




Universities of the World

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The Millennium Project
The University of Michigan






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With Appreciation

To Wikipedia and all of those who share their knowledge and images with all the world.

To Tom and John Knoll, who invented Photoshop, enabling documents such as this to be created.

To Larry Page and Google for giving us the tools we need to access the world's knowledge.

(Tom and Larry were Michigan students.)

Preface

During the past two decades, we have had the opportunity to participate in a remarkable forum, the Glion Colloquium, created by Luc Weber, former Rector of the University of Geneva. This "Davos-like" event brings together university leaders from around the world every two years in Glion-Above-Montreux, Switzerland, to consider the changing responsibilities, challenges, and opportunities facing their institutions. Asked to prepare papers on a major issue for discussion in advance, these higher education leaders meet for several days to discuss how their institutions face these issues, while enjoying the wonderful Swiss hospitality of the Hotel Victoria high above Lake Geneva.

Although begun initially as a dialog between European and American universities, over the past decade these discussions have expanded to include leading universities from around the world. While these institutions demonstrate to some degree the great diversity among cultures and environments around the globe, the Glion Colloquium also has revealed the many similarities characterizing their challenges and opportunities.

The Glion Colloquium has established itself as an influential resource in addressing both the challenges and responsibilities of the world's research universities. During its eleven conferences over 200 leaders of higher education, business, and government have participated in the Glion Colloquium to consider topics such as the rapidly changing nature of research universities, university governance, the interaction between universities and society, collaboration between universities and business, the globalization of higher education, and how universities prepare to address the changes characterizing our times. More recently the topics of the Glion Colloquium have focused in particular on many global challenges requiring both the human and intellectual contributions of universities, e.g., global sustainability as the activities of humankind threaten the fragile balance of our planet; the widening gaps in prosperity, health, and quality of life characterizing developed, developing, and underdeveloped regions; the accelerating pace and impact of new technologies; and the stability of the global economy in the face of questionable business practices, government policies, and public priorities.

For many of these conferences we have had the privilege of working closely with Luc and Marianne Weber to help support the Colloquium, by helping to invite key university leaders from around the world, helping to raise the funds necessary to support its meetings, and working to assist the Webers as hosts for the complex array of events characterizing each Colloquium.

During these years the Glion Colloquium has given us not only an increasingly global perspective of higher education but also an appreciation of both the great diversity and similarities among these world-class universities and their leadership. The Colloquium has also provided us with a sense of just how much of the character and quality of today's American universities are due to the influence over centuries of the great universities of Europe and Asia.

Hence, stimulated by our experiences with colleagues at the Glion Colloquium, we have embarked on a personal effort to understand better how the world's universities have helped shaped the American university of today. But more important is to develop an international perspective of how universities can prepare to face the challenges of higher education tomorrow, working together with their peer institutions throughout the world as demonstrated by the Glion Colloqium.

We have adopted an informal approach to this project, attempting to describe through words and images the evolution of today's university, while concluding with some speculation about the university of tomorrow. Perhaps our motivation can best be explained by a passage from the Glion Declaration of 2009, drafted by Frank Rhodes, President Emeritus of Cornell University, who summarized the views of the many university leaders participating in the Glion Colloquium.

> *The university is one of the greatest inventions of the present millennium: although created more than nine centuries ago, it remains one of the glories of human aspiration and one of the triumphs of the power of imagination. We, as members of its community of learning, challenge it to play a transforming role in society, and thus to transform itself. For 900 years of the present millennium, the university, as a community dedicated to those values has served society well. Its effectiveness in the new millennium will depend on its reaffirmation of those ancient values as it responds creatively to the new challenges and opportunities that confront it. This is the moment for both society and the university to reaffirm the social compact, on which the future of all our peoples will so largely depend, and for their leaders to work together towards the achievement of their common goals.*

Anne and James Duderstadt
Ann Arbor, Michigan
2018

Proceedings of the Glion Colloquium, available online at the Glion website:

http://www.glion.org

Proceedings of the Glion Colloquia:

Hirsch,Werner and Luc Weber, Eds., *Challenges Facing Education at the Millennium* (Oryx Press, Phoenix, 1999)

Hirsch, Werner and Luc Weber, Eds., *Governance in Higher Education* (Economica, Paris, 2001)

Hirsch, Werner and Luc Weber, Eds., *As the Walls of Academic Are Tumbling Down* (Economica, Paris, 2002)

Weber, Luc and James Duderstadt, Eds., *Reinventing the Research University* (London: Economica, 2004)

Weber, Luc and James Duderstadt, Eds., *Universities and Business: Partnering for the Knowledge Economy*, V Glion Colloquium (Paris: Economica: 2006)

Weber, Luc and James Duderstadt, Eds., *The Globalization of Higher Education*, VI Glion Colloquium (Paris: Economica, 2008)

Weber, Luc and James Duderstadt, Eds., *University Research for Innovation*, VII Glion Colloquium (Paris: Economica, 2010)

Weber, Luc and James Duderstadt, Eds., *Global Sustainability and the Role of Universities*, VIII Glion Colloquium (Paris: Economica, 2012)

Weber, Luc and James J. Duderstadt, Eds., *Preparing Universities for an Era of Change*, IX Glion Colloquium (Paris: Economica, 2013)

Weber, Luc and James J. Duderstadt, Eds., *Balancing External Responsibilities with University Priorities and Constraints*, X Glion Colloquium (Paris, Economica, 2015)

The view from the Hotel Victoria

The view from the Hotel Promenade

The Hotel Victoria

Marianne and Luc Weber

Luc and Marianne preparing for the meeting

Preparing for the Glion Colloquium at the Hotel Victoria at Glion-above-Montreux

Luc and Marianne Weber welcoming the guests

The opening lecture

The round-table work sessions

More discussions

Still more discussions

The participants in the Glion Colloquium

The work sessions begin

Luncheons on the Hotel terrace

Luncheon discussions

Evening discussions over dinner

Discussions on the terrace

More discussions

And a final raclette dinner

Where the real work is done...over wonderful Swiss meals.

A visit to École Polytechnique Lausanne

A visit to meet the president of Nestles

An excursion to Castle Chillon

Inside Castle Chillon

A tour of the Large Hadron Collider at CERN

Jim and Homer Neal honor Tappan's home in Vevey

Each Glion Colloquium had tours for the participants

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Chapter 1

Introduction

"About 85 institutions in the Western World established by 1520 still exist in recognizable forms, with similar functions and with unbroken histories, including the Catholic Church, the Parliaments of the Isle of Man, of Iceland, and of Great Britain, several Swiss cantons, and seventy universities. Kings that rule, feudal lords with vassals, and guilds with monopolies are all gone. These seventy universities, however, are still in the same locations with some of the same buildings, with professors and students doing much the same things, and with governance carried on in much the same ways."(Kerr, 2001)

Introduction

This book attempts to tell a story, through words and through images, of the evolution of one of western civilization's most important institutions, the university, with particular attention on how it has evolved in the United States. Although influenced by the intellectual contributions of early civilizations such as the Greeks, Romans, and Islam, the university of today was the creation of medieval Europe, first appearing in the late 12th century in the cities of Bologna and Paris and then evolving throughout Europe in various forms reflecting both local cultures and historical events. The student-driven culture of Bologna propagated throughout southern Europe and appears today in the large urban universities characterizing major European cities. The faculty-driven character of the University of Paris evolved in several forms including the residential colleges of Oxford and Cambridge, the discipline-based faculties of northern European universities, and the research universities appearing in 19th century Germany.

As Europeans colonized and populated America, they brought with them these various forms of the

Master and scholars in the medieval university

university, first as the colonial colleges of the Northeast (e.g., Harvard, William and Mary, Yale), then state universities (e.g., University of North Carolina, University of Georgia, University of Virginia) more similar to those of southern Europe, and finally in the late 19th century adopting elements of the German research universities (e.g., University of Michigan, Cornell, and Johns Hopkins). Yet while the American university–rather universities, since there was great diversity–was clearly influenced by its European antecedents, it merged and reshaped these earlier models while adding features more responsive to the needs of a rapidly growing and expanding democratic nation, e.g. the emphasis on social and intellectual development of young students characterizing the British colleges, the utility of responding to particular social priorities through professional education and public service characterizing southern Europe, and the stress on scholarship and graduate education of the German universities. From this synthesis emerged a

uniquely American form of higher education capable of addressing the needs of a rapidly growing and changing nation. The quality of American universities soared during the mid-20th century with the influx of talented international faculty and students fleeing conflict and persecution from the world wars.

In the late 20th century as universities in the United States began to dominate scholarship in key areas such as science and technology, both Europe and Asia launched major efforts to emulate aspects of American higher education. Through programs such as the Bologna Accord in the European Union, they began to stress strong public support of university research and graduate education, standardizing educational standards and policies to enable the mobility of students and faculty in a highly competitive marketplace for talent, and encouraging greater diversity in institutional missions and character as key elements of European integration. With the increasing importance of advanced education, research, and innovation in a knowledge-driven global economy, both developed and developing nations around the world have invested heavily both in broadening access to higher education ("massification") and creating world-class research universities ("league table rankings"). Of particular note have been the massive investments in Asian universities, particularly in China, India, Japan, Korea, and Singapore.

First, What Is a "University"?

At the outset we should acknowledge that terms such as "college" and "university" are used in widely different ways in higher education. A typical dictionary definition would go something like this: "A *university* is an institution of higher learning providing facilities for teaching and research and authorized to grant academic degrees; one made up of an undergraduate division which confers bachelor's degrees and a graduate division which comprises a graduate school and professional schools each of which may confer master's degrees and doctorates". (Merriam-Webster, 1928)

However the term "university" actually originated during the Middle Ages with the appearance of "unions" of students or faculty members who joined together to form communities of teachers or students. The Latin origin, *universitas*, meant "the totality" or "the whole" and was used by medieval jurists as a general term to designate communities or corporations such as guilds, trades, and brotherhoods. Eventually the term university was restricted to these unions of masters and scholars and given the more formal Latin title: *universitas magistrorum et scholarium* or *universitas scholarium*. Interestingly enough, in the medieval universities of Oxford and Paris only the masters were full-fledged members of the university; in contrast, in the universities of Bologna and Padua, the university consisted only of the students with the teachers simply being hired through annual contracts. (Haskins, 1923)

Similarly, the term "college" was initially used to describe the quarters where students could live and be taught rather than an institution granting degrees. Such facilities later came to describe specific residential centers for learning such as the colleges of Oxford and Cambridge, although in this case the degrees were granted by the university itself, a practice also later adopted in some American universities like Yale and Harvard. Eventually the term "college" was extended to include degree-granting higher education institutions that focused on undergraduate education such as liberal arts colleges or community colleges.

Formal Definitions (Oxford English Dictionary)

university - c.1300, "institution of higher learning," also "body of persons constituting a university," from Anglo-Fr. université, from M.L. universitatem (nom. universitas), in L.L. "corporation, society," from L., "the whole, aggregate," from universus "whole, entire" (see universe). In the academic sense, a shortening of universitas magistrorum et scholarium "community of masters and scholars;" superseded studium as the word for this.

college - c.1378, from O.Fr. collége, from L. collegium "community, society, guild," lit. "association of collegae" (see colleague). First meaning any corporate group, the sense of "academic institution" became principal in 19c. through Oxford and Cambridge, where it had been used since 1379. Collegiate is 1514, from M.L. collegiatus "of or having to do with a college."


John Henry Newman


Charles Eliot


Henry Tappan

Although in Europe there remains a distinction between a residential college (undergraduate education) and a true university (postgraduate and research intensive institutions), there has been a trend in the United States for many colleges to upgrade their names to "university" to enhance their prestige and marketing, even though they are in truth undergraduate institutions with little research activity and few graduate programs. In fact, there are even corporations that have given training programs the university title, e.g., McDonald University ("Hamburger U"). Yet perhaps President Charles Eliot of Harvard put the distinction between the two best in the late 18th century when he stated, "A college is a place to which a young man is sent; a university is a place to which he goes!" (Eliot, 1876)

From time to time, educators have attempted to define university in more intellectual terms. Although historically "university" referred to a union or corporate body of students or faculty, John Henry Newman stressed instead an alternative interpretation of the word: "The university is a place of teaching universal knowledge. This implies that its object is, on the one hand, intellectual, not moral; and on the other, that it is the diffusion and extension of knowledge rather than its advancement. If its object were scientific and philosophical discovery, I do not see why a university would have students; if religious training, I do not see how it can be the seat of literature and science." (Newman, 1911)

Michigan's first president, Henry Tappan, was even more specific in stressing this "universal knowledge" character of the university: "A university is literally a Cyclopedia where are collected books in every description that can aid learned investigation and philosophical experiment, and amply qualified professors to assist the student in his studies, by rules and directions gathered after long experience, and by lectures which treat of every subject with the freshness of thought not yet taking its final repose in authorship presents its discoveries and views in advance of what has yet been given to the world…where in libraries, classrooms, apparatus, and learned professors, provision is made for carrying forward all scientific investigations; where study may be extended without limit, where the mind may be cultivated according of its wants, and where, in the lofty enthusiasm of growing knowledge and ripening scholarship, the bauble of an academic diploma is forgotten…" (Peckham, 1963)

We tend to prefer a simpler synthesis of these definitions of the university:

A university is a community of masters and scholars (or in medieval terms, universitas magistrorum et scholarium), a school of universal learning (Newman, 1911) embracing every branch of knowledge and all possible means for making new investigations and thus advancing knowledge (Tappan, 1851), and offering degree programs across the full spectrum of academic and professional disciplines.

However here we would also acknowledge that this definition would exclude the vast majority of those institutions labeling themselves as "universities" throughout the world today.

Public Images of a University

What are the images that come to mind when hearing the term "university"? Do we imagine academic activities such as students listening attentively to brilliant faculty in the lecture hall or studying in the library? Or perhaps scientists toiling away late in the evenings in the laboratory striving to understand the universe or scholars poring over ancient manuscripts, rediscovering our human heritage? Probably not. (Duderstadt, 2007)

The contemporary American university is many things to many people, but its images are rarely stimulated by its core missions of teaching and scholarship. Some see the university as a campus with ivy-covered buildings linked by tree-lined walkways of students. To others, particularly among the armchair television viewers, a university's image is dominated by its athletic activities, its football or basketball teams, since these probably capture the largest attention by the American public through the commercialization of college sports. Or perhaps they see the university as a site for cultural activities with its concert halls, museums, and libraries.

Some see the university as a place where students can safely grow into adults, tolerant of the occasionally frivolous play that characterizes the process of maturation. But university students can also represent the youthful conscience of a nation, with engagement in many of the critical issues of the day–social justice, global sustainability, world poverty and health.

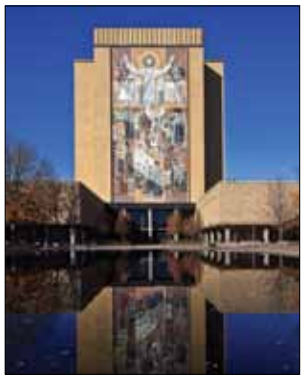
The contemporary university can also be seen through the complex array of services it provides to the public, e.g., the cutting edge research that improves the quality of our lives and drives our economy or its international character attracting students and faculty from throughout the world. Similarly, many members of the public see universities as centers of medical research, teaching, and clinical care of the highest quality.

Culture, Mythology, and Saga

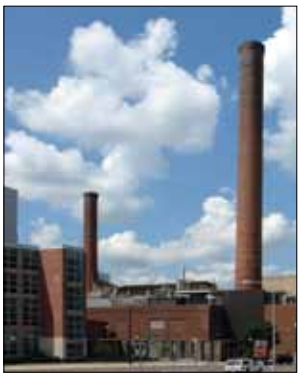
Universities are based on long-standing traditions and continuity, evolving over many generations (in some cases, even centuries) with very particular sets of values, traditions, and practices. Burton R. Clark, a noted sociologist and scholar of higher education, introduced the concept of organizational or institutional "saga" to refer to those long-standing characteristics that determine the distinctiveness of a college or university. (Clark, 1970) Clark's view is that "An organizational legend (or saga), located between ideology and religion, partakes of an appealing logic on one hand and sentiments similar to the spiritual on the other. Universities develop over time such an intentionality about institutional life, a saga, which then results in unifying the institution and shaping its purpose." As Clark notes, "An institutional saga may be found in many forms, through mottoes, traditions, and ethos. It might consist of long-standing practices or unique roles played by an institution, or even in the images held in the minds (and hearts) of students, faculty, and alumni. Sagas can provide a sense of romance and even mystery that turn a cold organization into a beloved social institution, capturing the allegiance of its members and even defining the identity of its communities."

While all colleges and universities have a social purpose, for some these responsibilities and roles have actually shaped their evolution and determined their character. The appearance of a distinct institutional saga involves many elements–visionary leadership, strong faculty and student cultures, unique programs, ideologies, and of course, the time to accumulate the events, achievements, legends, and mythology that characterize long-standing institutions.

For example, the saga of one of America's oldest universities, Yale, was shaped over the centuries by old-boy traditions such as secret societies (e.g., Skull and Bones), literature (from dime novel heroes such as Frank Merriwell and Dink Stover to Buckley's God and Man at Yale), and national leadership (William H. Taft, George H. W. Bush, Bill Clinton, George W. Bush, and, of course, Gerald R. Ford, although the latter was first and foremost a Michigan man). Harvard's saga is perhaps best captured by the response of a former Harvard president, who when asked what it takes



Touchdown Jesus
Notre Dame



The central powerplant
University of Michigan

Mr. Jefferson's "academical village" at Virginia

"Hoo Tow" (Hoover Tower) at Stanford

The statue of John Harvard
(using a student model)

Skull and Bones
Secret Society at Yale

to build a great institution like Harvard, responded simply: "300 years!" Notre Dame draws its saga from the legends of the gridiron, i.e., Knute Rockne, the Four Horsemen, and the subway alumni. Big Ten universities also have their symbols: fraternity and sorority life, campus protests, and gigantic football stadiums.

Again to quote Burton Clark, "The institutional saga is a historically based, somewhat embellished understanding of a unique organization development. Colleges are prone to a remembrance of things past and a symbolism of uniqueness. The more special the history or the more forceful the claim to a place in history, the more intensively cultivated are the ways of sharing memory and symbolizing the institution." (Clark, 1970) A visit to the campuses of one of our distinguished private universities conveys just such an impression of history and tradition. The ancient ivy-covered buildings; the statues, plaques, and monuments attesting to important people and events of the past, all convey a sense that these institutions have evolved slowly over the centuries in careful and methodical ways to achieve their present forms and define their institutional saga.

In contrast, a visit to the campus of one of our great state universities conveys more of a sense of dynamism and impermanence. Most of the buildings look new, even hastily constructed to accommodate rapid growth. The icons of the public university tend to be their football stadiums or the smokestacks of their central power plants rather than their ivy covered buildings or monuments. A visit to the campus of these universities conveys little sense that the history of these institutions is recognized or valued. The consequence is that the public university evolves through geological layers, each generation paving over or obliterating the artifacts and achievements of its predecessors with a new layer of structures, programs, and practices.

Clark Kerr used to marvel at the cohesion of universities such as Harvard, Stanford, Cornell, Yale, MIT, Brown, Berkeley, and Michigan and wondered what the secrets to social alchemy are that give them each their special character. (Kerr, 1963) Burton Clark would contend it was their unique "institutional saga". Hence our challenge is to understand the saga that led to the development both of the western university and its forms in the United States and around the world.

The Layout of the Book

Yet to understand the true character of the university, particular as a social institution, one must adopt a broader historical perspective. For example, while campus architecture is an important element in creating an atmosphere for learning, it is interesting to note that early universities such as those in Bologna and Paris had no buildings for centuries; rather their faculty and students rented rooms for lectures and held examinations and meetings in churches and convents. Indeed, even the magnificent architecture of the colleges of Oxford and Cambridge date from the Tudor years, centuries after these institutions were founded.

The university as we know it today is defined more by fundamental traditions and characteristics dating back to medieval times than to public perceptions such as ivy covered buildings, tree-lined campus walks, libraries and laboratories, or (thank heavens) looming football stadiums. A university is most fundamentally a learning community, where students and faculty–scholars and masters–come together in a common and shared life of learning. These institutions continue to embrace a curriculum of study, organized into subjects and tested through examination, leading to degrees quite similar to those of ancient times–baccalaureate, master, doctorate. The faculties continue to be organized by discipline, albeit including beyond the elements of the medieval university (theology, law, medicine, and the arts) to embrace an ever expanding array of new academic and professional subjects. The fundamental mission of the university also remains much as it was in earlier times: to train the next generation of scholars while maintaining and extending the traditions of learning and scholarship.

The structure of this book will initially follow a chronological pattern, tracing the development of the university first in Europe and then propagating to North America, where the further evolution of an American model of the university has stimulated a flow of influence both back to Europe and to the rest of the world. As our world becomes more tightly integrated through modern transportation and communications, this interaction among universities throughout the world has become extremely important in sharing not only our intellectual and cultural traditions but

increasingly in sustaining our economic and security objectives in a knowledge-driven global society.

After this consideration of yesterday, the book turns its attention to the university of today by comparing a large number of universities both in the United States and throughout the world. Here an effort is made to use both images and stories to suggest possible institutional saga for many of these institutions in the sense of Burton Clark. There is also an effort to develop a taxonomy of contemporary universities from various perspectives, including forms (e.g., Oxbridge college systems, multiversities, university systems, urban universities, academic villages, technical institutes, and newly emerging forms) as well as characteristics such as campus architecture and communities, students, faculty, pedagogy, governance, and even some speculation about the role of campus myths and sagas.

The book concludes with some conjectures about the university of tomorrow, both through extrapolating several of the challenges of today and suggesting possible evolutionary paths for the future

The primary goal of the university: graduates!

Chapter 2

In the Beginning

"In the history of the human race, the medieval university stands out as one of the great political institutions of all time. It drew Western Europe out of the Dark Ages and into the light. It invented cosmopolitan structures and norms that are still with us today." (Susan Lohmann, 2002)

The Antecedents: Greece, Rome, and Islam (< 1000 AD)

The antecedents to the university can be found over two millennia ago in the sophisticated learning cultures of the Greeks and the Romans. Plato (428 BC) founded one of the earliest schools, teaching disciplines in rhetoric and philosophy in the Grove of Academus. But more structured learning characterizing the university began with Aristotle (384 BC), who created a comprehensive system of philosophy on his Lyceum, encompassing morality, aesthetics, logic, science, politics, and metaphysics that would shape the scholarship and learning of the medieval university. Greek learning and philosophy would not only influence Roman civilization 500 years later, but it would shape much of theological philosophy characterizing Islamic, Jewish, and Christian traditions in the Middle Ages. Yet, while providing the foundation for learning and scholarship, Greek and Roman scholars did not establish permanent institutions of learning with the mission of bringing together faculty and students for advanced learning.

Early learning cultures also began in Asia with the teachings of the Chinese philosopher Confucius (551 BC), which stimulated learning and philosophy in the middle ages. India also created strong educational traditions, such as Nalanda (700 AD), whose ruins can be found today. But again these were not permanent institutions of higher learning.

If we define a university as a formal organization

Plato and Aristotle (by Raphael)

of students and faculty (scholars and masters) with authority to certify student learning through recognition such as awarding degrees, then the first earliest institutions resembling universities can be found in the Islamic world, associated with the great mosques that maintained and expanded much of the Greek and Roman achievements in scholarship. Between 1100 AD and 1200 AD there came a great influx of new knowledge into western Europe, partly through Italy, but chiefly through the Arab scholars of Spain– the works of Aristotle, Euclid, Ptolemy, and the Greek physicians, mathematics, and legal philosophy had lain dormant through the Dark Ages. (Haskins, 1957)

Of particular note in this regard were Al Karaouine founded in 859 AD in Fez, Morocco and Al-Azhar founded in Cairo, Egypt in 975 AD. Although these were centers of advanced learning in fields such as Islamic law, Arabic language, mathematics, and astronomy, they were still not of the form we would recognize today as universities. Yet such Islamic centers of learning were instrumental in bringing the Dark Ages

Plato's Academy

Roman children were sent to a house of a tutor.

Nalanda Monastery in India (700)

The Al-Karaouine Mosque in Fez, Morocco (859)

The Al Azha Mosque in Cairo (975)

The role of Islam in science and mathematics

The early evolution of learning

to an end as Arab scholars reintroduced in 12th century Europe the work of Greek and Roman philosophers and teachers. Advanced learning appeared in Islamic centers from Damascus to Córdoba, as students sought learning from the most famous teachers. Indeed, Islamic teachers would acknowledge student learning achievement with certificates analogous to today's diplomas, a practice that would later be adopted by medieval universities.

The First Universities (1100 – 1200)

Most historians view the earliest true universities as emerging in the early 13th century in Bologna and Paris. The Universities of Bologna and Paris are generally regarded as the *alma mater,* the "mother of studies", of today's universities throughout the world. While the appearance of each institution as a true *universitas magistrorum et scholarium*, a community of masters and scholars, was stimulated by the re-introduction into Europe of the earlier achievements of Greek and Roman civilization by Arabic scholars, they followed somewhat different paths. (Verger, in Reugg, 1992)

As Verger has noted, there has always been a bit of a controversy about the actual founding date of these first two institutions:

> If one regards the existence of a corporate body as the sole criterion, then Bologna is the oldest. In 1988 the University of Bologna celebrated its 900th anniversary. However there is little evidence for a 1088 founding date for Bologna. If one regards the association of teachers and students of various disciplines into a single corporate body, then Paris would be first in 1208. In Bologna between 1226 and 1234 a founding document was forged that asserted it was established in 423. Paris thought that it had been founded by Charlemagne. All of these were fictions. (Jacques Verger, 1992)

It is interesting to note in both Bologna and Paris, it was a famous teacher that drew students to these young institutions. In Bologna, it was Irnerius, who taught how the principles of Roman law could be applied to the developing communities of medieval Europe. In Paris, it was the theologian, Peter Abelard, who applied philosophy to examine theological controversies such as the transubstantiation of bread and wine into the body and blood of Christ in communion. (Lohman, 2002)

The University of Bologna

As hundreds of students gathered in Bologna to study law from famous teachers, they soon felt the need to unite for mutual protection and assistance. This "union" of students was similar to the medieval guilds already common in Italian cities. In fact, the word "university" was originally applied to any such group or corporation, whether carpenters or masons, and only later would be limited to guilds of masters and students, e.g., *universitas scholarium*. (Verger, 1992)

Although the student "university" was organized initially as a means of protection against the townspeople, it rapidly provided the students with additional powers. In fact, the teachers or masters were required to swear an oath of loyalty to the student unions, which assumed total control of the organization of studies. The students appointed the professors and assessed the adequacy of their performance through the threat of fines. They could also threaten their teachers with a collective boycott since the faculty lived primarily on the fees paid by their students. Since the student "university" had no buildings of its own, the students were free to move their activities elsewhere. If mistreated, the students could threaten the townspeople with the financial trauma of succession. The students would select a member of their community to be the head of the institution with the title of *rector*, a common practice among medieval universities in southern Europe.

Teaching and other academic matters were governed not by the students or their rector but by the faculties' collective, the c*ollegia doctorum*. The threats posed by such student governance stimulated the faculty to form their own guilds, setting qualifications for admission to counter the power of the students. The faculty went further and controlled the certification of student attainment by issuing a license, the *licentia docendi*, as the earliest form of an academic degree.

