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## **Lifecycle Assessment for a Devoted Religious Adherent**

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# Lifecycle Assessment for a Devoted Religious Adherent

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## Abstract

While the scientific study of religion is not new, the topic has yet to be approached by Lifecycle Assessment (LCA). This work demonstrates a method for assessing the personal “cost” of “manufacturing” a mature religious adherent, or, a believer committed to a particular faith. By measuring such inputs as personal importance of faith, prayer, religious service attendance, religious experiences, and scripture reading, an assessment can be made of the quantity of such inputs required to engender enduring religious devotion. Ultimately, this study has demonstrated that the data typically collected in longitudinal surveys are insufficient to adequately support any firm quantitative conclusions, but the method proposed is sound and can be exploited when data becomes available.

## Introduction

The use of Lifecycle Assessment (LCA) for religion is apparently novel (a literature search revealed nothing). Some progress on *Social* or *Societal* LCA has occurred (O’Brien et al., 1996; Dreyer et al., 2006; Hunkeler, 2006; Jorgensen et al., 2008, 2010; Weidema, 2005, 2006; Nazarkina et al., 2006; Ramirez et al., 2011), but it has not approached the measurement of religion in any regard. Since social LCA does not measure impact by physical flows, but from the way a product lifecycle impacts stakeholders, the methods of social LCA seemed more directly applicable to the study of religion than those of environmental LCA. Still, this LCA is neither a social LCA nor an environmental LCA (ala ISO 14044), but is modeled after principles drawn from both SLCA and ELCA and must be considered a hybrid method.

## Goal

It is difficult to address religious topics without starting with a long list of caveats. It is understood that many of the concepts herein are generalized and oversimplified. Religious and/or spiritual maturity is far more nuanced than it appears as discussed herein. Still, the data employed are not completely arbitrary and the conclusions drawn are not entirely unwarranted. In that regard, it should be understood that this LCA is somewhat experimental. The intent is to determine the feasibility of using LCA to measure specific products of religion in society, starting with the progress of the adherents themselves. The reasons this is being attempted are manifold, but include the notion that since religion (in general) is apparently sustainable (i.e., enduring and resilient in the face of much cultural evolution), there is something to be learned from such an institution; something that might have applicability to the development of sustainable *future* systems. While there is some religious terminology employed herein, it is minimal and very general—applicable across many religions. When its use is required, the terminology is defined, interpreted, and mapped into the language of LCA such that the intended audience can remain engineers who are interested in both LCA and the importance of the pervasive social systems known as religion. Religious scholars will also be interested to be introduced to a new mechanism by which religion is scientifically studied. The results of this study are intended to inform future work in both LCA and the scientific study of religion.

## Background

Religion is an obvious fact of life. Whether or not you find it beneficial, important, or transforming, as part of human culture it is inescapable. Because of this, it must be understood that society makes investments in, and reaps benefits from, the institution of religion. These can be measured and assessed in an LCA, but the methods are not necessarily obvious. Still, a variety of scholars writing in the field of LCA have hinted at techniques that open the door to possible application to religion.

For example, Weidema (2006) recommended Quality of Adjusted Life Years (QALY) be used to measure general human well-being across six damage categories. The idea of general human well-being is certainly qualitative and

suggests there could well be a qualitative measure of religious well-being or maturity. This might include “Spiritual Development Indicators” of some sort that aggregate several measurable aspects of religious involvement and reflect religious progress. Such indicators can be used to reflect a number of things in society, including some internal to a religion itself (e.g., progress along a spiritual maturity curve), and some impacting society at large (e.g., beneficial moral influence, or cost savings to a judicial system).

Hunkeler (2006) uses work hours as a mid-point indicator and intermediate variable in calculating societal LCA impacts. This suggests that tracking hours in the process of spiritual formation (meeting attendance, scripture reading, prayer) is a valid mechanism for measuring “investments” and allocating them to certain outcomes (e.g., spiritual maturity or devotion to a faith).

Dreyer, Hauschild, and Schierbeck (2006) discuss Lifecycle Impact Assessment (LCIA) from the standpoint of corporations that understand the need to take responsibility for their employees and others impacted by their products. Such concern over the impacts of human influences suggests that a thorough impact assessment of religious systems could be useful to religion in general and specific institutions in particular. Further it might allow for something akin to “competitive advantage” to be assessed for religion—though it is understood that this would be highly controversial.

Under the auspices of the United Nations Environmental Programme and the Society of Environmental Toxicology and Chemistry (UNEP/SETAC), Benoit et al. (2010) defined five stakeholder categories that can be used to measure business impact for social and societal LCA. These categories reflect the actors that are involved with, and impacted by, business activities, and hence are necessarily included in a social LCA. As demonstrated in Table 1, these stakeholder categories can be easily mapped to religion.

**Table 1. Stakeholders in Religion**

<b>Business Stakeholder Categories (Benoit et al., 2010)</b>	<b>Mapped to Religion</b>
Worker	Religious adherent as (1) paid or unpaid leader, teacher, staff, or helper within the faith community, and (2) volunteer in the surrounding community at large.
Consumer	Religious adherent as (1) learner, (2) worshipper, and (3) beneficiary of social aspects (e.g., acceptance, love, etc.) of the faith community. Also, non-adherents (or proselytes) who benefit similarly.
Local Community	Religious adherent as (1) moral influence, and (2) good citizen. Local community as beneficiary of volunteerism, donations, community action, etc.
Society (national and global)	Religious adherent continues as moral influence and good citizen, but at the societal level there is an increasing visibility and impact of the religious institution itself—whether an entire religion as a unit, or, for example, a large protestant denomination, etc. (e.g., community leadership, reputation, political action, etc.).
Non-consumer Value Chain Actors	A religious institution interacts as a member of the value chain with other religions, other non-religious institutions, organizations, businesses, legal entities, academia, etc.

Benoit et al. (2010) also hint at the possibility of considering future generations as stakeholders. Clearly, future generations have been an interest of religion throughout history and are increasingly becoming important in the sustainability discourse.

In sum, while it is clear that social and societal factors are being addressed in current LCA work, it will be important to demonstrate exactly how religious indicators can be employed. This LCA proposes a simple framework through which this can be accomplished.

## Scope

A *typical* social LCA for religion would evaluate the societal impacts of a religious institution that occur during the process of creating its various “religious” products (cf. Benoit & Mazijn, 2009, p. 37). Religion has many products. Among these are:

- Social influence (participation in dialogue about moral issues, e.g., abortion, stem cells, etc.)
- Moral behavior (sacrificial giving, care for the disadvantaged, etc.)
- Volunteer hours (community involvement, etc.)
- Financial donations to worthy causes (relief, homeless, missions)
- Presumably reduced cost to the justice system (Baier & Wright, 2001; Heaton, 2006)
- Weber-esque impact on economy (measurable, for example, as proposed by Buchanan, 1994)
- Psychological benefits, including improvements in overall well-being and mood (Newport, Witters & Agrawal, 2012; Lim, 2012)

This short and agreeably wide-ranging list contains a few items that are obviously not solely the purview of religion (even though devoted religious adherents are apparently *three times more likely* to give and volunteer than those who are religiously disengaged, cf. Smith, 2009, p. 262). In general, most of these products are generated through the involvement of mature religious adherents in society—and in fact, if an LCIA were performed, these would likely be impact categories.

Since most of these outcomes are facilitated by the mature adult adherent, it must be allowed that among the “products” of religion are mature adult adherents who are (in general) committed to their particular faith and will likely persist in the faith, ultimately influencing the next generation of adherents and the broader society around them. As mentioned above, this LCA will be somewhat of a hybrid between the ELCA and the SLCA because it will demonstrate the measurement of religion by evaluating the input investments required for generating such a mature adherent. While the social impacts which are generally the purview of SLCA *could* be measured, they are beyond the scope of this effort and remain for future research.

This LCA intends to project the “cost” of creating a devoted religious follower—at least, that is, within the specified system boundary (see below), and within the scope of the available data. Costs for creating a mature religious adherent arguably include physical plant expenses (buildings, mortgage/lease/rent, operations and maintenance, etc.), staff salaries, and travel to and from meetings (including energy costs), and a host of other ancillary inputs, but these are not evaluated herein. The focus here will remain on inputs that can be described as “personal costs” of becoming a mature adherent.

