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# Pursuing Dialogue Between Theologians and Engineers

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*Chapter Six*

## **Pursuing Dialogue between Theologians and Engineers**

JAME SCHAEFER AND PAUL C. HEIDEBRECHT

### **WHY THEOLOGIANs NEED TO REFLECT ON TECHNOLOGY**

While many reasons should compel theologians to reflect on technology in general and some technologies in particular, five major goals sparked interest in exploring the theology-technology connection at Marquette University: (1) to facilitate the unification of student knowledge and skills; (2) to specify the distinctions between theology and technological disciplines; (3) to discern and demonstrate ways of constructively relating theology and technology; (4) to serve as examples of theology-technology collaboration for students as they complete their formal educations and enter their professions; and (5) to formulate more plausible discourse about God in relation to the world.

#### *Facilitating the Unification of Students' Knowledge and Skills*

Departmentalizing disciplines continues to be the norm for most universities, especially at research institutions of higher learning. Pro-

fessors tend to speak in mutually incomprehensible languages, leaving students to fend for themselves without the knowledge and skills they need to relate the disciplines to one another. To mitigate these inadequacies in a student's educational experience, some universities are moving toward cores of common studies that link a plurality of disciplines considered essential for an undergraduate education. One or more theology courses are included in the core curricula of Catholic universities. Theology and other core courses constitute "the heart" of Marquette University's academic program that is designed to give students "a variety of ways to examine, engage and evaluate the world" and a "cross-training" of the human brain that "reflects the values of the Jesuit educational tradition and Marquette's mission to form lifelong learners committed to excellence, faith, leadership and service."<sup>1</sup> Marquette is also making strides toward relating disciplines through interdisciplinary courses and a "senior experience" within which the disciplines address a particular topic.<sup>2</sup>

Offering students who are seeking degrees in technological fields a formal opportunity to relate theology to their major academic concentration is vital to the type of education Marquette and other Catholic universities strive to provide. However, helping students to bridge their theological and technological studies requires theologians to have some basic knowledge about the phenomenon of technology in general and various technologies in particular. Unless theologians obtain this knowledge, they will not be able to reflect in substantive depth to aid their students in the quest for a more comprehensive educational experience.

### *Specifying the Distinctions between Theology and Technological Disciplines*

Key to the quest for unifying knowledge is distinguishing between technology and Catholic theology, the primary religion examined at Catholic universities. Defining technological and theological disciplines requires identifying their distinct data, methods, purviews, and limitations. Students should understand that each discipline has its own methods and contents and is not qualified to do the work of the other.

Identifying the data, methods, and limitations of technology is especially important for theologians so they can direct their students in reflections that are relevant, meaningful, and helpful. The astounding technological advancements that have been made in recent years attest to human ingenuity, while the adverse effects from some of these technologies, especially on those least able to protect themselves, affect how theologians think about the human person in relation to other persons individually and collectively, other species, ecological systems, and the biosphere of Earth.

Identifying the content and methods of theology is especially crucial in light of the literal approach to sacred texts by some sects that allege to follow the Abrahamic traditions. At Catholic universities, students learn to take a critical approach to these texts, as proffered by the Pontifical Biblical Commission of the Roman Catholic Church,<sup>3</sup> thereby recognizing the contexts of the times in which they were written, the circumstances that gave rise to these texts, and the authors' various understandings of the world. Students in theology courses are given an opportunity to appreciate how biblical writers and theologians have over the centuries tried to write meaningfully, relevantly, and fruitfully about their relationship to God. Engaging in theological discourse that is meaningful, relevant, and fruitful requires students to recognize the scientific and technological age in which they are enmeshed today. Key to this theological endeavor is realizing that discourse about God is always inadequate in light of the subject and is open to change when attempting to think about God and how God relates to the world in which humans are integral constituents.

Also significant to the task of defining theology is recognizing the multiplicity of religious traditions within the student population at Catholic universities. While Catholicism may be the privileged tradition on our campuses, the three Abrahamic traditions share some basic beliefs that can be highlighted when bridging the disciplines of theology and various technologies. Judaism, Christianity, and Islam profess belief in one creator and sustainer, think about the universe as totally dependent upon God, and reflect on the responsibility humans have to God for making and executing their decisions. These beliefs provide foundations from which to reflect critically on the research, develop-

ment, and application of technology in general, as well as on particular technologies. Teachings beyond these shared principles of faith can be appropriated and applied for their deepest possible meaning and application. It is essential for Catholic students to become familiar with social teachings on technology that have been issued by popes and councils of bishops, the *Catholic Catechism*, and critical reflections by theologians on these teachings. Students who profess other religious faiths can become informed about Catholic teachings as part of their educational experience on our campuses, but opportunities for them to become familiar with pertinent teachings of their own traditions and to apply them to their projects practically and theoretically should be made available in the ecumenical and interfaith spirit established by Vatican II.