The courses of study and degrees were designed to prepare students as university teachers. The bachelor's


Students were attracted to learn from great scholars such as Irnerius of Bologna and Abelard of Paris.

degree certified nothing beyond the capacity to serve as an apprentice in the art of teaching. The master's (magister) and doctor's degree testified to the capacity and formal right to deliver academic lectures in the liberal arts and eventually to teach in the professions such as medicine and law. Although the University of Bologna was preeminently a school of law, it would eventually offer study in other areas such as medicine and theology (although the medieval university did not develop faculties in other professions such as the mechanic arts because these were controlled by guilds). (Clark, 2006)

One can find in Bologna many of the characteristics of today's universities in academic subjects and organization. Yet the early medieval university existed only as a social and intellectual institution without its own buildings or campus in which space was rented for teaching, similar to most other medieval universities, for the first several centuries of its history. The University of Bologna model as a student-driven institution propagated rapidly throughout Italy, Spain, and southern France, giving these institutions a strong character of student influence that remains even today in higher education in southern Europe.

The University of Paris

A second European university soon emerged in Paris in roughly 1200, once again as a "union" based upon the medieval guild and formed about a great teacher, Peter Abelard, and a discipline, theology. However, in this case it was the faculty rather than the students who united to seek protection and freedom from the control by the church on their activities in the cathedral school of Notre Dame. (Jacques Verger, in Ruegg, European U History I) By 1231 the faculty "university" was able to obtain a papal privilege, the *bull Parens scientiarum*, "issued after a two years cessation of lectures growing out of a riot in which a band of students, having found wine that was good and sweet to drink, beat up the tavern keep and his friends until they in turn suffered". (Haskins, 1957)

We have noted that the Latin term, *universitas,* was first used to refer to professional based communities such as guilds, trades, or corporations. To distinguish its use to refer to learning institutions, one added terms identifying its participants, e.g., scholars or masters, as in *universitas scholarium* or *universitas magistrorum et scholarium*. If the institution was given status by an authority such as a pope or emperor that provided rights for its participants, then the term *studium generale* was also used. This formal recognition was later sought and obtained from the Holy Roman Emperor by the University of Bologna and other early medieval universities. (Clark, 2006)

The University of Paris pioneered yet another important feature of the university, the "college". Although its early activities were conducted near Notre Dame on the Île de la Cité, it eventually expanded across to the Left Bank (thereby giving the region the name "Latin Quarter" because of the use of the Latin language in all instruction conducted by medieval universities). The quarters provided for student living and learning acquired their own identity as they absorbed much of the activity of the university and were referred to as *colleges*. In fact it was one such college, the College de Sorbonne, named after Robert of Sorbon, a chaplain of Louis IX in the 13th century, which would eventually be identified with the University of Paris itself. Over time these colleges became a characteristic of teaching throughout northern Europe, first in Paris and later in a more highly developed form in the colleges of Oxford and Cambridge, e.g. the Sorbonne (1257) and Harcourt (1280) in Paris; Merton (1263), Balliol (1261), and University College (1280) at Oxford; and Peterhouse (1284) in Cambridge.

The term "faculty" was initially used to refer to a

discipline or field, but soon became the term for a group of teachers in a specific field such as law, medicine, or theology, commonly used today. (Verger, 1992)

Oxford and Cambridge

The third oldest university was Oxford, which actually existed as a teaching community as early as the 11th century, but grew rapidly when Henry II of France expelled all English students from the University of Paris in 1167. Unlike the University of Paris and Bologna where students lived in religious houses or rented quarters, in Oxford private benefactors established "colleges" consisting of housing along with rules for student life, the first being Merton College, named after the Bishop of Rochester. (Haskins, 1957)

After the arrest and execution of a few students in the early 13th century, upon orders of the mayor and the king, a group of masters and students fled Oxford to establish themselves as a new university in Cambridge, usually dated at 1209. Again a college system evolved similar to that at Oxford.

The college systems of Oxford and Cambridge, assumed responsibility for most teaching (within the tutorial system) as well as social life. The early Oxbridge colleges such as Balliol, Merton, and Peterhouse soon acquired not only independent endowments but the authority for academic activities through their tutors, fellows, and masters. They organized their own endowment, elected their own heads, and were governed by their own fellows through charters and statutes. It was only in the 20th century that the Oxbridge universities themselves would assume major responsibility for graduate education and research, while the colleges continued to focus on undergraduate education. (Clark, 2006)

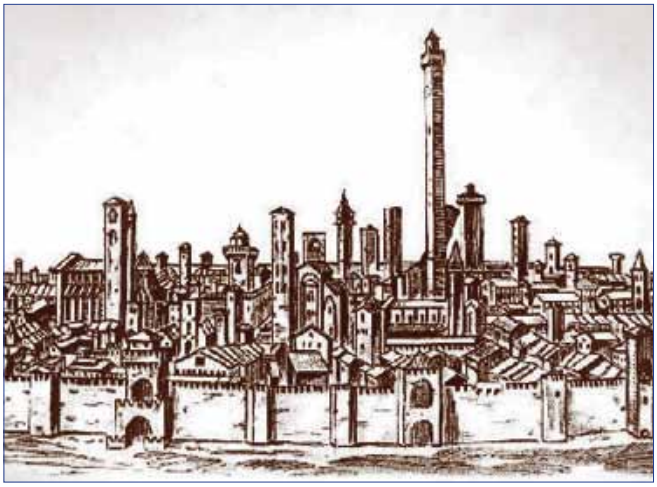
The Medieval University (1200 – 1400)

The medieval universities based both their scholarship and teaching on Greek philosophy, grounded in subjects such as elementary grammar, literature, music, and arithmetic. These were regarded as the "liberal arts" in the sense that they prepared free men for roles in law and public life, in contrast to the "servile" arts of the trades. The preparatory arts of grammar, rhetoric, and logic, were known as the *trivium*, and the more quantitative subjects of arithmetic, geometry, music, and astronomy were known as the *quadrivium*. It is interesting that medieval medicine was classified as mechanical science and therefore regarded as a servile art, as were other activities that based their training and practice on guilds or corporate bodies. (Leff, in Reugg, 1992)

The pedagogy of the medieval university was based on *scholasticism*, a method of learning taught by academics (scholastics) of medieval universities that involved articulating and defending orthodoxy, particularly in religious thought, rather than extending knowledge. Scholasticism placed a strong emphasis on dialectical reasoning through a process known as a *disputation*, a topic was first introduced as a question to the student, who then responded with a counterproposal to engage in an argument. As Clark explains:

> "Images of early universities show the lecturer in a cathedra, a chair (hence the name for a professorial chair). He lectures from a book to several adult students. The practice of the medieval lecture was to read aloud. The book was not a printed one, since the printing press had not been invented yet. On the whole, medieval training focused on memory, remaining mostly oral with no writing. The lecture, like the sermon, had a liturgical cast and aura. One must be authorized to perform the right and do it in an authorized manner.
>
> The disputation was an oral event. It aimed not at the production of new knowledge but rather at the rehearsal of established doctrines. What was produced, oral argument, was consumed on the premises. The disputation did not accumulate and circulate truth. It rather disaccumulated or dismantled possible or imagined error." (Clark, 2006)

University studies in the medieval university took six years for a bachelor's degree and up to twelve additional years for a master's degree and doctorate. The first six years were organized by the faculty of arts, where the seven liberal arts (the *trivium* and *quadrivium*) were taught: arithmetic, geometry, astronomy, music

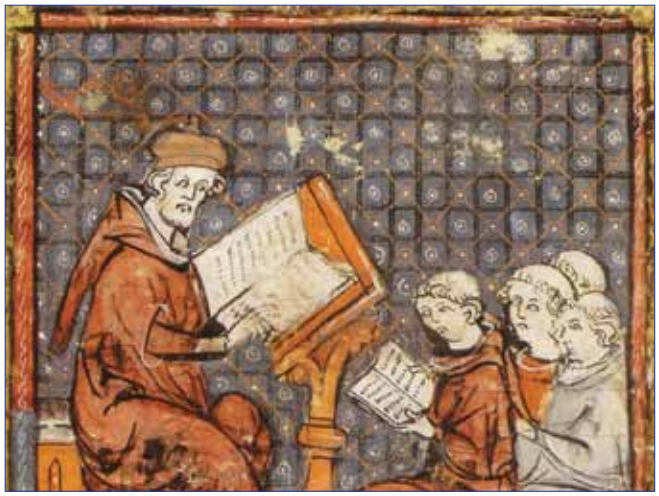


Medieval Bologna

The University of Paris in medieval times

Oxford University

Cambridge University



Master and scholars

The disputation

The medieval classroom

The academic dress of the faculty

theory, grammar, logic, and rhetoric. The primary emphasis was on memorization, logic, and debate structured according to the rules passed down from Greek learning, e.g., Aristotle.

Once a bachelor of arts degree had been conferred, the student could leave the university or pursue further studies, in one of the three other faculties – law, medicine, or theology – in which to pursue the master's degree and doctorate degree. Theology was the most prestigious area of study and also the most difficult. The attainment of the master of arts degree enabled scholars to lecture on all books used in bachelor of arts, while the doctorate was designed for the professions of theology, medicine, and law.

Since all medieval universities not only taught in Latin, but furthermore accepted the same degree structure, it was quite easy for students to freely choose their discipline and teaching without concern to nationality. The study of many students acquired a nomadic character, moving from place to place, university to university, teacher to teacher, until completing their studies. Students from similar origins and languages would frequently live and study together in associations called *nations*. This migratory character, enabled by instruction in a common language, Latin, and similar degree requirements would last until the 17th Century when more differentiation among universities would appear. (De Ridder-Symoens, in Reugg, 1992)

Universities began to proliferate throughout Europe as groups of faculty or students left their original universities seeking new teachers or learning disciplines. Bologna served as the model for the development of the medieval university in Italy, Spain, Portugal, and the rest of southern Europe. North of the Alps, the University of Paris proved most influential. Within a short time similar universities were established in Toulouse (1220) and Montpellier (1229). By 1500 France had 16 provincial universities, and the German lands had 17 universities). In contrast, England remained with only two universities, Oxford and Cambridge, but between them, they had 22 colleges. With the sole exception of Oxford and Cambridge, all of the European universities were situated in medieval cities. (Clark, 2006)

The Renaissance and Humanism

> *"In Italy the night that intervened between the intellectual daylight of antiquity and the dawn of the Renaissance was but one of those luminous nights in which the last light of the evening persisted until the first rays of the morning sun." (Haskins, 1957)*

While the medieval university provided the model for higher education first in Europe, then in North America, and eventually throughout the world, it was largely a bystander to the great intellectual movements of the 15th and 16th century: the Renaissance and the Reformation. (Lohmann, 2002) The medieval universities held fast to the traditions of scholasticism, both in philosophy and pedagogy, even as the intellectual movement of the Renaissance placed importance on *humanism*, the study of human nature and worldly topics rather than religious ones. Renaissance humanists believed that the liberal arts (art, music, grammar, rhetoric, oratory, history, poetry, using classical texts, and the studies of all of the above) should be practiced by all levels of "richness". They stressed the importance of self, human worth and individual dignity rather than religious dogma. (Verger, 1992)

Emerging from 14th century Florence, the humanist movement was stimulated by the discovery by scholars of many ancient texts in their original Latin and Greek. It represented a sharp departure from the scholasticism of the Middle Ages, and resulted in an age in which poetry and oratory, painting and sculpture, architecture and music became popular. As the printing press replaced medieval manuscripts with printed books, humanism moved from being an Italian phenomenon into being a European movement. Scholasticism, the Inquisition, superstition, and feudal society were decisively changed through the revolutions of the 17th and 18th centuries. (Haskins, 1957)

Ironically, however the creation of new knowledge was not an activity of medieval universities but instead evolved elsewhere. The great revival of science during the Renaissance largely bypassed the universities.

Disruptive technology: the printing press

Symbols of the Reformation

Reformation

As scholasticism began to weaken in the face of the humanist movement, the Church itself began to face the challenge of reform, urged by scholars such as Erasmus and later Martin Luther. Ironically, the Reformation of Luther first threatened the university, since Luther himself felt obliged to view the universities as dangerous agents of the papacy.

Yet, despite the appearance of the Reformation in England, Oxford and Cambridge preserved most of their medieval corporate autonomy and practices, with a classical curriculum. In contrast, the Reformation brought reform in Northern Europe where the new universities had a professoriate from the outset, with professors teaching the ordinary lectures, and masters and doctors without a chair needing the permission of the academic senate to lecture. Unlike the medieval Oxbridge system, professors ran the university.

The Reformation also brought major changes in student activities. Instead of obliged to attend all university lectures, the early Protestant student only had to pass the relevant examinations. The bachelor of arts disappeared in Protestant Germanies by the 17th century as the curriculum was taken over by the gymnasium, a new humanistic secondary school that supplanted the BA curriculum and would prepare students for the Abitur, the university entrance examination.

Although the medieval university had been focused on preparing men for the professions, including the clergy, in Protestant Europe, there was a belief that an education similar to that of the Greeks or Romans became desirable for these new secular graduates. Thus the humanities were added to the study of theology. As Sheldon Rothblatt notes, with this change the liberal educational canon was established. (Rothblatt, 1993) Later, the sciences were added to the humanities, although many universities were slow to change, expanding the curriculum to include humanities and sciences, and moving from Latin to the vernacular, only after these transformations had occurred elsewhere.

However there was little interaction between science and technology in the universities, since the technical world was largely controlled by guilds. The failure of the quadrivium to respond to the challenge from technology also reflected a failure of the prevailing theory of the liberal arts that were thought as a series of specific disciplines and not general areas of knowledge. Yet the interest in science in the world beyond the university, forced many faculty (e.g., Copernicus, Kepler, Galileo) to conduct their studies elsewhere. Only later would faculties in the sciences be created in European universities. (Lohmann, 2003)

On the Brink

The transformation of the medieval universities with the Renaissance and Reformation would eventually result in the modern university, with its focus on scholarship and academic programs to prepare students for the professions. Further transformation would be driven by new intellectual movements such as the Enlightenment, revolution, and modernism. So too, the discovery of the New World not only provided new opportunities for establishing universities for the resulting European colonies, but also prompted additions to the European university curriculum and new intellectual movements such as the Age of Discovery, the Age of Reason, and the Age of Revolution. This, in turn, would drive further transformation of the university into paradigms more familiar to higher education today. But before venturing into a new century in Europe, we must first understand the early impact of medieval, Renaissance, and Reformation Europe on higher education in the New World.

Two quotes emphasize the importance of the appearance of the medieval university in Europe:

"The university is a European institution; indeed, it is the European institution par excellence. As a community of teachers and taught, accorded certain rights, such as administration autonomy, curricula, and scholarship and the awarding of publicly recognized degrees, it is a creation of medieval Europe. Furthermore it is the only European institution that has preserved its fundamental patterns and its basic social role and functions over the course of history.

No other European institution has spread over the entire world in the way in which the traditional form of the European university has done. The degrees awarded by European universities, the bachelor's degree, the licentitate, the master's degree, and the doctorate, have been adopted in most diverse societies throughout the world." (Ruegg, 1992)

"In the history of the human race, the medieval university stands out as one of the great political institutions of all time. It drew Western Europe out of the Dark Ages and into the light. It invented cosmopolitan structures and norms that are still with us today." (Susan Lohmann, 2002)

The propagation of the medieval university throughout Europe by 1650.

Chapter 3

The New World

"Imported with so much of everything else from England, the collegiate way in America was from the beginning the effort to follow in the New World the pattern of life, which had developed at the English colleges. The collegiate way is the notion that a curriculum, a library, a faculty, and students are not enough to make a college. It is an adherence to the residential scheme of things. It is respectful of quiet rural settings, dependent on dormitories, committed to dining halls, permeated by paternalism." (Rudolph, 1960)

The Colonial Colleges (1650 – 1800)

The earliest American colleges were founded by the British colonists, who brought with them their experience from Oxford and Cambridge. In fact the first American college was Harvard, founded in 1643 by a large contingent of Cambridge men in Puritan Massachusetts, which also named its village after their former university. Over the next century each of the American colonies would found similar institutions to provide educated men for both the clergy and leadership roles in their governments: William and Mary in the Virginia colony in 1693, the Collegiate School (Yale) in Connecticut in 1701, the Academy of Philadelphia (Penn) in 1740, the College of New Jersey (Princeton) in 1746, Kings College (Columbia) in New York in 1754, the College of Rhode Island (Brown) in 1764, Queens College (Rutgers) in New Jersey in 1764, and Dartmouth College in New Hampshire in 1769.

While each of the colonial colleges was influenced by the English university, they also developed unique features arising both from the religious denomination of their founders as well as the particular circumstances of their colonial birthplace. For example, the founders of Harvard departed from the faculty governance of Oxbridge to create their institution instead as an independent, self-perpetuating corporation governed by a lay board of overseers rather than a small group of faculty fellows, a principle of lay governance that would become an important feature of all of American higher education. Yale (the Collegiate School) was initially a wandering institution, moving from town to town in Connecticut to conduct teaching in the homes of local ministers before finally settling in a permanent location in New Haven.

Actually, one might also question whether Harvard was the first college founded in America. In 1618 the a university in the Virginia colony was chartered and the Virginia Company of London gave orders for the construction of the "College of Henricopolis" and endowed it with 10,000 acres of land. However an Indian uprising left 347 colonists dead and the colony of Henrico was annihilated. When the charter of the Virginia Company was revoked in 1624, Virginia became a royal colony and plans for the College were abandoned. At times the College of William and Mary has claimed itself to be the nation's first college "in its antecedents" and technically this is true--W&M's charter or foundational concept was laid decades before Harvard's founding. (Thelin, 2004)

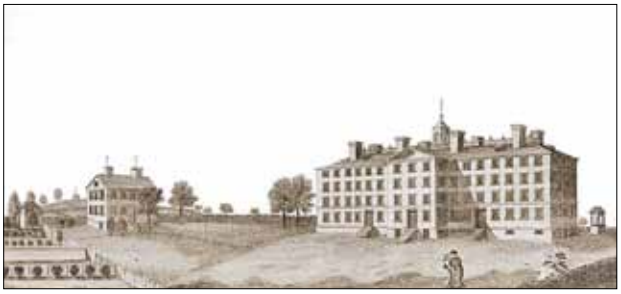
There are several amusing aspects of the colonial colleges. First their names frequently had interesting origins. For example, John Harvard was a Puritan minister in Massachusetts who left part of his estate and 400 books to name the new college in Cambridge. Yale is a bit more interesting, since when it was founded in 1701, first as the "Collegiate School", it attempted to capture the wealth of Elihu Yale, a Boston-born director of the East India Company by naming its first building after him. However in the confusion of thanking him for his modest gift of a box of books and a portrait of King George I, it was suggested that they had instead

The Colonial Colleges

Rutgers - Queen's College, 1766

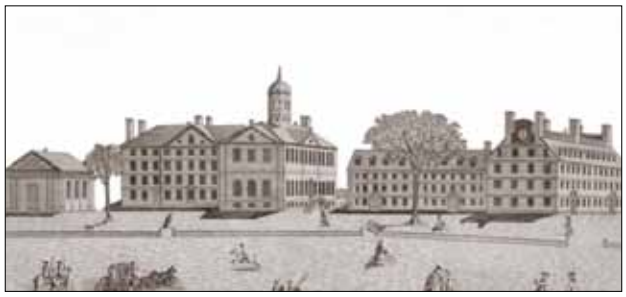
William and Mary, 1693

Princeton - College of New Jersey, 1746



Brown - College of Rhode Island, 1764

Yale - Collegiate School, 1701



Harvard - New College, 1638

Dartmouth, 1769

Pennsylvania - College of Philadelphia, 1740

Columbia - Kings College, 1754

named the college itself, much to their later regret when he refused to give them any more gifts. (Kelley, 1974)

The naming of several other colonial colleges for quite modest contributions began a practice that unfortunately continues to today's fund-raising experiences. Attaching the names of donors to major university buildings, programs, or even the institutions themselves rarely is deserved by the relatively modest magnitude of their gifts. (Little wonder that university fund-raisers refer to this practice as "the edifice complex"!)

In educational practices, the colonial colleges borrowed heavily from their English roots. Although the humanism of the Renaissance was the spirit behind the Reformation ideal of the learned clergyman, the curriculum continued to be based heavily on the content of scholasticism and the pedagogy of Oxbridge, stressing the Greek and Latin, logic, rhetoric, and moral philosophy and taught by young scholars serving as tutors rather than professors. Books were a rarity so that lecture, memorization, and recitation drills tended to dominate the classroom. Despite the emergence of the spirit of the Enlightenment–the Age of Reason–in pre-Revolutionary America and its influence on leaders such as Jefferson, Franklin, and Paine, the colonial colleges remained very much moored to scholasticism and medieval learning until the early 19th century when a new wave of institutions began to appear in the young nation in the early state universities of North Carolina, Virginia, and Michigan. In fact, the charters of the colonial colleges make little mention of faculty (masters or professors), and a full-time academic profession did not appear in North America until the latter half of the 18th century. (Rudolph, 1962)

In other respects, however, there were some important early departures from Oxbridge traditions. For example, the Oxford and Cambridge colleges functioned less as academic institutions and more as boarding schools for socializing young men from the aristocracy, with the primarily goal of "transforming savages into gentlemen", the words of one educator. Yet in the American colonies the students came more from the mercantile class rather than the cavaliers and rakes of Oxbridge, and there was a greater commitment to stress not only the classics but to provide the mental discipline necessary for leadership in church and state. Since there was little public provision for elementary education in the American colonies, they enrolled quite young students (typically 16 years of age) whose early education rested largely with the parents (an early example of home schooling). (Rudolph, 1962)

The colonial colleges also broke important new ground in establishing new principles of governance and legal structures. Distrusting the autonomy of Oxbridge fellows, they adopted instead the Scottish tradition by chartering the colleges as corporations, governed by external boards of lay citizens, which, in turn, vested considerable authority in an appointed president of the college–a radical departure from European universities, which tended to be governed by faculty bodies (England), the crown (Spain), or the state (France, Germany). Although independent with strong religious affiliations, America's early colleges were established and initially supported by colonial governance and hence were as linked as strongly to the state as to the church, particularly after the Great Awakening of religious fervor of the late 18th century made strict denominational control of college life more difficult to sustain. Although today these institutions, now comprising the Ivy League of universities, vigorously proclaim their "private" character, their heritage was very much as "public" institutions, obliged to abide by laws that recognized their responsibility to colonial society, and receiving a significant fraction of their support from public sources. (Rudolph, 1962)

Although the great medieval universities in Europe were in urban environments–e.g., Bologna, Paris, Madrid, Vienna–the colleges of Oxford and Cambridge were in quiet rural settings, self-contained with dormitories, dining halls, faculty residences, and libraries. Hence the American colonial colleges largely followed this pattern, in rural villages such as Cambridge, Williamsburg, New Haven, and Princeton. Of course the concentration of a spirited group of young students, far removed from not only their families but adult communities, could lead to the annoyance of occasional misbehavior, but this too was regarded as part of the process of young boys (remember, they were enrolled at age 16) growing up in such a boarding school environment. Hence the colonial colleges were characterized by dormitories, dining halls, a rural setting, and strong *in loco parentis*. (Thelin, 2004)

The Early State Universities (1780 – 1850)

Following the Revolutionary War, the governments of the new states began to form universities, first in the south where the colonial colleges had not yet appeared, e.g., the University of Georgia in 1785, the University of North Carolina in 1789, and the University of South Carolina in 1793. (Here it should be noted that although Georgia's university was founded first, it did not enroll any students until 1801; hence North Carolina usually claims the title of the first "state" university.) By 1800 there were 25 colleges in America, doubling to 52 in 1820 and then doubling and doubling yet again to 241 by 1860. An unusual feature of this rapid expansion was the very limited role of the federal government in the establishment of higher education, in contrast with the experience in Europe. Instead both religious organizations and the states themselves played the leading role in establishing the new institutions, albeit at times with incentives provided by the federal government. In fact the only two "national" institutions were those for military education: West Point in 1802 and Annapolis in 1845. (Rudolph, 1962)

During the early half of the 19th century, the religious revival movement known as the Great Awakening was manifested in the efforts of religious denominations to establish hundreds of small religious colleges across the Midwestern United States. Although many of these efforts failed, some of these religious colleges succeeded, eventually shedding their sectarian origin to become prominent independent colleges such as Oberlin, Denison, Wooster, Kenyon, Ohio Wesleyan, and Miami–the latter two being appropriately located in the villages of Athens and Oxford!

There was also a surge in the number of state colleges, stimulated in part by federal actions. Key was a sequence of land-grant acts enacted by Congress in which the income from the sales of federal land was dedicated to the founding and support of new colleges as the population of the new nation began to move westward. Although the land-grant movement is generally associated with the Morrill Act of 1863, in fact one of the most consequential efforts was the Northwest Ordinance, which established the policies by which the western territories could attain statehood. This was patterned after the Land Ordinance developed by Jefferson, and passed by Congress in 1787 when the Ohio River valley was being settled. When any part of the territory had acquired 60,000 free inhabitants, it could become a state (with Congressional approval). But even more critical were the provisions of civil rights and liberties, religious freedom, and education, especially personal freedom. It decreed: "there shall be neither slavery nor involuntary servitude in the said territory." But equally significant for our purposes was the Northwest Ordinance's statement of the importance of education in the new states: "Religion, morality, and knowledge being necessary to good government and the happiness of mankind, schools and the means of education shall forever be encouraged." To this end, the Ordinance utilized the sale of township lands to finance the creation of schools in the new territories. The University of Michigan was chartered in 1817 in the Michigan territory and provided with federal land-grant in 1817. In the Ohio territory Miami University was chartered in 1811 and Ohio University in 1818. (Peckham, 1963)

Perhaps the best known of these early state institutions was the University of Virginia, founded–indeed, designed and shaped–by Thomas Jefferson. "Mr. Jefferson's University" was chartered in 1819 and opened in 1825 with 8 faculty members. Forty years later it was second only to Harvard in size. Jefferson's "academical village", his magnificent plan for the academic mall at the core of the University of Virginia, in which students would live side-by-side with faculty, surrounded by Greek columns and crowned by the rotunda of the college's library, was striking in architecture and lasting in its distinction. The University of Virginia was distinctive in two other ways: it had no religious affiliation, and it required no religious asset of its students. It also broke from the classical curriculum. But the University provided no model for other institutions, because of Jefferson's belief that students could take any classes they wished, and his opposition to degrees—indeed Virginia granted no degrees until 1868. (Rudolph, 1962)

Yet, even as the state college began to emerge as the true paradigm of public higher education, the colonial colleges were able to free themselves from public control, establishing themselves as independent institutions. Key here was the 1819 landmark Dartmouth

Ohio University

University of Georgia

University of North Carolina

University of Virginia

University of South Carolina

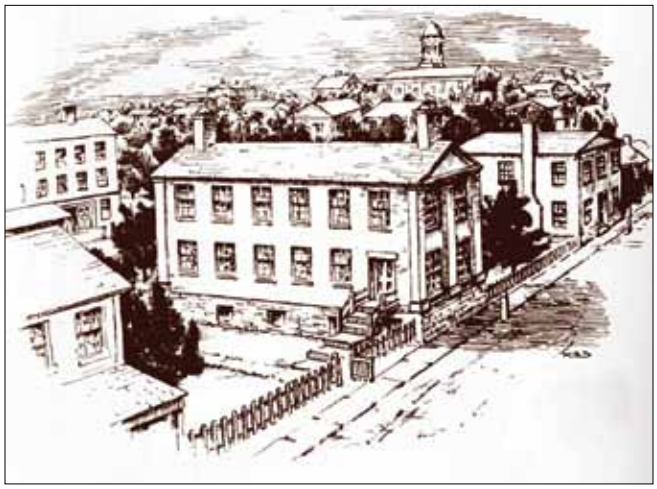
The Early State Public Universities

The words of the Northwest Ordinance
in the auditorium of old University Hall

College decision by the Supreme Court ruling that the institution was not a civil or public institution nor was its property public; rather it was a private institution, albeit with an object to benefit the public. This ruling provided the key distinction between public and private institutions.