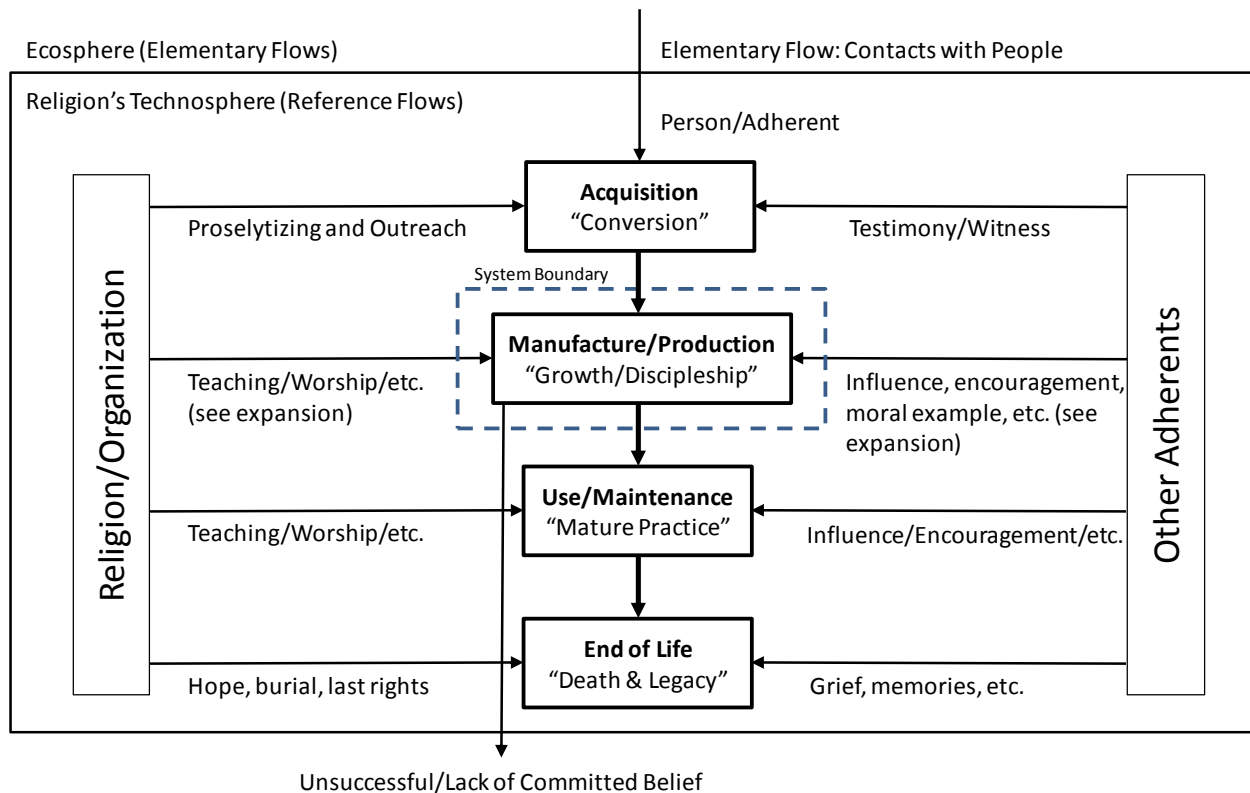
In LCA terminology, the use phase (for religion, perhaps “practice” is better) represents the active participation of the mature adherent in culture and society. While important and targeted for future analysis, evaluating such societal involvement is well-beyond the scope of this short study. Instead, this LCA will focus on some of the critical steps required to “manufacture” mature adherents (i.e., “committed believers”). In this sense, since the “product” does not “leave” the manufactory per se, this LCA is most properly termed a *gate-to-gate* study of the “cost” to manufacture a productive mature adherent of religion assuming conversion has already taken place. If the LCA included the efforts involved in conversion, it could be considered a cradle-to-gate LCA. Obviously, if an adherent were tracked from conversion to death, it would constitute a cradle-to-grave analysis. Again, these are left for future work.

Figure 1 sets the system context and depicts the system boundary adopted for this LCA (dashed lines). While this LCA focuses on the *Production/Manufacture* phase (for religion it is more properly thought of as the maturation, growth, or discipleship process and is discussed in detail below), a few clarifying remarks must be included about how the simplifying assumptions were approached. Note first that this LCA has no intention of addressing the entire technosphere of religion. The boundary is actually much more tightly scoped within that technosphere. While for “religion” at large, elementary flows might consist of people or “contacts,” for this LCA the flows (listed below) are more properly considered reference flows.

Since the LCA covers the development of a mature adherent, *Acquisition/Conversion* is assumed and ignored herein. This is not to say that the step is unimportant or could not have been subjected to study. Since many religions place

significant focus (and concomitant resources) on proselytizing, this may, in fact, be a fruitful area for research in a separate LCA. The Atlas of Global Christianity, for example, indicates that over 40,000 missionaries were sent from the US to South America in 2010—this cannot happen without considerable investment (Johnson & Ross, 2010, p. 263). Other religions have no concept of proselytizing or conversion, so their costs would be comparatively light. Though not addressed herein, this is a fruitful area for future work.

There are also simplifications made in ignoring the *Use/Practice* phase. Many religious traditions see the maturation process as a lifelong endeavor and may, therefore, object to the measurement of a *final* product referred to herein as a mature adherent. This objection is noted, but can also be shown to impact this LCA in a minimal way. There is an element of “reinforcement” (or, ongoing discipleship training) that occurs during the life of the mature adherent, but it includes events similar to those in the production phase. The exception is that adult influence becomes more like peer support when the emphasis switches from “becoming mature” to “living the daily life of the adherent.” While such ongoing learning and spiritual development occurs, such maintenance is not the kind that makes a person more likely to remain in the faith. Instead, it is more likely to develop a personal capability to assist others in remaining faithful. Further, it is during this period that the adherent begins to take on the role of the teacher or mentor (though perhaps informally) and becomes an influence to younger adherents to improve their constancy or to pass the faith along to a next generation.



**Figure 1. System Boundary Selection**

The *End of Life* phase would also be an enormously interesting area of research because of the potential *legacy* that an adherent leaves. This was ignored for this LCA, but measuring such a legacy is certainly important in any research on religion. The end-of-life phase would most certainly be required in any LCA that tracks a religious adherent from cradle to grave.

Returning to the *Production/Discipleship* phase, it is clear there are a variety of “raw materials” that are used in manufacturing a mature religious adherent. Some of these are resources invested by the adherent themselves and some are invested by the religion and the associated religious infrastructure. Still others are contributed to by a mixture of inputs from *both* the religion and the adherent. While many of these overlap, this LCA attempts to focus on the personal investments made.

**Table 2. Raw Materials for a Mature Religious Adherent**

<b>“Raw Material”</b>	<b>Unit of Measurement</b>	<b>Source</b>
personal importance of the religion	high, medium, low, none	religion
prayer	hours per week	adherent
meeting attendance (e.g., worship, education)	hours per week	both
non-parental adult influence	high, medium, low, none	religion
parental influence	high, medium, low, none	religion
doubts about religious faith	at least some, none	adherent
religious experiences (e.g., retreat)	number of events	both
scripture reading	hours per week	adherent
answered prayer or miracle observed	number of events	both

Table 2 lists some significant inputs (reference flows) to the production of a mature religious adherent, but there are also significant omissions for simplicity. For example, there is a notion of specific teaching and/or catechism that is rolled-up into the “meeting attendance” inventory item. Further, there is currently no measurement of external insult (used clinically) like non-adherent hostility, cultural influences, or moral questioning. In more complete models, these impacts would likely require inclusion.

The functional unit selected for this LCA is “mature religious adherent” so all inputs will be quantified according to that (for example, “hours of meeting attendance per mature religious adherent”). While such an approach seems formulaic and potentially sacrilegious, there seem to be statistically significant trends that can be observed when such statistics are viewed. Further, as can be demonstrated by the statistics collected each year, such numerical analysis of religion is frequently fostered by religions themselves (e.g., Barrett, 2001; Johnson & Ross, 2010).

Allocation procedures are based on the “receiving end” of the events in question. For example, an adherent may attend meetings in which she is taught as one among many, but measurement of that will be counted as “hours in meetings” instead of normalized to direct one-on-one training. This is another simplifying assumption that must be made based on the data available. Future analysis may allow for better granularity in the reporting. For example, it would not be incorrect to include *both* the hours invested by the teacher *and* all the hours invested by a student into an overall “cost” metric despite the seeming double counting of the teacher hours when all students are considered. Still a better model would likely normalize this cost based on the heuristic that one-on-one teaching is “better.”