Identification of the disciplinary purviews and limitations of theology and technology should lead to recognizing where their expertise lies when addressing a technological issue and the unique contributions that each discipline can make when engaged in dialogue. Instead of thinking that one discipline has dominance over the other, they will be viewed as complementary when approaching mutual issues from their distinct perspectives.

*Discerning and Demonstrating Ways of Constructively  
Relating Theology and Technology*

While theology and technology are distinguishable from one another, professors need to explore how they can be related constructively on issues at their boundaries. The most obvious way is for theology to provide ethical direction on the research, development, deployment, and use of technology, as physicist and theologian Ian Barbour has aptly demonstrated.<sup>4</sup> There are, however, other ways that may be less obvious. Among these are: (1) answering ultimate "why" and moral "how" questions about human functioning in the world; (2) thinking more cogently about the human person; (3) constructing a model for technologists from religious teachings; (4) providing a horizon of wisdom within which scientific and technological achievements can be viewed and employed; and (5) affirming technology as a type of human labor. We discuss each briefly.

Informed by general knowledge of technologies, Catholic theologians can be equipped to identify religious foundations for developing and using technology by answering ultimate “why” and moral “how” questions about human functioning in the world as informed by their relationship to God. Answering these questions is especially crucial since some technologies affect humans as well as other species and ecological systems directly and indirectly in negative as well as positive ways. Informed Catholic theologians should be able to point to principles of faith that cause technologists to pause and reflect on the ramifications of projects they are contemplating, planning, and executing. Among these principles are maintaining the dignity of the human person, respecting life, having special concern for the poor and future generations, seeking the common good, and valuing the physical world as God’s creation.<sup>5</sup> Why and how humans should function in ways that reflect these principles are questions that theologians should help students answer. The “why” questions may be easier to answer from a theological perspective than the “how,” since technical issues are usually complicated and defy an easy solution. However, knowledge of real and projected effects of technologies should facilitate answering these questions when tapping into traditional Catholic thinking, especially teachings about the virtue of prudence and the other moral virtues that prudence informs as discussed below.

Theological reflection on technologies can also help theology professors engage in more cogent theological discourse about the human person, the more-than-human others that constitute Earth, and the planet as a whole because of their relationship to God as their mutual creator and sustainer in existence. That humans evolved from and with other species over billions of years of cosmological-biological development must be factored realistically into how humans think about themselves in relation to one another, other species, ecological systems, the biosphere, and the cosmos. A more humble view of *homo sapiens* surfaces—especially when realizing that humans are radically dependent upon other species, the air, the land, and water for material sustenance—as well as a sense of responsibility to God for how technology is developed and used can be explored. The specialty of theological anthropology is ripe for reflection and especially fruitful when

addressing technology in general and various technologies in particular.

Awareness of near- and long-term ramifications of technologies contributes to the construction of a model for human behavior that orients technologists toward their relationship with God. Many possible exemplars of people in relation to God can be appropriated from the Catholic theological tradition, though some from biblical, patristic, and medieval teachings need updating to reflect our contemporary understanding of the world. For example, retrieving the teachings of St. Thomas Aquinas on the integrity of the world and the moral virtues is particularly helpful for modeling the technologist as a virtuous cooperator.<sup>6</sup> From Aquinas's perspective, developing the habit of being prudent will assure a step-by-step approach to discerning the best possible technology to apply in the best possible location to meet intended needs with minimal adverse effects now and into the future.<sup>7</sup> Informed by the results of this discernment process, technologists can avoid excess and waste by developing the virtue of temperance,<sup>8</sup> and they can mitigate adverse effects on human and ecological systems by developing the virtue of justice.<sup>9</sup> Development of the virtue of fortitude<sup>10</sup> will help technologists follow the best possible plan, consistently act professionally, and avoid swerving from this plan for selfish or other non-professional reasons. A morally grounded technologist in the Catholic tradition will be motivated by the theological virtue of love, which ultimately, according to Aquinas, is the desire for eternal happiness in the presence of God.<sup>11</sup> In addition to Aquinas's model and others that are retrievable from the Catholic theological tradition, students who belong to other religious communities should be encouraged to search for and evaluate models that their traditions offer.

When informed at least generally by technological advancements, theologians can provide a horizon of wisdom within which these advancements are viewed and employed. In 1998, the late Pope John Paul II urged scientists and technologists "to continue their efforts without ever abandoning the *sapiential* horizon within which scientific and technological achievements are wedded to the philosophical and ethical values which are the distinctive and indelible mark of the

human person."<sup>12</sup> Catholic universities can promote this horizon by learning from the wisdom literature of the Bible how to live orderly lives that are conducive to a right relationship with God.<sup>13</sup> Reflections on the wisdom literature by prominent theologians throughout the centuries can also be explored and, where necessary, reconstructed to reflect the technological times in which we currently live.

