three was taken into account by choosing the study material with the help of electronic data searching tools. During the research process, it was clear that the material chosen influenced the findings. The nursing and caring perspective in sub-studies two and three, which were reviews of previous literature, directed to the use of nursing and caring journals. This perspective selection limited the material and many interesting studies in the areas of medical, social, engineering sciences or philosophy were left out. This selection was made because the purpose of the research was to determine the concept from the caring science point of view and to find evidence from the caring science perspective to develop the ideal model of the ethics and caring of technology. To acquire profound knowledge of the concept of technology and its ethics in sub-study two and of patients' experiences of technology in care in sub-study three, extensive material searches were carried out. The number of included articles was fairly high and their quality varied, but they provided a comprehensive and integrative description of the use of the concept and its ethics and patients' experiences of technology in care. When evaluating the limitations of literature reviews, it is vital to explore the whole research process, including how precise

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<sup>180</sup> Sivonen & Kasén 2010, Sivonen 2012.

and extensive the literature search strategy was and how selection bias of the material was prevented.<sup>181</sup>To map out an effective literature search strategy, the searches were performed with support from information specialists focused on health sciences and systematic reviews. Based on discussions with two independent information specialists from different library organisations, the electronic databases Medline<sup>®</sup> and CINAHL were selected. Both experts considered these two databases to cover a wide range of material, making the use of other databases futile. However, the chosen databases and keywords may have resulted in missing some relevant literature. Since the concepts referring to technology are multiple, some relevant studies may have been excluded although commands of related terms were used. Furthermore, the area of technology is developing at an extremely rapid pace; as a result, the use of technology or its studies may not yet have been documented or taken in to the databases. Similarly, predicting the future of the use of technology is difficult because the technology that is used by health care professionals today could in future be technology used by patients. The quality evaluation in sub-study two is done by grouping the material according to the study method of the material. In sub-study three, the quality evaluation is done by limiting the material to qualitative studies. This means that quality evaluation of the literature reviews' material in sub-study two and three was not done in the meaning of traditional evaluation of reliability and validity. The hermeneutic research method, used in these articles, strived to find new knowledge and understanding of the concept technology and its ethics, and the quality evaluation in traditional sense would not serve the purpose of this hermeneutic research. By the end of the research process it was noticed that content saturation was reached from the perspective of the research and sub- study questions, and the results and understanding

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<sup>181</sup> Coughlan & al. 2013.



gained made it possible to perform abduction and create the idea of technology and form theses as preconditions of the ethics of technology in caringscience.

Gadamer's literature as material of the research of caring science was based on the correspondence of the substance and methodology of the study in caring science. The knowledge of the text and its meaning and its interpretation are dimensions which are united in Gadamer's literature, and they have been used and applied in caring science. Gadamer's literature on the human good and 'techné' is classic and elemental material.<sup>182</sup>

Hermeneutics as a research approach is a circle where the researcher attempts to make something unclear or unknown clear and understandable. Hermeneutic interpretation as a research method constitutes a constant movement between the research material, pre-understanding and interpretation horizon, between particular and general, aiming at understanding the concept of technology, its ontology and meaning from the caring science point of view. In this interpretation process the interpretation and its reasoning were written open in order to describe the transparency and trustworthiness of the process. In this interpretation circle old but forgotten ontology of the concept technology was found, and through it new ontological evidence was obtained to develop caring science and ethics and truly caring care in the context of technology.<sup>183</sup> During the research process a research diary was written, reflecting the process and the development of gaining understanding. Moreover, the diary described the interpretation of gaining knowledge in different phases of the research. At the end of the process, the whole material was interpreted and the preconditions of the ethics of technology in caring science were formulated in the form of an ideal

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<sup>182</sup> Eriksson & Lindström 2007, Debesay & al. 2008.

<sup>183</sup> Debesay & al. 2008, Eriksson & Lindström 2007, Eriksson 2010a.

model on the ontological and philosophical foundation of the concept of technology in caring science.

One interest of the research was to visualise the added value caring science and its hermeneutic research tradition can offer to care in the context of technology. The results showed that by opening the ontology of the concept and by determining the concept and its ethics in caring and nursing science new knowledge, understanding and knowing was gained. The knowledge can be used as evidence on different levels of planning, designing, implementing and assessing care, but also in caring science as a component of theory development. Abduction as a method of creating an ideal model of the ethics and caring of technology in caring science opened up new ways of thinking and seeing the concept of technology in caring science. Knowledge of the concept of technology was broadened and deepened. Technology is not only a tool, a process, or a method; it also has an ontology which opened the ethical dimension of the concept and the concept's relation to the substance where it is. From a caring science point of view, an important dimension of the concept of technology is that technology is teachable. This dimension highlights the importance of human communion and caring relationship when planning the utilisation of technology and giving support to patients when using new and modern technology in care.

The abduction in this research is based on theoretical knowing of caring science, a pre-understanding of the concept of technology, dictionary material, previous nursing and caring science literature and Gadamer's philosophical literature. The material gave support to the concept's ontological determination. The interpretation of caring and nursing science literature gave the contextual perspective to the concept, while the caritative caring theory offered a theoretical foundation from which to make the abductive leap and create the synthesising abstraction of the idea of technology and the ideal model of the

ethics and caring of technology in caring science. The testing of the ideal model is planned to be conducted in the post-doctoral phase.

In this research, the goal of the good of human being has been courted by means of basic research by determining the preconditions of the ethics of technology in caring science. In future, the preconditions created will be tested in empirical studies with patients. The gained knowing of the concept of technology and its ethics and caring can be utilised in caring science in theory development and in health care, both in management and when planning the implementation and use of technology in caring. The results of the research also highlight the need of caring expertise in multi-professional teams when designing and assessing new technology for patients and in social and health care. Knowledge of the concept, its ontology and ethics, and the preconditions of its ethics are the knowledge which can be utilised on a political level when making decisions about legislation concerning the use of technology in society, particularly in health and social care. Technology is not only 'the thing' that can solve the problems of the future, but neither is it something that is only bad and threatens human life and values. Because of the multidimensionality of the concept of technology, it is important to recognise the preconditions of the ethics and caring of technology when the aim is to increase the human good. In future, the challenge is to focus more research on the ethics of caring science in the context of technology; for example, what is the content of the concepts *arête*, *phronësis* and virtue in the context of technology, and what is the relation of these concepts and technology.

I close this research with Gadamer's words<sup>184</sup>: "This is not really something we need to learn about all over again. It is something we all know, but we have forgotten its paradigmatic importance and to that extent need to remember it once more." The paradigmatic importance of caring ethos and the ethos of

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<sup>184</sup> Gadamer 1996, 80.

technology are eternal and the basis for the good of human being and ethics of caring in the context of technology. The ontological and contextual evidence in caring science provides a solid foundation for theory development in the constantly and rapidly changing world of caring and technology.

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Eila-Sisko Korhonen

# Technology and its Ethics

What is the concept of technology and its ethics in caring science? What makes caring truly caring in the context of technology? These questions motivated this basic research in caring science. The methodology of this research is hermeneutic concept determination and interpretation. At the end of the research process the ideal model of the ethics of technology is created.

Together with caritative caring science, the interpretation horizon of this research, the gained universal, ontological evidence of the concept of technology and the contextual evidence of caring science of the concept of technology formed the basis to a new understanding and knowledge of the concept of technology and its ethics. The ideal model of the ethics of technology was created on that basis around the idea of technology and caring.



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