The data requirements for this LCA are daunting. First, any study employed must be longitudinal covering the years of development from conversion to religious maturity. Second, specific data must be tracked in order to make a compelling case for the cost of creating a mature adherent. Some of this data (hours in training, number of spiritual experiences, hours in prayer, etc.) is quantifiable (but still difficult to track), while some is necessarily qualitative and must be extrapolated from coded responses (e.g., personal importance of religion). This introduces severe limitations on the utility of the results, but perhaps no more so than any other LCA. While some defense of qualitative scoring is likely to be required, it should be remembered that such scoring is not unprecedented. The United Nations Development Programme employs qualitative scoring for many of the measurements it makes in pursuit of the Millennium Development Goals (undp.org). These are similar. There is a broad literature on such qualitative metrics as it relates to measurements of human flourishing (Nussbaum & Sen, 1993; Nussbaum, 1998; Sen, 1999; Alkire, 2002; Giovannini, 2005; Stiglitz, 2009; Stiglitz, Sen & Fitoussi, 2010). While not ideal, qualitative data can be carefully utilized and this effort identifies all such use, making it clear when extrapolation or mapping is required.

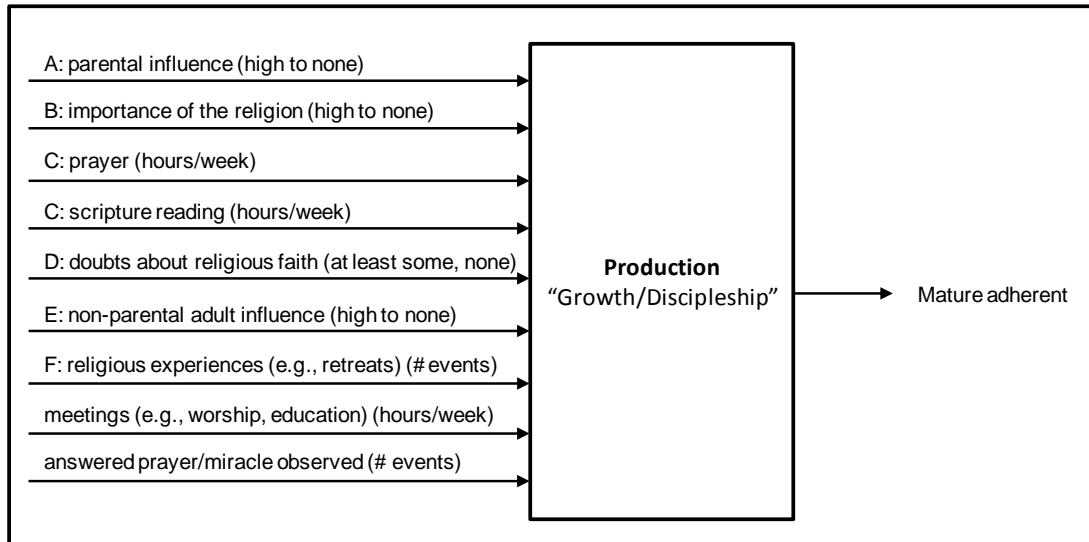
### **Lifecycle Inventory Analysis**

In lieu of input data categories like “energy” and “raw materials,” inputs have been structured around the formative events that contribute to creating a mature religious adherent (again, note the tight boundary scope for this LCA). The following input data categories have been envisioned (see also Table 2):

- adherent – personal investment of the adherent
- religion – investment of the religion, religious institution, or other adherents within the religion

- mixed – combined contribution of adherent and the religion
- external – a source outside the adherent and religion

As already mentioned, emphasis is to be placed on the personal investments of the adherent, though it is undeniable these involve related investments from others. The applicability of external influences (culture, non-religious acquaintances, media, hostility, etc.) is undoubted, but will not be addressed herein. Only one output is addressed: the mature adherent.



**Figure 2. Inputs for creating a Mature Religious Adherent**  
**Note: Capital letters (A-F) provide ties to Smith’s analysis (see table 3)**

Figure 2 depicts the flows analyzed for this LCA. The initial goal of this LCA was to provide an idea of the personal investment required to become a mature religious adherent. While the goal remains, the conclusions drawn herein will be much more broadly qualitative than initially hoped. This is in large part due to the fact that data collected in measurement of religion is not targeted at specifically measuring the “costs” involved in generating its “products”—however broadly defined the products are. Instead, evaluations of this sort require significant manipulation and interpretation of the extant data. A review of several surveys will demonstrate this point.

### Data Source Discussion

The General Social Survey (Smith, Marsden & Hout, 2010) is an annual survey taken to assess general cultural trends (marriage, work, education, politics, etc.) and it includes a wide variety of questions about religious influences as well. Unfortunately, only two questions (“how often do you attend religious services?” and “about how often do you pray?”) relate directly to the purpose of this LCA. Further, since the GSS is a random sampling and not a longitudinal study, it is impossible to track whether or not such indicators reflect a contribution to an enduring faith. Still, this data provides some reasonable indication of what it means to, for example, pray “frequently” versus “infrequently” and can be helpful in associating specific numbers with qualitative answers to such ideas concepts as “prays frequently.” For example if the GSS reported that some religious adherents prayed several times per day, then it is valid to stipulate that someone who prays “frequently” might pray, say, three times per day. Such extrapolation, while subjective, will be useful in later data analysis. It should be pointed out as well that the GSS data is self-reported. That is, it is the people who are asked how many times per day they pray, so the answers could well be artificially inflated or subject to confound if, for example, different ideas of prayer are confused.

The Religion and Public Life Survey (Pew, 2010) examines American attitudes toward a wide range of topics related to religion and public life. Again, only one question (“aside from weddings and funerals, how often do you attend religious services?”) is germane to this analysis. This study is also random and not longitudinal, so the data cannot be directly used to determining if frequent attendance contributes to adherent maturation. Still, based on the

statistically significant samples available, such studies might be helpful in correlating such answers as “seldom” to answers like “less than once a year” in similar studies. When the data is scarce, the analyst must use whatever tools are available in drawing conclusions, but ultimately understand that it reflects on the validity of the interpretations.

The Portraits of American Life Study (Emerson & Sikkink, 2006) is focused on religion in the United States, with a particular focus on capturing ethnic and racial diversity. While PALS seeks to show the impact of religion in everyday life, and track connections between religious change and other forms of change in individuals and families over the course of their lives and across generations, only one wave of the study has been completed. Still, the questions are limited to non-specific notions (e.g., “experienced a miracle” or “helped by an angel”) and coded assessments (e.g., never, rarely, or frequently “attended religious services”).

The Longitudinal Study of Generations (Bengston et al., 2009), though spanning over 30 years and four generations, asks only basic questions about religiosity: (1) frequency of religious service attendance, (2) self-defined religiousness and (3) agreement with conservative religious beliefs. Of these, only the first really applies to this LCA. Fortunately, since this survey tracks intergenerational influence, it can at least be used to corroborate findings of other longitudinal studies that have determined that mature religious adults can have significant influence on emerging adults.

The *Atlas of Global Christianity* (Johnson & Ross, 2010) is a huge collection of statistics specifically about the Christian faith. While it is an important (if daunting) resource, it can contribute little to the specific purposes of this LCA. Though it demonstrates the global progress of the Christian faith over the past 100 years in which data was collected, it does not contain indicators that relate to the maturation of *individual* Christians—neither is it a longitudinal study of specific adherents. It does contain information that is of broad interest to the study of religion including, for example, missionaries sent, evangelism “offers,” and responsiveness to such offers (pp. 318-21). Of particular interest (and possible future application to this study) are the statistics about contacts between Christians and non-Christians (pp. 316-7). Such information is important when modeling growth and expansion of religion.

The general trend in the data availability probably speaks to the difficulty and expense of gathering such details over long periods of time.

#### *The NSYR Data*

The National Study of Youth and Religion (Smith, 2008, 2009) seems to be the most directly applicable longitudinal study to date. This 10-year study of emerging adult attitudes toward religion captures in significant detail several of the aspects germane to this LCA. Some immediate caveats can be made. For example, Smith’s study was conducted in the U.S., so this implies that religions such as Islam are under-represented. In fact, though many individuals were not religious, of the religious students surveyed, the majority were Protestant, Roman Catholic, Jewish, or Latter Day Saint. Still, this study has significant value in the literature. This LCA will leverage the important findings of the NSYR, but it will become clear that even this study captures only in broad strokes the quantitative data of interest.

Smith (2009) has developed six paths that result in stable or increased religiousness in emerging adults and three paths that result in decreased religiousness. He concluded: “Thus it is shown that it is possible to use statistical techniques to identify which among many possible life factors from the teenage years are most strongly associated with a more robust religious life during emerging adulthood” (Smith, 2009, p. 217). Note that Smith’s “increased” or “decreased” religiousness is measured at the test subject’s emergence into adulthood. For the purposes of this LCA, increased (or stable) religiousness at emergence into adulthood will be equated with adherent maturity, and decreased religiousness with adherent failure to reach maturity. Failure of an adherent to reach maturity in a religious tradition can be considered “waste” (in a non-pejorative, LCA-related sense) since the combined investment of the adherent and the religious tradition will not have resulted in a mature adherent but one who is more likely to abandon the faith. This failure to reach maturity is itself an interesting topic for future research and it must be remembered that failure in one tradition may, in fact, result in adoption of another.

