Abstract
Overpopulation, global warming and fossil fuel consumption threaten our species with extinction in the near future. Our institutions of higher learning are not producing adequate technological, scientific, or engineering based solutions to these problems. Two of the causes for this lack of progress are fragmentation and overspecialization of our institutions of higher learning. A new model for intra-institutional collaboration is called for. A few promising developments in the status quo are reviewed and critiqued.

Introduction
Albert Einstein is credited with having said, “We cannot solve our problems with the same thinking we used when we created them.” (Einstein, 2009) One of the greatest mathematicians, scientists, philosophers, and thinkers of our time urged us to adopt new tactics, paradigms, and epistemologies when it became obvious that the tired, failed, and antiquated status quo was not going to solve our problems. Yet higher education persists and continues down the same paths with ever larger budgets, turf wars, and fragmentation. The compounding interest of humanity’s neglect for our planet is ubiquitous and obvious for all who care to apprise themselves of the truth. Potentially intractable problems of climate change, overpopulation, disease, resource competition, and conflict threaten our survival (Klare, 2004). But we continue to educate students in much the same way as they have been for decades-decades that have allowed these problems to become much worse. The academy has become hopelessly specialized, fragmented, and dysfunctional (Kezar, 2006) and must change if we are to prepare future generations to finally put to rest the lingering problems that are plaguing humanity.

Our institutions of higher learning must reverse the academic fragmentation and isolation that has allowed these problems to metastasize into possible extinction threats. This writing illuminates the pressing need for interdisciplinary, intra-institutional, academic cooperation. This essay will examine the potential extinction threats facing humanity, the causes of those threats, a paradigmatic solution to those problems, and a possible model upon which to base this multi-disciplinary cooperation. Academic cooperation can prevent human extinction.

Our Problems
Several deep seeded and intense social issues are only intensifying because of years of neglect. Overpopulation threatens biodiversity, water supplies, public health, viable biomes, and global food supplies (Henrichsen & Robey, 2000). Global Warming will cause resource competition, famine, pestilence, and possibly an ice age. Furthermore, the reliance on a fossil fuel consumptive energy paradigm guarantees human extinction as a result of resource wars and/or climate change (Klare, 2004). Indeed, most mildly
globally aware individuals are well versed in the cornucopia of challenges that are overwhelming our organizations', governments', and technologies' ability to effectively respond. These urgent and pressing potentially lethal concerns will henceforth be referred to as “problems”.

**The Causes**
The intractable tribulations previously described are simply symptoms of larger causes. Simply put, our organizational dynamics have failed us. Humanity as an organization is succumbing to decay and slipping into a reactive management style that is incapable of negotiating a hyperturbulent environment. Many of these problems have been on humanity’s radar for generations. Others have only recently captured our collective imagination. All of these issues have one root cause—humans. Our ability to procreate, consume natural resources in an unsustainable fashion, and our inability to leverage technology to reduce our impact on the natural environment has caused these potential calamities. Malthus warned us about overpopulation in the nineteenth century. Climate change has been a “hot topic” since the 1960’s. Oppenheimer was presciently aware of what he helped to create as he watched the very first atomic explosion in the early 1940’s.

These problems persist because humanity has not leveraged its educational systems to solve them. Despite herculean efforts, massive expenditures, and nearly infinite people hours, we have not mobilized to tackle these problems at all levels of the academy. Two factors inhibit the academy’s ability to solve these concerns. The academy or, institutions of higher education, are temporally short sighted and fragmented (Brand, 1999; Scarsella, 2009; Schmidt, 2009; Taylor, 2009). The dogged focus on short term pursuits coupled with the increasing specialization is leaving American institutions of higher learning incapable of leading technology driven change to beat back humanity’s calamities with our intellects.

**Temporally Challenged**
Most work at the academy focuses around the fundamental unit of academic organization—the semester. Most professors are conditioned to think of a 16 week or an eight week time frame for the organization of their work. Some professors who teach at Tier I or Doctoral I research institutions who are engaged in long term longitudinal studies have been conditioned to think in longer terms—say 5 years. Mid-level academic managers (e.g. Department Chairs and Deans) think in the 3-7 year time frame. Executive Level Managers look 8-15 years down the road. The only person charged with thinking about what the academy will look like 20 or 30 years from now is the President or the Chancellor.