Theology informed by technology can also affirm the enterprise of technological development, which is often viewed ambivalently,<sup>14</sup> and can caution against the proliferation of technologies that may threaten the health and well-being of people, ecological systems, and the planet. While some technologies have enhanced and prolonged human life and well-being, others have spewed persistent toxicants into the air, on the land, and into waterways; produced stockpiles of nuclear wastes that await isolation from the biosphere for thousands of years; genetically enhanced humans, animals, and plants without sufficient attention to present and future ramifications; replicated nonhuman animals and anticipate replicating humans; and facilitated access to information and ideologies that threaten society. Theological reflection on technology as a manifestation of human labor, long lauded in Catholic social teachings since the end of the nineteenth century,<sup>15</sup> can affirm the quest to develop technologies that are helpful to people, especially the poor and powerless now and into the future, so that they can secure the necessities of life as they journey toward their goal of eternal happiness with God. Of course, theological reflection must also be extended to encompass the effects that technologies have on the more-than-human environment with its diverse species and ecological systems, which, with humans, constitute God's continuing creation through the evolutionary process.

Thus, theologians who are knowledgeable about specific technologies can facilitate student reflection on and understanding of the usefulness and functionality of theology in relation to technology. That theology and technology can be related constructively out of mutual respect for the contributions they make to a more comprehensive approach to issues at their boundaries is an invaluable lesson for students to grasp. That theology can be helpful to students who are pursuing engineering and other technological degrees when they are consider-



ing the research, development, and use of technologies can be amply demonstrated by identifying and applying principles of religious faith to projects they are contemplating.

*Serving as Examples of Theology-Technology Collaboration for Students.*

Constructive contact between theology and technology professors can expand the horizons of both, clarify their roles at a Catholic university, and better equip them to facilitate the goal of providing a comprehensive educational experience for their students. Professorial collaboration can also serve as an example for students to carry into their professional lives so they can be open to a range of possibilities and thereby avoid a myopic view of projects in which they are engaged. Acknowledging the other's discipline, respecting it, and showing how religious faith can relate constructively to technological studies constitutes a great service that professors in Catholic universities can and should provide for their students.

*Formulating More Plausible Discourse about God in Relation to the World*

Theological reflection on technology can spur more cogent thinking about God in relation to the world. As noted above, biblical and post-biblical discourse about God over the centuries reflects the contexts of the inspired writers' times, the circumstances that prompted their writing, and their understandings of the world.<sup>16</sup> Extensive efforts have been underway for over thirty years to engage explicitly in theological discourse that is informed by contemporary scientific findings, as evidenced by the burgeoning literature, conferences, and courses offered on Catholic and other university campuses. A major aim of these efforts is to reconstruct discourse about God and the human person so it is relevant to our times, meaningful for personal and community reflection, and helpful when considering how humans should act. Underlying this effort is the realization that theology is ongoing by those who believe in God and who wish to express their faith

in ways that are plausible in light of extant knowledge about the world. Being informed by contemporary scientific findings that underlie technologies tends to facilitate more plausible theological discourse.

While theological reflection on technology in general and various types of technologies in particular opens to thinking about the human relation to other people, other species, natural systems, and the universe, as noted above, reflection on the phenomenon of technology and scientific findings that underlie and facilitate technological endeavors also open to more plausible and meaningful discourse about God in relation to the world. The most basic findings by scientists indicate that the universe has developed cosmologically over nearly fourteen billion years and produced at least one planet on which biological life has emerged with one species eventually capable of producing astounding technologies. When reflected upon, these findings prompt more cogent ways of thinking about God. God can be understood as generous by endowing the world with the capacity to become the universe that scientists study today and within which technologies are developed and advanced. God can be understood as empowering the world to self-organize in increasing complexity to a point in time where humans have emerged to develop highly complex technologies. God can be understood as freedom-giving by not interfering in or interrupting the natural processes out of which the universe is developing through God's sustaining action. God can be understood as patient while at least one species opens up to and responds to God's self-communication on how its members should function in the world. God can be understood as calling the entire universe of constituents to completion and human constituents to orient their efforts toward fulfillment in God's eternal life.<sup>17</sup> By reflecting on God informed by the scientific findings that undergird technology and the technological experiences that prompt further scientific theories and testing, theologians will be continuing the quest to talk about God from the context of our time and scientific understanding of the world.

These and other rationales should prompt theologians to reflect on technology in general and various technologies in particular. The depth of these reflections will depend, of course, on the specialty of the theologian, though the subspecialties of systematic theology and ethics opens most appropriately to the scholarly pursuit of the technology-

theology relationship. As already indicated, a key impetus to this pursuit is examining human agency in the world, which is the focus of theological anthropology.