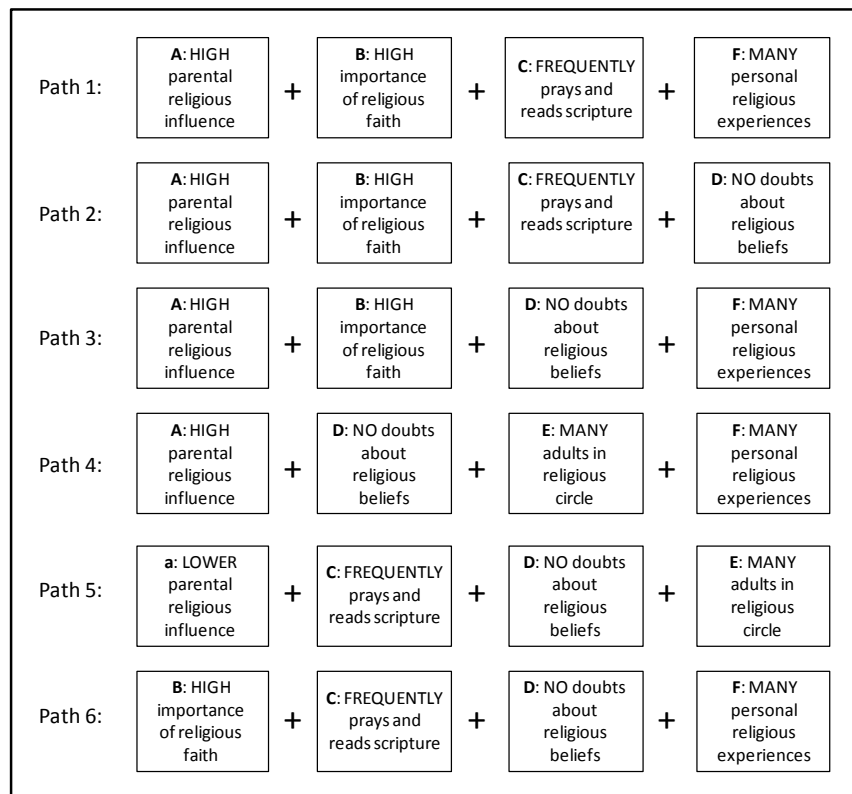
Smith’s nine paths are comprised of the causal factors summarized in Table 3 where each is represented by a letter (capital letters indicate higher/better while lowercase indicates lower/worse) that is used later as an abbreviation:



**Table 3. Smith's (2009) Causal Factors Driving Level of Religious Involvement**

Tag	Causal Factor Definition
<b>A</b>	HIGH parental religious service attendance and importance of faith
<b>a</b>	LOWER parental religious service attendance and importance of faith
<b>B</b>	HIGH personal importance of religious faith
<b>b</b>	LOWER personal importance of religious faith
<b>C</b>	FREQUENTLY prays and reads scripture
<b>c</b>	LESS FREQUENTLY prays and reads scripture
<b>D</b>	Has NO doubts about religious beliefs
<b>d</b>	Has at least SOME doubts about religious beliefs
<b>E</b>	Has MANY adults in religious circle to turn to for help and support
<b>e</b>	Has FEWER adults in religious circle to turn to for help and support
<b>F</b>	Has had MANY personal religious experiences (e.g., answered prayer, miracle)
<b>f</b>	Has had FEWER personal religious experiences

The six paths resulting in *high* or *increased* interest in religion (euphemisms abound, e.g., increased devotion, increased religiosity, etc., but this is what “mature adherent” is mapped to in this LCA) are outlined in Figure 3. Three paths resulting in low or *decreased* interest in religion are outlined by Smith, but these will not be addressed herein.



**Figure 3. Pathways to Lasting Believer Commitment (Mature Adherent)**

Source: Adapted from Smith, 2009, p. 226

If, at the end of their “production” phase (emergence into adulthood) the adherent has experienced increased interest in and enduring commitment to their religion, the religion is considered to have successfully produced a mature adherent. Otherwise the maturation process (product development) will be considered failed. While this is a simplification of the process, and the religious faithful will rightfully argue that the work of discipleship and maturation is *never* done, this is considered a practical cut-off for the purposes of this LCA.

Using Smith's research and the statistics of the National Study of Youth and Religion, a preliminary "cost" of adherent maturation should be demonstrable.

*A: High Parental Religious Influence*

While Smith (2009) finds that emergent adults are (as every generation) attempting to put some distance between themselves and their parents (p. 150), the documented similarities of parent and emerging adult religious practice indicates strong parental influence in religious outcomes. Ultimately, Smith found that parental influence in the faith is formative for emerging adults. This coincides with Bengtson et al. (2009) who determined that it was twice as likely for grandparents and parents to pass along their faith than their political beliefs to their progeny (p. 329). But Smith also found that the *absence* of parental religious encouragement did not necessarily mean an emerging adult would abandon his or her childhood faith (Smith, 2009, p. 226). If significant influence from other adults in the faith community was available, this could be equally influential in making the faith enduring (see discussion of *E* below).

*B: High Personal Importance of Religious Faith*

There are a variety of factors that contribute to the measurement of personal importance of religious faith but (aside from the very important self-assessment) the most significant seems to be attendance at religious services. Also entering the equation should be financial giving and volunteerism. Though not solely an indicator of religiosity, devoted religious adherents are three times more likely to donate money and more than twice as likely to volunteer for service projects than are the non-religious (Smith, 2009, p. 262; cf. Appendix E).

*C: Frequency of Prayer and Scripture Reading*

Frequent prayer and scripture reading demonstrate devotion to a religious faith in an easily measurable manner. Unfortunately, most of the data collected is qualitative (or loosely quantitative, e.g., "several times a week") instead of firmly quantitative in nature. This added uncertainty is discussed at length below.

*D: Doubts about Religious Faith*

While having no doubts about one's faith *might* be attributed to naïve belief, having some doubts and working to resolve them satisfactorily tends to be a mark of maturity and long-term commitment. While it is obvious that having no doubts would not adversely impact belief, having resolved some honest doubts might lend itself to a bolstered faith in a belief system. Further, working through such doubts may also be an indicator of influence by other religious adults in influential positions such as mentor or teacher roles.

*E: Many Adults in Religious Circle*

Even if parental influence is absent or negative, religious adults in the faith community can contribute to an enduring faith. However, counting these parental proxies is not an easy chore. Snell (2009) confirms that youth involved in youth groups do have greater exposure to believing adults (due in part to their regular attendance at services and their exposure to youth group leaders and helpers), but counting the adults in the circle of influence may be impossible due to the variety of religious organizational structures and faith community sizes. Still, Ellison & George (1994) find that "the average person who attends church 'several times a week' enjoys roughly 2.25 more non-kin ties than the person who 'never' attends" (p. 54). For this LCA, it will be assumed that roughly two non-parental adult relationships are required to provide adequate proxy for the parental relationships that may be absent.

*F: Personal Religious Experiences*

Smith (2009, p. 337, note 14) suggests the following as determinative for personal religious experiences: the adherent (1) had a specific "commitment" experience (e.g., to God) where one faith is chosen over others, (2) had prayers answered, (3) has experienced a miracle, and (4) has had a moving spiritual experience such as participation in a retreat, camp, or a service mission.

Table 4 summarizes some additional background information on the data incorporated in the LCA. The table also provides pointers to specific data in Appendices.

**Table 4. Smith's (2009) Causal Factors mapped to raw data**

<b>Tag</b>	<b>Factor</b>	<b>Summary and Appendix</b>	<b>Comments</b>
<b>A,a</b>	Parental influence	> 65% of religious adherents demonstrate beliefs similar to those of their parents (Appendix A)	Parental religiosity (and associated influence) can be based on their own religious service attendance habits, giving to religious institutions and charitable organizations, helping the needy and importance of faith.
<b>B,b</b>	Personal importance of religious faith	Over 43% of religious adherents indicate their faith is extremely or very important (Appendix B). Over 30% attend services regularly (Appendix B). Most make donations and volunteer (Appendix E).	There are a variety of factors that contribute to the measurement of “importance” of religious faith but the most significant seem to be attendance at services, giving, and volunteerism (primarily <i>outside</i> the religious organization). Such factors will be measured along with the personal assessment of high importance.
<b>C,c</b>	Frequency of prayer and scripture reading	32% pray daily or more, 9% read scripture daily or more (Appendix C).	Prayer can be measured as “regular” (i.e., daily or weekly) or not. Actual duration of prayer sessions would be ideal, but the data is not available. Extrapolations are made later.
<b>D,d</b>	Doubts about religious beliefs	53% have no doubts about their beliefs (Appendix C).	Measured by counting “doubts” or “seasons of doubt” and subsequent resolution or simply the ability to dialogue about such doubts in the interest of resolution and growth in belief.
<b>E,e</b>	Adults in religious circle	Average religious service attendee experiences 2.25 more non-kin ties (Ellison & George, 1994, p. 54).	While parental influence is formative, other adults can act as proxies. Non-parental adult influence can be measured accordingly.
<b>F,f</b>	Personal religious experiences	Variety, see Appendix D.	Smith has identified the need for several personal religious experiences.