A Case Study: The University of Michigan

One of the most interesting–and perhaps most important–of the institutions founded early in the 19th century was the University of Michigan, which not only would become a trailblazer in shaping the development of the American university throughout the 19th and 20th century, but would provide many of those academic visionaries who would lead this effort both at Michigan and at other universities across the nation. It can be argued that it was in the Midwest, in towns such as Ann Arbor and Madison, that the early paradigm for the true university in America first evolved, a paradigm capable of responding to the needs of a rapidly changing nation in the 19th Century and that still dominates higher education today. In many ways, the University of Michigan has been throughout its history a flagship of public higher education in America. Although the University of Michigan was not the first of the state universities, it was the first to be entirely free of sectarian control, created as a true public institution, and responsive to the people of its state. It also traces its early heritage to two quite different models of higher education in 18th century Europe.



The original building of the Catholepistemiad
or University of Michigania in Detroit, 1817

The University of Michigan (or more accurately, "the Catholepistemiad or University of Michigania", a rather odd name coined by one of its early founders) was established in 1817 in the village of Detroit, two decades before Michigan achieved statehood, by an act of the Northwest Territorial government and financed through the sale of federal lands granted by the United States Congress. Actually, the first incarnation of the University of Michigan (aka "Catholepistemiad") was not a university but rather a centralized system of primary and secondary schools, borrowing a model from the Imperial University of France founded by Napoleon a decade earlier. It was only after the State of Michigan entered the Union in 1837 that a new plan was adopted to shift the university beyond secondary education, establishing it as a "state" university after the Prussian system, with programs in literature, science and arts; medicine; and law–the first three academic departments of the new university. (Peckham, 1963)

Both because the university had already been in existence for two decades before the State of Michigan entered the Union in 1837, and because of the frontier society's deep distrust of politics and politicians, the new state's early constitution (1851) granted the university an unusual degree of autonomy as a "coordinate branch of state government," with full powers over all university matters granted to its governing board of regents, although surprisingly enough it did not state the purpose of the university. This constitutional autonomy, together with the fact that the university traces its origins to an act of Congress

The University of Michigan's campus in 1852 (Cropsey Painting)

rather than a state legislature, has shaped an important feature of the university's character. In financial terms, the University of Michigan was actually a United States land grant university supported entirely by the sale of its federal lands and student fees rather than state resources until after the Civil War. Hence throughout its history the university has regarded itself as much as a national university as a state university, albeit with some discretion when dealing with the Michigan State Legislature. This broader heritage has also been reflected in the university's student enrollment, which has always been characterized by an unusually high percentage of out-of-state and international students. Furthermore, Michigan's constitutional autonomy, periodically reaffirmed through court tests and constitutional convention, has enabled the university to have much more control over its own destiny than most other public universities.

Implicit in the new constitution was also a provision that the university's Board of Regents be determined by statewide popular election, again reflecting public dissatisfaction with both the selection and performance of the early-appointed regents. (The last appointed board retaliated by firing the professors at the university.) The first assignment of the newly elected board was to select a president for the university (after inviting back the fired professors). After an extensive search, they elected Henry Philip Tappan, a broadly educated professor of philosophy from New York, as the first president of the reconfigured university. We will return later to discuss Tappan's unusual leadership of the university and his prescient vision of the future of the American university. Because of the University's founding as a "territorial university" enabled by a gift from Congress, there has always been a question as to whether it is actually a "state" university. The Regents of the University attempted to clarify this in an 1859 report to the State of Michigan containing the following statement:

> "The University of Michigan is indebted for its existence of the munificence of Congress, in the redemption of its solemn pledge given to the whole Northwest that 'schools and the means of education should forever be encouraged', and to keep up the mutual good feeling between our State and the General Government in which the endowment of the University originated. The doors of all its Departments are open to students from every state in the Union, upon the same terms as to those of our own State; so that it may, in some sense, with propriety, be styled a National Institution, and every State in the Union has an interest in its prosperity." (Peckham, 1963)

The Morrill Act and the Land-Grant Movement (1860 – 1900)

It is important to consider a parallel movement in America that created an alternative to the collegiate classical curriculum: a utilitarian paradigm that launched a movement toward a specialization of knowledge capable of better serving the needs of an industrial society, and in the process, restructured the

Student Boarding House Room

Student Boarding House Room

Men's Bycicle Club

Student Life 1890

May Day at Michigan

Tug of War across the Huron River

19th Century student activities at the University of Michigan

division of intellectual labor within the university: the American Land-Grant Movement.

It is interesting that American universities, which prided themselves on their autonomy, should have taken their special character as much from the pressures of their environment as from their own inner designs, and that institutions which identify themselves as either "private" or "state" should have found their greatest stimulus in federal initiatives. Certainly the most significant event in defining a uniquely American university was the passage of the Morrill Act in 1862. This Act and its successors defined the democratic character of America's public universities and added to their portfolio of activities both public service and eventually research. The Morrill Act put federal lands at the disposal of every state government, and thereby helped to develop a whole new network of institutions with a popular and practical orientation, the land-grant colleges, which today enroll more than 20% of all American college students.

> An Act donating Public Lands to the several States and Territories that may provide Colleges for the Benefit of Agriculture and the Mechanic Arts.
>
> Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled. That there be granted to the several States, for the purpose hereinafter mentioned, an amount of public land, to be apportioned to each State a quantity equal to thirty thousand acres for each senator and representative in Congress to which the States are respectively entitled by the apportionment under the census of 1860.
>
> And be it further enacted, that all moneys derived from the sale of the lands aforesaid by the States to which the lands are apportioned, and from the sales of land scrip hereinbefore provided for, shall be invested in stocks of the United States, or of the States, or some other safe stocks, yielding not less than five per centum upon the par value of said stocks; and that the moneys so invested shall constitute a perpetual fund, the capital of which shall remain forever undiminished, … and the interest of which shall be inviolably appropriated, by each State which may take and claim the benefit of this act, to the endowment, support, and maintenance of at least one college where the leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the legislatures of the States may respectively prescribe, in order to promote the liberal and practical education of the industrial classes on the several pursuits and professions in life.
>
> Excerpts from the Morrill Act of 1862

What was distinctive about the Morrill Act was that the land grants were not literal gifts of land on which a state would build a college. Rather the act established a complex partnership in which the federal government provided incentives for each state to sell distant Western lands, with the states being obliged to use the proceeds to fund advanced instructional programs. The program began in 1862 with a generous incentive system whereby each state was allotted by formula a portion of federal lands commensurate with the number of its congressional representatives. The state government was then required to dedicate land sale proceeds to establishing collegiate programs in such "useful arts" as agriculture, mechanics, mining, and military instruction–hence the "A&M" in the name of many land-grant colleges. (Thelin)

Through the Morrill Act each state was given 30,000 acres of public lands in the west for each senator and representative. Although 10% of the proceeds from sale of the land could be used for the purchase of a site for a new college "where the leading object shall be, without excluding other scientific or classical studies, to teach such branches of learning as are related to agriculture and the mechanic arts", the remainder of the fund had to be maintained as a perpetual endowment. The follow-on Hatch Act of 1887 provided further federal funds for the creation of agricultural experiment stations, which were instrumental in modernizing American agriculture.

It should be noted that the actual motivation behind the Morrill Act had more to do with devising an effective and popular way to dispose of federal lands in the new western territories than supporting American

higher education. In fact, the initial effort to pass the act encountered strong resistance from many members of Congress worried about whether it favored some sections over others, and whether the western states would suffer from the use of their lands to endow eastern colleges. It was only after the secession of the southern states that triggered the Civil War that it was passed and Lincoln signed it. This pattern in which federal support of higher education was really provided to accomplish other objectives became a frequent pattern over the years, e.g., the G.I. Bill that was really intended to avoid a job crisis with returning veterans from WWII or the government-university research partnership that was aimed at winning the Cold War. (Thein, 2004)

Whatever the original motivation, the states responded rapidly to the federal largesse and eventually 69 American colleges were being supported by this legislation. Several states created "A&M" (agriculture and mechanical) colleges. Others turned over to existing state universities both the land-grant endowments and the responsibility of serving agricultural and the mechanic arts. In Connecticut, the Sheffield Scientific School of Yale became the land-grant college (although this grant was turned over later to the University of Connecticut). Dartmouth and MIT also received land grants. Both Indiana and New York used the opportunity for land grant to seek a major gift to found a new institution–in the case of Indiana, the $100,000 of John Purdue; in the case of New York, the $500,000 of Ezra Cornell. Some states even used the land-grant funds to create a liberal arts college such as California, where the College of Oakland was transformed into the University of California, with a curriculum that closely approximated the offerings of a New England college.

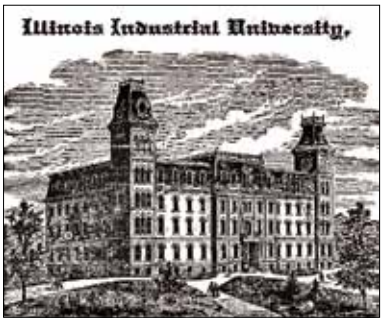
The land-grant college movement was a uniquely American approach to meeting the needs of a growing nation for both a more democratic and utilitarian approach to higher education, providing both college opportunities for the working class while addressing the technology needs of agriculture and industry. Although Michigan and Wisconsin had already established the importance of the state university prior to the Civil War, the land-grant act would soon have great impact on the nation stimulating the appearance of state colleges across the nation that would eventually challenge the influence of the eastern colonial colleges. In a very real sense they achieved both the Jeffersonian goals of popular learning necessary for a democratic society and the practical utility necessary for a rapidly industrializing nation. (Rudolph, 1962)

From College to University

It is important to recognize that the collegiate approach to education was decidedly not intellectual. Rather it was based upon the Oxbridge model of a classical education for the elite, the future leaders of the clergy, government, and in the case of the American colonies, commerce. Furthermore those comprising the faculties of the 19th century colleges were not scholars but rather tutors. It was once suggested that the perfect education would have a student sitting on one end of a log conversing with the noted Williams professor (and president) Mark Hopkins on the other end. Yet Hopkins himself once stated: "You read books. I don't read books, in fact I never did read any books." (Rudolph) Yale argued in its report of 1828 that the purpose of a college education was not to produce learned men but instead provide "the discipline and furniture of the mind". As Jeremiah Day, president of Yale, asserted, "The college course is preeminently designed to give power to acquire and to think, rather than to impact special knowledge or special abstract subjects. College is a system of mental gymnastics, essentially nothing else." (Veysey, 1965)

Yet by mid-century, the classical curriculum adopted by the colleges centered on Greek and Latin, rhetoric, and moral philosophy began to be challenged by the education needs of an emerging commercial and industrial nation. Beyond this utilitarian objective, there were also concerns expressed by American scholars returning from Europe about the growing influence of the German research universities where the faculty's involvement in original scholarship had been elevated to a priority comparable to that of instruction.

There were several efforts during the early 18th century to move beyond the collegiate model to create a true university in the European sense. Benjamin Franklin launched a more utilitarian model in his Philadelphia Academy (later the University of Pennsylvania). Thomas Jefferson based his design of the University of Virginia on the principles of the



University of Illinois

Michigan State University

Iowa State University

Penn State University

Cornell University

University of Minnesota

Early Land Grant Universities

Enlightenment, on freedom, similar in spirit to the emerging themes of Lehrfreiheit and Lernfreiheit of the German universities. Wayland also introduced many of the themes of the German universities during his leadership at Brown. But the most interesting attempt to build a true university in America–and a truly public university, at that–occurred in mid-century in Michigan, with the arrival of Henry Tappan as the first president of the University of Michigan.

A Case Study Redux: Back to the University of Michigan

Amid this swirl of conflicting views over the future shape of American higher education, Henry Philip Tappan arrived as president of the University of Michigan in 1852, determined to build a university very different from those characterizing the colonial colleges of 19th century America. Tappan was strongly influenced by European leaders such as Wilhelm von Humboldt, who stressed the importance of combining specialized research with humanistic teaching to define the intellectual structure of the university. Tappan articulated a vision of the university as a capstone of civilization, a repository for the accumulated knowledge of mankind, and a home for scholars dedicated to the expansion of human understanding. In his words, "a university is the highest possible form of an institution of learning. It embraces every branch of knowledge and all possible means of making new investigations and thus advancing knowledge." (Peckham, 1963)

In Tappan's view, the United States had no true universities, at least in the European sense. With the University of Michigan's founding heritage from both the French and Prussian systems, he believed he could build such an institution in the frontier state of Michigan. He envisioned a new form of American university: "We shall have no more acute distinctions drawn between scholastic and practical education; for, it will be seen that all true education is practical, and that practice without education is of little worth; and then there will be dignity, grace, and a resistless charm about scholarship and the scholar."

And build it, he did, attracting distinguished scholars to the faculty such as Andrew D. White and Charles Kendall Adams and placing an emphasis on

President Henry Tappan

graduate study and research and investing in major research facilities. Among Michigan's firsts during his presidency, it built one of the three largest telescopes in the world for astronomical research, erected the first teaching laboratory for chemistry, taught the first courses in subjects such as meteorology, forestry, bacteriology, American literature and established the first professional schools in the west in medicine (1850), engineering (1854), and law (1859).

In his efforts to create "a university worthy of its name", Tappan proposed to separate off the boarding school role of American colleges to secondary schools or gymnasia similar to Prussia while elevating the university to a comprehensive institution where students could find any area of instruction they desired. Of particular interest was a University Course discarding the tutorial or recitation format of the college and instead providing "the highest knowledge" through lectures to students with access to libraries and laboratories–an early vision of the American graduate school.

Yet frontier Michigan was a crude setting for Tappan's vision of the true university. Furthermore his determination and occasionally abrasive personality stirred up resistance (and plots for a coup) on the part of several on his faculty and Regents of the University. In 1863 the Board of Regents, probably unjustly, certainly foolishly–and inevitably–fired him." Although premature, Tappan's vision for Michigan in the 1850s and 1860s provided the first American model of a modern university. And through his leadership and

influence, others would follow the early Michigan effort to successfully create a true university for America. Years later, Michigan's James Angell was to have the last word on the Tappan's experience: "Tappan was the largest figure of a man that ever appeared on the Michigan campus. And he was stung to death by gnats!" (Peckham, 1963)

By the mid-19th century, higher education in America had evolved far beyond the collegiate model imported from Oxbridge by the colonies. The state universities were empowered by the Land-Grant Acts both to provide educational opportunities to the middle class while developing more utilitarian programs capable of serving an industrial society. Yet, as Michigan's Henry Tappan suggested, a rapidly growing and democratic nation needs something further: an institution capable of generating new knowledge through the scholarship of its faculty and students, by adapting the research university paradigm evolving in Europe to the American experience.

Hence it is time to return once again to the evolution of higher education in Europe.

The early Michigan campus
Medical School, Chemical Laboratory, Law School, Mason Hall, South College (left to right)

Medical Building (left) Chemical Laboratory (center) Law building (right)

Mason Hall (left) South College (right)
A classroom (left) and a student meeting room (right) in Mason Hall (originally, the University Building)

Chapter 4

Meanwhile, Back on the Continent

"The university instructor is no longer the teacher, and the student no longer the taught; the latter rather researches, and the professor guides it. Education at the university puts one in a position to grasp the unity of academic knowledge (Wissenschaft) and to bring it forth, thus demands creative powers. For insight into academic knowledge as such is a creation, even if a subordinate one. To the university is reserved that which one can discover in and through oneself: insight into pure academic knowledge. For this act of self, freedom is necessary, and solitude helpful. The relation between teacher and student thus becomes wholly different from before (at school). The former is not there for the latter; rather both are there for knowledge."(von Humboldt, 1804)

Reformation, Expansion, and Differentiation (1600 – 1700)

From their early roots in Bologna and Paris, universities began to develop in different forms in different countries and cultures. The University of Bologna provided the template upon which most universities in southern Europe were modeled, located in major cities, strongly influenced by students, and still embracing a classical curriculum based on the traditional four faculties: theology, jurisprudence, medicine, and the arts and philosophy. This was an open system of higher education in the sense that students attended lectures individually and completed a course of study on their own, while being responsible for finding board and lodging in the surrounding city. In contrast, the university models provided by Paris and Oxford and later evolving in France, England, and Spain, were based on colleges in which students lived under close supervision in university lodging (e.g., "colleges"). (Reugg II, 1996)

Catholic universities were common even during much of the Reformation since two-thirds of European universities were in Catholic regions. The Jesuit order had particular influence at many of these institutions, providing education much like the English tutorial college system and utilizing celibate Jesuit instructors. By 1700 Jesuits had more than 700 universities. However the Jesuit universities departed from the traditional mechanisms of appointment by faculty and developed governance through faculties of the three classical disciplines (the trivium): grammar, logic,, and rhetoric, although law and medicine were taught by secular authorities. (Ruegg II, 1996)

In Spain the three great universities, Salamanca, Alcala (later moved to Madrid), and Valladoid were created on the Bologna model but were constrained by the counter-Reformation during the early years of the Enlightenment. Universities in Portugal, Lisbon, and Coimbra were first strongly supported by the royal families, but in 1537 the University of Lisbon was dissolved and studies were centralized in Coimbra where the king invested heavily in new faculty. (Clark, 2006)

As the Reformation swept across Europe, the Jesuits were eventually pushed out of France and Spain and temporarily dissolved by the Pope in the late 18th century. This enabled the universities of southern Europe to devote themselves to the service of the state rather than the church, and they were strongly influenced by the Enlightenment.

In northern Europe the University of Paris provided the model of faculty-centered universities. French universities continued to be organized in the University of Paris model as a university of teachers, with faculties awarding degrees in the four classical disciplines: theology, law, medicine, and the arts. Much of the rest of northern Europe, including Scotland and the

German lands, adopted a hybrid model combining the collegiate system for general instruction and a centrally organized university faculty model for the disciplines.

The French universities, of which Paris, Montpellier, and Orleans were the oldest institutions, were highly regarded centers of learning during the late Middle Ages. While attendance at the University of Paris prepared students for careers, other French universities remained rather small institutions, lacking social prestige. Although initially hesitant to discard scholasticism, the French universities gradually implemented currricula based on humanism, although theology continued as an important element. The Jesuits in France were as difficult to control as in other Catholic countries, and the universities remained closely tied to the Catholic interests of the state, serving increasingly as preparatory schools for those wishing to follow state and church careers. During the 17th century, the French universities, whether organized as a collection of colleges or faculties, began to be challenged by new academic forms, the **É**coles, structured as academies and technical schools. (Ruegg II, 1996)

Higher education in England continued to be defined by the two medieval universities, Oxford and Cambridge, with a collegiate or tutorial model in which teaching was decentralized among numerous learning communities or colleges with faculty organized along college lines rather than academic disciplines. The purpose of universities was not to provide graduates for the professions, as in much of the rest of Europe, but rather education aimed at producing gentlemen for the ruling class. (Clark, 2006)

Students were admitted to and identified with their colleges, not with a discipline or the university more broadly. The power rested in the hands of the college masters, tutors, fellows, and later the dons, while the professors were largely pushed aside, with pay "typically too meager to support intelligent life". (Clark, 2006) In fact, the professoriate would remain without substantial power until the emergence of new universities in the 19th century.

There was a brief period of experimentation with a collegiate system at some German universities, with early universities resembling an English university, with students studying for a BA and living in colleges or dormitories. However this collegiate organization disappeared in favor of a faculty-based organization during the Renaissance and Reformation where the power was vested in the faculties and their organizations such as the academic senate.

By the end of the 18th century there were 143 universities in Europe, roughly one for each one million people. The countries rich in universities were either those with a long history of universities (Italy and France) or those in which scientific development began to appear (Scotland, the German lands). In countries still dominated by a strong crown rather than a civil government, such as England and Portugal, there were few universities. It is also striking that while the early universities were first located in major cities (except for Oxbridge), most of the large and expanding cities of the early modern period–e.g., London, Amsterdam, Brussels, Berlin, Munich, Marseille, Lyons, Madrid, Lisbon, and Warsaw–had no university and remained without one for many years.

The Enlightenment and Revolution (1700 – 1800)

The intellectual movement of the Enlightenment, emerging in the early 18th century had great impact on universities as scholars began to oppose the absolute rule of monarchs and instead emphasize the equality of all individuals. Although the Enlightenment idealized the concepts of democracy and republic from Greek and Roman civilizations, scholars such as John Locke interpreted these as implying that citizens held certain natural rights such as life, liberty, and property, and that governments derived their existence from the consent of the governed and their duty to protect these rights. If a government did not protect these individual rights, then the people had the right to overthrow it–a message that was soon heard both in the New World (the American Revolution) and in 18th century France. (Ruegg II, 1996).

The Enlightenment created a strong movement for a general improvement in human life, which began in England and passed through France, providing the model for thought throughout the Continent and leading to revolution against established authority. In 1803 the French Revolution abolished the entire old academic system and closed all colleges and universities. They were replaced by new schools and technical academies,

écoles and polytechnics, including at the highest level the "Grand **É**coles", which produced the leaders of government and science in the new French republic. In 1810 Napoleon went further by creating his *Université Impériale de France* as an administrative structure to oversee all higher learning in France and its conquests. (Recall that the early design of the University of Michigan was based on this French model of a universal learning institution). (Turner, 1988)

The new French university model introduced by Napoleon stood in sharp contrast to both the collegiate and faculty-centered models then prevalent in 18th century Europe. It enabled government to impose severe discipline and control over the curriculum, the awarding of degrees, conformity of views, and student behavior. French university professors trained at the École Normale Supérieure, and much of their prestige depended on their schools' reputations. Even after the French universities were restored in 1895, the strong centralization of higher education in France and the influence of the Grand **É**coles would continue during the 20th century.

The goals of intellectual freedom introduced by the Enlightenment, the subsequent revolutions against established government, and finally Napoleon's conquests pushed aside the remnants of the medieval university through Europe. The university's role of focusing on the four classical branches of knowledge: theology, jurisprudence, medicine, and arts and philosophy, was broadened to include scholarship and broader professional education (including military education). In 1783 there were 143 universities in Europe; in 1815 there were only 83. The 24 French universities had been abolished. In Germany 18 of 34 universities had disappeared. In Spain only 10 of 25 remained. (Reugg II, 1996)

Scholarship became more nationalized as nations established their own academies and Latin was replaced by local languages. Universities became secularized, retaining their central position in the intellectual life of Germany and the Holy Roman Empire. The same was true for the Scottish universities, whose Enlightenment character influenced American colleges. The English universities largely held to their old traditions.

von Humboldt and the Birth of the Research University (1800 – 1900)

Napoleon attempted to apply the *Universitié Impériale* system to his conquests across Europe. After he defeated the Prussians in 1806, he closed the University of Halle. Yet this disappearance of Prussia's leading university triggered the emergence of a new institution, the University of Berlin, which would adopt a new paradigm that would eventually dominate Europe: the research university. This approach, usually associated with Wilhelm von Humboldt, Prussian minister of education, was built on the belief that the function of the university should be broadened beyond learning to include scholarship, the creation of new knowledge. (Lohmann, 2003)

von Humboldt argued that, unlike the new French **É**coles, the envisaged institution in Berlin must include all the traditional disciplines. He rejected both the medieval structure of the university and the French model of professional colleges, arguing instead for the importance of not simply conveying knowledge but actually generating research as a responsibility of the faculty, thereby laying the foundations for the modern research university. von Humboldt argued that one must always treat academic knowledge as something being sought, as a task never perfected. It was something organic and reaching into the depths. Furthermore, both the freedom to learn, *Lernfreiheit*, and the freedom to teach, *Lehnfreiheit*, would become the foundation of academic freedom characterizing the new universities emerging in the 19th and 20th centuries.

The success of this model is provided by the experience of American universities, based upon academic freedom and corporate autonomy, and it stands in sharp contrast to the damage done to universities by repressive regimes based upon totalitarian ideologies such as communism, fascism, and national socialism.

The resulting German universities fostered professional, bureaucratically regulated scientific research performed in well-equipped laboratories, instead of the kind of research done by private and individual scholars in Great Britain and France. The seminars and institutes offered a new principle of organization for the 19th century German university,

Wilhelm von Humboldt

The University of Berlin
(renamed Humboldt University in 1949)

refining the superstructure of the four medieval faculties.

The University of Göttingen was a major leader in evolution of the modern university by creating the academic mechanism that enabled scholarship, the seminar, and introducing a new degree, the doctor of philosophy, and a rite of passage for attaining that title, the doctoral dissertation. In 1752 the University of Göttingen was able to offer the doctor of philosophy. The degree finally began to spread, to Austria in 1786 and Tübingen after 1803. In the U.S. the PhD first appeared in 1861 at Yale. In Britain a doctorate in arts and sciences first entered the University of London in 1860 and did not make it to Oxbridge until 1917. (Ruegg III, 2004)

The seminars, institutes, and doctoral dissertations became the essential academic elements of the German research university of the 19th century. Universities such as Göttingen moved away from the English universities based on tutorial teaching, and instead provided a site for research that assembled all branches of knowledge with the aim to attract foreign students. The aim was to bring in academics with sufficient reputations to attract students and, of course, the fees they would pay.

As the 19th century German universities rose in prominence and impact, various forms of research began to propagate throughout Europe and eventually to America, acquiring unique forms shaped by the characteristics of each region. For example, although Oxford and Cambridge would eventually accept the role of a professoriate engaged in original research, they would continue to provide undergraduate education through the colleges and the tutorial system. As we will see in Chapter 5, the American university would combine the German model of research and graduate education with a more utilitarian and democratic character capable of serving the needs of a growing industrial nation while underpinning undergraduate education with a new concept of the classical curriculum including the arts, humanities, and sciences, i.e., the "liberal arts". They would also add specific programs to prepare students for a broad array of professions (e.g., law, business, medicine, engineering, music, education, etc.)

Most other European universities gradually evolved toward government support, losing the financial independence they had traditionally enjoyed. This control was exercised by ministries of education appearing among most European governments that were given responsibility for university affairs. It was through these central administrations that the external authorities could influence education and research. They became responsible for the recruitment of teachers and appointments. Governments began to establish national standards, particularly in professions such as law and medicine. This control continued after WWI and was extended to the creation of non-university higher education institutions providing technical training.

Rising numbers of students brought demands

for new resources and financial problems. Old infrastructures were generally insufficient and inadequate. Increased student populations required larger teaching staffs. Only the specialized schools of higher education (the Grand Écoles of France, the Technische Hochschulen in Germany) to the extent they maintained their administrative autonomy, generally escaped the problems facing the overgrown universities.