### SEMINAR ON THEOLOGY, TECHNOLOGY, AND ETHICS

One way to encourage theological reflection on technology in general and specific technologies is to include this topic among the standard array of topics covered during the formal education of theologians. In recent years, the list of special topics in systematic theology and Christian ethics at Marquette that merit the focused attention of graduate students has been dominated by traditional or highly specialized theological issues.<sup>18</sup> Some of the special topics seminars provide the opportunity to examine themes that relate to technology—for example, ecological ethics, economic ethics, and war and peace. However, for reasons discussed above, devoting an entire seminar to the topic of technology seemed increasingly appropriate in order to sustain discussion of the following questions: (1) Does theology have a role to play in response to the development of new technologies and in the use of established technologies? If so, what is that role and how should it be played? (2) To what extent do the sparse reflections on the theology-technology-ethics relationship point to fruitful ways of engaging theologians now and in the near future? (3) What resources can the Catholic and other Christian traditions draw upon to advance theological reflection on technology and norms for guiding its development and use? Are any of these resources particularly helpful for thinking about human agency to guide human behavior in the world?

Offered for the first time in the fall of 2004, the theology, technology, and ethics seminar attracted seven graduate students—two masters level and five doctoral level students—which is a typically sized graduate class in the Department of Theology at Marquette. Both the experience of designing this seminar and teaching it for the first time evidenced the need for greater reflection on technology within all theological traditions. Nevertheless, this effort constituted a modest but promising first step toward the larger agenda of encouraging dialogue and collaboration between professors of theology and technology.

The assigned readings for the seminar were divided into three broad categories in order to provide an overview of historical, theological, and ethical perspectives on technology in general. This shift in perspectives was intended to provide a transition from a more descriptive to more prescriptive analysis of the relationship between theological thought and technology, although, to a certain extent, all readings included a combination of both types of analysis.

We began by reading David Noble's *The Religion of Technology*, as well as excerpts from Susan White's *Christian Worship and Technological Change*, Jay Newman's *Religion and Technology*, and David Hopper's *Technology, Theology, and the Idea of Progress*.<sup>19</sup> These readings raised a number of crucial questions that were subsequently tracked throughout the seminar, including: (1) How is technology defined? (2) Is the definition broad or narrow? (3) What is the underlying attitude toward technology? (4) Does the author lean toward viewing technology as a threat or a sign of progress? (5) To what extent are models and norms provided for human agency in relation to technological development and use? and (6) What is the religious perspective or the religious tradition that informs the author's scholarship, and how sound is the author's grasp of that tradition?

While David Noble's portrayal of the Christian tradition is selective of sources that are not fully representative of that tradition, his book provided a provocative starting point for the course. Noble argues that the history of technology is properly understood as religious history, since technological development accelerated whenever it was invested with religious significance. The unifying thread throughout this history is the identification of technology with transcendence, an identification that is characteristically Christian: "Christianity alone blurred the distinction and bridged the divide between the human and the divine. Only here did salvation come to signify the restoration of [human]kind to its original God-likeness."<sup>20</sup> Noble also thinks this identification is problematic.

On the deeper cultural level . . . technologies have not met basic human needs because, at the bottom, they have never really been about meeting them. They have been aimed rather at the loftier

goal of transcending such mortal concerns altogether. In such an ideological context, inspired more by prophets than by profits, the needs neither of mortals nor of the earth they inhabit are of any enduring consequence. And it is here that the religion of technology can rightly be considered a menace.<sup>21</sup>

Despite the hostility toward Christianity that Noble portrays in this book, his thesis underscores the need for a background in theology to fully understand technology and for the kind of dialogue that was facilitated in the Marquette seminar. Located as we are *within* the Christian tradition, we would go beyond Noble to argue that, in addition to explaining the past to provide guidance for human interaction with technology in the future, a theological exploration of technology must strive to be prescriptive as well as descriptive.<sup>22</sup>

Theological perspectives were provided by Willem Drees, Carl Mitcham, Jacques Ellul, and Robert John Russell, a collection of lectures by Philip Hefner, and essays by Paul Tillich.<sup>23</sup> As this list of authors might suggest, it is difficult to find places where contemporary theologians address the topic of technology in a sustained manner. Certainly Ellul's work must be grappled with in any course of this type, although his background was in critical social thought rather than theology. Credit must be given to Mitcham for his work in editing the only and now dated anthology on theology and technology, but he is a philosopher not a theologian. Tillich might appear to be the one exception, although his interest in technology grows out of, and is clearly secondary to, his broader interest in the relationship between theology and culture. In a parallel manner, the interest of Drees, Russell, and Hefner in technology grows out of their significant work in the emerging field of religion and science.<sup>24</sup> This by no means diminishes the potential value of the theological resources provided by these authors, but it does highlight the difficulty in making the topic of technology a priority in theological circles.