### Data Manipulation

For this LCA, I have attempted to remain true to Smith’s correlated factors in calculating the total costs of developing a mature religious adherent. Since the LCA is looking for more than just correlation (that is, I want to measure the actual investment), it was necessary to quantify some the NSYR data. When this occurs, it is explained thoroughly and all assumptions are listed in the sections that follow. The six correlated indicators (**A** through **F**) were calculated as functions of specific raw data in the NSYR dataset as shown below. See details and equations in Appendix F.

**A** =  $f(\text{PATTEND}, \text{PIMPREL}^*)$   
 - parent attendance at services and parent importance of faith

**B** =  $f(\text{FAITH1})$   
 - personal importance of faith

**C** =  $f(\text{PRAYALON}, \text{READBIBL})$   
 - praying alone, reading scripture

**D** =  $f(\text{DOUBTS1\_w1}, \text{DOUBTS1\_w3})$   
 - evolution of doubts from wave 1 to 3

**E** =  $f(\text{ADLTTALK}, \text{ADLTSUP})$   
 - access to and ability to talk to supportive adults

**F** =  $f(\text{PRAYANSR}, \text{MIRACLE}, \text{RELRETRT}, \text{MISSION}, \text{COMITGOD})$   
 - answered prayer, miracles, retreats, missions, commitment experience

\* Variable names are from NSYR 2008 datasets available at *theARDA.com*.

### Path Calculations

In general, devotion or religiosity was a function of the factors calculated above

$$\text{Devotion} = f(\mathbf{A}, \mathbf{B}, \mathbf{C}, \mathbf{D}, \mathbf{E}, \mathbf{F})$$

Success path outcomes were calculated as shown in Table 5 (see also Appendix F).

**Table 5. Path Calculation Formulas**

Path	Factors
Path 1	<b>A + B + C + F</b>
Path 2	<b>A + B + C + D</b>
Path 3	<b>A + B + D + F</b>
Path 4	<b>A + D + E + F</b>
Path 5	<b>C + D + E</b>
Path 6	<b>B + C + D + F</b>

If a path's total is at least 4, it was considered a successful maturation of the adherent. Note the uniqueness of Path 5. Since the parental influence is de-emphasized in this path, the formula lacks a fourth contribution. This forces the adherent to rely on non-parental adult support as well as to demonstrate more commitment to individual prayer and scripture reading in order to ensure success.

### Confirmation

If a religious adherent is successful due to *any one* of the six paths measured, it is assumed he or she will remain committed to his or her faith. Based on the data there is no need to assume that more than one path must be taken. The results were confirmed with the Wave 3 NSYR data as described in Appendix F. Smith finds the personal importance of faith (**B**), praying alone (part of **C**), and attendance at religious services to be the most highly indicative factors of continued religiosity (oddly, attendance at religious services is not included in Smith's list of highly correlated factors, see Table 3, but, as mentioned above, is implicated as a contributing factor in the measure of personal importance of faith). Hence the following general formula was used to validate the results of the model. See Appendix F.

Confirm =  $f(\text{FAITH1}, \text{PRAYALON}, \text{ATTEND})$   
 - personal importance of faith, praying alone, attendance at services

### Results and Summary Data

The data in Table 6 (showing only a representative sample of the 3370 subjects) demonstrates the outcomes of each of the factors calculated according to the formulas outlined above and detailed in Appendix F. The percentages shown are the percent of subjects who "qualified" as meeting the criteria for a "1" in each particular category. It is striking that so large a proportion have significant parental and other adult influence toward positive religiosity. Note as well that it was possible to score greater than 1 in certain categories (including praying and reading scripture).

**Table 6. Summary Subject Data with Factor Calculations**

Subject ID	Smith's Factors					
	A parent infl.	B pers. faith	C pray, read	D no doubt	E adult infl.	F relig. exp.
Totals:						
3370	1710	1077	1119	1026	1602	356
	51%	32%	33%	30%	48%	11%
Subject Data:						
214	1	1	0	1	0	0
220	0	0	0	0	0	0
560	1	1	1	1	0	1
1044	0	0	1	0	0	0
1544	1	1	2	0	0	1

Table 7 depicts the projected outcomes based on the formulas used to incorporate the factors into the path measurements (again, only a representative sample of subject data is listed). Each path defined by Smith (and calculated as shown in Appendix F) indicates whether or not the religious adherent will successfully reach maturity and remain devoted to the faith based on the factors of that path. Obviously, all adherents will not take all paths to success, though some can be observed to have satisfied the requirements for success in several paths. Note that the most frequently traversed path to maturity (Path 2 at 10%) is one in which the adherent maintains a strong personal sense of the importance of faith, has strong parental influence, reads scripture and prays frequently, and maintains few or no doubts about the faith.

**Table 7. Projected Adherent Maturity Outcomes and Validation**

Success Outcomes = Mature Adherent							Confirm	Check
Path 1 A+B+C+F	Path 2 A+B+C+D	Path 3 A+B+D+F	Path 4 A+D+E+F	Path 5 a+C+D+E	Path 6 B+C+D+F			
209	350	169	111	112	209	486		
6%	10%	5%	3%	3%	6%	14%		
Samples:								
Fail	Fail	Fail	Fail	Fail	Fail	Fail	OK	
Fail	Fail	Success	Success	Fail	Fail	Fail	?	
Fail	Fail	Fail	Fail	Fail	Fail	Fail	OK	
Success	Success	Success	Fail	Fail	Success	Success	OK	
Fail	Fail	Fail	Fail	Fail	Fail	Success	!	
Fail	Fail	Fail	Fail	Fail	Fail	Fail	OK	
Fail	Success	Fail	Fail	Fail	Success	Success	OK	

The *confirm* column (in Table 7) is calculated as shown in Appendix F and validates or confirms the projections with data from the final census taken during the longitudinal study (NSYR Wave 3). Based on the three indicators (personal importance of faith, frequency of praying alone, and attendance at religious services), a rough estimate of the devotion of the adherent can be calculated. Assuming all three indicators score high, it can be assumed the adherent is still (at the time of the final interview) committed to the faith. This allows for an assessment of the devotion of an adherent to be compared to the path-based projections in the columns on the left. This comparison is summarized in the *check* column. When the projection made by the LCA model matches the outcome summarized by the raw data, the check column will reflect "OK."

Note that occasionally the projections of success or failure were not confirmed. In some instances, while the path calculations project success, the confirmation calculation indicates failure. In these instances, the check column indicates a question mark (?) which represents unexpected loss to the religion. On other occasions, a projected failure turns into success and provides an unexpected gain to the religion. These are indicated with an exclamation mark (!). Table 8 shows the summary when all the data is considered.

**Table 8. Model Confirmation Summary**

Matches (model confirmed by data)	91%
Unexpected successes (gains to religion)	3%
Unexpected failures (losses/waste)	6%

Despite the solid agreement, it must be observed that there is a “wildcard” with religion that may never be reconcilable. Despite many investments and inputs, some people still abandon their religion for any of a number of reasons. Hence, the 6% “defection” rate reflected in this analysis is fully expected, if not predictable. Further, the 3% of surprising “entries” into the faith are no doubt welcome, but cannot be projected by this dataset.

One of the goals of the LCA was to be able to project the quantitative “cost” of the personal investment necessary to achieve maturity as a religious adherent. This would involve quantifying the many qualitative responses tracked in the survey. For example, Tables 9 and 10 propose some rough estimates.