The 20th Century

Even as the German model of universities as knowledge-based rather than student-learning-based institutions began to propagate through Europe, the demands of industrializing economies for better educated populations began to pressure nations to expand educational opportunities. The impact of science on professions such as medicine was demanding that apprenticeship learning be replaced by more rigorous university training. The primary constraints on such evolution were both available educational resources, e.g., schools, colleges, and universities, and a cultural shift away from regarding higher education as appropriate only for the aristocratic or ruling class and expanding it to broader segment of the population, much as the land-grant act had done in America. (Ruegg III, 2004)

Great Britain continued to offer only a costly education to aristocrats for most of the 19th century, and it was not until the early 20th century that new universities such as the University of London opened higher education to the middle class. The influx of non-aristocratic students into European universities presented challenges, because suddenly there existed a variety of students from different backgrounds and with different expectations, that challenged the more knowledge-focused Humboldtian university.

European university students in the 19th and 20th centuries were largely responsible for their own education. They gathered about university centers and were largely responsible both for their learning (no requirements to attend classes) and living (finding suitable housing).

As a consequence of the student freedom provided by the modern European university, student political activities aimed at influencing society became increasingly prevalent on university campuses during the 19th and 20th century. Such organized movements emerged in different regions at different moments, depending upon particular generational and social issues. Sometimes they were extremely effective in driving social change. At other times they were brutally repressed by authoritarian governments. Yet student engagement in broader social issues became an important force in contemporary society, frequently sensing social issues and generating protest movements long before more established political forces could react.

Until the mid-20th century, European universities primarily focused on educating only a small fraction of the population, usually those either from the wealthy classes or destined for leadership roles in government or the professions. Yet this would change dramatically in the late 20th century as it became increasingly apparent that forces such as globalization and technology were rapidly raising the educational requirements for workforce productivity and national prosperity and security. The goal of "massification", providing higher education to a large percentage of the population, became a driving force in economically developed nations around the world.

Higher Education in Today's Europe

Today our world has entered a period of rapid and profound economic, social, and political transformation based upon an emerging new system for creating wealth that depends upon the creation and application of new knowledge and hence upon educated people and their ideas. It has become increasingly apparent that the strength, prosperity, and welfare of a nation in a global knowledge economy will demand highly educated citizenry enabled by development of a strong system of tertiary education. It will also require institutions with the ability to discover new knowledge, develop innovative applications of these discoveries, and transfer them into the marketplace through entrepreneurial activities. (Duderstadt, 2009)

Yet the traditional institutions responsible for advanced education and research–colleges, universities, research institutes–are being challenged by the powerful forces characterizing the global

Student activism became increasingly important in European universities.

economy: hypercompetitive markets, demographic change, increasing ethnic and cultural diversity, and disruptive technologies such as information, biological, and nanotechnologies. Markets characterized by the instantaneous flows of knowledge, capital, and work and unleashed by lowering trade barriers are creating global enterprises based upon business paradigms such as out-sourcing and off-shoring, a shift from public to private equity investment, and declining identification with or loyalty to national or regional interests. The populations of most developed nations in North America, Europe, and Asia are aging rapidly while developing nations in Asia, Africa, and Latin America are characterized by young and growing populations. Today we see a serious imbalance between educational need and educational capacity–in a sense, many of our universities are in the wrong place, where populations are aging and perhaps even declining rather than young and growing, driving major population migration and all too frequently the clash of cultures and ethnicity. New technologies are evolving at an exponential pace, obliterating both historical constraints such as distance and political boundaries and enabling new paradigms for learning such as open educational resources, virtual organizations, and peer-to-peer learning networks that threaten traditional approaches to learning, innovation, and economic growth.

On a broader scale, the education investments demanded by the global knowledge economy are straining the economies of both developed and developing regions. Developing nations are overwhelmed by the higher education needs of expanding young populations at a time when even secondary education is only available to a small fraction of their populations. In the developed economies of Europe, the tax revenues that once supported university

education only for a small elite are now being stretched thin as they are extended to fund higher education for a significant fraction of the population (i.e., massification). Yet their aging populations demand highest priority for public funding be given to health care, security, and tax relief, forcing higher education systems to become more highly dependent on the private sector (e.g., student fees, philanthropy, or intellectual property). More fundamentally, in a knowledge-driven economy, many governments are increasingly viewing higher education primarily as a private benefit to students and other patrons of the university rather than a public good benefiting all of society, shifting the value proposition from that of government responsibility for supporting the educational needs of a society to university responsibility for addressing the economic needs of government–an interesting reversal of traditional responsibilities and roles.

In many respects the challenges facing higher education in developed nations (e.g., OECD) are quite similar and perhaps incompatible: the need to dramatically broaden participation in higher education to build a competitive workforce (massification), to enhance the quality of both education and scholarship to compete in a knowledge-driven economy, and to reduce the relative burden on tax payers who face other public spending priorities such as health, retirement, and national security. All create strong pressures on universities to diversify their funding sources through mechanisms such as raising student fees, building relationships with industry, encouraging philanthropy, and expanding the market for educational services through adult education or international students.

Within this context, the opportunities afforded by globalization look quite significant. Current estimates suggest that the number of students seeking university degrees will roughly double over the next two decades to as high as 250 million, with most of this growth in the developing world. Some nations such as Australia have already launched aggressive efforts not only to recruit fee-paying international students but to establish overseas campuses to generate additional resources, finding that as the proportion of these students rises above 15%, their institutions begin to exhibit a more global character not only in funding but also in governance and management.

Both national and institutional aspirations for quality also have acquired a global character with the appearance of numerous surveys (USN&WR, Shanghai Joao Tong, London Times) attempting to establish a world ranking of major universities. This has caused some consternation as established universities with long histories of educational excellence have fallen in the rankings. It is certainly the case that an over emphasis on such rankings can distract both institutions and governments from more fundamental roles and objectives. But it is also clear that the concerns about the competitive quality of higher education have stimulated initiatives such as the Bologna Process in Europe aimed at overcoming fragmentation, increasing cooperation and competition, increasing investment in both universities and research systems, preparing for demographic change (particularly aging populations), and encouraging innovation and risk-taking.

Global competition among universities has also raised an awareness of the need to provide both a greater degree of institutional autonomy to enable the agility, flexibility, and innovation required by today's fast-changing world as well as a more sophisticated and strategic framework for higher education systems. Key in the latter is the acceptance of the importance of mission differentiation, since the availability of limited resources will allow a small fraction of institutions to become globally competitive as comprehensive research institutions (with annual budgets typically in the range of $1 billion or more). A differentiated system of higher education helps to accomplish both the goals of massification and promoting quality, but assigns different roles in such efforts for various institutions. Enabled both by the continental scale and its decentralized nature, the United States has achieved the most diverse system, enabling it to focus significant public and private resources to create a small set (less than 100) of world-class research universities, while distributing the broader roles of mass education and public service among a highly diverse collection of public and private institutions, albeit with an inevitable tendency toward "mission creep". Although such strategic diversification is beginning to appear in Asia, it will be particularly difficult to achieve in Europe where the von Humboldt tradition of universities still resists defining the role of a college or university as

primarily teaching (as opposed to scholarship).

Europe has been slow to recognize that its integration is being hampered by the archaic structures of its universities, which are, in the main, government owned. Even top universities, like Oxford or the Sorbonne, are sometimes uncertain how to evaluate one another's diplomas. Key was the meeting of education ministers from 29 European countries in Bologna in 1999 who developed a detailed plan to give credibility to their declaration. By 2010 Europe had adopted a common framework of degrees with clearly defined undergraduate and postgraduate levels, to apply a Europe wide credits systems, develop quality controls and eliminate obstacles to students and teachers changing schools. Although there has been some local resistance, most universities recognize that the Bologna Process is unstoppable and are participating in discussions. Universities in Eastern Europe have embraced the initiative as a map to modernization. (Adelman, 2009)

Europe has chosen to utilize the Bologna Process (and related programs such as Erasmus, Socrates, and the European Science Area) to enhance cooperation and competition among institutions, stimulate greater mobility of students and faculty, and achieve greater diversification enabling the focus of sufficient resources on a subset of institutions to achieve world-class quality. While Russia has accepted much of the Bologna philosophy, it also faces the challenge of merging their universities with the scientific institutes where most research occurs and garnering greater support from both public and private sources. Japan has focused on the incorporation of its national universities, separating them legally from the government to provide them with the autonomy and presidential authority to become more strategically aligned with the global economy.

Current effort represents a victory of the British model, with the current five years of undergraduate study divided into a 3-year bachelor's and two-year master's programs. Core curriculums are being prepared in seven disciplines: business, chemistry, education sciences, geology, history, math, and physics. A growing number of European universities are teaching in English, the accepted global *lingua franca*. English-language master's and PhD courses are already the norm in Nordic countries. Even universities in France, Germany, Italy, and Spain are introducing courses in English, although some are resisting.

European nations adopted the Lisbon Agenda (2000) "to become the most competitive and dynamic knowledge-based economy with more and better jobs and social cohesion by mobilizing the brainpower of Europe". European organizations were created such as the European Higher Education Area (e.g., the Bologna process) or at the level of the European Commission (e.g., the Lisbon agenda) with initiatives such as the European Research Area (better integration of National and European research policies and the project of the European Research Council). The Lisbon agenda tends to use as a benchmark the United States investments in higher education and research (currently at levels of 2.6% and 3.0 % of GDP, respectively) while the Bologna process and ERC tend to emulate characteristics of the American research universities (e.g., standardizing university degrees upon the bachelors, masters, and PhD) while basing the envisaged European Research Council research programs on competitive, peer-reviewed grants much like the U.S. National Science Foundation. While this establishes major investments in higher education and research as priorities, with the goal of bringing Europe up to the level of the United States, there remain serious concerns that such an ambitious objective may be inconsistent with the low economic growth of national economies. It furthermore will likely require major structural changes in how European universities are organized, governed, and financed. (Duderstadt, 2009)

Remaining Challenges for Europe

Several key issues remain: the challenge in providing the resources necessary for massification, the increasing differentiation of both institutional types and missions demanded by the global marketplace, and the role of the state in planning, management, and regulation of higher education.

There are growing concerns that the current model for financing higher education in Europe, almost entirely dependent upon public tax support, is simply incapable of sustaining massification while achieving world-class quality. Currently the investment in higher education in

European countries ranges from 0.9% to 1.8% of GDP, of which only approximately 10% comes from private sources (e.g., student fees). European university leaders express many concerns about the financial vulnerability of their institutions, still primarily dependent on tax support without appreciable student fees or gift income, and insufficiently entrepreneurial compared to the massive research universities in America.

Since tax revenues are already stretched thin sustaining Europe's strong social programs, it seems unlikely that the EU and other developed European nations will be able to provide the advanced educational opportunities required by a knowledge-driven economy without appreciable changes in tax policies (to encourage private philanthropy) and student/family expectations (to accept significantly higher student fees). It has also become increasingly clear that with public tax support of higher education constrained by the burdens of generous social services and weak economic growth, further massification will only erode the support of research universities. While increasing student fees and modifying tax policies to encourage philanthropic support of higher education will be challenging, there may no alternative to enhancing private support if Europe's universities are to remain competitive.

This combination of very powerful economic, demographic, and technological forces could well drive a massive restructuring of the higher education enterprise on a global scale similar to that experienced by other economic sectors such as health care, transportation, communications, and energy. Nations are moving toward revenue-driven, market-responsive higher education systems because their current tax systems are increasingly unable to support the degree of universal access to post-secondary education required by knowledge-driven economies in the face of other compelling social priorities–particularly the needs of aging populations. Furthermore, there is growing willingness on the part of political leaders to use market forces as a means of restructuring higher education in an effort to increase both efficiency and quality. Put another way, market forces are rapidly overwhelming public policy and public investment in determining the future course of higher education.

Whether a deliberate or involuntary response to the tightening fiscal constraints and changing priorities for public funds, the long standing recognition that higher education is a public good, benefiting all of society, is eroding. Higher education is increasingly viewed in many nations as a private benefit that should be paid for by those who benefit most directly, namely the students. Without the constraints of public policy, earned and empowered by public investments, market forces could so dominate and reshape the higher education enterprise that many of the most important values and traditions of the university could fall by the wayside, including its public purpose. (Newman, 2004) (Zemsky, 2005)

It is also increasingly apparent that the great diversity of higher education needs, both on the part of diverse constituencies (young students, professionals, adult learners) and society more broadly (teaching, research, economic development, cultural richness) will demand a diverse ecosystem of institutional types. Here diversity should be viewed as positive and not conflated with the concept of hierarchy. One could envision a range of models of universities ranging from the mega to the single faculty or single focus business school. Notwithstanding the differences in scale between institutions of higher education there is still a need to ensure that each institution had the capacity to 'flex its provision' to meet changing circumstances and changing demand for higher education provision whether in the area of learning and teaching, research, knowledge transfer, and increasing and widening participation.

In regions dominated by public institutions, there is a need to think through the implications of creating new institutional forms for new private universities in Europe. These new institutions will need to be flexible and non-bureaucratic to survive in a market-led environment. There could well be a market for relatively small, flexible, world-class higher education institutions, which like some of the world-class business schools, could operate successfully on private funding from tuition fees while also competing for state funds for research and knowledge transfer. There might even be a market for the broad educational training characterizing the liberal arts colleges of the United States.

Chapter 5

A Uniquely American University

"A university anywhere can aim no higher than to be as British as possible for the sake of the undergraduates, as German as possible for the sake of the graduates and research personnel, as American as possible for the sake of the public at large–and as confused as possible for the sake of the preservation of the whole uneasy balance." (Kerr, 1963)

Spreading to the New World

The evolving forms of the European universities propagated throughout the world. By 1800 North America had largely adopted the English model while Latin America had taken its models from Spain. Early in the 19th century the German Humboldt model of a "research university" would appear in the United Sates, Japan, and elsewhere. Many of the features of English and Scottish universities influenced the evolution of universities in North America, Australia, and India. The French model was more limited in impact, to North Africa, Syria, and Indo-China. The world's idea of the university as it was shaped in the 19th century is therefore a European one.

The first colleges founded by the English colonists of North America were created as adaptations to the new environment of English institutions. The traditional course of studies pursued in Oxbridge remained fairly intact, though with a mixture of moral philosophy, policy economy and sciences from Scotland. Students were admitted to American colleges and the goal of the early universities was defined as the formation of character. Courses were strictly prescribed, attendance at classes was compulsory, and the morals of students were kept under surveillance since they attended colleges at an early age (16) and graduated young. There were few courses of preparation for professional careers on offer; graduates might enter such careers later, the clergy for example. (Thelin, 2004)

Early American universities followed the British mode requiring a charter by a political authority. However they differed in one very important respect since they adopted the use of governing boards of lay citizens characteristic of the Scottish universities rather than the faculty governance model of Oxbridge. In other ways, however, the colonial colleges bore a resemblance to Britain with a strong board of nonacademic governors, a principal or president with executive power, and no effective voice for the teaching faculty.

The first state universities in North Carolina and Georgia first resembled the colonial colleges, albeit with modest religious affiliation and adopting a broader range of academic subjects. However, similar to the colonial colleges, these early state universities were established and supported with little encouragement or aid from government.

Prior to the Civil War most of higher education in America still held to the collegiate model aimed at socializing young adults through a classical curriculum stressing rote learning and recitation of the classical curriculum to achieve mental discipline. Yet both the needs of a rapidly growing and industrializing economy, the democratic character of the young nation shaped very much by the "life, liberty, and pursuit of happiness" themes of the Enlightenment, and the awareness of the shift of European universities increasingly toward the generation of new knowledge through faculty scholarship as a fundamental responsibility, all suggested the need for a new paradigm. Despite the limited success of Henry Tappan's early attempt to import the German university into Michigan at mid-century, the German university still held out an attractive model for transforming American higher

education from a collegiate to a university character.

Yet, just as it had with the Oxbridge collegiate model, American higher education would adopt only those elements of the German university that best aligned with American needs and experience. Unlike the establishment of the German gymnasium for general education, the American universities would assume this role for its undergraduate students, while creating graduate schools for the Humboldtian focus on research and advanced education. While the faculty would gain academic freedom (*Lehrfreiheit*), students would have only limited freedom in academic programs *(Lernfreiheit*). Rather than stressing only pure research for knowledge's sake, American universities would expand investigations to include utilitarian objectives more directly responsive to the needs of society, particularly in education for the professions. The German model of academic freedom was eventually to become an important characteristic of higher education in American. (Rudolph, 1962)

But there continued to be considerable variation in how American colleges and universities would evolve. Harvard and Yale adopted the Oxbridge residential college model. Even in the state universities, which were to show the greatest readiness to accept the German model of a research university, the provision of residential accommodation was associated with traces of the collegiate pattern of Oxbridge. Yet it was initially in the state universities emerging in the 19th century that the role of the faculty in conducting original scholarship and research emerged, drawing inspiration from German universities such as Göttingen and Berlin.

In fact there was little attention to undergraduate students or religion or morality as university priorities. Pure science formed the major concern of leading academic scientists in institutions such as Johns Hopkins and Clark University. The German ideal of "pure learning" largely unaffected by utilitarian demands became the notion of "pure science" by Americans, largely missing the larger implications of *Wissenschaft* which encompassed broader knowledge. (Turner, 1988)

The dominant characteristic of the new American universities was their ability to create and nurture specialized departments of knowledge. The broadly educated professor of earlier eras of the European universities was replaced by an increasingly disciplinary focus by faculty members whose primary interest became original research. Pedagogy in American institutions shifted from tutorials and recitations to lectures, seminars, and laboratories.

The American universities largely abandoned the Oxbridge model of the "university" as an examining or administrative institution for the residential colleges where true learning and scholarship occurred. Instead the American universities of the 19th century modeled themselves after the German university, with a graduate faculty working with a body of student scholars to conduct original research.

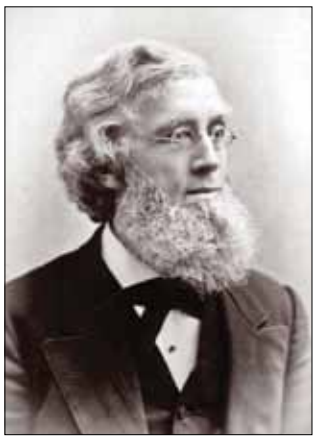
To understand this phase of the evolution of the American university, it is useful to return once again to our case study of the University of Michigan.

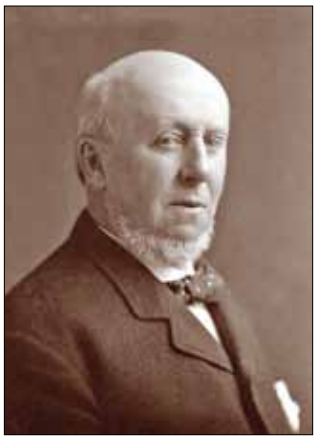
Back to Michigan...Once Again

Henry Tappan's effort to build America's first true university, which would not only conduct instruction and advance scholarship but also respond to popular needs, was far beyond what the frontier culture of mid-19th century Michigan would tolerate. Nevertheless he laid the foundation for defining a unique form of the American university that wove together the classical curriculum and mental discipline of the collegiate model, the utilitarian emphasis of the newly emerging state universities, and the German university emphasis on pure scholarship. During his tenure the University of Michigan broadened the classical curriculum to include the sciences, planted the early seeds for a graduate school to distinguish postgraduate professional studies from undergraduate education, introduced the seminar model of instruction for graduate education, provided students with the ability to select their courses (*Lernfreiheit*), built the first instructional chemistry laboratory, and launched a major research initiative with the construction of the Detroit Observatory. Perhaps even more significant was Tappan's effort to attract to Michigan's faculty outstanding scholars, who not only embraced his vision but would go on to propagate it as they moved on to lead other American universities, e.g., Andrew D. White to Cornell, Charles Kendall Adams to Cornell and then Wisconsin, Alexander Winchell to Syracuse, Erastus


Henry Tappan


Erastus Haven


Henry Frieze


James Angell

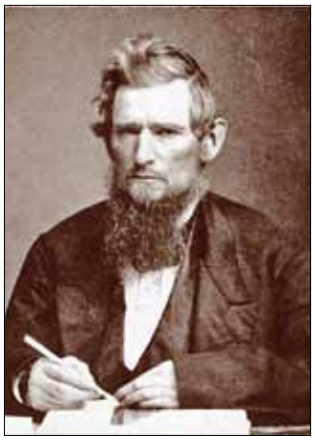
Haven to Northwestern, and so on. Yet Tappan's vision, personality, and European pretensions ran counter to the frontier culture of Michigan, with one newspaper describing him as "the most completely foreignized specimen of an abnormal Yankee we have ever seen". (Peckham, 1963) Michigan's Board of Regents, urged on by several faculty members strongly resistant to change fired Tappan in 1863, ironically during a secret session soon after their defeat in the statewide election.

The lame-duck board named as his successor Erastus Haven, a former faculty member (and one of those who had opposed Tappan and long sought the Michigan presidency). However Haven broke no new ground in moving further toward Tappan's vision of a university. In fact he sided with the Regents to deny admission to women. The unusual nature of his appointment in the wake of Tappan's firing would continue to deprive Haven of strong faculty and regental support. He soon became frustrated with faculty criticism and left in 1869 for the presidency of Northwestern University.

The regents asked Henry Frieze, professor of Latin Language and Literature, to serve as interim president until Haven's successor could be selected. Frieze would later serve again in the interim role on two other occasions when Angell went on overseas assignments. Despite his brief tenure, Frieze accomplished much, quietly moving to admit women; obtaining the funds to build University Hall, the dominant academic building of the 19th century campus; and establishing the University Musical Society, the center of cultural life in the university and Ann Arbor to this day. He moved ahead to implement several of Tappan's plans, including establishing a "university college" that was essentially a graduate school.

It was also Henry Frieze, who as interim president revived Tappan's project of turning the state's high schools into an American version of Germany's gymnasiums, creating the American secondary school systems, the "high schools" as we know them today. Prior to the Civil War, most public education occurred at the primary level, and colleges and universities were obliged to create associated academies to prepare students for college-level studies. Frieze began the practice of certifying select Michigan public schools as capable of offering respectable college preparation, thereby freeing the university from preparatory commitments and stimulating the schools of the state to extend their responsibilities into secondary education. This was the device that unleashed the high-school movement in the Midwest and later the nation, not only enabling the state universities to cultivate scholarly aspirations, but reshaping public education into clearly differentiated elementary and high schools.

Michigan's next president, James Angell, not only embraced but managed to achieve much of Tappan's agenda during his 38-year tenure and is widely regarded today as one of the most important architects of the modern public university. Although Angell was not an educational visionary himself, there were others on the faculty such as John Dewey who strongly influenced the direction of American education. Many of today's characteristics of the University of Michigan first appeared during Angell's long tenure, such as the academic organization of schools and colleges, the four-year B.A./B.S. curriculum of 120 semester hours, the Michigan Daily, the Michigan Marching Band,



Ezra Cornell

Andrew Dickson White

and the Michigan football team. When Angell arrived the university had 33 faculty and 1,100 students, and the university administration consisted of only three people: a president, treasurer, and secretary. By the time Angell retired in 1909, the university had grown to over 400 faculty and 5,400 students, the largest in America.

As noted earlier, Angell was an articulate and forceful advocate for the role of the public university in a democracy. He continued Frieze's efforts to shape coherent systems of public elementary and secondary education and replaced the classical curriculum with a more pragmatic course of study with wider utility and public accountability. With other public university leaders of the era such as van Hise at Wisconsin, he established the state universities of the Midwest in a central role in the life of their states.

The American Research University

The genius of American higher education was to graft the German professorial university at the graduate level onto the English collegiate model of Oxbridge at the undergraduate level, while expanding the mission of the institution to address the utility sought by a growing nation. (Kerr, 1963) This was made possible both because of strong public support through initiatives such as the Land Grant acts, but also because of philanthropy of wealthy Americans such as Ezra Cornell, Johns Hopkins, and John Rockefeller. It was led by the vision and skill of several 19th century university presidents including Tappan, Wayland, White, Eliot, Adams, and Angell (four of which were from Michigan).

The Morrill Act enabled American higher education to evolve beyond the Oxbridge collegiate model aimed only at providing a classical education to an elite element of society. Embracing the themes of the Enlightenment, the universities emerging in the latter half of the 19th century aimed not only at generating new knowledge through original research and applying it to serve society through new organizations such as the agriculture experiment stations and extension movement. They also had a mission to provide educational opportunities to the working class, both through campus based programs and through their role in building a nationwide system of primary and secondary education.

Although donor Ezra Cornell helped to launch this commitment of American higher education with his proclamation, Cornell University was actually built by Andrew White, a disciple of Henry Tappan at Michigan. And it was in Midwestern universities such as Michigan and Wisconsin that the mission of "providing an uncommon education for the common man" was embraced. For example, at Michigan in 1902 a poll of student parents occupations were 30% business, 22% farmers, 17% nonacademic professionals. (Veysey, 1965)

The most important example of the effort to adopt the Humboltian model of German universities was Johns Hopkins University, founded in 1876. The benefactor Johns Hopkins promised his fortune in railroad stock to the creation of what would become the first substantial American effort to support pure scholarship. Visits to universities such as Cornell and Michigan, which were strongly committed to both advanced scholarship and


Daniel Coit Gilman


David Starr Jones


William Rainey Harper

educating "the common man", convinced the trustees of the new institution that the time was ripe for the development of a graduate university on the German model.

Ironically, when trustees of Johns Hopkins asked Yale and Princeton's presidents for their advice, they refused even to answer the letter. When they approached Andrew White of Cornell and Charles Eliot of Harvard, neither White nor Eliot urged emphasis on research, and instead recommended they duplicate Cornell or Harvard's programs for a more practical higher education. However when they approached James Angell of Michigan, he convinced them that the time was right for the development of a great graduate university on the German model. Very much in the Michigan spirit, he argued that whatever they did ought to be something new and different. A rapidly changing nation required new colleges and universities that could change with it!

Hopkins embraced the graduate school with exceptional academic standards, the renovation of professional education (particularly medicine) the department, the creation of research institutions and centers, university presses, and the great proliferation of courses. Johns Hopkins developed as a faculty-centric institution, viewing the faculty, its needs, its work, as so central to its purpose that its first president, Daniel Coit Gilman, insisted that the faculty be given only students who were sufficiently well prepared to provide them with challenging and rewarding stimulation.

While the bold vision for the new institution was inspiring, it was also ahead of its time. It was difficult to find the highly educated students needed by the graduate programs for their masters and doctoral candidates. Perhaps more seriously, Johns Hopkins soon discovered that no university could operate without the tuition payments provided by students in the undergraduate college. Furthermore the liberal arts college provided the real and symbolic core within the university structure that fostered the loyalty of alumni and donors.

There was actually a second effort to faithfully adopt the Humboldt model: Clark University, which aspired to be a "purer" Johns Hopkins, but became a decided failure. In 1889 Clark opened as the first and only entirely graduate institution in the U.S. But its benefactor soon lost interest, and it quickly lost its faculty (to Chicago). One could even question whether Clark was ever really a university.

Benefactors were important in launching other private universities that would become world leaders. Although Stanford was founded in 1904 with a generous gift from railroad tycoon Leland Stanford as a memorial to his son, Mrs. Stanford soon took control of the campus, driving founding president David Starr Jordan and many of his faculty away.

John D. Rockefeller was a far less intrusive benefactor in founding the University of Chicago, and allowed its first president, William Rainey Harper, the freedom to build rapidly one of the nation's leading universities.