Seminar discussions in this section tended to focus on each author's understanding of the human person in relation to the physical world and God, and in this regard Ellul and Hefner represented two extremes in the spectrum of authors considered. Ellul's emphasis on

the autonomy of technological systems and ways of thinking appears to limit human agency, a perspective that most likely flows from his Reformed theology's teachings. However, far from suggesting that Christians are powerless, Ellul's emphasis on the autonomy of technical progress demonstrates his view that mastering progress is ultimately an ethical and spiritual problem. Indeed, Ellul insists that "scientists and technologists" heed the gospel message:

The challenge to our very existence posed by science and technology today can only be met on the basis of a spiritual renewal, on the discovery of a new foundation for human life . . . namely, on the basis of the choice of non-power and on the practice of liberty.<sup>25</sup>

Hefner emphasizes a dynamic understanding of the human person, characterized as a "created co-creator," and considers technology as part of the process of "human becoming." Put even more strongly: "Technology is either pointless in the long run, or it is an expression of the fundamental self-transcending reality of God."<sup>26</sup> He argues that technology can extend rather than diminish human agency, and a theological tradition can provide the necessary perspective for directing humans to proper ends. While Hefner's larger project certainly merits consideration, both he and Tillich fail to provide sufficient normative guidance. They appear to accept the world in general, along with the technological milieu within which we live, as neutral. Our technological culture is what it is, Hefner and Tillich indicate, and we need to change the way we orient ourselves to it.<sup>27</sup> Because engineers and other technologists are intimately involved in the development of technologies, they are better placed than theologians to recognize that particular technologies are far from neutral. Technologies not only embody the values of their human creators; they also encourage the adoption of particular values, or at least shape the existing values of their users. Thus, technologists can inform theological reflection so it is more relevant and meaningful for developers and users of technologies.

Ethical perspectives were provided by selections from Hans Jonas's *The Imperative of Responsibility*, Albert Borgmann's *Power Failure*, and

by Murray Jardine's recent book, *The Making and Unmaking of Technological Society*.<sup>28</sup> Jonas, Borgmann, and Jardine are philosophers who are concerned with the relationship between religion and technology. More importantly, they share a common concern for praxis and agree on the need to identify a way of embodying values and convictions in our actions and practices. Jonas argues that the unprecedented power and reach of modern technology, a phenomenon that Borgmann refers to as the "device paradigm," is a primary reason why we find it so hard to connect values to actions in the world. We simply lack the ability to grasp the full impact of our technologically mediated actions. Jardine agrees, arguing that the "profound moral crisis" in the West is the result of our "inability to make moral sense of our technological capabilities."<sup>29</sup> In other words, we are unable to make moral sense of our capacity to change our environment through technology because our moral framework assumes that this environment is part of an unchanging natural order. He goes on to argue that the Christian tradition is partially to blame for this inability, and that a transformed Christian worldview provides the solution.

Like theologians concerned with Christian ethics, engineers and other technologists would find Jonas's and Jardine's intellectual proposals rather unsatisfying. Conversely, the work of Albert Borgmann holds great promise for finding common ground, since his primary concern is to transform our practices, not our ideas. In short, Borgmann suggests that there are times when Christian convictions lead to practices that challenge the technological practices of contemporary Western societies. Yet help is needed from all angles to negotiate the shape and implement these "focal" practices in order to create communities that will both restrain and redeem technology.

While the seminar students took turns leading the discussions on the assigned readings and provided helpful background information on the authors, their role became even more significant during the final part of the seminar. A full class was devoted to the presentation of each student's research project in which manifestations of technology were engaged theologically and ethically by drawing on the resources of a particular theological tradition. Each of these specific technologies was identified early in the semester in order to minimize overlap and

maximize the sharing of sources. The technologies included both cutting-edge and mature topics: genetic engineering, sex-change technology, technology for care of the terminally ill, the pharmaceutical industry, television, automobiles, and music-making technology.

Fortuitous for this seminar was the fact that the participants came from a variety of denominational backgrounds including Roman Catholic, Eastern Orthodox, Christian Reformed, Evangelical Protestant, and Mennonite. Their diverse perspectives were most clearly articulated during the presentation of research projects. In every case students were forced to choose theological conversation partners who had not directly addressed the topic at hand, much less technology in general. This proved at times to be a challenge, although in each case it was confirmed that theological resources are available to spur further reflection on issues related to technology. The efforts of major theologians such as James Gustafson, Karl Rahner, Stanley Grenz, and John Howard Yoder, along with Catholic social teachings and statements from the Reformed Catechism proved helpful when applied to the technological issues researched by the students. However, they recognized the need to continue to peruse their traditions for promising ideas that can aid theological reflection in a technological age.

Thus, the relative dearth of theological reflection on the topic of technology in the scholarly literature provided both a challenge and an opportunity. The seminar challenged the students to locate readings appropriate to their research projects, and it provided an opportunity for them to work creatively and constructively on these projects. From these efforts, the students recognized many possibilities for future research as they considered topics for their master's theses and doctoral dissertations.