**Table 9. Estimates for Quantifying Time-investment Factors  
(these estimates do not include preparation and travel times)**

Factor	Discussion	Quantification
Religious Service Attendance	Assume “frequent” attendance is a <i>minimum</i> of 3 times per month at 1 hour per service (assume <i>maximum</i> of 50 wk/yr). Add 1 hour (usually higher) for weekly (40/year) small group teaching (Sunday school, home groups, or other). Add 0.5 hour weekly for mingling and fellowship.	Between $(3 \cdot 12 \cdot 1) + (40 \cdot 1) + (40 \cdot 0.5) = 96$ and $(50 \cdot 1) + (40 \cdot 1) + (40 \cdot 0.5) = 110$ hours per year.  Assume: ~100 hours per year.
Prayer  (see below for measures of answered prayer)	Assume specific prayer (i.e., <i>not</i> a metric for the biblical injunction to “pray without ceasing” in 1 Thess. 5:17). Assume “frequent” prayer is 5 times per week at 3-5 minutes. Often, extended prayer meetings may occur. Assume 2 per year at 1 hour each.	Between $52 \cdot 5 \cdot 3 / 60 = 13$ hours and $52 \cdot 5 \cdot 5 / 60 = 22$ hours per year.  Assume: ~15 hours per year.
Scripture Reading	Assume 0.5 hours per week (from ~5 minutes per day). Many times scripture reading is mixed with a “devotional booklet” (such as <i>Our Daily Bread</i> ). There are also through-the-bible-in-a-year programs, for example, that require ~50 hours per year (depending on familiarity with text and reading rate).	Between $0.5 \cdot 50 = 25$ and 50 hours per year.  Assume: ~35 hours per year.

**Table 10. Estimates for Quantifying non-Time-investment Factors**

Factor	Discussion	Quantification
Answered Prayer	Regarding answered prayer: most frequent simple prayers seem to be for healing of sickness, safety in travel, or guidance in decision-making. These have statistically high probability of success, but can be used as confirmation. This topic suffers from significant diversity in interpretation because prayer has benefits beyond answers.	Perhaps assume some each year.

<b>Factor</b>	<b>Discussion</b>	<b>Quantification</b>
Resolved Doubts	This is important but difficult to measure. Other survey inputs (e.g., whether or not the religious institution is thought to be a good place to surface doubts and discuss them) are also important.	Perhaps assume several doubts can remain in process of resolution over extended periods of belief for each year.
Parental Faith and Religious Influence	Assume parents contribute significant influence, but that such influence is not exclusively formational. Further, there is apparently potential for negative impact if parenting becomes authoritative (cf. Caputo, 2004).	Up to 2 (one each for mother and father), but see below.
Non-Parental Religious Adult Influence	Such non-parent adults are usually encountered in religious services or teaching sessions at the religious institution.	Assume adult influences (including parents, above) must be greater than 2 (though it is not required that the same adults be involved during the entire maturing process)

Assuming these very rough estimates are the typical personal investment required to achieve a status of “mature adherent” (i.e., committed believer), the following summarizes the total cost of a mature religious adherent:

Personal Cost of Mature Religious Adherent =  
150 hours (variously allocated) +  
some answers to prayer +  
some doubt resolution in progress +  
at least two supportive adults.

*per year* (over a 10 year period).

Note that the 10 year period is implied by the duration of the NSYR longitudinal study. While the non-hourly investments (answered prayer and doubt resolution) are extremely soft, the values for the investment of time and for the guidance of supportive adults seem plausible. This would imply that approximately 1500 hours of exposure to religious services, scripture reading, and prayer under the tutelage of at least two adults on an ongoing basis is required to ensure a believer reaches maturity in his or her faith.

### **Uncertainty and Sensitivity Analysis**

As with any measurement of social indicators and especially of religious practice, this study is impacted by considerable uncertainty. First, it could be argued there is an over-reliance on the NSYR data. The NSYR study was conducted in the U.S., so a variety of religious expression is under-represented (e.g., Islam and Hinduism). In addition to this, some parameter uncertainty exists in the qualitative data. For example, though other comparative studies might provide hints, it is difficult to say with any certainty what “frequently” or “two or three times per month” really means quantitatively. Hence, though the NSYR correlates well with other studies (to the extent they overlap), this LCA could benefit from additional data and more precise data.

Second, it is fair to criticize an untoward focus on Smith’s highly correlated factors that lead to increased or stable religiosity. While Smith’s work is compelling, it would be beneficial, for example, to allow for a broader array of “religious experience” or a more nuanced measure of maturity. Based on the statistics surrounding the doubt resolution discussion, it is evident, for example, that some find “intellectual satisfaction” and “explanatory power” or “philosophical completeness” and “cohesion” to be more important than, say, “miracles observed.” In this regard, sole dependence on Smith’s factors arguably introduces some model uncertainty.

Third, a focus on “emerging adults” may introduce some scenario uncertainty. For example, are there significant differences in investment when an adult adopts a faith as opposed to a student? Though a statistically very small percentage of adults “come to faith” (cf., Barna.org, 2009), adults would seem to have an entirely different experience when it comes to religiosity. Further, does a long build-up through childhood years have as significant an impact as is implied herein? Such scenarios must be explored in the interest of completeness.

Fourth, there is much potential for confound and uncertainty in the data itself. For example, all the data in the NSYR study is self-reported by the subjects being interviewed. While these numbers are *not automatically* likely to be significantly skewed due to their sensitive or embarrassing subject matter (Regnerus & Uecker, 2007), they *could* be misreported due to other reasons such as misunderstanding or misinterpretation of concepts. For example, such topics as prayer, answered prayer, and miracles can have wildly different meanings among religious adherents and across a variety of faith traditions.

It is possible that better data could be received from the religious institutions themselves. While most large worship services track only gross attendance, many smaller groups like Sunday/Sabbath schools and home groups keep track of individual attendance in the interest of accountability (Cloud & Townsend, 2003). This source of data may be more effective for measuring actual hours invested by individuals or at the very least provide solid averages that could be used in calculations. Such numbers would also add the value of reporting the number of specific teacher hours as well.

### **Lifecycle Impact Assessment**

This LCA does not develop an impact assessment, though it is clear that future work will require such an assessment since religion is not an entirely personal experience. Many contributors are involved in religious maturity. Further, considering the many impacts that religion has on culture seems to make this an area ripe for research. Should a complete LCIA be done, it would be an important confirmation of the effectiveness of LCA for religious measurement.

### **Interpretation and Discussion**

Suggesting that religion (or even just the people of religion) is measurable is bold, but not unprecedented. Based on the review of surveys above, it is clear that religion has been quantitatively studied for ages. There are several reasons why religion might be subjected to LCA as it is herein, but a beneficial framing exercise is to first ask why *any* LCA is performed. The answers are easy and obvious, and, in fact, directly applicable to the study of religion. If, for example, the process being studied is natural, researchers desire to understand and codify it in the interest of expanding the overall knowledge of the human race. Who knows what can be learned in the process of basic science? Human history is replete with experiences that demonstrate the value of such efforts. If, on the other hand, the process being studied is of human design (where most LCA studies are focused), the researcher is often interested in improving such processes, making them less expensive, less resource intensive, more earth friendly, or simply calling attention to previously unknown or unexpected inputs or impacts. These are noble goals in themselves. Studying religion has similar goals. If those involved in the “processes” of religion can come to understand them better, they can adjust approaches to make them more effective, less expensive, or even improve their social impact. In fact, Christian research organizations like the Barna Group (Barna.org) have arisen to do just that.

Many religions have found it important to track progress. It is vital to know what processes are effective and which do not deliver a positive return on investment and should be phased-out of use. For example, some religious systems emphasize the importance of attracting youth and remaining culturally relevant (Mueller, 2006; Stevens, 2008). This is perfectly in line with statistics that demonstrate that over 70% of all religious conversions occur prior to adulthood (Barna.org, 2009). Most religious traditions have seminaries in which the progress of knowledge in the faith is measured until such a time as a person becomes qualified to become a leader in the faith and graduates with appropriate certifications. The LDS church has specifically deployed the concept of a “seminary” as required for *high school* students and locates such seminaries within walking distance from most public high schools. It would be naïve to think that such important investments are not tracked and measured. While most religious leaders will understand the results of this LCA to be an oversimplification, they will not disagree that similar approaches and statistics are used in measuring the performance of their work and spiritual progeny.

Whether measuring religious adherent maturity can be boiled down to Smith’s six highly correlated factors or needs to be expanded to 20 or even 200 factors, the approach identified in this work is clear and the outcomes can be easily compared to the inputs. Oversimplification or not, religion was likely easier to measure in the past than it is now. As do most social institutions, religion evolves and these inputs and outcomes must be expected to change over time. With the advent of modernization and post-enlightenment marginalization of religious belief, it was vital, for



example, for Protestant Christianity to provide “right” answers to the important questions of life. This resulted in the early 20<sup>th</sup> century publication of such literature as *The Fundamentals* which provided these answers (cf. Marsden, 2006) and allowed for an easily measurable determination of whether or not someone had matured in their faith. Assuming an appropriate recitation of orthodoxy (right belief) and orthopraxy (right practice), spiritual maturity could be confirmed (or not). It was left to the church leaders to promulgate the answers and perform such informal evaluations. With the advent of postmodernism and further evolution of the *Zeitgeist*, mature adherents of religion are not so easily measurable. Now, even within fundamentalist circles, it is far more important that dialogue be fostered and doubts resolved in a dialectic manner. But, religion is not unique in this regard. Astute observers in the scientific community realize that even the environmental science and sustainability discourses are subject to this need for dialectic.