A Practical Midwestern Bent

Ironically, the Hopkins theme seemed to align best

with the frontier spirit of the state universities in the Midwest where frontier democracy and pioneering spirit would support such a radical departure from the collegiate paradigm. While Harvard moved closer to Yale and Princeton in its conservatism, the state universities in the Midwest and western United States became the leaders in educational experimentation and innovation. The contrast between the future Ivy League and Big Ten universities began to be more than simply that between privately endowed and state supported institutions. (Veysey, 1965)

As noted earlier, Michigan had been an early leader in the effort to build a truly American university. As members of its faculty moved on to become university presidents at leading land-grant institutions such as Cornell, Wisconsin, Minnesota, and Illinois, they took with them the Humboldt philosophy to transform these institutions into research universities. Their states joined Michigan in establishing a system of secondary schools, similar to the German gymnasia, to provide students for these early comprehensive American universities.

Hence the momentum shifted to the Midwest where a more homogenous population maintained that inclusiveness and quality were unreconcilable goals. Here universities originally developed along utilitarian lines simultaneously sought academic excellence, broad accessibility, and–interestingly enough–a tone of social distinction, at least in local terms. The theme which more than any other lends unity to the careers of leading men who came after James Angell at Michigan, Andrew White and Charles Kendall Adams at Cornell and Charles Kendall Adams, later at Wisconsin, Charles Van Hise at Wisconsin, and David Starr Jordan at Stanford–is the attempt to balance all three of these requirements for institutional success.

Of course, the challenge was gaining adequate support from state legislatures. The Morrill Act provided a basic incentive; what the states could obtain for nothing they were likely to take. Eventually the alumni of state universities grew to be sufficiently powerful forces within state government to stimulate adequate state support, although this would continue to have its ups and downs.

The American university would continue to change and evolve to serve a changing nation. Even as standardization grew more in some areas such as educational goals, institutions became more diverse both in scholarship and resources. Change became the order of the day. President Angell of Michigan, commenting on the transformation of the university during his day, much too casually remarked: "Our rather multifarious usages have grown up without much system under peculiar exigencies." (Hastings)

A New Century

In 1900 there were roughly 500 institutions of higher learning in the United States. But most probably did not even deserve the title of "college", much less "university". Only one hundred were capable of producing graduates capable of further study at the graduate or professional level. Furthermore, only a dozen were true universities, at least in the European sense. These would have included most of the charter members of the Association of American Universities: Harvard, Johns Hopkins, Columbia, Chicago, U. California, Clark, Cornell, Catholic U, U. Michigan, Stanford, U. Wisconsin, and U. Pennsylvania, Princeton, and Yale. The largest was Columbia with and enrollment of 6,232 students, followed by Harvard, Chicago, and Michigan with enrollments between 4,000 and 5,500. Of note here was that there were only three public (state) universities on the list: California, Michigan, and Wisconsin. Furthermore, both Clark and Catholic universities were far from university stature and no longer are members of AAU. However Clark Kerr noted that throughout the 20th century there were three "mountain ranges" of institutions of exceptionally high quality: the northeast (the Ivy's), the Big Ten, and California.

Although a few scholars such as Abraham Flexner still pointed to Johns Hopkins effort to become a true university, with only education at a graduate level focusing on the generation of new knowledge, by 1930 American universities had moved in a different direction. They were becoming less like a "genuine university, characterized by highness and definiteness of aim, unity of spirit and purpose" and more in the model of the great public universities of the Midwest, where a collegiate undergraduate program was augmented with a graduate school of the Humboldt

character, but then surrounded by professional schools with the strong utilitarian character of the land-grant tradition.

Of course there were back reactions. Robert Hutchins tried to take U. Chicago back to Cardinal Newman's or even Yale's 1828 character. While he succeeded in reviving the philosophic dialog, Chicago went on being a modern American university. Earnest attempts were made to create American counterparts of Oxford and Cambridge at Harvard, Yale, and Princeton: residence halls, student unions, intramural playfields, etc., in sharp contrast to the pure German model which had provided the student with only the profession and the classroom (and which had led Tappan to abolish dormitories at Michigan). (Veysey, 1965)

In contrast Harvard's approach was diversity. "The Harvard students are gathered from all over the world, admitted under all sorts of conditions, and given the most diversified training." Harvard's policy of welcoming African Americans and exerting special effort to secure students from China would have been unthinkable at Princeton.

There are several other ways to assess this multifaceted character of the American university. From one perspective it was a synthesis of the medieval university, the German research university, and the American land-grant college. From another, it was a merger of the British, German, and American models. But these characteristics continued to evolve. The British focus on the collegiate model lost ground. Largely nonresidential institutions such as community colleges and comprehensive universities became more dominant as universal access has impacted them and as liberal arts colleges have turned "comprehensive" or enrolled a smaller number of students. Yet the German (research) and American (service) models have advanced comparatively in influence.

At the same time, the land-grant movement was evolving. As Kerr has noted, "These two influences turned out to be more compatible than might at first appear. The one was Prussian, the other American; one elitist the other democratic; one academically pure, the other sullied by contact with the soil and the machine. One looked to Kant and Hegel, the other to Franklin, Jefferson, and Lincoln. But they both served the industrial age through research and training of technical competence. Two strands of history were woven together in the modern American university. Michigan became a German-style university and Harvard, a land-grant". (Kerr, 1963)

A Case Study–One More Time: The University of Michigan

From its founding, the University of Michigan has always been identified with the most progressive forces in American higher education. The early colonial colleges served the aristocracy of colonial society, stressing moral development over a liberal education, much as the English public schools, based on a classical curriculum in subjects such as Greek, Latin, and rhetoric. In contrast, Michigan blended the classical curriculum with the European model that stressed faculty involvement in research and dedication to the preparation of future scholars. Michigan hired as its first professors not classicists but a zoologist and a geologist. Unlike other institutions of the time, Michigan added instruction in the sciences to the humanistic curriculum, creating a hybrid that drew on the best of both a "liberal" and a "utilitarian" education. (Peckham, 1963)

Michigan was the first university in the West to pursue professional education, establishing its medical school in 1850, engineering courses in 1854, and a law school in 1859. The university was among the first to introduce instruction in fields as diverse as zoology and botany, modern languages, modern history, American literature, pharmacy, dentistry, speech, journalism, teacher education, forestry, bacteriology, naval architecture, aeronautical engineering, computer engineering, and nuclear engineering.

Throughout its early years, Michigan was the site of many other firsts in higher education. It provided leadership in scientific research by building one of the first university observatories in the world in 1854, followed in 1856 with the nation's first chemistry laboratory building. In 1869 it opened the first university-owned hospital, which today has evolved into one of the nation's largest university medical centers. It continued as a source of new academic programs in higher education into the 20th century. It created the first aeronautical engineering program in 1913, and

then followed soon after WWII with the first nuclear engineering (1952) and computer engineering (1955) programs. The formation of the Survey Research Center and associated Institute of Social Research in the 1950s stimulated the quantitative approach that underpins today's social sciences. Michigan was a pioneer in atomic energy, launching the world's first university program in peaceful uses of the atom. It partnered with IBM to develop time-sharing computing in the 1960s and later played a leadership role in building and managing the Internet, the electronic superhighway that is now revolutionizing our society. Its influence as an intellectual center today is evidenced by the fact that it has long been one of the nation's leaders in its capacity to attract research grants and contracts from the public and private sector, attracting over $1.4 billion a year in research support today. (Duderstadt, 2001)

Throughout its history, the University of Michigan has also been one of the nation's largest universities, vying with the largest private universities such as Harvard and Columbia during the 19th and early 20th centuries, and then holding this position of national leadership until the emergence of the statewide public university systems (e.g., the University of California and the University of Texas) in the post-WWII years. It continues to benefit from one of the largest alumni bodies in higher education, with over 500,000 living alumni. Michigan graduates are well represented in leadership roles in both the public and private sector and in learned professions such as law, medicine, and engineering. Michigan sends more of its graduates on to professional study in fields such as law, medicine, engineering, and business than any other university in the nation. The university's influence on the nation has been profound through the achievements of its graduates.

Michigan students have often stimulated change in our society through their social activism and academic achievements. From the teach-ins against the Vietnam War in the 1960s to Earth Day in the 1970s to the Michigan Mandate in the 1980s, Michigan student activism has often been the catalyst for national movements. In a similar fashion, Michigan played a leadership role in public service, from John Kennedy's announcement of the Peace Corps on the steps of the Michigan Union in 1960 to the AmeriCorps in 1994. Its classrooms have often been battlegrounds over what colleges will teach, from challenges to the Great Books canon to more recent confrontations over political correctness. Over a century ago *Harper's Weekly* noted that "the most striking feature of the University of Michigan is the broad and liberal spirit in which it does its work." This spirit of democracy and tolerance for diverse views among its students and faculty continues today.

Nothing could be more natural to the University of Michigan than challenging the status quo. Change has always been an important part of the university's tradition. Michigan has long defined the model of the large, comprehensive, public research university, with a serious commitment to scholarship and progress. It has been distinguished by unusual breadth, a rich diversity of academic disciplines, professional schools, social and cultural activities, and intellectual pluralism. The late Clark Kerr, the president of the University of California, once referred to the University of Michigan as "the mother of state universities," noting it was the first to prove that a high-quality education could be delivered at a publicly funded institution of higher learning.

Interestingly enough, the university's success in achieving quality had little to do with the generosity of state support. From its founding in 1817 until the legislature made its first appropriation to the institution in 1867, the university was supported entirely from its federal land grants and the fees derived from students. During its early years, state government actually mismanaged and then misappropriated the funds from the Congressional land grants intended to support the university. The university did not receive direct state appropriations until 1867, and for most of its history, state support has actually been quite modest relative to many other states.

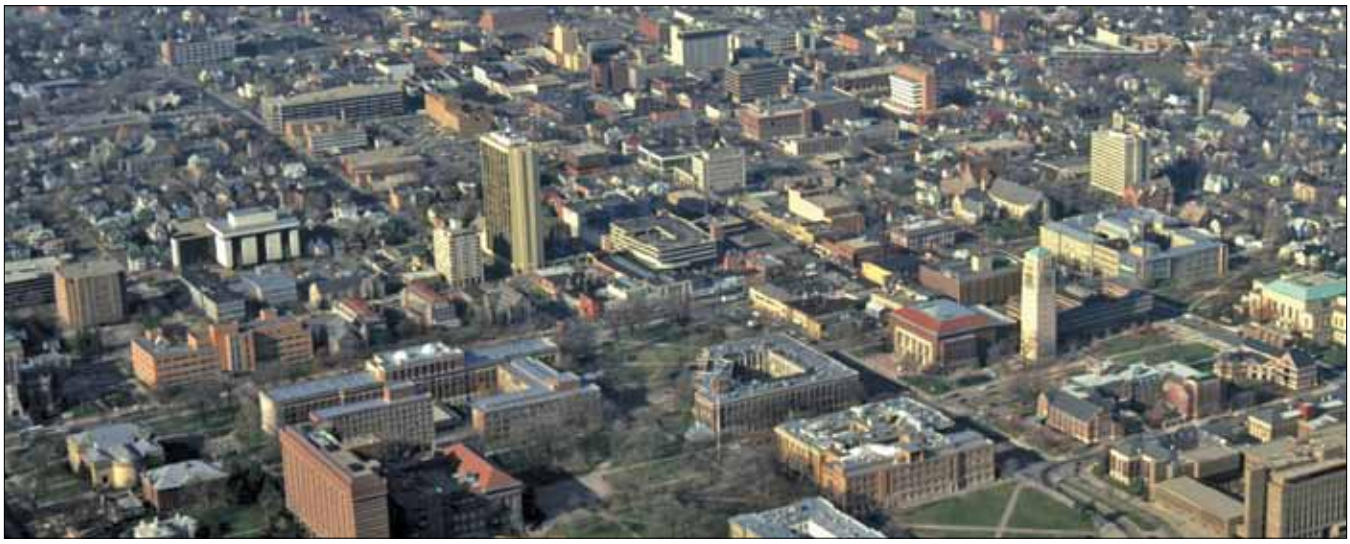
Rather, many believe that the real key to the university's quality and impact has been the very unusual autonomy granted the institution by the state constitution. The university has always been able to set its own goals for the quality of its programs rather than allowing these to be determined by the vicissitudes of state policy, support, or public opinion.

Put another way, although the university is legally "owned" by the people of the state, it has never felt obligated to adhere to the priorities or whims of a

The University of Michigan campus (1855, Jasper Cropsey)

The University of Michigan campus (1910, RichardRummell)

The University of Michigan campus (1930)



The University of Michigan campus (1970)

The University of Michigan campus (2000)

The University of Michigan campus (2014)

particular generation of Michigan citizens. Rather, it viewed itself as an enduring social institution with a duty of stewardship to generations past and a compelling obligation to take whatever actions were necessary to build and protect its capacity to serve future generations. Even though these actions might conflict from time to time with public opinion or the prevailing political winds of state government, the university's constitutional autonomy clearly gave it the ability to set its own course. When it came to objectives such as program quality or access to educational opportunity, the university has always viewed this as an institutional decision rather than succumbing to public or political pressures. (Duderstadt, 2007)

This commitment to academic excellence, broad student access, and public service continues today. In virtually all national and international surveys, the university's programs rank among the very best, with most of its schools, colleges, and departments ranking in quality among the top ten nationally and with several regarded as the leading programs in the nation. Other state universities have had far more generous state support than the University of Michigan. Others have had a more favorable geographical location than "good, gray Michigan." But it was Michigan's unusual commitment to provide a college education of the highest possible quality to an increasingly diverse society–regardless of state support, policy, or politics–that might be viewed as one of the university's most important characteristics. The rapid expansion and growth of the nation during the late 19th and early 20th centuries demanded colleges and universities capable of serving all of its population rather than simply the elite as the key to a democratic society. Here Michigan led the way in both its commitment to wide access and equality and in the leadership it provided for higher education in America.

Along with the University of Wisconsin, the University of Michigan hinted at the potential the state universities of the upper Midwest possessed to gain national stature as full-fledged modern universities. Whereas Wisconsin had a tradition of support and appreciation within its host state, the University of Michigan survived years of neglect from its state legislature and made great gains in the latter decades of the 19th century. Perhaps more than any other state university it initiated a program that made the campus the coordinating center of the entire state public school system. The lynchpin of the UM "certificate system" was that any graduate of a certified high school was guaranteed admission to the University of Michigan.

Particularly notable here was the role of Michigan President James Angell in articulating the importance of Michigan's commitment to provide "an uncommon education for the common man" while challenging the aristocratic notion of leaders of the colonial colleges such as Charles Eliot of Harvard. Angell argued that Americans should be given opportunities to develop talent and character to the fullest. He portrayed the state university as the bulwark against the aristocracy of wealth. Angell went further to claim that "the overwhelming majority of students at Michigan were the children of parents who are poor, or of very moderate means: that a very large portion have earned by hard toil and by heroic self-denial the amount needed to maintain themselves in the most frugal manner during their university course, and that so far from being an aristocratic institution, there is no more truly democratic institution in the world." To make a university education available to all economic classes, for many years tuition and fees at the university remained minimal. As President Angell put it, "The whole policy of the administration of the university has been to make life here simple and inexpensive so that a large portion of our students can support themselves." This commitment continues today, when even in an era of severe fiscal constraints, the university still meets the full financial need of every Michigan student enrolling in its programs. (Peckham, 1963)

As historian Frederick Rudolph suggests, it was through the leadership of the University of Michigan after the Civil War, joined by the University of Minnesota and the University of Wisconsin, that the state universities in the Midwest and West would evolve into the inevitable and necessary expression of a democratic society. Frontier democracy and frontier materialism combined to create a new type of institution, capable of serving all of the people of a rapidly changing America through education, research, and public service. As Rudolph notes, these institutions attempted to "marry the practical and the theoretical, attempting to attract farm boys to their classrooms and

scholars to their faculties." (Rudolph, 1962)

The university has long placed high value on the diversity of its student body, both because of its commitment to serve all of society, and because of its perception that such diversity enhanced the quality of its educational programs. From its earliest years, Michigan sought to attract students from a broad range of ethnic and geographic backgrounds. By 1860, the Regents referred "with partiality" to the list of students from other states and foreign students drawn from around the world. Forty-six percent of the university's students then came from other states and foreign countries. Michigan awarded the first doctorate to a Japanese citizen who later was instrumental in founding the University of Tokyo. President Angell's service in 1880-81 as United States Envoy to China established further the university's great influence in Asia.

The first African American students arrived on campus in 1868. Michigan was one of the first large universities in America to admit women in 1870. At the time, the rest of the nation looked on with a critical eye, certain that the experiment of co-education would fail. Although the first women students were true pioneers, the objects of intense scrutiny and some resentment, by 1898 the enrollment of women had increased to the point where they received 53 percent of Michigan's undergraduate degrees, roughly the same percentage they represent today.

One of Michigan's most important contributions to the nation may be its commitment to providing an education of exceptional quality to students from all backgrounds. In many ways, it was at the University of Michigan that Thomas Jefferson's enlightened dreams for the public university were most faithfully realized. Whether characterized by gender, race, socioeconomic background, ethnicity, or nationality–not to mention academic interests or political persuasion–the university has always taken great pride in the diversity of its students, faculty, and programs. Its constitutional autonomy enabled it to defend this commitment in the face of considerable political resistance to challenging the status quo, eventually taking the battle for diversity and equality of opportunity all the way to the United States Supreme Court in the landmark cases of 2003. In more contemporary terms, it seems clear that an important facet of the institutional saga of the University of Michigan would be its achievement of excellence through diversity.

As Turner notes, the major research universities of the United States are, in many respects, all alike. While Michigan is similar in many ways to Wisconsin and Berkeley, it is decidedly more "eastern" in style and in composition. But Michigan was also more egalitarian than its eastern, private counterparts. Michigan stands culturally midway between the Ivy and what we now call the Big Ten, with characteristics of each.

Throughout the 20th century the University of Michigan maintained an unusual breadth in the conduct of most academic programs and activities (except for agriculture, the province of Michigan State University). When Clark Kerr celebrated "the multiversity" in 1963, he described Michigan just as accurately as he did his own Berkeley (although, ironically, UC Berkeley does not have a school of medicine or extensive activity in other biomedical activities.)

As Turner stresses, "Michigan is a more impressive university as a whole than in those of its parts that are measured by conventional indices of excellence. The principled constraint has been the University's effort to govern itself by the standard academic values of free and open inquiry, veracity, objectivity, reasoned argument, and reliance on evidence. Multitudinous, sprawling, decentralized, contingent, imperfect, Michigan retains its capacity to inspire. That capacity derives not from any claims to uniqueness but from its strivings toward cosmopolitanism, from the enormous range of learned pursuits and doctrines available here." (Turner, 1988)

This is perhaps stated best by a former faculty member, David Hollinger: "If there is a Michigan mystique, it is more democratic than exclusive, more egalitarian that hierarchical; it is a mystique more of pluralism than of uniqueness of any sort. Michigan's tradition is pre-eminently national rather than local. The chiefly historical significance of the University of Michigan is an embodiment of the national academic culture, as an institution successfully devoted to both excellence and comprehensiveness." (Hollinger, 1988)

The Endless Frontier

The research university emerged as a powerful new entity that earned international respect for

American scholarship. World War II provided the incentive for even greater activity as the universities became important partners in the war effort, achieving scientific breakthroughs in areas such as atomic energy, radar, and computers. During this period American universities learned valuable lessons in how to develop and transfer knowledge to society and how to work as full partners with government and industry to address critical national needs. In the postwar years, a new social contract evolved that led to a partnership between the federal government and the American university aimed at the support and conduct of basic research. This led to a new institutional form, the American research university. (Cole, 2009)

Much of this was driven by the Servicemen's Readjustment Act of 1944, designed to provide social stability as the WWII veterans returned (and not so much to provide educational opportunity). Few expected very much from this. But by 1946 GI enrollments passed one million. By 1950 more than 2 million, or 16%, had opted to enroll in postsecondary education through the GI Bill. What was notable about the program? First it was an entitlement with no limit on the number of applicants. Second, tuition and benefits payments were portable. The catch, however, was that the institution had to be federally approved, which created accreditation through regional accreditation associations. Finally the GIs were older and more pragmatic, hardworking, and in a hurry to complete their degrees. Despite the unexpected appeal and success of the GI Bill, neither its advocates or critics viewed it as a permanent program. Yet it did stimulate federal financial aid programs.

The other major area of federal policy was the plan for strong federal support of academic research requested by President Truman from WW II technology leader Vannevar Bush. His report, *Science, the Endless Frontier*, stressed the importance of this partnership between government, industry, and universities in the conducting the research and development necessary for national security, economic prosperity and public health. As the report stressed: "Since health, well-being, and security are proper concerns of government, scientific progress is, and must be, of vital interest to government." At the heart of this partnership was the practice of federal support of competitive, peer-reviewed grants, and a framework for contractual

Vannevar Bush

relationships between universities and government sponsors. In this way the federal government supported university faculty investigators to engage in research of their own choosing in the hope that significant benefits would accrue to American society in the forms of military security, public health, and economic prosperity. (Bush, 1945)

The basic structure of the academic research enterprise of the past half-century was set out in the Bush report some fifty years ago. The central theme of the document was that the nation's health, economy, and military security required continual deployment of new scientific knowledge and that the federal government was obligated to ensure basic scientific progress and the production of trained personnel in the national interest. It insisted that federal patronage was essential for the advancement of knowledge. It stressed a corollary principle—that the government had to preserve "freedom of inquiry," to recognize that scientific progress results from the "free play of free intellects, working on subjects of their own choice, in the manner dictated by their curiosity for explanation of the unknown."

Since the federal government recognized that it did not have the capacity to manage effectively either the research universities or their research activities, the relationship became essentially a partnership, in which the government provided relatively unrestricted grants to support part of the research on campus, with the hope that "wonderful things would happen." And, indeed they did, as evidenced by the quality and impact

of academic research.

Federal support was channeled through an array of federal agencies: basic research agencies such as the National Science Foundation and the National Institutes of Health; mission agencies such as the Department of Defense, the Department of Energy, the National Aeronautics and Space Administration, and the Department of Agriculture; and an assortment of other federal units such as the Departments of Commerce, Transportation, and Labor. In most cases, the mechanism used to support research was the merit-reviewed research grant, where faculty submit unsolicited proposals detailing the research they were interested in conducting. The funding agency then asks various experts, including peers of the investigators, to review the proposal and evaluate its quality and importance. Based on this review and available funding, the agency then decides whether to fund the work or decline the proposal. If the decision were to fund, a grant would be provided to the host institution for the support of the work, typically for a one to several-year period.

Although grants arising from unsolicited proposals were the most common form of support, some funding agencies did approach select institutions with request-for-proposals to conduct research directed toward specific needs. For example, NASA might seek a particular type of scientific instrument for a space mission, or the Department of Defense might need a better understanding of radar reflection from unusual aircraft wing geometries. Such procured research was usually provided through research contracts between the agency and the host institution rather than through relatively unrestricted grants.

The resulting partnership between the federal government and the nation's universities has had an extraordinary impact. Federally supported academic research programs on the campuses have greatly strengthened the scientific prestige and performance of American research universities. The research produced on our campuses has had great impact on society. This academic research enterprise has played a critical role in the conduct of more applied, mission-focused research in a host of areas including health care, agriculture, national defense, and economic development. It has made America the world's leading source of fundamental scientific knowledge. It has produced the well-trained scientists, engineers, and other professionals capable of applying this new knowledge. And it has laid the technological foundations of entirely new industries such as electronics and biotechnology.

American Higher Education Today– A Mature Industry?

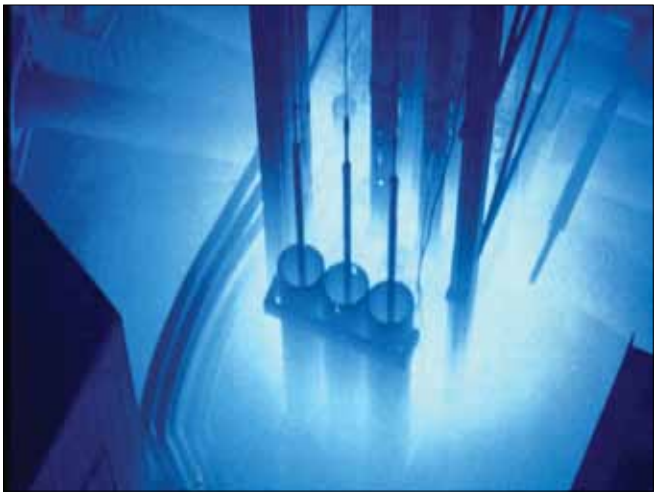
Higher education in the United States is characterized both by its great diversity in university profiles and an unusual degree of institutional autonomy–understandable in view of the limited role of the federal government in tertiary education. As *The Economist* notes, "The strength of the American higher education system is that it has no system." (Economist, 2005) In the United States our colleges and universities, both public and private, are relatively free from government control, at least compared to institutions in other nations. We have no ministry of higher education or national system of education, relatively few federal regulations, and essentially no broad federal higher education policies.

The American university's constituencies are both broad and complex and include as clients of university services not only students but also patients of its hospitals; federal, state, and local governments; business and industry; and the public at large (e.g., as spectators at athletic events). To address this diversity—indeed, incompatibility—of the values, needs, and expectations of the various constituencies served by higher education, the United States has encouraged a highly diverse array of tertiary educational institutions to flourish. From small colleges to immense multi-campus universities, religious to secular institutions, vocational schools to liberal arts colleges, land-grant to urban to national research universities, public to private to for-profit universities, there is a rich diversity both in the nature and the mission of America's roughly 3,600 post-secondary institutions. (Duderstadt, 2001)

More generally, the strength of American higher education depends upon characteristics such as:

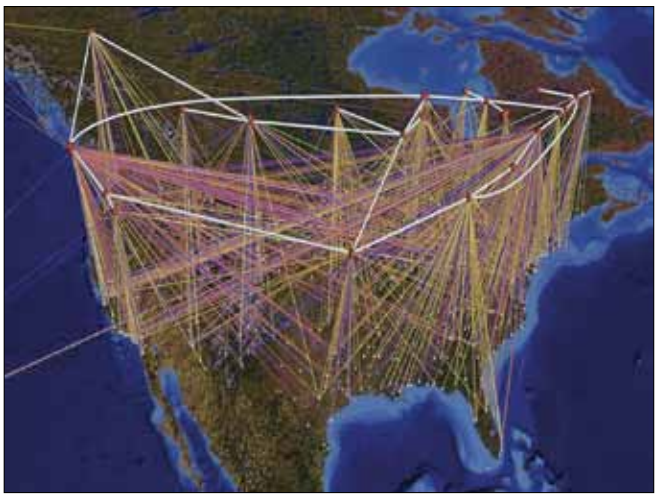
- The great diversity among institutions and missions.
- The balance among funding sources (private vs. public, state vs. federal).

Clinical trials of the Salk vaccine



Peaceful uses of atomic energy

All Michigan crew on Apollo 17



Partnered with IBM to build the Internet

Leaders in engineering and technology research

Leaders in biomedical research

The University of Michigan provides an excellent example of the impact of federally funded research.

•The influence of market forces (for students, faculty, resources, reputation).

• Its global character (attracting students and faculty from around the world)

•A limited federal role that leads to highly decentralized, market-sensitive, and agile institutions, students, and faculty.

•Supportive public policies (academic freedom, institutional autonomy, tax and research policies).

