The word university is derived from the Latin: Universitas Magistrorum et Scholarium – a community of teachers and scholars. Around a millennium ago, human beings established the first universities; set apart from the medieval monasteries, church schools, and ancient centers of learning, these were organized degree-granting institutions created with charters and with certain collective legal rights. Rulers and governments created universities to satisfy the thirst of knowledge of their subjects with the belief that society would benefit from the scholarship generated by them. The idea was to create, curate, acquire, and transmit knowledge independent of influence from kings, emperors, or religious authority. This notion of academic freedom was implicit in the charters of the first universities ten centuries ago. Academic subjects included theology, law, logic, mathematics, and, later, natural philosophy and human anatomy, astronomy or astrology, and others. There is strong evidence that without the establishment of these early universities, the great Scientific Revolution that erupted at the end of the Renaissance and continued to the 18th century, which laid down the foundations of modern science, would not have been possible. Leading to the Age of Enlightenment, the revolution was sparked by the work of Copernicus and Vesalius, saw the works of Newton, Kepler, Leibnitz, Cauchy, Euler, Laplace, Descartes, Galileo, and many more, dramatically advance our understanding of the universe and humankind’s place in it, and put into motion dramatic advances that eventually changed the entire world.

In many places, but not uniformly throughout the United States, the word university is reserved for institutions that grant doctorates in one or more areas, with the idea that research is intimately connected with the mission of
the institution and has been integrated seamlessly into the teaching mission. This has been more or less the convention internationally for a thousand years. The university has thus been a destination for those who wanted to access accumulated knowledge and to acquire the latest knowledge to enrich their livelihood, their lives and their welfare -- it being always understood that the generation of knowledge through research was fundamentally a purpose of the university.

Perhaps the greatest upheaval in recent times for university research began post World War II in which our knowledge exploded in a fraction of the time of the Age of Enlightenment. Most of the major centers of learning were in Europe at that time. It became clear that countries that were to be technology leaders, who would determine the future of society, their own security, and the welfare and quality of life of their citizens, would be those with the greatest research universities. Within the halls and laboratories of universities, thereafter, we saw the development and emergence of statistical mechanics, quantum mechanics, relativity, molecular and cell biology, digital computing, space exploration, the beginning of treatments and cures for many diseases that effect humankind, and ultimately miniaturization, micro-electronics, and telecommunications.

Some years ago, the U.S. Department of Defense instituted three budget categories for research that are now more or less adopted by funding agencies in general: 6.1 standing for Basic research, 6.2 for Applied research, and 6.3 for Advanced Technological Development. There are various shades between these categories. 6.1 research is understood to be high-risk fundamental research with the main goal of expanding knowledge. The purest basic research is done without thought of any practical use in the future. Applied research was designed to tackle and solve the problems of the modern world to improve the human condition. In the categories of basic and applied research, it is
estimated that 20-50 years may elapse before the research results may find their way into practical use. More recently, very applied research may bring products to market in 2-5 years. Nobel Laureate George Smoots said that if we only did applied research, “we’d still be making better spears.” University research thus spans the gamut of basic and applied research. Advanced technological development is generally in the province of large corporations, agencies and national laboratories, and is uncommon among universities except through special partnerships.

In view of the role of universities throughout their history, it is not surprising that in January 26, 1839, the Constitution of the Republic of Texas set aside 50 leagues of land to support public universities. This is not the State of Texas, but the Republic of Texas under President Mirabeau B. Lamar. Texas became a state in 1846, and a bill establishing the University of Texas was passed in 1858 setting aside $100,000 in bond’s toward the construction of a university. That bill was eventually revoked and in the State Constitution of 1876, 1 million acres were set aside for the support of the creation of a "university of the first class". Later, in 1883, another two million acres were set aside to support the development of major universities. [UT and TAMU]. I am pleased to be associated with a university that strives to be of the first class, although it took us 128 years to get us to where we are; but what is most remarkable is that Texas leaders, going back to the Republic, fully appreciated the indispensable role of universities in enriching the welfare and quality of life of its citizens.

Research universities are engines of discovery, where knowledge is acquired that creates economic growth central to competitiveness, welfare, security, and advancement of our society while also expanding our understanding of the complex events that occur in nature. The works of great men and women who contributed to our accumulated knowledge have almost all have been associated with universities. In only the last century, we can add to our list the
names of Schrodinger, Dirac, Heisenberg, Salk, de Bakey, Einstein, von Karman, von Neumann, and many others.

Today, most of the world’s 6.1 research is done in this country and takes place in over 300 universities. You can not open your eyes and be conscious, without observing a physical entity or a physical event outside the purview of university research. It has had a pervasive impact on all areas central to modern civilization.

If you consider what we know about the performance and design of aircraft, space vehicles, ships, drones, satellites, automobiles, robots, submarines, or about the complex processes that affect our environment, our climate, our weather, or the discovery, extraction and refining of oil and the development of petrochemical products, or the function of our cardiovascular system, the complex cellular mechanisms that lead to cancer and the methods developed to treat it, the origins of our universe, black holes, the expanding universe, the miracle of DNA, the genome, the design of new drugs, the fascinating role of subatomic particles in the basic fabric of the universe, the great advances in nanomanufacturing and oceans of new discoveries that have engulfed us in just a few decades, a heart-beat of human existence – all these have been the focus of university research. But beyond all these things is the education of future generations of productive citizens, equipped with a piece of our accumulated knowledge and, more importantly, with the discipline and means to continue acquiring knowledge throughout their lives. These are the products of university research and teaching. They have had an impact on every aspect of human life and will continue to open vistas never opened before to the human species.
Local Examples of University Research

- Oil Spills
- Nano-fabrication
- Mantle Convection
- Protein Dynamics
- Visualization & Image Processing
- Earthquakes
- Polymerization
- Drug Design
- Subsurface Modeling
- Cardiovascular