### MOVING TO THEOLOGY-ENGINEERING COLLABORATION

Lessons learned from conducting the theology, technology, and ethics seminar help considerably toward shaping a future course. One that relates theology, engineering, and ethics is warranted at Marquette



and other Catholic institutions that boast strong engineering curricula. The ideal course will be team-taught and offered for either theology or engineering credit at the undergraduate or graduate level. A team-taught course will provide an opportunity to engage both engineering and theology faculty on the larger issues at the boundaries of their disciplines and on issues pertinent to specific projects. Having both faculty in the classroom for the duration of the course will allow interchange of perspectives and demonstration of how each discipline is supposed to function when their data, methods, purviews, and limitations are respected.<sup>30</sup> This exchange of perspectives will be fortified by offering a maximum of opportunities to the theology and engineering students to demonstrate how the two disciplines will function when addressing engineering projects.

A future theology-engineering seminar will consist of four sections. The first will focus on a historical overview of the relationship between engineering and theology. In the second, foundational theological and ethical constructs in the Catholic and wider Christian traditions will be identified from which to address engineering in general. The third section will be dedicated to examining one engineering project in sufficient depth and reflecting theologically on that project from the foundations and ethics identified in the first section to guide the development of the project. In the culminating section, students will be teamed in pairs to research and represent either theology or engineering when looking at a particular engineering project, present their cases in class, and write a research-reflection paper integrating the two disciplines on the project.

Reading sources will vary in the first section of the seminar. It will begin with the introductory section of Barbour's *Ethics in an Age of Technology* to set the stage for characterizing how students think about technology at this point and to discern the ways in which subsequent authors think about technology. Until a comprehensive text is available to provide a historical overview of the theology-technology relationship,<sup>31</sup> some of the readings from the theology, technology, and ethics seminar will have to suffice. A critical view of Noble's *The Religion of Technology* will at least provide an opportunity to identify other sources in the Christian tradition that need to be incorporated to

understand more fully the complexities of the technology-theology relationship while also recognizing the dangers in the chilling strains of Christian thinking that Noble exposes so vividly. Excerpts from White's *Christian Worship and Technological Change* will be particularly useful when examining how particular technologies have been shaped by cultural and specifically religious values as well as how some technologies have influenced theological discourse and practices. Selections from Newman's *Religion and Technology*, Hopper's *Technology, Theology, and the Idea of Progress*, John Staudenmaier's *Technology's Storytellers*, and John Brooke and Geoffrey Cantor's *Reconstructing Nature*<sup>32</sup> will also be helpful in providing a historical understanding of technological development. This section will close with an article by Staudenmaier in which recent trends in studying the history of technology are overviewed.<sup>33</sup> Throughout this section, dialogue between the professors is crucial to help students recognize key ideas underlying the theology-engineering relationship historically and determine any significance these ideas have today.

In the second section of the seminar, foundational theological and ethical constructs in the Catholic and wider Christian traditions to which the students ascribe will be identified in order to address engineering in general. Theological approaches taken by Ellul and Tillich, who have pioneered interest in the relationship between theology and technology, will be examined along with more recently published texts by Drees, Russell, and Hefner.<sup>34</sup> Russell and Hefner's models of the human as "eschatological companion" and "created co-creator" respectively will be examined along with Schaefer's "virtuous cooperator"<sup>35</sup> as options for consideration and application to engineers. Most of Borgmann's *Power Failure* will be assigned to immerse students in his thinking about the need for engineers and theologians to collaborate in restraining and redeeming technology and in determining how that need can be filled. An article by Normand Laurendeau will stimulate student thinking about his "ethic of responsibility" for engineers.<sup>36</sup> This section will end with the identification of theological foundations and norms for human agency that are needed in subsequent sections. While the theology professor will take the lead, the input of the engineering professor is vital to question, inform, and challenge theological

reflection and to develop the model of human agency to assure they are pertinent to the engineering profession. Each student will opt for one model and explain why in a reflective essay.

The third section of the seminar will be dedicated to examining one engineering project in sufficient depth and reflecting theologically on that project from the primarily Catholic foundations and ethics identified in the prior section. Of course, the engineering professor will take the lead on explaining the project, while the theologian will become sufficiently informed about it so theological reflection can be relevant, meaningful, and useful when addressing the project from a theological and ethical perspective. This section will serve as the exemplar for the culminating section of the seminar.

For the last section, students will be teamed in pairs to research and represent the engineering or theological perspective on an engineering project they have selected from among possibilities identified early in the seminar. Students will choose the religious tradition upon which they wish to reflect—an option that facilitates investigating their own traditions. Their research and planning for this task will have begun before the third section of the seminar commences, and consultation sessions with the pertinent professor will be mandatory to assure that the students are on the right track and working well with one another as mutually engaged disciplinarians. The engineers and theologians will present their findings in seminar, and the other students will provide helpful critiques of the adequacy of the presenters' representations of their assigned disciplines. As a culminating project, each student will write a reflection paper in which the engineering and theological perspectives on the project are integrated.