Frankly, many of these administrators were chosen because they know how to raise money, have good connections at the state legislator, or were entitled to the position because they have been at the institution for many years. Very few university Presidents were chosen because they have an exciting vision of what their organization will look like in 30 years. More likely they were chosen because they are well versed in one or more of the above skill sets and because they have social intelligence, are
photogenic, and positively represent the university in public settings—not because of an awe inspiring “vision” about what the academy should look like, much less a practical plan about how we are going to get there.

Indeed, Dealtry even goes so far as to say that the epochal changes happening in technology, research, business, and society have made the collective experience of these administrators obsolete. That obsolescence may even be contributing to organizations being even less responsive to changing environments and changes on the horizon. In short, the current groups of organizational leaders are not selected based on vision, but on experiences that may have qualified them on paper for their positions, but in reality have probably taught them to lead in a way that is inconsistent with future casting (Dealtry, 2006). This inexorably leads to what Brown & Harvey (2006) refer to as a “reactive management style” that is unable to effectively adapt to hyperturbulent environments.

In fact, most in the ivory tower of the academy are focused on the short term. The questions most often asked by the professors include things like: How will this decision impact my bid for tenure? Will this appointment enable me to move up the academic ladder? When are grades due? What holidays do I need to figure into my syllabus? A majority of educators, even at Research I institutions are not routinely asking questions oriented in the long term. It seems that our academic culture is not significantly better than popular culture in this regard. Both are guilty of an overwhelming short-sightedness that favors instant gratification at the expense of long-term diligence and deep future gazing (Brand, 1999).

Stewart Brand (1999) lamented this temporal orientation in a book called The Clock of the Long Now. This book encouraged humanity to reconceptualize how we interact with and think about time. He proposed a global metaphor for long term thinking of a clock that ticks once a year, and gongs once a decade and cuckoos once a millennium. This clock would theoretically remind all of humanity to focus on the long term and to stop being so obsessed with the here and now.

**Fragmented**
The products of our short term thinking in the academy are copious journal articles that regurgitate what other scholars have already discovered (Taylor, 2009), excessive attention to documenting our accomplishments in the tenure and promotion process and general lack of truly innovative thinking and creativity. Traditional academia does not encourage the long term thinking needed to address our collective problems (Gelles, 2009; Kidd, 2009; LeVine, 2009; Lyons, 2009; Sample; 2009; Surridge, 2009; Young; 2009; Young, 2009, Young, 2008).

In addition to a lack of vision and the failure to think about the future, the second cause of our collective problems within the purview of this writing is fragmentation in the ivory tower. The academy has become hopelessly fragmented, specialized, and narrowly focused. Historians specialize on specific leaders, wars, and geographic locations. Medical doctors specialize and may have an additional subspecialty. I recently met my
first ventricular cardiologist, and a chemist might specialize on specific types of reactions. In short, very few in the academy are engaging their colleagues in any meaningful and productive way. Many superstar academics live, work, teach, and produce scholarly writings in isolation.

I recently overheard a discussion at a wedding between two internationally renowned scholars in different disciplines. One a well respected geologist who has worked with NASA and the other an award winning economist. These two academics didn’t work at the same college, but they did live in the same town and were both close to the Bride or the Groom. They are both rock star academics who had never met each other. Because these two do not attend the same conferences, teach at different universities, and travel in different circles, these two towering intellects had never crossed paths until both of them happened to bump into each other in line at the open bar of a wedding.

The academy is an academic silo (Kezar, 2006), a walled garden, a place where the institutional structures (e.g. buildings, departments, schools, conferences, and journals) encourage scholars to focus narrowly on their chosen discipline. Subsequently, most scholars are not encouraged to step back and think about society’s larger problems and how their knowledge could contribute to potential solutions (Jenkins, 2009; Gelles, 2009; Kezar; 2006; Kidd, 2009; LeVine, 2009; Lyons, 2009; Sample; 2009; Surridge, 2009; Young; 2009; Young, 2008).