While religious leaders know that adherent maturity is not stasis, they do find it important to know when the maturation process is far enough along that an adherent can be trusted with the exigencies of mature religious practice. Do religions crassly “graduate” adherents into maturity? Certainly not. But there is a comfort level religious leaders have with those who understand and can discern the implications of their religious practice in society. There is an important comfort that comes from one who will “show well” as opposed to one that misrepresents the faith. Such maturity comes at great expense and much investment, so it is vital to track it.

## **Conclusion**

This study has done far more than simply calculate the personal investment required in becoming a mature religious adherent. While the scientific study of religion is not new, it appears new to LCA and this study has demonstrated the effectiveness of hybridizing environmental and social LCA approaches in the interest of broadening the possible domains in which LCA can be applied. This study has also demonstrated the sort of qualitative to quantitative mappings that are going to be required while researchers design more specific experiments and collect more specific data. In light of this, this study has proposed a new method and rationale for measuring religion beyond what is currently being done. In doing so, it has demonstrated three things. First there is a need for *different* data than is currently collected in longitudinal surveys. Second, the data collected must be less notional and *more specific*. Third, there is a need for *more sources* of data so that such studies need not rely solely on adherent self-reporting. Finally, this study has outlined a direction for future research. Within religion and the religious adherent’s lifecycle there remain significant areas to explore. This LCA provides only a hint at what might be discovered in that uncharted domain.

## Appendix A: Parental Influence

National Study of Youth and Religion (2008) data represents the third wave of a 10-year longitudinal survey of emerging adults aged 17-23 years old. Note for all NSYR data (as applicable) the following applies:

- CP – Conservative Protestant
- MP – Mainline Protestant
- BP – Black Protestant
- RC – Roman Catholic
- J – Jewish
- LDS – Latter Day Saint (Mormon)

(all values are percents rounded to the nearest whole number)

	US Mean	CP	MP	BP	RC	J	LDS
<b>Religious belief similarity to Mother</b>							
Very or somewhat similar	69	74	61	76	65	61	75
Very or somewhat different	31	26	39	24	35	39	25
<b>Religious belief similarity to Father</b>							
Very or somewhat similar	65	72	61	76	58	50	75
Very or somewhat different	35	28	39	24	42	50	25

Source: Adapted from Smith, 2009, p. 128

Note: US Mean will be different from that reported by Smith because the "not religious" category has been omitted

Longitudinal Study of Generations (2000)

	Grandparents		Parents		Students	
	F	M	F	M	F	M
<b>How often do you attend Religious Services?</b>						
(1=never, 3=several times a year, 5=once a week)	3.3	3.1	3.1	3.2	2.9	2.8
<b>How religious are you?</b>						
(1=not very, 4=very)	2.9	2.7	2.8	2.6	2.5	2.3
<b>Conservative religious beliefs?</b>						
(1=low, 4=high)	2.9	2.8	2.9	2.8	2.7	2.5

Source: Bengtson et al., 2009, p. 335

## Appendix B: Adherent Importance of Religion

	US Mean %
<b>Religious service attendance</b>	
More than once a week	6.8
Once a week	13.5
2-3 times a month	10.6
Once a month	7.8
Many times a year	6.5
A few times a year	19.2
Never	35.4
Don't know/Refused	0.1
<b>Importance of faith in daily life</b>	
Extremely important	19.9
Very important	23.9
Somewhat important	29.4
Not very important	14.0
Not important at all	12.8
Don't know/Refused	0.1
<b>Belief in God</b>	
Yes	77.6
No	6.0
Don't know/Unsure	16.1
Refused	0.2

Source: Smith, 2009, p. 112

	US Mean %	CP	MP	BP	RC	J	LDS
<b>Importance of religious faith shaping daily life</b>							
Very or extremely important	45	57	33	72	34	16	59
Not very or not important at all	28	15	37	3	28	61	23
<b>Degree of interest in learning about religion</b>							
Very interested	37	40	25	50	21	22	62
Not very or not at all interested	24	16	32	11	35	32	20

Source: Smith, 2009, p. 114

Note: US Mean will be different from that reported by Smith because the "not religious" category has been omitted

	<b>US Mean</b>	CP	MP	BP	RC	J	LDS
<b>Expects to be attending religious services when 30 years old</b>	<b>57</b>	67	48	72	49	38	67
<b>Importance of marrying someone of the same religion</b>							
Very or extremely important	<b>28</b>	39	20	30	14	12	54
Not very or not important at all	<b>47</b>	39	55	43	60	60	25

Source: Smith, 2009, p. 140

Note: US Mean will be different from that reported by Smith because the "not religious" category has been omitted

## Appendix C: Adherent Behavior

	US Mean	CP	MP	BP	RC	J	LDS
<b>Religious Service Attendance (see sheet 2)</b>							
Weekly or more	<b>25</b>	28	12	25	15	10	60
Never	<b>33</b>	24	38	18	36	62	22
<b>Frequency of praying alone</b>							
Daily or more	<b>32</b>	42	24	43	22	8	54
Never	<b>21</b>	10	23	6	20	45	23
<b>Frequency of reading scripture alone</b>							
Daily or more	<b>9</b>	10	5	7	2	5	23
Never	<b>50</b>	31	59	30	66	87	24
<b>In the past year:</b>							
Practiced meditation other than prayer	<b>20</b>	13	24	7	14	29	30
Practiced Sabbath or day of rest	<b>28</b>	31	12	23	14	14	71
Practiced spiritual discipline of fasting	<b>32</b>	21	17	23	28	34	66
Participated in religious music group	<b>22</b>	23	15	34	9	4	44
Read religious book other than scripture	<b>33</b>	39	27	26	22	18	67
Shared religious faith with someone	<b>41</b>	51	42	40	36	11	65
<b>Attended religious education or Sunday School</b>							
Weekly or more	<b>14</b>	15	6	15	4	2	44
Never	<b>52</b>	34	63	32	77	83	20
<b>Had doubts about religious faith in prior year†</b>							
Many doubts	<b>6</b>	4	6	3	6	8	7
No doubts	<b>53</b>	54	48	66	48	40	64
<b>For believers to be truly religious and spiritual, they need to be involved in a religious congregation††</b>							
Agree	<b>28</b>	34	16	31	21	16	49
Disagree	<b>72</b>	65	84	68	79	84	51

Source: Smith, 2009, p. 116

† Smith, 2009, p. 124

†† Smith, 2009, p. 135

Note: US Mean will be different from that reported by Smith because the "not religious" category has been omitted

## Appendix D: Religious Experiences

In the last two years you have...	US Mean	CP	MP	BP	RC	J	LDS
become more religious	<b>27</b>	27	16	37	16	15	51
stayed the same religiously	<b>55</b>	53	60	49	66	66	33
become less religious	<b>18</b>	20	23	13	17	19	13
experienced an answer to prayer	<b>48</b>	63	38	71	38	13	66
witnessed a miracle	<b>43</b>	53	31	66	29	19	60
made a personal commitment to live for God	<b>41</b>	47	32	63	28	12	64
attended a religious retreat or conference	<b>28</b>	33	21	30	18	14	53
gone on a religious mission or service project	<b>18</b>	22	17	16	10	7	35
regularly prayed to give thanks for meals	<b>45</b>	55	31	76	33	12	63

Source: Adapted from Smith, 2009, p. 126

Note: US Mean may differ from that reported by Smith because the "not religious" category has been omitted

## Appendix E: Giving and Volunteerism

Note: Smith defines four categories of emerging adult (Smith, 2009, p. 259):

- Devoted (5%) – Attend religious services weekly or more often, faith is very or extremely important, pray a few times a week or more, read scripture once or twice a month or more often.
- Regular (14.3%) – Attend religious services two to three times a month or weekly, faith ranges from very to not very important, prayer and scripture reading are variable but less than the devoted.
- Sporadic (17.9%) – Attend religious services a few times a year or monthly, faith ranges from somewhat to not very important, prayer and scripture reading are variable.
- Disengaged (25.5%) – Rarely or never attend religious services and identify as “not religious,” faith is not very or unimportant, pray one to two times a month or less, read scripture one to two times a month or less.