•The research partnership between universities, the federal government, and industry.

A few other characteristics of American institutions should be mentioned. Beyond their fundamental purpose of teaching and scholarship, American colleges and universities have inherited from their British antecedents the mission of the socialization of young students. Not only does this require a very substantial investment in residence halls, community facilities, and entertainment and athletic venues, but it can also distract the university from its more fundamental knowledge-based mission. Nevertheless, American parents now see college as "the place where we send our children to grow up".

Furthermore, American colleges and universities are expected to compensate for the significant weaknesses currently characterizing primary and secondary education in the United States, even if that requires providing remedial programs for many under-prepared students. Today only 26% of high school graduates are college-ready across the full spectrum of academic disciplines (English, reading, math, and science). (ACT, 2013) While many leaders of American universities sometimes wish they could shift to the "no-frills" approach of European universities and focus their activities on teaching and scholarship for more mature students, this has proved difficult for all but the highly focused for-profit and on-line colleges designed for adult learners (e.g., the University of Phoenix and the Western Governors University).

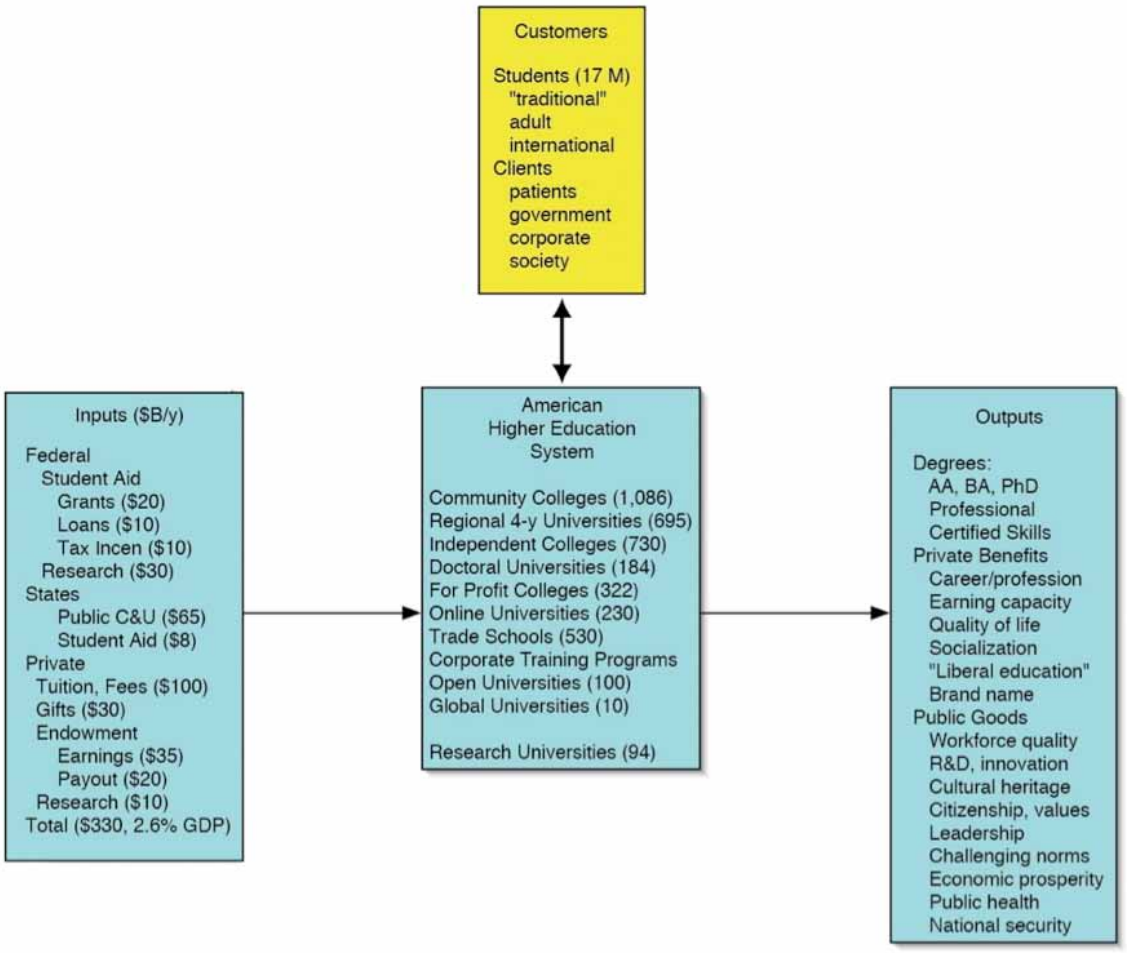
The reality faced by most American universities is that many of the valuable academic services they provide to society–e.g., educating low income students, offering instruction in the arts and humanities, and conducting research and scholarship–are inherently unprofitable and hence must be subsidized either through government support or through other activities capable of generating a profit. American universities are continually adding new activities only marginally related to their fundamental educational mission in an effort to generate new revenues, e.g., aggressive management of endowment assets and intellectual property, equity interest in spinoff high-tech companies, conducting commercial entertainment activities (football, concerts, theatre), and providing educational services to wealthy clients (e.g., oil-rich nations).

The United State's primary source of both new knowledge and graduates with advanced skills continues to be its research universities. These institutions, with the strong and sustained support of government and working in partnership with American industry, are widely recognized as the best in the world, admired for both their research and their education. America's research universities are, today, a key asset for our nation's future. They are so because of the considered and deliberate decisions made in the past by policy makers, even in difficult times.

Traditionally, the higher education enterprise has been pictured as a learning pyramid, with the community colleges at the base, the accredited public and private four-year colleges at the next level, the institutions offering graduate degrees next in the pyramid, and the research universities at the pinnacle. In some states these roles are dictated by a master plan. In others, the role and mission of educational institutions are not constrained by public policy but rather determined by available resources or political influence.

In reality, however, institutional roles are far more mixed. It is true that community colleges serve primarily local communities, but they provide quite a broad range of educational services, ranging from two-year associate degrees to highly specialized training. They also provide an increasing amount of postgraduate education to individuals currently holding baccalaureate degrees who wish to return to a college in their community for later specialized education in areas such as computers or foreign languages.

Many small liberal arts colleges strongly encourage–in some case, even pressure—their faculty to be active scholars, seeking research grants and publishing research papers in addition to teaching. Certainly



The Characteristics of American Higher Education

too, many four-year colleges have added graduate programs and adopted the title "university" in an effort both to serve regional interests and to acquire visibility and prestige. At the other end of the spectrum, many research universities have been forced to take on significant responsibilities in remedial education at the entry level, particularly in areas such as language skills and mathematics, as a result of the deterioration of K–12 education. Many have even moved directly into the K–12 education arena, creating and managing charter schools or even entire school systems. These trends will only increase an already significant blurring of roles among various types of institutions.

Some suggest that we need to think of American higher education as a mature industry. After all, most states are already providing postsecondary education to 60 percent or more of high school graduates. Public support of higher education for traditional purposes, whether from state or from federal governments, is unlikely to increase. And as is happening with other mature industries such as health care, both the public and private sector are asking hard questions about the cost, efficiency, productivity, and effectiveness of our colleges and universities.

To view higher education only from the perspective of its traditional constituencies, however, is to miss the point of the transformation that must occur as we enter an age of knowledge. For example, if lifetime education becomes a necessity for job security—as it has in many careers already—the needs for college-level education and training will grow enormously. So too American higher education could well be one of this nation's most significant export commodities, particularly if we can take advantage of emerging technologies to deliver high-quality educational services on a global scale. Higher education could be—should be—one of

the most exciting growth industries of our times, but this will depend on the development of new models of higher education that utilize far more effective systems for financing and delivering learning services.

Yet, today, much of this earlier commitment to investment in education and research seems to have waned. Not only the quality of our primary and secondary education but also the skills of our workforce lag many other nations. Over the past decade, government support of our public universities has dropped by roughly 35%, putting leading research universities such as U. California, U. Wisconsin, and U. Michigan at risk. (Holliday, 2012) After a brief surge during the late 1990s with the doubling of the budget of the National Institutes of Health, both federal and corporate support of basic and applied research have fallen significantly, while fields such as the social sciences have been savaged by conservative political forces. And perhaps most telling of all, the inequities characterizing educational opportunity in America have become extraordinary. The unfortunate reality facing young students today can be summarized by observing: "If you are poor and smart, you have only a one-in-ten chance of obtaining a college degree. In contrast, if you are dumb and rich, your odds rise to nine-in-ten!" (Vest, 2010)

More fundamentally, an extraordinary shift has occurred in the public perception of the purpose of American higher education over the past half century. In early decades following World War II, higher education was viewed primarily as a public good because the critical role played by an educated population and the knowledge generated on our campuses in determining the welfare of the nation merited strong support from public tax revenues. Today our nation seems to no longer understand that the support of educational opportunity and campus-based research represents investments in the future, not burdensome expenditures from public resources. Instead most Americans view a college education primarily as a private benefit, which enables students to compete for high-paying jobs, as evidenced in part by the rapidly increasing income differential between those with and without a college degree. Hence, it is not surprising that public policy has shifted to view a college education as something that students should pay for themselves through fees, enabled in part through loans and debt.

So, too, as the compelling challenges of the post-World War II economic recovery, the Cold War, and the space race subsided, federal support of the research and development needed for prosperity and security has weakened in the United States. Rather than the "peace dividend" anticipated during the 1990s the nation's R&D investment relative to the nation's GDP has dropped. Faced with the financial pressures of quarterly earnings that demand corporate priorities shift away from long-term research to product development, great research organizations such as Bell Laboratories have disappeared. Even more seriously, federal policies no longer place a priority on university research and graduate education, as basic research funding has dropped by roughly 20% over the past decade. Most recently, a conservative Congress has adopted rigid constraints such as a sequestration on all federal expenditures, putting at serious risk not only basic research but also the capacity and quality of the nation's research universities. (Lane, 2014)

Both the irony of this situation flows from the realization that today our world has entered a period of rapid and profound economic, social, and political transformation driven by knowledge and innovation. It has become increasingly apparent that the strength, prosperity, and welfare of region or nation in a global knowledge economy will demand a highly educated citizenry enabled by development of a strong system of education at all levels. It will also require institutions with the ability to discover new knowledge, develop innovative applications of these discoveries, and transfer them into the marketplace through entrepreneurial activities. Hence current American higher education policy represents a dramatic disinvestment in its future.

Throughout most of our history, education in America has been particularly responsive to the changing needs of society during early periods of major transformation, e.g., the transition from a frontier to an agrarian society, then to an industrial society, through the Cold War tensions, and to today's global, knowledge-driven economy. As our society changed, so too did the necessary skills and knowledge of our citizens: from growing to making, from making to serving, from serving to creating, and today from creating to innovating. With each social transformation, an

increasingly sophisticated world required a higher level of cognitive ability, from manual skills to knowledge management, analysis to synthesis, reductionism to the integration of knowledge, invention to research, and, today, innovation and entrepreneurship. Our nation's challenge today is to understand that once again it is time to challenge current public policy and make new commitments to education to enable our nation to achieve prosperity, health, and security.

Chapter 6

A Gallery of American Universities

The Colonial Colleges

Harvard

Yale

Pennsylvania

Princeton

William and Mary

Brown

Columbia

Rutgers

Dartmouth

The Colonial Colleges

HARVARD UNIVERSITY was founded in 1636 in Cambridge, MA, with the primary mission of training Congregational and Unitarian clergy. Named after the minister John Harvard, who left the school $779 and a library of 400 volumes in his will, today Harvard has evolved into one of the world's great research universities, with an unusually broad range of academic and professional programs in essentially all fields, along with an endowment of $40 billion.



YALE UNIVERSITY was first chartered in 1701 by the Connecticut Colony as an itinerant school before finally settling in New Haven in 1716. In return for a modest gift of books, it was named after a director of the East Indian Company, Elihu Yale (although the legend is that the University only intended to name a building after him). Yale is organized into residential colleges for students, similar to Oxford and Cambridge.



The **UNIVERSITY OF PENNSYLVANIA** was founded by Benjamin Franklin as the Academy of Philadelphia in 1740. It later evolved into one of the first American universities to be modeled after European universities with both undergraduate and graduate programs. Although primarily a public university in its early years, in the 20th Century it has evolved into a privately funded institution similar to other universities in the Ivy League.



The Colonial Colleges

PRINCETON UNIVERSITY was founded in Elizabeth, NJ in 1746 first as the College of New Jersey to train ministers, before moving to the village of Princeton in 1754, assuming that name, and broadening its mission to produce a new generation of leadership for the young nation. Today it provides both undergraduate and graduate instruction in both liberal arts and sciences as well a professional education in selected areas such as public affairs, architecture, and finance.

COLUMBIA UNIVERSITY was established in 1754 as King's College by royal charter of George II, renamed Columbia College in 1784, and then Columbia University in 1896 when it was moved to Morningside Heights in upper Manhattan, New York City. It has long been regarded as one of America's leading research universities, producing 96 Nobel laureates,123 Pulitzer Prize winners, and 10 Supreme Court Justices.

BROWN UNIVERSITY was established in 1764 as the College in the English Colony of Rhode Island and Providence Plantations. It was one of the first American colleges to accept students regardless of religious affiliation, as well one of the first doctoral-granting U.S. colleges in the 19th Century. Today it is known for its liberal undergraduate curriculum, allowing students to design their own educational programs rather than being constrained to narrow majors.

The Colonial Colleges

RUTGERS UNIVERSITY was chartered as Queen's College in 1766 in New Brunswick, NJ and renamed Rutgers College in 1825 in honor of Colonel Henry Rutgers, whose $5,000 gift allowed it to reopen after financial difficulties. In 1864 the college expanded its role in agriculture, engineering, and science when it was named as a land-grant college under the Morrill Act, thereby evolving into a public university during the 20th Century as "The State University of New Jersey".



DARTMOUTH COLLEGE was established in Hanover, NH in 1769. Although founded to educate Native Americans in Christianity and the English way of life, it primarily trained Congregationalist ministers before broadening to secular education in the 20th century. It later established the independence of private higher education in a Supreme Court decision in 1819. Although retaining the name "college", today it is regarded as one of the nation's leading research universities.



The COLLEGE OF WILLIAM AND MARY in Williamsburg, VA was established by royal charter by King William III and Queen Mary in 1693 as a school to educate both Native Americans and sons of the colonists. As the second oldest college in America, it educated many of the early leaders of the republic (e.g., Thomas Jefferson, James Monroe, and John Tyler). Today it remains one of the nation's leading public colleges.



Eastern Universities

Vermont

Carnegie Mellon

Pittsburgh

Johns Hopkins

Georgetown

New York University

City College of NY

Connecticut

State University of NY

New Hampshire

Boston University

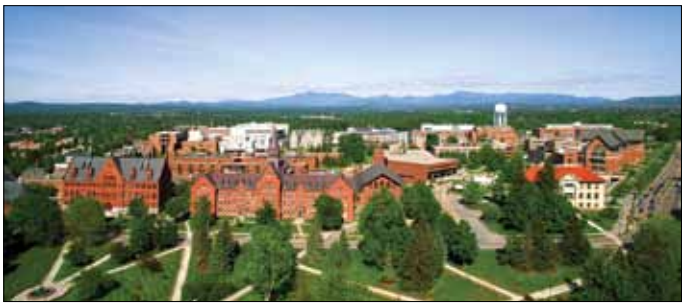
Massachusetts

Case Western Reserve

Boston College

Eastern Universities

The **UNIVERSITY OF VERMONT,** located in Burlington, VT was established intially as a private university in 1791 and later in 1865 following the Morrill Act merged with Vermont Agricultural College to become a land-grant public institution. The quality of its programs in the liberal arts and sciences has given it the reputation of being one of the eight "Public Ivy" institutions in the United States.


The **UNIVERSITY OF NEW HAMPSHIRE** was established in 1866 as a land-grant university in Hanover, NH in connection with Dartmouth, since the later institution had established its private status in the 1819 Supreme Court case. The University moved its flagship campus to Durham in 1893, although it also maintains campuses in Manchester and Concord. It is one of the few U.S. institutions with land, sea, and space grant research centers.



The **UNIVERSITY OF MASSACHUSETTS AMHERST,** the flagship of the UMass system was established in 1863 as the Massachussetts Agricultural College in response to the Land-Grant Act. It was renamed Massachusetts State College (1931), and University of Massachusetts (1947). It serves as part of the "Five Colleges" consortium along with Smith, Mount Holyoke, Hampshire, and Amherst Colleges.



Eastern Universities

The **UNIVERSITY OF CONNECTICUT,** located in Hartford was established in 1881 as Storrs Agricultural School/College (1881) and renamed the University of Connecticut in 1939. The university is a land, sea and space grant institution. Its location in the center of New England, 30 minutes from Hartford and 90 minutes from Boston enabled its academic programs to play a major role in the economic development of the region.



The **STATE UNIVERSITY OF NEW YORK (SUNY),** a system of public higher education in New York, was established 1948 to include all state-supported institutions of higher education in NY, except for the CUNY system. Today it has 64 campuses, including major research university campuses in Albany, Buffalo, Binghamton, and Stony Brook. Its enrollment of over 600,000 students makes it one of the largest university systems in the world.



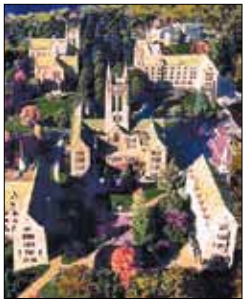
The **CITY UNIVERSITY OF NEW YORK,** founded in 1847, was the first free public institution of higher education in the US. Considered the flagship, CUNY is the oldest institution of the system of 24 campuses, enrolling 16,000 students in one of the most diverse student bodies in the nation, with students from 208 countries and Black, Hispanic, and Asian students each comprising 25% of its enrollment.



Eastern Universities

NEW YORK UNIVERSITY is a private university established in 1831. NYU's main campus is located in Greenwich Village with other campuses throughout New York City. NYU is paticularly noted as a true international university, operating universities and centers throughout the world. With over 75,000 students, it is one of the largest private universities in the nation with a budget in excess of $8 billion per year.

BOSTON COLLEGE is a private Jesuit research university established in 1863. Although BC is a major research university with 14,500 students, its "college" name reflects its early history as a liberal arts college and preparatory school. It provides an important example of the historical impact that the Jesuit order of the Catholic Church has had on the creation and leadership of major universities both in the United States and throughout Europe.



BOSTON UNIVERSITY, a private research university established in 1869, traces its origin to Newbury Biblical Institute (1839) associated with the United Methodist Church. Today, BU is a nonsectarian institution enrolling 33,000 students and offering a broad range of instruction in the liberal arts and professions at both the undergraduate and graduate level. It ranks as one of the nation's leading research universities.

Eastern Universities

CARNEGIE MELLON UNIVERSITY, a private research university, was founded by Andrew Carnegie in 1900 as the Carnegie Technical Schools. In 1967, its successor, the Carnegie Institute of Technology, merged with the Andrew Mellon's Institute of Industrial Research to form Carnegie Mellon University. Today Carnegie Mellon is regarded as one of the world's leading research universities, particularly in the areas of computer science and technology.

Andrew Carnegie

Andrew Mellon

CASE WESTERN RESERVE, a private research university, was established in 1967 in Cleveland by the merger of Case Institute of Technology (1881) and Western Reserve University (1826), the latter founded in the area that was once known as the Connecticut Reserve. The merger of the two institutions created one of the nation's leading research universities, an institution of great importance both to the midwest and the State of Ohio.

GEORGETOWN UNIVERSITY, a private research university was established in Washington in 1789. Georgetown, the oldest Jesuit institution in the US, has been administered independent of the church since 1805, educating leaders in government and international affairs. Its location in the Georgetown neighborhood of Washington, DC, has provided a particularly important mission to prepare leaders for careers in public policy and international affairs.

Eastern Universities

JOHNS HOPKINS UNIVERSITY, located in Baltimore, Maryland was established in 1876 and named for the philanthropist Johns Hopkins, whose $7 million bequest, then the largest gift in history, also financed the associated Johns Hopkins Hospital. Adopting the concept of the graduate school from German universities, Johns Hopkins is considered the earliest model for the American research university.



The **UNIVERSITY OF PITTSBURGH** was founded in 1787 on the edge of the American frontier following the Revolutionary War as the Pittsburgh Academy. After moving to the city, it was renamed the University of Pittsburgh in 1908 and remained a private institution until it became part of the Commonwealth System of Higher Education of the State of Pennsylvania. Today it has one of the largest research budget of any American university at $900 million per year.



The **UNIVERSITY OF MARYLAND, COLLEGE PARK** was chartered in 1856 and established in 1859 as the Maryland Agricultural College becoming a land-grant institution in 1864. Today it serves as the flagship of the University of Maryland system, and its location only 4 miles from Washington DC has provided it with both powerful access and participation in major research projects from major federal agencies such as NIH, NASA, and NIST.



Southern Universities

North Carolina

South Carolina

Florida

Virginia

Vanderbilt

Florida State

Georgia

Duke

Emory

Southern Universities

The **UNIVERSITY OF NORTH CAROLINA** is the oldest public university in the nation, established in Chapel Hill in 1789 and enrolling its first students in 1795. Today the UNC-Chapel Hill is the flagship campus of the UNC system, long regarded as one of the most outstanding research universities in the south and admired for its long commitment to the liberal arts focus of its undergraduate programs.

The **UNIVERSITY OF SOUTH CAROLINA,** located in Columbia, SC was established in 1801 and today serves as the flagship of the USC system, which enrolls 49,000 students with 35,000 on the Columbia campus. Beyond its strong academic programs, its library houses the largest collections of the writings of both Ernest Hemingway and the Scottish poet Robert Burns. In addition to undergraduate and graduate programs, it has an unusually broad set of professional schools.

The **UNIVERSITY OF GEORGIA** was established in Athens, GA in 1785. It is considered to be the oldest state-chartered university in the United States. The University has been recognized as a "Public Ivy" for the quality of its undergraduate programs as well as one of the nation's leading university libraries. Its host city, Athens, is ranked among the best college towns in America, while the university is the flagship for public higher education in the state.

Southern Universities

EMORY UNIVERSITY is a private university, orginally established as Emory College in Oxford Georgia in 1836 by the Methodist Episcopal Church, relocating to Atlanta in 1915. Emory was named in honor of John Emory, a Methodist bishop. Today Emory is not only ranked as one of the nation's leading research universities, but it operates Emory Healthcare, the largest healthcare system in the State of Georgia.




The **UNIVERSITY OF FLORIDA** traces its origins to the East Florida Seminary, established in 1853, before being relocated as the University of Florida to Gainesville in 1906. It is a large institution (54,000 students) with an unusually broad spectrum of undergraduate, graduate, and professional programs. It functions both as a sea-grant and space-grant research university, understandable in view of its location near two coasts and Cape Kennedy.



FLORIDA STATE UNIVERSITY, located in Tallahassee, was established in 1851. Founded initially as a seminary, it functioned through most of its history as Florida State College for Women until becomiing co-educational following WWII. In the post-war years, it developed rapidly both its academic programs and research activities. Activist students that sought diversity and social justice, earning FSU the nickname "the Berkeley of the South".

Southern Universities

The **UNIVERSITY OF VIRGINIA,** located in Charlottesville, was founded in 1819 by Thomas Jefferson, who took interest in the design of its campus and its curriculum (which functioned without majors for much of the 19th century). Today UVA is ranked as one of the top four public universities in the nation, with outstanding programs at the undergraduate, graduate, and professional school level.

VANDERBILT UNIVERSITY, located in Nashville, Tennessee was established in 1873. It was named in honor of Cornelius Vanderbilt, who endowed the school with $1 million, in the hope that the institution could help heal the divisions caused by the Civil War. Vanderbilt remains today as one of the few private universities in the South, with strong programs both in the liberal arts and biomedical sciences.

DUKE UNIVERSITY, was founded in Trinity, NC, first as Brown's Schoolhouse and then as Union Institute Academy by Methodists and Quakers, moving to Durham in 1892. In 1924, tobacco and electric power industrialist, James Buchanan Duke, established the Duke endowment stimulating the institution to changed its name to Duke University. Today Duke is one of the nation's leading private universities, with an endowment of $11 billion.

Mideast Universities

University of Michigan

University of Wisconsin

University of Minnesota

University of Illinois

Notre Dame

Ohio State University

University of Indiana

Purdue University

Northwestern University

Michigan State University

University of Chicago

Pennsylvania State University

Mideast Universities

The **UNIVERSITY OF MICHIGAN,** founded in 1817 in Detroit as the Catholepistemiad, or University of Michigania. It existed only as a primary school until Michigan reached statehood in 1837 when it was moved to Ann Arbor, enrolling its first students in 1841. Although supported primarily by fees and federal land-grants, it was given constitutional autonomy over all academic matters, which is one of the reasons it has long provided leadership in higher education.



The **UNIVERSITY OF WISCONSIN** was established in Madison in 1848 and became a land-grant institution in 1866. Serving today as the flagship of the University of Wisconsin system, the UW Madison is regarded as one of the top research universities in the world, with strong programs across all academic and professional disciplines. It has served as a model for other states later striving to create their own public university systems.



The **UNIVERSITY OF ILLINOIS at URBANA-CHAMPAIGN,** originally Illinois Industrial University, was established as a land-grant institution in 1867. From the beginning the liberal arts were stressed along with agriculture and industrial programs. Serving as the flagship of the University of Illinois system, UIUC has world-class programs in most academic and professional discplines, with particular strength in the physical sciences.

Mideast Universities

The **UNIVERSITY OF IOWA,** located in Iowa City was established in 1847. It was the first American public university to open as coeducational, the first to open a Department of Religious Studies, and the first to recognize LGBT student organizations. The university developed the Master of Fine Arts degree, and it manages the world-famous Iowa Writer's Workshop that has produced 17 Pultizer Prize winners.



INDIANA UNIVERSITY was established in Bloomington in 1820 as the State Seminary, renamed Indiana College in 1829 and Indiana University in 1839. The IU Bloomington campus serves as the flagship for several other IU campuses across the state, including its medical campus in Indianapolis (operated with Purdue University). It is renown for having one of the finest schools of music in the nation.



PURDUE UNIVERSITY, located in West Lafayette, Indiana was established in 1869 as a land-grant university focusing on agriculture and engineering. It was name after John Purdue, a business leader and philanthropist who donated $150,000 (about 2.7 million today). Although a national leader in science and engineering, Purdue and IU with a campus in Indianapolis also provides strong programs in biomedical sciences and a medical center for clinical care.



Mideast Universities

NORTHWESTERN UNIVERSITY, a private research university located in Evanston, Illinois, was founded by John Evans in 1851. Its goal was to serve the Northwest Territory. Instruction began in 1855, and women were admitted in 1869. Although most of its campus is located along Lake Michigan north of Chicago, its law, medical, and professional schools are located in Chicago's Streeterville neighborhood providing the campus with a strong urban character.

MICHIGAN STATE UNIVERSITY, located in East Lansing, was established in 1855 as the Agricultural College of the State of Michigan, and served as a model for land-grant universities. After the passage of the Morrill Act in 1862, MSU became coeducational. Although evolving into a world class research university in many fields, it has recently built one of the most powerful atomic particle accelerators in the world (FRIB) that has provided leadership in nuclear physics.