Kezar examined this “siloh mentality and concluded that the academic organizations that best excelled in promoting inter-disciplinary collaboration and multi-disciplinary thinking were the institutions that actively encouraged them. These institutions communicted the importance of such projects in their missions; facilitated multi-disciplinary collaboration with the allocation of space; encouraged these partnerships with seed money, stipends, and release time; and rewarded intra-institutional collaboration in the tenure and promotion criteria. Subsequently, these institutions are better than average at encouraging collaboration. Kezar also concluded that most of what is happening in the status quo is tinkering around the edges and that a fundamental rethinking of the academy to encourage multi-disciplinary thinking and scholarship was merited if it was expected to successful. That rethinking should include structures, processes, people, and rewards (Kezar, 2006).

Furthermore, without that fundamental rethinking and reconceptualization of academy with an eye towards dismantling the information silos and walled gardens, multi-disciplinary collaboration will be short-term, prone to relapse into its presently designed state, and regression. (Dealtry, 2006). In short, if we truly desire multi-disciplinary cooperation in math and science to resolve issues like global warming, over population, fossil fuel dependency, famine, disease, and resource competition then we must design our institutions of higher learning to facilitate that outcome. The form and function of those potential collaborations will be explored in the next section.

The Solutions
The academy must reinvent itself to foster multi-disciplinary cooperation. An unnamed academic interviewed for Kezar’s (2006) research study said it best, “If the administrative structure reinforces people staying in their boxes, then this makes partnerships difficult.” The physical spaces, buildings, people and processes must be redesigned to encourage cooperation. Furthermore, a culture shift in executive leadership must be made to lead the redesign to encourage this collaboration. For too long education has been run like a business (Jenkins, 2009). An eye towards the bottom line does not typically encourage multi-disciplinary research (Taylor, 2009). Maximizing profits and minimizing losses is a management paradigm that has seeped out of business and into the academy. Too much focus on running the university like a corporation has left most academics too busy with management duties, committee work, and teaching to engage in as much meaningful research as has been produced in the academy in the recent past (Schmidt, 2009).

The solution is simple. Reinvent the university as a problem oriented, multi-disciplinary cooperative entity (Dealtry, 2006; Goldstein, 2009; Kezar, 2006; Kidd; 2009; Scarsella, 2009; Young, 2009). Kezar speaks at length about the need to flatten the university structure to tear down the “information silos” of the ivory tower. A religious studies scholar from Columbia takes it a step further, Taylor advocates a whole scale dismantling of academic departments in an op-ed piece in the New York Times in favor of what he refers to as “problem focused programs” that are organized not around academic pursuits, but solving real world problems. It appears as though some “entrepreneurial types” may have already beaten Taylor to the punch.

**Singularity University**

With much fanfare, collaboration, and expectation, Singularity University opened its doors this winter. This institution has some impressive partners: NASA, Google, Yahoo, and Microsoft. The University is a non-accredited, non-degree granting, private, for profit institution of higher learning based in Silicon Valley, California. The actual campus is located on the grounds of the NASA complex there. This University is the brainchild of futurist Ray Kurzweil. Kurzweil worked in Silicon Valley, invented products, developed companies, and has written many futuristic themed books that explore humanities inevitable interactions with and eventual merger with computers.

Before embarking on a discussion of Singularity University’s unique approach to multi-disciplinary collaboration, a brief explanation of the name “Singularity University” is warranted. The name for Singularity University is based on his application of astrophysics terminology for the narrowest point of density in the bottom of a black hole. The mass of the black hole is so great and its gravitational pull so immense, that as it attracts matter into its gravitational pull, the matter reaches a point at which it is unable to escape called an “event horizon”. Once the “event horizon” has been crossed the matter will inexorably be sucked into the black hole. After the matter enters into the black hole it is smashed into every other piece of matter that the black hole has pulled in. Eventually, all of that matter is reduced down to a diameter of the head of a pin called the singularity.
Kurzweil applies this term to the University because he predicts that the singularity is near. It is estimated that given the current advance of technology that computers will be able to out-think humans. Kurzweil predicts that point in 2030. That singularity will be a major turning point in the history of our species. According to Kurzweil, we'll either merge, singularity style, with the computers or we will become extinct.

The University is designed to bring different disciplines that don't usually interact with one another together, under one roof for intense cross-training and multi-disciplinary collaboration in the sciences. The modest aim of the university is to solve all of the aforementioned “problems” by bringing together physicists, nanotechnologists, agronomists, computer scientists, engineers, and a whole litany of practitioners of hard science to produce revolutionary cross discipline breakthroughs in food production, engineering, technology and energy production.