	<b>US Mean</b>	Devoted	Regular	Sporadic	Disengaged
<b>Gave more than \$50 to causes in the last year</b>	<b>34</b>	75	40	26	25
<b>Volunteered for community service not required</b>	<b>40</b>	67	49	43	30
<b>Frequency of volunteer activities in past year</b>					
10 or more times	<b>12</b>	26	10	14	9
1-2 times	<b>13</b>	8	18	14	12
<b>Helped homeless or needy informally, not through organization</b>					
A lot	<b>12</b>	19	11	7	7
A little or none	<b>55</b>	44	60	66	69
<b>Proportion of closest friends who volunteer for community service</b>					
None	<b>51</b>	20	49	50	58
Less than half	<b>31</b>	38	36	35	29
Half or more	<b>18</b>	42	15	14	13

Source: Smith, 2009, p. 262

Note: US Mean figure includes others not listed in the four categories of adherent

## Appendix F: Data Manipulation

The following algorithms were used to calculate the values of the factors used in path calculations.

### A: High parental influence (*parent-importance*)

Summary: Must be reported as “very” or “extremely” important in the interview

Data Source: Wave 1 NSYR data

Variables used: PIMPREL, PATTEND

Data range (PIMPREL):

- Extremely important
- Very
- Fairly
- Somewhat
- Not very
- Not important at all

Data range (PATTEND):

- A few times a year
- Many times a year
- Once a month
- 2-3 times a month
- Once a week
- More than once a week

Formula:

If

(PIMPREL = “Very” OR PIMPREL = “Extremely Important”) AND  
(PATTEND = “2-3 times a month” OR PATTEND = “Once a week” OR  
PATTEND = “More than once a week”)

Then

**parent-importance = 1**

### B: High personal importance of religious faith (*personal-importance*)

Summary: Must be reported as “very” or “extremely” important in the interview

Data Source: Wave 3 NSYR data

Variables used: FAITH1

Data range:

- Extremely important
- Very
- Somewhat
- Not very
- Not important at all

Formula:

If

FAITH1 = “Very” OR FAITH1 = “Extremely Important”

Then

**personal-importance = 1**

### C: Frequency of Prayer and Scripture Reading (*pray-read*)

Summary: Must pray *and/or* read scripture regularly (i.e., at least once a week)

Data Source: Wave 3 NSYR data

Variables used: PRAYALON, READBIBL



Data range (PRAYALON):

- Many times a day
- About once a day
- A few times a week
- About once a week
- One to two times a month
- Less than once a month
- Never

Data range (READBIBL):

- Never
- Less than once a month
- One to two times a month
- About once a week
- A few times a week
- About once a day
- Many times a day

Formula:

```
If
    PRAYALON = "A few times a week" OR
    PRAYALON = "About once a day" OR
    PRAYALON = "Many times a day"
Then
    pray-read = 1
If
    READBIBL = "A few times a week" OR
    READBIBL = "About once a day" OR
    READBIBL = "Many times a day"
Then
    pray-read = pray-read + 1
```

Note that pray-read can exceed 1.

***D: Doubts about faith (no-doubts)***

Summary: Must have only a few doubts over the 10-year study

Data Source: Wave 1 and Wave 3 NSYR data

Variables used: DOUBTS1\_w1, DOUBTS1\_w3

Data range (DOUBTS1\_wN):

- No doubts
- A few doubts
- Some doubts
- Many doubts

Formula:

```
If
    (DOUBTS1_w1 = "No doubts" OR DOUBTS1_w1 = "A few doubts") AND
    (DOUBTS1_w3 = "No doubts" OR DOUBTS1_w3 = "A few doubts")
Then
    no-doubts = 1
```

***E: Many adults in religious circle (adult-support)***

Summary: The subject is comfortable talking to adults and has more than four to talk to about serious religious matters.

Data Source: Wave 1 NSYR data  
Variables used: ADLTTALK, ADLTSUP  
Data range (ADLTTALK):

- Very comfortable
- Fairly comfortable
- Somewhat comfortable
- Somewhat uncomfortable
- Fairly uncomfortable
- Very uncomfortable

Formula:

If  
    (ADLTTALK = “Very comfortable” OR  
    ADLTTALK = “Fairly comfortable” OR  
    ADLTTALK = “Somewhat comfortable”) AND  
    ADLTSUP > 4  
Then  
    **adult-support = 1**

*F: Personal Religious Experiences (relig-experiences)*

Summary: Must have at least four religious experiences

Data Source: Wave 3 NSYR data

Variables used: PRAYANSR, MIRACLE, RELRETRT, MISSION, COMITGOD

Data range (PRAYANSR, MIRACLE, COMITGOD):

- Yes
- No

Formula:

If  
    PRAYANSR = “Yes”  
Then  
    subtotal = subtotal + 1  
If  
    MIRACLE = “Yes”  
Then  
    subtotal = subtotal + 1  
If  
    COMITGOD = “Yes”  
Then  
    subtotal = subtotal + 1  
  
    subtotal = subtotal + RELRETRT + MISSION  
  
If  
    subtotal > 4  
Then  
    **relig-experiences = 1**

Devotion (or, religiosity), then, is a function of the factors calculated above:

$$\text{Devotion} = f(\mathbf{A, B, C, D, E, F})$$

And Smith’s success path outcomes were calculated as shown below.

Path	Factors	Expanded Mnemonics (shown in <b>bold</b> in the formulas)
Path 1	<b>A+B+C+F</b>	parent-importance + personal-importance + pray-read + relig-experiences
Path 2	<b>A+B+C+D</b>	parent-importance + personal-importance + pray-read + no-doubts
Path 3	<b>A+B+D+F</b>	parent-importance + personal-importance + no-doubts + relig-experiences
Path 4	<b>A+D+E+F</b>	parent-importance + no-doubts + adult-support + relig-experiences
Path 5	<b>C+D+E</b>	pray-read + no-doubts + adult-support
Path 6	<b>B+C+D+F</b>	personal-importance + pray-read + no-doubts + relig-experiences

If a religious adherent is successful due to *any one* of the six paths measured, it is assumed he or she will remain committed to his or her faith.

The results were confirmed with the Wave 3 NSYR data as described herein. Smith finds the personal importance of faith (**B**), praying alone (part of **C**), and attendance at religious services to be the most highly indicative factors of continued religiosity (oddly, attendance at religious services is not included in Smith’s list of highly correlated factors, but, as mentioned above, is implicated as a contributing factor in the measure of personal importance of faith). The following formula was used to validate the results of the model.

$$\text{Confirm} = f(\text{FAITH1}, \text{PRAYALON}, \text{ATTEND})$$

Summary: Must have high importance of faith, significant prayer and attend services regularly

Data Source: Wave 3 NSYR data

Variables used: FAITH1 (see **B** above), PRAYALON (see **C** above), ATTEND1

Data range (ATTEND1):

- A few times a year
- Many times a year
- Once a month
- 2-3 times a month
- Once a week
- More than once a week

Formula:

If  
                   FAITH1 = “Very” OR FAITH1 = “Extremely Important”

Then  
                   **faith** = 1

If  
                   PRAYALON = “A few times a week” OR  
                   PRAYALON = “About once a day” OR  
                   PRAYALON = “Many times a day”

Then  
                   **pray** = 1

If  
                   ATTEND1 = “2-3 times a month” OR  
                   ATTEND1 = “Once a week” OR  
                   ATTEND1 = “More than once a week”

Then  
                   **attend** = 1

If  
                   **faith + pray + attend = 3**

then  
                   Adherent = **SUCCESS**

## Appendix G: NSYR Data Variables Used

27 of 918 variables were used from Wave 1 (2003). Only the most highly correlated are reflected in the calculations.

1. ADLTSUP
2. ATTEND1
3. COMITGOD
4. DOUBTS1
5. GIVEN
6. GIVEREL
7. HELPED
8. IDS
9. MADEFUN1
10. MIRACLE
11. PATTEND
12. PIMPREL
13. POLACT
14. PRAYALON
15. PRAYANSR
16. READBIBL
17. RELEXP
18. SSCHL
19. VOLDIFF
20. VOLNUM1
21. VOLNUM2
22. VOLREL
23. VOLREQ
24. VOLUNTER
25. YTHGRP1
26. YTHLDR1
27. YTHLDR2

20 of 488 from Wave 3 (2008):

1. ATTEND1
2. ATTEND30
3. COMITGOD
4. DOUBTS1
5. FAITH1
6. GIVEN
7. HELPED
8. IDS
9. INWAVE3
10. MIRACLE
11. MISSION
12. PRAYALON
13. PRAYANSR
14. READBIBL
15. RELRETRT
16. VOLNUM2
17. VOLREL
18. VOLREQ
19. VOLUNTER
20. YTHGR2\_2

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