The **PENNSYLVANIA STATE UNIVERSITY** was founded initially as the Farmers' High School of Pennsylvania (1855), then as the land-grant Agricultural College of Pennsylvania (1862), and today as flagship Pennsylvania State University in State College, PA. Although founded initially as a state university, PSU today is only "state-related", evolving into one of the world's leading research universities with both state and private support.

Mideast Universities

THE OHIO STATE UNIVERSITY, located in Columbus was established as a land-grant institution in 1879. Originally the Ohio Agricultural and Mechanical College, the name changed to Ohio State University in 1878. The Columbus campus enrolls around 60,000 students, making it one of the largest universities in the nation, with a comprehensive array of world-class academic, professional, and research programs working closely with local industry such as Bechtel.

The **UNIVERSITY OF MINNESOTA,** located in Minneapolia and Saint Paul was established in 1851. The flagship of the University of Minnesota system with four sister campuses, it is organized into 19 schools and colleges, and enrolls almost 50,000 students. The quality of its academic programs earns the University's reputation as a "Public Ivy", while its research activities, particularly in the chemical sciences, rank among the nation's leaders.

The **UNIVERSITY OF CHICAGO** is a private research university established in 1890 by the American Baptist Education Society, with funds supplied by John D. Rockefeller. The original curriculum was based on theoretical rather than applied sciences, and today the undergraduate programs of the University are famous for their focus on the liberal arts. The presence of both U Chicago and Northwestern provide the city of Chicago with unusually strong academic assets.

Midwestern Universities

Colorado

Nebraska

Kansas

Missouri

Oklahoma

University of Iowa

Notre Dame

Texas

Washington University

Texas A&M

Rice

Baylor

Midwestern Universities

The **UNIVERSITY OF NEBRASKA,** located in Lincoln was established in 1869 under the Morrill Land-Grant Act. Over the next several decades the institution expanded significantly, hiring professors from eastern schools to teach in newly organized professional colleges while conducting research in agricultural sciences. Of particular importance was the "Nebraska method" of ecological study of the grassland ecology of the upper midwest.



The **UNIVERSITY OF COLORADO** was founded in Boulder in 1876 five months before Colorado entered the Union. Largely through the influence of the University, the Boulder area became the center of major national research activities in environmental science, atmospheric science, and space physics. UC Boulder became the flagship for a larger system including Colorado School of Mines and UC Denver.

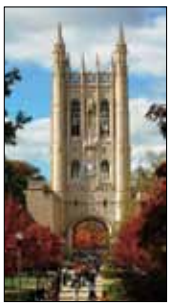


The **UNIVERSITY OF KANSAS** was established in 1865 in Lawrence following the admission of the former Kansas Territory to statehood in 1861 after the Civil War. Although private donations provided both the site and initial funding, the university eventually became a state-funded land-grant institution, later establishing both the Edwards campus and a major medical center in Kansas City.



Midwestern Universities

The **UNIVERSITY OF MISSOURI** was established in 1839 in Columbia as the first public university west of the Mississippi and later as a land-grant institution. The MU Columbia campus became the flagship of a system with additional campuses in Kansas City, St. Louis, and Rolla. The University's School of Journalism became world-famous, and the University built and operates the largest nuclear research reactor on any American campus.


The **UNIVERSITY OF NOTRE DAME,** a private Catholic institution, located in Indiana was established in 1842. Notre Dame began as a primary and secondary school, receiving college status in 1844. Originally an all male institution, women were admitted in 1972. Notre Dame has long been known for the high quality of its undergraduate programs and study abroad programs. Yet it also has a broad array of high quality graduate and professional programs.



The **UNIVERSITY OF OKLAHOMA** is located in Norman. In 1890 the Oklahoma Territorial government established three universities. When Oklahoma became a state in 1907 the Norman campus was renamed the University of Oklahoma, establishing both graduate and professional programs and becoming a major research university during the 20th Century. It has played a major role in the development of gas shale fracturing, with great impact on the state and the nation.



Midwestern Universities

The **UNIVERSITY OF TEXAS,** located in Austin was established in 1881. It is the flagship institution of the University of Texas system, enrolling over 50,000 students. The university has seven museums and seventeen libraries, including the LBJ Library. Its location in Austin just one mile from the Texas State Capital has given it great influence over the evolution of the state, and its Permanent University Fund (from oil lands) makes it one of the nation's richest public universities.



TEXAS A&M UNIVERSITY was established in 1876 as a land-grant institution, previously known as the Agricultural and Mechanical College of Texas (1871-1973). Texas A&M has the largest student body in Texas, enrolling around 69,000. Initially Texas A&M concentrated on classical studies, languages, literature, and applied mathematics but later broaden to include science, engineering, and agriculture. The George H. W. Bush Presidential Library is on its campus.



RICE UNIVERSITY was founded in 1912 as William M. Rice Institute for the Advancement of Literature, Science and Art. Although intially focusing on undergraduate education for Texas students, the institution has evolved into a major research university in the applied sciences including the physical sciences, space science, and nanotechnology. The university has eleven residential colleges and eight academic schools and enrolls 7,000 students.


Midwestern Universities

WASHINGTON UNIVERSITY is a private research university founded in St. Louis, Missouri in 1853 by business, political, and religious leaders in the Midwest and named after George Washington. For many years the institution functioned as a night school but later organized the finances to evolve from a regional university to a national research university (including playing a signficant role during WWII in the Manhattan Project).



The **UNIVERSITY OF HOUSTON** was founded in 1927, evolving over the 20th Century into a state research university and the flagship of the University of Houston System. It offers more than 280 degree programs with more than 40 research centers on campus in areas from superconductivity, space sciences and engineering, natural resources, and artificial intelligence. It is viewed as a critical asset for both the Houston and the broader Texas economy.



BAYLOR UNIVERSITY is a private research university founded as a Baptist institution in Waco in 1853 and named after a Texas judge. In the 1940s Baylor established a major medical department first in Dallas and then in Houston, which has evolved into one of the nation's leadiing medical centers with funding from the M.D. Anderson Foundation and others, although this eventually became independent of Baylor University.



Western Universities

Arizona

Arizona State

Oregon

Washington State

Washington

Oregon State

Utah

Brigham Young

New Meixico

Western Universities

The **UNIVERSITY OF ARIZONA,** a public flagship research university, located in Tucson, was established in 1885, the first university in the Arizona Territory. Although it was first founded as a normal school (teacher's college), it has evolved into one of the nation's leading research universities with particular strength in the astronomical sciences. It also operates two medical schools and associated medical centers.

ARIZONA STATE UNIVERSITY is a public university with five campuses in the Phoenix area and four regional centers throughout Arizona. Established in 1885, it is one of the largest public universities in the nation enrolling 72,000 students. In recent years it has evolved into one of the most innovative American universities, exploring new approaches to traditional academic disciplines and seeking both economic and racial diversity among its students.

The **UNIVERSITY OF NEW MEXICO,** located in Albuquerque was established in 1889. UNM is the flagship research university with five branch campuses located in Gallup, Los Alamos, Rio Rancho, Taos and Los Lunas. The University is distinguished by one of the largest student and faculty populations of Hispanics and Native Americans in the nation, reflecting the highly diverse history and culture of New Mexico.

Western Universities

The **UNIVERSITY OF WASHINGTON** has its main campus in Seattle, with a campus in Tacoma and Bothell. It opened in 1861 as the Territorial University of Washington. Low enrollment and financial difficulties closed it three times (1867, 1876, 1883). Today UW has evolved into one of the world's leading research universities, particularly in the areas of computer science and engineering with nearby companies such as Microsoft and Amazon.



WASHINGTON STATE UNIVERSITY, established in 1890 as a land-grant institution is located in Pullman. WSU operates three other campuses: WSU Spokane, WSU Tri-Cities and WSU Vancouver (all established in 1989). With a total enrollment of 30,000, WSU has experimented with technology-based learning such as its Internet-based Global Campus and leading programs in veterinary medicine, food and plant science, and biomedical sciences.



The **UNIVERSITY OF UTAH** was established in 1850 as the University of Deseret, in the provisional State of Deseret, proposed by the LDS Church in 1849. Receiving its current name in 1892, the institution moved to Salt Lake City in 1900. As the state's largest institution, the University has assumed a leadership position in research activities important to the mountain west while operating the state's leading medical center.



Western Universities

BRIGHAM YOUNG UNIVERSITY is a private research university located in Provo, Utah, owned and operated by The Church of Jesus Christ of the Latter-day Saints. Established in 1875, today BYU enrolls 33,000 students, most being members of the LDS Church. Its students are required to follow an honor code consistent with the LDS teachings of academic honesty. Many of its students take a leave from their studies to serve as Mormon missionaries.



The **UNIVERSITY OF OREGON** was established in 1876. The citizens of Eugene helped finance the new institution by holding festivals, socials and produce sales, raising $27,000. The University, facing early debt, nearly closed in 1881 and later considered a proposal to merge Oregon and Oregon State University that failed. However today, with strong state and private support (particularly from the Knight family), Oregon has become a leading research university.



OREGON STATE UNIVERSITY was established in 1868 in Corvallis as a land-grant institution. Throughout its history the university had eleven name changes to better align with the largest available federal grants in agriculture research. It is a land, sea, space and sun-grant institution with research activities throughout the state and in other countries, particularly in the oceanic sciences.



California Universities

UC Merced

UC Santa Cruz

UC Riverside

UC San Francisco

UC Berkeley

UCLA

UC San Diego

UC Irvine

UC Davis

UC Santa Barbara

Stanford

Southern California

California Universities

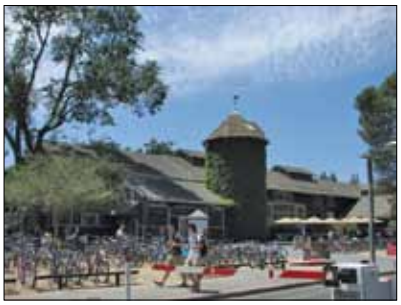
STANFORD UNIVERSITY, located in Palo Alto, California, is a private research university established in 1885 by Leland and Jane Stanford in honor of their only child Leland Stanford Jr. The campus was built on Stanford's 5,000 acre farm and opened in 1891. As one of the most selective institutions in the nation, Stanford competes in quality and impact with Harvard and Yale, and leads the nation in its entrepreneurial activities

The **UNIVERSITY OF CALIFORNIA, BERKELEY** is one of the ten research universities of the University of California system. Established in 1868 from the merger of the private College of California, and the public Agricultural, Mining and Mechanical Arts College as a land-grant institution, UCB today ranks as this nation's leading public research university, providing leadership for American higher education.

The **UNIVERSITY OF CALIFORNIA, LOS ANGELES** was established in 1919 as the Southern Branch of the University of California. It was renamed the University of California at Los Angeles in 1927 and evolved during the 20th Century into one of the nation's leading and most comprehensive research universities with particular strength in the biomedical sciences (and its associated medical center).

California Universities

The **UNIVERSITY OF CALIFORNIA, DAVIS** was established in 1905 as the University Farm in Davisville, enrolling 40 men from Berkeley for training in agriculture, latter accepting its first women students in 1914. In 1922 UC Davis became part of UCal system, and although initially the UC's land-grant campus, it has evolved beyond fields such as agriculture and veterinary medicine to become a comprehensive research university with a major medical center.


UNIVERSITY OF CALIFORNIA, SANTA CRUZ, established in 1965 with a residential college system. The goal of the new institution was to provide a cross-disciplinary, innovative undergraduate education. Its undergraduate focus and oceanside location led to free-wheeling spirit and the nickname "Uncle Clark's Summer Camp", named after Clark Kerr, UC president during the 1960s who founded the institution.



UNIVERSITY OF CALIFORNIA, SANTA BARBARA traces its history to Anna Blake School (1891), Santa Barbara State Normal School (1909), Santa Barbara State College (1921), Santa Barbara College of the University (1944), and University of California, Santa Barbara (1958). Today it is a comprehensive research university ranked among the nation's best with particularly strong programs in the physical sciences.


California Universities

UNIVERSITY OF CALIFORNIA SAN DIEGO, a public research university located in La Jolla was established in 1960, near the Scripps Institution of Oceanography. UCSD was organized as a collection of six residential colleges, similar to Oxford and Cambridge. Its proximity to the high-tech industries in southern Californa stimulated its growth into one of the nation's leading research universities.

UNIVERSITY OF CALIFORNIA, IRVINE was established in 1965, one of the three new UC campuses to accommodate the growing enrollments. UC Irvine operates the UC Irvine Medical Center, the Arboretum and a portion of the UC Natural Reserve System. UCI set up the first Earth System Science Department in the United States, and its innovation in such research activities has contributed to its leadership as a research university.

UNIVERSITY OF CALIFORNIA, SAN FRANCISCO was established in 1864, as the Toland Medical College, and as the Medical Department of the University of California (1873). It is dedicated entirely to the health sciences, and its School of Medicine is the oldest medical school in the Western United States. Located in the center of San Francisco, its medical center is both one of the largest and most complete in the nation.

California Universities

The **UNIVERSITY OF CALIFORNIA, MERCED** is the newest UC campus, established in 2005 in the heart of the San Joquin Valley just north of Fresno. Although its location in the heart of the state's agricultural industry provides a strong mission in the agricultural sciences, UC Merced has evolved into a comprehensive university campus with an enrollment of 7,000 undergraduate students and a rapidly forming set of graduate programs.



The **UNIVERSITY OF CALIFORNIA, RIVERSIDE** was established in 1954 on the site of the UC Citrus Experiment Station. Today with an enrollment of 21,000, it has evolved into a general campus of the UC system with one of its most ethnically and economically diverse student bodies. Both its College of Education and College of Engineering are particularly strong. It was the first public university campus in the nation to offer gender-neutral housing option for students.

The **UNIVERSITY OF SOUTHERN CALIFORNIA** is a private university established in 1880, and affiliated with the Methodist Church until 1952. It has educated a large number of southern California business leaders, and its location in Los Angeles enabled it to establish relationships with cultural institutions throughout Asia and the Pacific Rim. Along with UCLA, UCI, and Caltech, it provides the Los Angeles area with a powerful technology-driven economy.



Technical Institutes

Caltech

Olin College of Engineering

Georgia Tech

MIT

RPI

RIT

US Air Force Academy

US Military Academy

US Naval Academy

Technical Universities

The **CALIFORNIA INSTITUTE OF TECHNOLOGY** is a private doctorate-granting institution in Pasadena, California. A preparatory and vocational school in 1891, it was reconfigured as one of the nation's leading scientific institutes by scientists such as George Hale, Arthur Noyes, and Robert Milliken in the early 20th century. Today many regard Caltech as the world's leader in the physical sciences, as evidenced by its many Nobel Prize winners.



The **MASSACHUSETTS INSTITUTE OF TECHNOLOGY,** a private research university in Cambridge, Massachusetts was established in 1861. MIT adopted a European polytechnic model stressing laboraory instruction in applied science and engineering. Its leadership in these areas led to the Route 128 high-tech corridor in Boston and established leadership in many areas such as computer technology and biotechnology.



The **GEORGIA INSTITUTE OF TECHNOLOGY** is a public research university in Atlanta. Founded in 1885 as the Georgia School of Technology as part of a plan to build an industrial economy in the post-Civil War South. Georgia Tech expanded rapidly during the 20th century and today is the leading science and engineering school in the southern United States. Its graduates have gone on to lead much of the nation's high technology industries.



Technical Universities

RENSSELAER POLYTECHNIC INSTITUTE is a private research university in Troy, NY. Established in 1824 as the nation's first engineering school by Stephen van Rensselaer and Amos Eaton, RPI has embraced the mission of the "application of science to the common purposes of life". It has served as a model not only for the engineering programs in other universities but also for the nation's service academies.



FRANKLIN W. OLIN COLLEGE OF ENGINEERING, located in Needham, Massachusetts was established in 1997, funded primarily by the F. W. Olin Foundation, and adopting a highly innovative approach to engineering education consisting of student team projects rather than traditional majors. It has worked closely with neighboring Wellesley College to provide the additional liberal arts education for its students.



ROCHESTER INSTITUTE OF TECHNOLOGY became a private doctoral university in 1944. It traces its history to 1891 with the merger of Rochester Athenaeum (1829), Mechanics Institute (1885). The original name was Rochester Anthenaeum and Mechanics Institute. Composed of nine academic colleges, RIT enrolls around 17,000 students. It is most widely known for its programs in computing, engineering, imaging science, as well as several fine arts programs.

Technical Universities

The **UNITED STATES MILITARY ACADEMY AT WEST POINT,** also known as **West Point, Army, Army West Point, The Academy or The Point,** founded in 1802 is a four-year federal service academy. Established originally as a fort on the Hudson River, today West Point is the source of the leadership of U.S. Army and other areas of the armed forces. Candidates must both apply for admission to the academy and be nominated by a member of Congress.



The **UNITED STATES NAVAL ACADEMY,** also known as **USNA, Annapolis, or Navy,** is a federal service academy in Annapolis, Maryland, educating officers for the US Navy and US Marine Corps. Established on the grounds of Fort Severn in 1845, today it enrolls 4,500 cadets (both men and women). The academic program is based on a science and engineering curriculum, augmented with training in leadership and military policy.

The **UNITED STATES AIR FORCE ACADEMY,** also known as **USAFA, Air Force Academy,** or **the Academy**, a military academy for officer training for the US Air Force was established in 1945 in Colorado Springs. Admission is very competitive, enrolling around 4,200 students and requiring nomination, as with the other service academies. Cadets take a broad curriculum not only in science and engineering but as well in the liberal arts and leadership.



Chapter 7

A Gallery of Universities of the World

Great Britain and Ireland Universities

Oxford

Queen Mary University

Cambridge

Imperial College London

University College London

London School of Economics

St. Andrews

Edinburgh

Glasgow

Great Britain and Ireland Universities

Bristol

Liverpool

Durham University

Kings College London

University of Sheffield

Manchester

Trinity Dublin

NEI Galway

University of Cork

Great Britain and Ireland

OXFORD UNIVERSITY began teaching students around 1096 (making it the first college in the English-speaking world) and grew rapidly after 1167 when Henry II banned English students from enrolling in the University of Paris. Both Oxford and Cambridge are divided into dozens of self-governing "colleges" containing both faculty and students. Since the city of Oxford grew up around its colleges, it does not have a campus in the sense of contemporary universities.



CAMBRIDGE UNIVERSITY was founded in 1209 (second only to Oxford in the English-speaking world) by scholars fleeing from Oxford because of a dispute with the townspeople. Cambridge, like Oxford, is comprised of self-governing colleges, along with one of the world's great libraries, cultural and scientific museums, publishing houses, and medical organizations (i.e., Cambridge University Health Partners).



The IMPERIAL COLLEGE OF LONDON was established in 1851 by Prince Albert, who envisioned the South Kensington location to include the Victoria and Albert, Museum, the Natural History Museum, Royal Albert Hall, and the Imperial Institute. The College was organized into faculties of science, engineering, medicine, and business, with an emphasis on emerging technologies and practical application.



Great Britain and Ireland

KINGS COLLEGE LONDON was established in 1829 by King George IV and the Duke of Wellington. Today, Kings has five campuses: Strand Campus, Guy's, St. Thomas', Waterloo, and Denmark Hill. Kings became one of the two founding colleges of the University of London (the other being University College London). Kings is a founding member of the Francis Crick Institute and Med City, the largest European Center for medical teaching and biomedical research.



UNIVERSITY COLLEGE LONDON - UCL was established in 1826 as the first university in London and the first in England to be secular, without religious affiliation for its students. It was also the first English university to admit women. UCL has its main campus in the Bloombury area of central London with a number of institutes and teaching hospitals elsewhere in London and satellites in other nations.



ST. ANDREWS UNIVERSITY was established between 1410 - 1413 when a group of Augustinian clergy was expelled from the University of Paris by the Avignon schism and from Oxford and Cambridge by the Anglo-Scottish War. The University occupies historic and modern buildings throughout St. Andrews and has 18 academic schools organized into four faculties. It is consistently ranked as the third best university in the UK, behind only Oxbridge.



Great Britain and Ireland

THE UNIVERSITY OF EDINBURGH was established in 1582. The university is located within the Old Town of Edinburgh with many of the buildings in this historic district belonging to the university. The instutution played an important role as the chief intellectual center during the Enlightment and gave the city the nickname of "the Athens of the North". Alumni included some of the great names in history such as Maxell, Darwin, Hume, and Bayes.



The UNIVERSITY OF GLASGOW was established in 1451. Glasgow originally educated wealthy students, preparing them for professions in law, medicine, civil service, teaching, and the church. In the 19th century it began to provide for the needs of the growing urban and commercial middle class. It numbers among its graduates some of the great names in history: engineer James Watt, economist Adam Smith, physicist Lord Kelvin, and surgeon Joseph Lister.



The **UNIVERSITY OF BRISTOL (**1909) was originally named the Merchant Venturers' Navagation School (1595), followed by the University College of Bristol (1876). The university is located throughout the city. Bristol is organized into six academic faculties with many programs at the undergraduate and graduate level. It is general ranked among the top ten of UK universities and is a highly selective institution in admissions and recruitment of its faculty.



Great Britain and Ireland

The UNIVERSITY OF LIVERPOOL was established in 1881 and gained its royal charter in 1903, which allowed it to award degrees. It is one of the six original "red brick universities", a term originally used to refer to universities in British industrial cities. It was one of the world's first universities to establish programs in oceanography, urban studies, architecture, and biochemistry. It has established an independent university in China, Xi'an Jiaotong-Liverpool University.



The UNIVERSITY OF MANCHESTER was formed in 2004 by the merger of the University of Manchester Institute of Science and Technology and the Victoria University of Manchester. The University of Manchester is also a red brick university, south of the Manchester city center. It has the third largest endowment in England, after only Oxbridge, and operates major cultural assets such as musuems, art galleries, observatories, and has produced 25 Nobel Laureates.



TRINITY COLLEGE, DUBLIN was established in 1592. It was modeled after the Universities of Oxford and Cambridge, but with only one college, known as "Trinity College" or the "University of Dublin". It was established to consolidate the rule of the Tudor monarch in Ireland as one of Britain's earliest universities and the oldest in Ireland. It is widely considered to be the most prestigious university in Ireland due both to its history and competitive admissions process.



Great Britain and Ireland

The **LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE (LSE)** was founded in 1895 for the betterment of society. LSE joined the University of London in 1900 and established its first degree courses in 1901. Its global reputation is demonstrated by the fact that over 70% of its enrollment are international students. It is renown for some of the highest quality research in the social sciences in the world.



QUEEN MARY UNIVERSITY OF LONDON (QMUL) was founded in 1785 and named in honor of Mary of Teck. QMUL has faculties in Science and Engineering, Humanities and Social Sciences, and Medicine and Dentistry. In 1995 it merged with Westfield College along with St. Bartholomew's Hospital Medical College and the London Hospital Medical College to form its School of Medicine and Dentistry.



The **UNIVERSITY OF DURHAM** was founded by an Act of Parliament in 1832 and granted a Royal Charter in 1837. The university includes 63 buildings, including the 11th century Durham Castle and a 1930s Art Deco Chapel. Durham was one of the first universities to charge tuition in England and has done so for more than 600 years. The University manages the Durham World Heritage site in partnership with Durham Cathedral.



Great Britain and Ireland

The **UNIVERSITY OF SHEFFIELD** was established in 1905 by a merger of three colleges. Sheffield is one of the red brick universities founded in the late 19th century industrial cities of England to provide students with techinical and engineering skills. It is a multi-campus university spread over two campus areas and organized into five academic faculties. In 2011 Sheffield was named "the University of the Year" by the Times Higher Education Award.



UNIVERSITY COLLEGE CORK was founded in 1845 as one of three Queen's College that were located in Belfast, Cork and Galway. In 1908 it was renamed the University College, Cork, and renamed again in 1998 as the **NATIONAL UNIVERSITY OF IRELAND, CORK.** The institution has four colleges: Arts/Celtic Studies/Social Science; Business/Law; Medicine/Health Sciences; Engineering/Food Science, and has an enrollment of 20,000 students.



The **NATIONAL UNIVERSITY OF IRELAND GALWAY** was founded in 1845 as Queen's College, Galway, renamed the Queen's University of Ireland (1846), the University College, Galway (1908), and the National University of Ireland, Galway (1997). Under the University College, Galway Act of 1929, the institution was given the responsibility of using the Irish language as the working language of the college.



Italian Universities

University of Bologna

Polytechnique University of Milan

University of Padua

University of Turin

University of Rome

University of Milan

University of Pisa

University of Naples

University of Florence

Italy

The **UNIVERSITY OF BOLOGNA** was founded in 1088. It is the oldest university in the world in continuous operation and the first institution to use the term *universitas* to note the organization of students and masters. It enrolls 85,000 students in its 11 schools. The University's crest carries the motto *Alma Mater Studiorum*, and it is considered the *alma mater* for all of the world's universities. It has campuses in Ravenna, Forli, Cesena, Rimini and abroad in Buenos Aires.



The **UNIVERSITY OF PADUA** was founded in 1222 as a school of law and theology and was one of the most prominent universities in early modern Europe. It is probably older than the 1222 date when a large group of students and professors left the University of Bologna in search of more academic freedom. The university expanded its curriculum into civil and Canon law, astronomy, dialectic, philosophy, grammar, medicine, and rhetoric.



The **SAPIENZA UNIVERSITY OF ROME** was founded in 1303 and reorganized in 1431 to offer Law, Medicine, Philosophy and Theology. A tax on wine raised funds for its support. In the 1650s the university became known as *Sapienza*, meaning wisdom. Today with 112,564 students, it is the largest European university by enrollments. Until 1982, it was the only public university in Rome and hence responsible for educating most of Italy's leadership.



Italy

Although the first university in Florence was the *Studium Generale* established by Pope Clement VI in 1132, the **UNIVERSITY OF FLORENCE** of today was established in 1859 and recognized as a full-fledged university in 1860 by the government of the newly unified Italy. There are 12 schools, and the faculties are located throughout Florence based on their subject matter.

The **UNIVERSITY OF MILAN** was founded in 1924 from a merger of two older institutions with programs in medicine, sciences, and humanities. The university is located in several buildings in Milan's historic district and is one of Europe's largest with 60,000 students and a teaching and research staff of 2,000. It consistently ranks as one of the best universities of Italy both overall and in specific subject areas.

The **UNIVERSITY OF NAPLES FEDERIO II,** founded in 1224, is the oldest public non-religious university in the world and one of the oldest academic institutions in continuous operation. Its mission was dedicated to training secular and administrative staff. It ranks among the best universities in the world both in instruction and in research. It is the only generalist Italian university globally ranked.

Italy

The **UNIVERSITY OF PISA** was founded in 1343 by an edict of Pope Clement VI, which guaranteed the universal and legal value of its educational qualifications. The first courses of study included theology, civil law, canon law and medicine. Its curriculum has broadened over time to include both the basic and applied sciences, including space and nuclear science. It ranks along with La Sapienza University of Rome as Italy's leading university.



The **UNIVERSITY OF TURIN** was founded in 1404. Suffering many disruptions, including the plague, it was moved to Chieri (between 1427 and 1434), and Savigliano (1434). Closed in 1536, it was reorganized in 1566 based on the University of Bologna. Today it continues to play an important role ranking as not only one of the oldest but also one of the leading institutions in research and in training across the disciplines.



The **POLYTECHNIC UNIVERSITY OF MILAN** was established in 1863 and is the largest technical university in Italy, offering degrees in engineering, architectlure, and design. There are two main campuses in Milan and five campus in other major cities. It is ranked as the top university in engineering in Italy, with particular strength in design, civil and structural engineering, and architecture.