Reasons for interfacing theology and engineering are compelling during our age of technology, and particularly so at Catholic universities that strive to provide a unifying educational experience for their students. A graduate seminar on theology, technology, and ethics at Marquette University offered an opportunity to test the fruitfulness of dialogue. Lessons learned from this seminar will be applied to a future seminar in which theology and engineering will be interfaced by a

team of theology and engineering professors who will demonstrate how their disciplines relate constructively to one another. This future seminar will continue to present major challenges to teaching, especially in light of the paucity of scholarly literature on the history of the relationship between theology and technology in general and engineering in particular. Established theologians who are seeking fruitful avenues of research and students who are engaged in theology doctoral programs should be stimulated by the need and many possibilities for pursuing the interface of theology, technology, and ethics.

## NOTES

1. Core of Common Studies [Statement], Marquette University, available at <http://www.marquette.edu/programs/core>.

2. Among the examples of providing interdisciplinary experiences are Origin and Nature of the Universe, a course taught jointly by a physicist and a systematic theologian specializing in the theology–natural sciences relationship, and the capstone seminar for the Interdisciplinary Minor in Environmental Ethics, a course that draws upon the knowledge and skills learned in specific biology, economics, philosophy, physics, environmental engineering, and theology courses to address an environmental problem.

3. Pontifical Biblical Commission, *Interpretation of the Bible in the Church* (Washington DC: United States Catholic Conference of Bishops, 1993).

4. Ian Barbour, *Ethics in an Age of Technology*, Gifford Lectures 1990–91 (San Francisco: HarperSanFrancisco, 1993).

5. These principles of Catholic social teaching have been identified by the *magisterium* of the Roman Catholic Church and reflected upon by scholars, especially since the encyclical by Pope Leo XIII, *Rerum novarum*. For the central social teachings by pontiffs and councils, see the Pontifical Council for Justice and Peace, “The Social Agenda” (<http://www.thesocialagenda.org/>) and *Compendium of the Social Doctrine of the Church* (Washington DC: United States Conference of Catholic Bishops, 2004). For scholarly reflections, see Edward P. DeBerri and James E. Hug, *Catholic Social Teaching: Our Best Kept Secret*, 4th ed. (New York: Orbis Books, 2003). Among the most erudite sources on the often reflected upon notion of the common good are the following: David Hollenbach, *The Common Good and Christian Ethics* (New York: Cambridge University Press, 2002); James Donahue and M. Theresa, eds., *Religion, Ethics, and the Common Good* (Mystic, CT: Twenty-Third Publications, 1996);

David A. Boileau, ed., *Principles of Catholic Social Teaching* (Milwaukee: Marquette University Press, 1998); Dennis P. McCann and Patrick D. Miller, eds., *In Search of the Common Good* (New York: T & T Clark, 2005); Timothy Backous and William C. Graham, *Common Good, Uncommon Questions: A Primer in Moral Theology* (Collegeville, MN: Liturgical Press, 1997). On the notion of valuing the physical creation, see Jame Schaefer, "Valuing Earth Intrinsically and Instrumentally: A Theological Framework for Environmental Ethics," *Theological Studies* 66, no. 4 (2005): 783–14.

6. Jame Schaefer, "The Virtuous Cooperator: Modeling the Human in an Age of Ecological Degradation," *Worldviews: Environment, Culture, Religion* 7, nos. 1–2 (2003): 171–95.

7. For Aquinas's treatment of the virtue of prudence, see, for example, *Summa theologiae* II–II.65 and II–II.47.

8. On temperance, see Aquinas's *Summa theologiae* II–II.141.

9. On justice, see Aquinas's *Summa theologiae* II–II.58 and 61.

10. On fortitude, see Aquinas's *Summa theologiae* II–II.123.

11. Thomas Aquinas, *Summa theologiae* II–II.23–25; also *De caritate* 3 and 7.

12. Pope John Paul II, *Fides et ratio, an Encyclical Letter to the Bishops of the Catholic Church on the Relationship between Faith and Reason*, no. 106, Vatican City, September 14, 1998.

13. See the books of Proverbs, Ecclesiastes, Song of Songs, Ecclesiasticus, Sirach, and Wisdom.

14. Barbour, *Ethics in an Age of Technology*, 3–25.

15. See Pope Leo XIII, *Rerum novarum, Encyclical on the Condition of the Working Classes*, Vatican City, May 15, 1891, and Pope John Paul II, *Laborem exercens, Encyclical on the Ninetieth Anniversary of Rerum Novarum*, Vatican City, September 14, 1981.

16. Pontifical Biblical Commission, *Interpretation of the Bible in the Church*, 40–42; see also 72–75 for a strong critique of the fundamentalist approach whereby the words are taken literally instead of attempting to understand them in the context of the times and understanding of the world in which they were written.