There are a myriad of potentially attractive attributes to Singularity University. The model of multi-disciplinary collaboration is well informed. Their timing is perfect – many of these problems will become unmanageable in the next decade. Their name is catchy – Multi-disciplinary Hard Sciences U just doesn't have the same “Wow” factor. Finally, the direction and mission are spot on and exactly what more “traditional” schools should be doing. However, Singularity University isn’t necessarily the answer all America’s higher education woes. In fact, many things about it are downright objectionable.

For instance the $25,000 price tag is stifling (Barak, 2009; Gelles, 2009; Kidd, 2009; LeVine, 2009; Sample, 2009). I know $25,000 in higher education tuition isn’t what it used to be and many private, liberal arts colleges routinely charge that sum for a year’s worth of tuition, books, and living expenses. However, when one considers that sum isn't for a whole year or even a semester, but the bill for tuition only for a 9 week summer term, one must conclude that the cost isn't just prohibitive but obscenely over-priced.

In addition to the cost, the opportunity is limited. Singularity University will only admit 30 students per term (Barak, 2009; Gelles, 2009; Kidd, 2009; LeVine, 2009; Sample, 2009). The plan is to admit more as the University grows and becomes more established, but for now not many people will be given a chance to study there.

Finally, the long term prospects for productivity diminished by proximity. It may be difficult for a micro-biologist from Holland to continue to collaborate with the computer scientist from Japan and the agronomist from Columbia. These researchers will go back to their walled gardens and information silos from whence they came. It remains to be seen how distance and a lack of proximity will impact the new alumnus brethren from Singularity U's ability to collaborate. In short, it is a great stop gap measure, but genuine, long-term, university supported intra-institutional collaboration is what is needed (Dealtry, 2006 and Kezar, 2006). More long term multi-disciplinary partnerships will require more long term commitments from universities (Dealtry, 2006).
Singularity co-founder and Chief Executive Officer Peter Diamandis states that Singularity University isn’t about supplanting the traditional university, but rather about augmenting it (Young, 2009). We in the academy had better pay attention to the model that Kurzweil is creating, and act sooner as opposed to later to emulate the parts of the model that work without the monetary barriers and proximity limitations of Singularity University. At least one futurist thinks our fate as a species depends on it. Vincent Scarsella an attorney, cultural critic, scholar of organizational dynamics and futurist, contends:

Humanity has failed to devise, develop and implement an organizational system, culture, or government, capable of ensuring the survival of the human species from possible natural or manmade cataclysm, such that it is certain, at the present level of technological achievement of the species, that mankind (sic) is doomed to extinction. This failure puts the species at constant risk of extinction, either by its own doing, or due to some natural cataclysm, such as impact by a comet or asteroid or inevitable death of the sun. In sum, the human species is chargeable with failing to develop organizational and governmental systems among its cultural groups which provide the maximum quality of life for all members of the species; has failed to avoid destructive behavior among individuals and groups of individuals; has failed to become unified and join in an effort to insure the survival of the species; and, has failed to use its collective intelligence to steadfastly pursue a comprehension of God and the Cosmos. Surely, the human species must plead guilty to these charges. Simple observation reveals that many millions of human beings wallow in abject poverty, ignorance, and have become ready targets for physical and mental disease and epidemics; wars rage around us in all their cruel stupidity in many parts of the world; and, intellectual and economic resources are wasted in the pursuit of war (aka military defense), materialistic wealth, and other banal pursuits, while so little of such resources are spent in search of the larger questions of the human condition that nag at the very core of our existence.

We must change the failed dynamics of our organizations of higher learning and education if we wish to persist in the face of the difficult times ahead. Our educational institutions have inadvertently adopted a “reactive” management style that is ineffective in the hyperturbulent world of today. The modern American university has become short-sighted and fragmented. If our universities can tear down the walls between the gardens and foster communication between the information silos, then the university can once again drive innovation, produce research breakthroughs, and solve the most pressing “problems” facing our species. If our organizations fail to reinvent themselves in the face of their collective failures, then we can expect similar results to those produced during the past 30 or so years. Future research should focus on developing coherent models for how best to facilitate this inter-institutional cooperation. In conclusion, let us reflect upon another quotation from Albert Einstein, “Insanity: doing the same thing over and over again and expecting different results.” (Einstein, 2009)

References
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