17. Karl Schmitz-Moormann in collaboration with James F. Salmon explores poignantly the concept of *creatio appellata* in their *Theology of Creation in an Evolutionary World* (Cleveland: Pilgrim Press, 1997).

18. Examples of traditional topics include ecclesiology, pneumatology, and church and state; examples of specialized topics include St. Augustine's *De Trinitate*, *nouvelle theologie*, and eucharistic controversies.

19. David Noble, *The Religion of Technology: The Divinity of Man and the Spirit of Invention* (New York: Alfred A. Knopf, 1997); Susan White, *Christian*

*Worship and Technological Change* (Nashville: Abingdon Press, 1994); Jay Newman, *Religion and Technology: A Study in the Philosophy of Culture* (Westport, CT: Praeger Press, 1997); David Hopper, *Technology, Theology, and the Idea of Progress* (Louisville: Westminster/John Knox Press, 1991).

20. Noble, *The Religion of Technology*, 10.

21. Noble, *The Religion of Technology*, 206–7.

22. Susan White's book provides additional support for this dialogue, although it implies that a background in the history of technology is required in order to understand fully the practices of the church. See further her discussion of calendars and clocks in chapter 4, "Worship and Technology in History, 1: Medieval Engineering and the Liturgy," in *Christian Worship and Technological Change*.

23. Willem Drees, "Human Meaning in a Technological Culture," and "Playing God? Yes! Religion in the Light of Technology," *Zygon* 37, no. 3 (2002): 597–604 and 643–54; Carl Mitcham, "Technology as a Theological Problem in the Christian Tradition," in *Theology and Technology: Essays in Christian Analysis and Exegesis*, ed. Carl Mitcham and Jim Grote, 3–20 (Lanham, MD: University Press of America, 1984); Jacques Ellul, "The Technological Order," in *The Technological Order: Proceedings of the Encyclopedia Britannica Conference*, ed. Carl F. Stover, 10–37 (Detroit: Wayne State University Press, 1963), and "Technology and the Gospel," *International Review of Mission* 66, no. 262 (1977): 109–17; Robert John Russell, "Five Attitudes Toward Nature and Technology from a Christian Perspective," *Theology and Science* 1, no. 2 (2003): 149–59; Philip Hefner, *Technology and Human Becoming* (Minneapolis: Fortress Press, 2003); Paul Tillich, *The Spiritual Situation in Our Technological Society*, ed. J. Mark Thomas (Macon, GA: Mercer University Press, 1988).

24. For those (like ourselves) who are interested in pursuing dialogue between theologians and engineers, there is much to be learned from the past and present experiences of theologians and scientists engaged in dialogue. An examination of the similarities and differences of issues at the boundaries of these disciplines is beyond the scope of this essay.

25. Ellul, "Technology and the Gospel," 117.

26. Hefner, *Technology and Human Becoming*, 87.

27. In "Five Attitudes Toward Nature and Technology from a Christian Perspective," 157, Russell shares his model of the human as an "eschatological companion" in which he incorporates Hefner's "created co-creator," thereby recognizing the human ability to alter nature and humanity through technology while acknowledging that this power has limits since God, not human-kind, will usher in the eschaton.

28. Hans Jonas, *The Imperative of Responsibility: In Search of an Ethics for the Technological Age* (Chicago: The University of Chicago Press, 1984); Albert

Borgmann, *Power Failure: Christianity in the Culture of Technology* (Grand Rapids, MI: Brazos Press, 2003); Murray Jardine, *The Making and Unmaking of Technological Society: How Christianity Can Save Modernity from Itself* (Grand Rapids, MI: Brazos Press, 2004).

29. Jardine, *The Making and Unmaking of Technological Society*, 9.

30. A model for this approach is the team-taught course at Marquette University, Origin and Nature of the Universe, which has been offered four times over the past eight years and which juniors and seniors could take for physics or theology credit.

31. A survey of publishers is continuing to determine the future availability of the kind of text we envision.

32. John M. Staudenmaier, *Technology's Storytellers: Reweaving the Human Fabric* (Cambridge MA: MIT Press, 1985); John Brooke and Geoffrey Cantor, *Reconstructing Nature: The Engagement of Science and Religion*, Gifford Lectures 1995–96 (Edinburgh: T & T Clark, 1998).

33. John Staudenmaier, S.J., "Recent Trends in the History of Technology," *The American Historical Review* 95, no. 3 (1990): 715–25.

34. Philip Hefner, "Technology and Human Becoming," *Zygon* 37, no. 2 (2002): 655–66.

35. Schaefer, "The Virtuous Cooperator."

36. Normand Laurendeau, "An Ethic of Responsibility for the Engineering Profession: Philosophical and Religious Perspectives," *CTNS Bulletin* 20 (2000): 3–20.