French Universities

Paris -Sorbonne

Paris-Saclay

Montpellier

Toulouse

Grenoble

École Polytechnique

Aix-Marseilles

École Normale Supéricure Paris

Strasbourg

France

The **UNIVERSITY OF PARIS-SORBONNE** was established around 1150 and associated with the cathedral school of Notre Dame de Paris. It is thought to be the second oldest university in Europe, the University of Bologna being the first. Its primary campus is primarily located in the Latin Quarter of Paris with other campuses in Marais, Malesherbes, and Cligancourt. In 2018 the Faculty of Humanities of the University of Paris merged into Sorbonne University.

The **UNIVERSITY OF STRASBOURG** traces its beginning to the German language *Universitat StraBburg* founded in 1538 and later turned into a French university following the French Revolution. In 1970 it was divided into three institutions: Louis Pasteur University, Marc Bloch University and Robert Schuman University. Today U Strasbourg is the second largest in France with 46,000 students.

The **ÉCOLE NORMALE SUPÉRIEURE (ENS)** was founded in 1794 and located in the Latin Quarter of Paris. It was recreated as a *grande écol*e during the French Revolution with the intent of providing the Republic with professors trained in the spirit and values of the Enlightment (including Michel Foucault and Jacques Derrida). Today it has achieved particular recognition in the fields of mathematics and physics.

France

The **ÉCOLE POLYTECHNIQUE,** established as a *grand école* in 1794 during the French Revolution, once served as a military academy in 1804. Originally located in the Latin Quarter of Paris, the main buildings were moved to Palaiseau on the Saclay Plateau in 1976 and today serves as one of the world's leading engineering academies. It provided the model for other "polytechnic" institutions such as École Poltechnique de Montreal and the California Institute of Technology.



AIX-MARSEILLES UNIVERSITY was founded in Provence in 1409. Today's university is the largest in France with nearly 70,000 students, resulting from the 2012 merger of three universities: The University of Provence, the University of the Mediterranean, and Paul Cezanne University. Five campuses are located in Aix-en-Provence and Marseille. It is known for its programs in the fields of law, politics, business, economics, and literature.



The **UNIVERSITY OF PARIS-SACLAY** opened in 2015 with the goal of becoming a research-focused French federal university. Its goal is to become the center for training within the technology clusters, similar to Stanford University in Silicon Valley. It integrates several leading *grandes écoles*, public universities, and research centers that are part of the world's top research organizations in various fields of science and technology.



Spain, Portugal, Greece Universities

University of Salamanca

University of Athens

University of Valladolid

Complutense U of Madrid

University of Barcelona

University of Alcalá Madrid

University of Coimbra

University of Lisbon

Autonomous U of Madrid

Spain, Portugal, Greece

The **UNIVERSITY OF SALAMANCA,** founded in 1134, is the oldest university in Spain. It is renown for the study of the humanities, especially languages. The university was used as the model for educating the indiginous peoples during Spain's conquest of South America and today lays the foundation for modern-day law and economic science. It draws students from across Spain and the world.



The **COMPLUTENSE UNIVERSITY OF MADRID** received a Royal Charter in 1293 to found a *Studium Generale* (1293-1499). (The name comes from *Complutum*, the latin name of Alcalá where the University was first located.) Today's campus occupies the entire Ciudad Universitaie district of Madrid and enrolls over 86,000 students. Over the course of seven centuries the University has provided invaluable contributions in the sciences, fine arts, and political leadership.



The **UNIVERSITY OF ALCALÁ** was founded as a *Studium Generale* in Alcalá de Henares in 1293. By royal order in 1836 it was moved to Madrid and renamed the Literary University. In 1851 it was called the Central University of Madrid and in the 1970s returned to its original name of the University of Alcalá. Today the University preserves its traditional humanities faculties to promote an diffuse the Spanish language.



Spain, Portugal, Greece

The **AUTONOMOUS UNIVERSITY OF MADRID** is a public university established in 1968. The end of Spain's isolation following its civil war led to economic growth for the middle class, resulting in the demand for greater access to higher education. The campus is located north of Madrid and known for the quality of its Faculty of Law, the most prestigious in Spain. It also ranks highly in fields such as mathematics.



The **UNIVERSITY OF VALLADOLID** was founded in 1241 in the city of Valladolid. The university maintains seven campuses located in four cities of Castile and Leon: Valladolid, Palencia, Soria and Segovia. The campus, designed as a university town, was to be self-sufficient. It is particularly well-known for its programs in music and the theatrical arts, presenting numerous cultural programs through the year.



The **UNIVERSITY OF BARCELONA** was established in 1450. Throughout the centuries Barcelona had many schools sponsored by the cathedral and the city. Today, offering 353 graduate programs and 96 doctorate programs to its 54,000 students, it is considered the best university in Spain. It has become the principal center of university research in Spain and has set a European benchmark for research activities.



Spain, Portugal, Greece

The **UNIVERSITY OF COIMBRA,** established in Lisbon in 1290, was located in a number of cities until it moved to Coimbra in 1537. The University of Coimbra is one of the oldest universities in continuous operation and the oldest university of Portugal. It was a founding member of the Coimbra Group, a group of leading European research universities. It offers degrees at all levels in nearly all fields of knowledge, e.g., arts, humanities, natural and social sciences, and medicine.



U LISBOA

The **UNIVERSITY OF LISBON** was established in 2013 from the merger of the former University of Lisbon (1911-2013) and the Technical University of Lisbon (1930-2013). The University of Lisbon is the largest university in Portugal with around 47,000 students. The institution has eighteen schools and several research institutes, with particular strength in the fields of mathematics, physics, engineering/technology, and computer sciences.



The **NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS** was established in 1837. From 1911 to 1932 Kapodistrian University housed the humanities, while the National University was home to the sciences. They were merged in 1932. It is the oldest higher education institution of the modern Greek state and the first contemporary university in the Eastern Mediterranean, with over 104,000 students.

German Universities

Bonn

Göttingen

Heidelberg

Humboldt- Berlin

Free U Berlin

Karlsruhe

Technical U Berlin

Tübingen

Technical U Munchen

Aachen

Munich

Freiburg

Cologne

Trier

Germany

The **HUMBOLDT UNIVERSITY OF BERLIN** was established in 1811 as the University of Berlin**.** Its founder, Wilhelm von Humboldt emphasized research as the main focus of the Humboldtian model that was adapted by many of the world's universities. It remained one of the most prestigious universities in the world until after WWII when it suffered from the totalitarian government of East Berlin. Today the university is regaining its global reputation.

The **FREE UNIVERSITY OF BERLIN** was founded in West Berlin in 1948, with American support during the Cold War, as the University of Berlin in East Berlin was no longer open to the West. The FU Berlin provided students with an important voice to challenge the restrictions of the Cold War and see a reunified Germany and Berlin. Today FU Berlin and Humboldt University are working together and creating joint departments.

The **UNIVERSITY OF GÖTTINGEN,** was founded in 1734 to propagate the ideas of academic freedom. Until the Nazi purges of Jewish faculty in the 1930s, the University was the leading scientific institution of Europe with faculty such as Hilbert, Pradtl, and Einstein, many of whom fled to the United State. Following WWII, the University has recovered both its freedom and its reputation as one of the leading universities of the world.

Germany

HEIDELBERG UNIVERSITY was founded in 1386. Heidelberg is Germany's oldest university, established as the third university in the Holy Roman Empire. Today with 30,000 students, instruction in over 100 discplines, and 56 Nobel Prize winners, the university remains one of the great research universities of the world with particular strength in the sciences and medicine, attracting students from around the world.

The **LUDWIG MAXIMILIAN UNIVERSITY OF MUNICH** was founded in 1472 as the University of Ingolstadt, moving in 1800 to Landshut by King Maximillian of Bavaria and later to Munich in 1826. There was Jesuit influence during the Counter-Reformation, and the Enlightenment led to emphasis on natural science. It is the second largest university in Germany with 52,000 students, and it has played a major role in the German Excellence Initiative for promoting research excellence.

The **TECHNICAL UNIVERSITY OF MUNICH** was founded in 1868 by King Ludwig II. A research university with campuses in Munich, Garching and Freising-Weihenstaphan, it has played an important role in transitioning Bavaria from agriculture to technology. It is still the only state university dedicated to technology and engineering, although similar to other "polytechnics" in Europe and Asia

Germany

The **TECHNICAL UNIVERSITY OF BERLIN,** originally named "TH Charlottenburg", was founded in 1879 by a merger of the Berlin Building Academy (1799) and the Royal Trade Academy (1821). Today it is one of the most prestigious educational institutions in Europe with a high proportion of international students. It is known for its leading engineering programs, particularly in mechanical engineering and engineering management.



RWTH AACHEN UNIVERSITY, located in Aachen, North Rhine-Westphalia, was established in 1870. It is the largest technical university in Germany, enrolling 42,000 students in 144 academic programs. The University maintains particularly close links to industry and benefits from the highest amount of industrial support in Germany. As a leading technical institution, it also attracts a significant number of international students.



The UNIVERSITY OF BONN, established in 1818, was the successor to the Academy of the Prince-elector of Cologne, founded in 1777. An institution of the Enlightment, it was nonsectarian, offering programs in theology, law, pharmacy and general studies. Today with over 35,000 students and an usually broad collection of disciplines, the university provides leadership for German higher education in adapting to the Bologna process to unify European education standards.

Germany

The **UNIVERSITY OF FREIBURG** was founded in 1457 by the Hapsburg dynasty. The University of Vienna was the first university to be established in the Austrian-Hapsburg territory, Freiburg being the second. The University has a long tradition of teaching in the humanities, social sciences, and natural sciences, enrolling 25,000 students in programs offered by 11 faculties and attracting students from across Europe.



The **UNIVERSITY OF COLOGNE** was founded and began teaching in 1388. Closed by the French in 1798, it was re-established by the Prussian government in 1919. Cologne is the largest university in Germany, enrolling more that 48,000 students. The University is a leader in the area of economics and is regularly placed in top positions for law and business, both for national and international rankings.



The **UNIVERSITY OF KARLSRUHE** was founded in 1825 as a polytechnical school, modeled after the École Polytechnique in Paris. Located near to several leading European research laboratories in areas such as atomic and nuclear physics, Karlsruhe has the leading computer science program in Germany, establishing a computer laboratory in 1966. The University receives more federal funding for research that any other German university.

Germany

The **UNIVERSITY OF TRIER** was founded in 1473. Due to finances, the university was acquired by the Jesuits in 1560. It was closed by the French in 1798 and remained closed until 1970 when it was re-established by the state of Rhineland-Palatinate. Today the University has 14,000 students attending programs of 6 faculties. It continues to honor its host city with the motto: "God completes the favors of wisdom from the City of Trier!"

The **UNIVERSITY OF TÜBINGEN** was established in 1477. One of Germany's oldest universities, it is noted for medicine, natural sciences, and the humanities. The university does not have a campus, but uses several buildings in the old town. In the area of German studies, it has been ranked first almong all German universities for many years, and it is known as a center for the study of theology and religion. (Tubingen is also a "sister city" of Ann Arbor, Michigan.)

Western European Universities

Genèva

Ghent

Stockholm

Groningen

Oslo

Copenhagen

EPFL Lausanne

Wageningen

University of Vienna

Univeristy of Helsinki

Zurich

Western European Universities

Karolinska Sweden

Amsterdam

Uppsala

Aarhus

KU Leuven

University of Lund

Erasmus Rotterdam

ETHZ Zurich

University of Bergen

University of Aalto

University of Iceland

Western Europe

The É**COLE POLYTECHNIQUE FEDERALE DE LAUSANNE (EPFL)** was established in 1853 as a research institute and university specializing in the natural sciences and engineering with the mission of education, research and technology transfer. EPFL is widely regarded as one of the leading technical universities in the world. Located in the French-speaking part of Switzerland, its sister institution in the German-speaking part is the Federal Institute of Technology in Zurich.



The **SWISS FEDERAL INSTITUTE OF TECHNOLOGY IN ZURICH (ETH ZURICH)** was established in 1855. The mission was to educate scientists and engineers to serve the national interest and to interact with industry. ETH Zurich is consistently ranked among the most prestigious universities in Europe for the subjects of engineering and technology. Its most famous faculty member was Albert Einstein!



The **UNIVERSITY OF ZURICH** was established in 1833 from existing colleges of theology, law, medicine, and philosophy. It was the first European university to be established by the state. It is the largest university in Switzerland, enrolling over 26,000 students. It consists of seven faculties: philosophy, human medicine, economic sciences, law, mathematics and natural sciences, theology and veterinary medicine.



Western Europe

The **UNIVERSITY OF GENÉVA** was established in 1559 by John Calvin as a theological seminary and law school. In 1873, it dropped its religious affiliations and became a secular institution. It offers studies over a broad range of disciplines taught by nine faculties. The university actively pursues teaching, research, and community service as its primary objectives, and it is a member of the LERU organization of top European research universities



The **UNIVERSITY OF COPENHAGEN** was established in 1479 and is the oldest university and research institution in Denmark. The university has four campuses located in the Copenhagen area. Although instruction is offered in Danish, the large number of international students (about half from Nordic countries) has motivated the institution to do much of its teaching in English. The University has been shifting its activities from old city buildings to a new campus.



The **UNIVERSITY OF AARHUS** was established in 1928. It is the largest university in Denmark with an enrollment of 44,500 students after a merger with Aarhus School of Engineering in 2013. The institution was founded after WWI to handle the country's increase in students, particularly after U Copenhagen became overcrowded. Its business school has attracted particular attention with "Triple Crown" accreditation.



Western Europe

The **ERASMUS UNIVERSITY ROTTERDAM** was established in 1913, named after Desiderius Erasmus Roterodamus, a 15the century humanist and theologian. The institution focuses on four major areas: Health, Wealth, Governance, and Culture. It manages the largest and one of the foremost academic medical center in the Netherlands, while its schools of economics and management are European leaders.



The **UNIVERSITY OF GHENT** was established as a Flemish institution in 1817. After the Belgian revolution of 1830 the new Belgian state began to administer the university, and it became the first Dutch speaking university in Belgium. Today the University enrolls 41,000 students with 9,000 staff members. In contrast to the Catholic University of Leuven or the Free University of Brussels, it considers itself a pluralist university, unconnected to any particular religion or ideology



WAGENINGER UNIVERSITY AND RESEARCH CENTER, a Dutch university located in Wageningen, Netherlands, was established 1918, with a merger of Wageninger University with the National Agricultural College. Today the university is considered world-class in the fields of life sciences, agricultural and environmental science, and forestry. The institution has around 11,000 students from over 100 countries.



Western Europe

The **UNIVERSITY OF AMSTERDAM** was established in 1632. Its main campus is located in the center of Amsterdam and is one of Europe's largest research universities with 32,000 students. The University has produced not only Nobel laureates but also Dutch prime ministers. It has faculties in the areas of humanities, social and behavioral sciences, economics and business, science, law, medicine, and dentistry.



The **UNIVERSITY OF GRÖNINGEN** was established in 1614 in the Netherlands. At its founding there were four faculties: Theology, Law, Medicine and Philosophy. It has frequently been selected as the best university in the Netherlands, with eleven faculties, nine graduate schools, 27 research centers, and more than 175 degree programs. The number of foreign students enrolled at the University has been increasing, particularly from Germany.



The **CATHOLIC UNIVERSITY OF LEUVEN** was established in 1425, discontinued in 1797 by the French, and re-established in 1834. The bilingual institution was divided into two "sister universities" in 1968, turning the Dutch language section of the University into the independent Katholieke Universitiet Leuven and the French-speaking university, Université Catholique de Louvain, which was moved to a new greenfield campus.



Western Europe

The **KAROLINSKI INSTITUTE** is a medical university founded in 1810 in Stockholm and today ranks among the leading medical academic programs in the world. Each year the Institute awards the Nobel Prize in medicine or physiology. The Institute serves both as a major health care provider and a biomedical research center, acounting for 30% of the medical training and 40% of the academic medical and life sciences research in Sweden.



The **UNIVERSITY OF STOCKHOLM,** established in 1878 as a college and receiving university status in 1960. With over 70,000 students in studies of law, humanities, mathematics, and the natural sciences it is one of the largest universities in Scandinavia. Although initially located in urban Stockholm, its growth in enrollment stimulated a move of the main campus to Frescati, located north of the city center.



The **UNIVERSITY OF OSLO,** established in 1811, is the oldest university in Norway and was modeled after the Universities of Copenhagen and Berlin. The faculties include: Theology, Law, Medicine, Humanities, Mathematics, Natural and Social Sciences, Dentistry and Education. Its original campus is located in the center of Oslo, but further growth, particularly in its medical centers, has occurred in suburban Oslo.



Western Europe

The **UNIVERSITY OF VIENNA** was established in 1362. The university does not have a single campus but has grown along with the city with sixty academic buildings located throughout Vienna. With 94,000 students, it is both one of the largest and most respected universities in Europe. At one time it was organized as a democratic institution with equal power to students, junior faculty, and professors, but today the university has a governing board and chancellor.



HELSINGIN YLIOPISTO
HELSINGFORS UNIVERSITET
UNIVERSITY OF HELSINKI

The **UNIVERSITY OF HELSINKI was** established in 1640 in the city of Turku as the Royal Academy of Åbo. In 1829 it moved to Helsinki. It is oldest and largest university in Finland, enrolling around 36,000 students, complying today with the Bologna process offering bachelor, master, licenciate, and doctoral degrees. Remaining true to its strong Humboldtian past, the University places heavy emphasis on high quality teaching and research.

The **UNIVERSITY OF ICELAND** was established in 1911, merging three post-secondary institutions, which taught theology, medicine and law. The campus is located in central Reykjavik with additional activities adjacent to the city and in the countryside. The university has five schools, offering social and natural science, humanities, medicine, engineering and education to a student population of around 13,000.



Western Europe

The **UNIVERSITY OF BERGEN** was founded in Bergen, Norway in 1946, although it was preceeded by the Bergen Cathedral School in 1153 and the Royal Norwegian Naval Academy in 1817. The Bergen Museum had been offering academic studies since 1825. The university enrolls around 17,000 students and, in common with other Norwegian universities, charges no tuition to its enrolled students.



AALTO UNIVERSITY was established in Helsinki in 2010 as a merger of three Finish universities: Helsinki University of Technology (1849); Helsinki School of Economics (1904); University of Art and Design Helsinki (1871). Close collaboration between the scientific, business, and arts communities was encouraged to foster multidisciplinary education and research. It was named after Alvar Aalto, the prominent Finnish architect and designer who planned much of its campus.



LUND UNIVERSITY, established in 1666 in the province of Scania, Sweden traces its beginning to 1425 as a Franciscan *studium generale* located next to the Lund Cathedral. Lund is one of Europe's oldest universities. Today the University has 42,000 students enrolled across eight faculties with 302 different programs and 2,000 courses. It is the site of a world-leading synthrotron radiation laboratory used for materials research.



Eastern European Universities

St. Petersburg State

Moscow State

Jagiellonia

Boğaziçi

Technical U of Prague

National Nuclear U

Charles

Middle East Technical U

Eötvös Loránd

Eastern Europe

MOSCOW STATE UNIVERSITY was established in 1755 by the Russian Empress Elizabeth. After the October Revolution of 1917, the university admitted children of the proletariat and peasantry, helping to prepare these children for entrance exams. Today many of its programs are located in a building complex towering above the city as one of the tallest structures in the world. The university has also expanded into other campuses bordering the city.



ST. PETERSBURG STATE UNIVERSITY was established in 1724 and is the oldest and one of the largest universities in Russia enrolling around 35,000 students. During the Soviet period the university was known as Leningrad State University and its graduates include Vladimir Putin. Today the university has programs covering a broad spectrum of the humanities, social sciences, natural sciences, and technology.



The **NATIONAL RESEARCH NUCLEAR UNIVERSITY (MOSCOW)** was established in the 1940s during WWII with the goal of training people for the nuclear industry. The institution became the leader in education and training for peaceful nuclear energy, with significant nuclear facilties (including a research nuclear reactor) on its campus. More recently it was renamed the Moscow Engineering Physics Institute.



Eastern Europe

CHARLES UNIVERSITY (PRAGUE) was established in 1348 by the Holy Roman Emperor Charles IV. It is both the oldest and largest university in the Czech Republic and the first university in Central Europe. Like many other institutions founded in medieval times, the institution does not have a campus, but rather academic buildings are located throughout the city. Since Czech's emergence from behind the Iron Curtain, the university has enjoyed academic freedom.



JAGIELLONIAN UNIVERSITY, also known as the **UNIVERSITY OF KRAKÓW,** was established in 1364. The campus is located in the city of Kraków and offers studies in the humanities, law, natural and social sciences and medicine. With over 40,000 students, it is both Poland's largest university and most admired institution of higher learning. On its 500th anniversary, a monument to Copernicus was placed on its campus.



The **MIDDLE EAST TECHNICAL UNIVERSITY (METU),** located in Ankara, Turkey was established in 1956. It was organized to contribute to the development of a skilled workforce, with emphasis on engineering and the natural sciences for the surrounding Middle East countries. The official language of instruction is English, aimed at encouraging an international student body and faculty. The institution has around 31,000 students


Eastern Europe

BOĐAZIÇI UNIVERSITY, located in Istanbul, Turkey was founded in 1863 as Robert College (named after Christopher Robert, a wealthy American and philanthropist). It was the first American institution of higher education founded outside of the United States, and instruction was given in English. Today the university operates on six campuses in Istanbul with emphasis on applied science, engineering and social sciences.



EÖTVÖS LORÁND UNIVERSITY, located in Budapest, Hungary, traces its history to 1635, begun as a Catholic institution for teaching theology and philosophy. It went through many name changes from 1770 until 1950 when it acquired its current name. It is the largest and most prestigious public university in Hungary, with 28,000 students and research institutes located throughout Budapest and along the Danube.



The **CZECH TECHNICAL UNIVERSITY IN PRAGUE was** established in 1707 in the Kingdom of Bohemia. Today it is one of the largest universities in the Czech Republic, and also the oldest non-military technical university in Europe. It has eight faculties and 419 fields of study in the basic and applied sciences and engineering. It has a number of important research institutes in areas including computing, applied physics, and radiochemistry.



Canadian Universities

Queens

Toronto

McGill

British Columbia

Alberta

McMasters

Montreal

Ottowa

Laval

Canada

McGILL UNIVERSITY was established in 1821 by royal charter granted by King George IV of the United Kingdom. It was named in honor of James McGill, a Montreal merchant from Scotland, whose bequest established McGill College in 1813. Located on Mount Royal in downtown Montreal, McGill offers degrees in over 300 fields of study with most students in the five largest faculties: Arts, Science, Medicine, Engineering, and Management.



LAVAL UNIVERSITY, a French-language public research university, located in Quebec City was issued a royal charter by Queen Victoria in 1852. It traces its roots to the Séminaire de Québec (1663), making it the oldest higher education institution in Canada. The university was founded by the British to provide French Canadians with the opportunity to pursue higher education. Most of its campus was erected from the 1950s onward in the suburbs of Quebec City.


The **UNIVERSITY OF TORONTO** was established by royal charter as King's College in 1827. The Church of England controlled the university until 1850 when it became a secular institution and was named the University of Toronto. The university has played a leadership role in many fields, including literary criticism, communication theory, and was the birthplace of the electron microscope, insulin, and stem cell research.



Canada

THE UNIVERSITY OF ALBERTA, a public research university located in Edmonton, Alberta, Canada was established in 1908. Modeled on the US state universities stressing research and extension service to the country, today the university enrolls about 40,000 students. With additional campuses in Calgary, it has become a major economic driver in Alberta, with an economic impact amounting to roughly 5% of the Alberta's GDP.



McMASTER UNIVERSITY, a public research university in Hamilton, Ontario, was established in 1887 and named in honor of William McMaster, a Canadian Senator and banker, with a bequest of $900,000. The Baptist Convention controlled the university until it became a privately chartered and publicly funded non-denominational institution in 1957. Today it enrolls over 30,000 students in subjects including business, engineering, health sciences, humanities, and sciences.



MONTREAL UNIVERSITY was established in 1878, initially as a branch of the Université Laval, and named Université de Laval in Montréal. In 1919 it was granted full autonomy as a Catholic university and later in 1967 became a secular institution with a provincial charter. It has over 67,000 students, drawing from across Canada and internationally. It offers 650 undergraduate and 71 doctoral programs.



Canada

The **UNIVERSITY OF OTTAWA** was established by the Catholic Archdiocese of Ottowa as the College of Bytown in 1848 and renamed the College of Ottawa in 1861, receiving university status in 1866. It was reorganized in 1965 as a corporation, independent of any outside body or religious affiliation. Today as a bilingual public research university, it enrolls over 41,000 students across a broad range of disciplines.



QUEENS UNIVERSITY, located in Kingston, Ontario, Canada was established in 1841 by the Church of Scotland, with a royal charter by Queen Victoria. The original intent of the university was to prepare students for the ministry, but today Queens is a public research university with 25,000 students across ten undergraduate, graduate, and professional faculties and schools, including offering the first extension courses in Canada.



Australian Universities

West Australia

Melbourne

Queensland

New South Wales

Australian National

Sydney

Adeliade

Monash

Australia

The **UNIVERSITY OF SYDNEY,** Australia's first university, was established in 1850 because of the belief that a state secular university was imperative for the growth of a society aspiring towards self-governance. The university today has sixteen faculties and schools and enrolls around 34,000 students. One of Australia's "sandstone" universities, it is noted to be one of Australia's most beautiful campuses.

The **UNIVERSITY OF NEW SOUTH WALES** was established in the Sydney suburb of Kensington in 1949. Its predecessors, the Sydney Mechanics' School of Arts (1833) and the Sydney Technical College (1878), were established to provide training in the new technologies economies as the New South Wales economy shifted from its pastoral base to industries fueled by the industrial age. Although it attempted to launch a campus in Singapore in 2007, this soon collapsed financially.

The **AUSTRALIAN NATIONAL UNIVERSITY,** a research university located in Canberra, was established in 1946. There are seven teaching and research colleges, plus national academies and institutes located on its main campus in Acton. Originally a postgraduate research university, it commenced undergraduate teaching in 1960 by adding the Canberra University College, a former campus of the University of Melborne.

Australia

MONASH UNIVERSITY was established in 1958 and located in Melbourne, Australia. Monash enrolls over 48,000 undergraduates and 21,000 graduate students. The University has a number of campuses in Victoria and one campus in Malaysia, as well as international alliances with Italy, India, China, South Africa, and the University of Warwick in the UK. It is home to major research facilities including the Australian Synchrotron and Australian Stem Cell Centre.

The **UNIVERSITY OF QUEENSLAND,** founded in 1909, is one of Australia's oldest sandstone universities. The main campus is in Brisbane with other campuses located throughout Queensland. With 51,000 students, the University has a broad range of academic programs as well as over one hundred research institutes and centers in areas such as nanotechnology, bioengineering, and vaccine development.

The **UNIVERSITY OF MELBOURNE** was founded as a "sandstone" university in 1853 and located in Parkville. Other campuses are located across Victoria. Its campus is designed as a collection of 12 residential colleges (similar to Oxbridge) and its academic programs consist of 11 separate academic units associated with numerous research centers in areas including neuroscience, law, social reserach, and business.

Australia

The **UNIVERSITY OF ADELAIDE** was established in 1874 as the third oldest university in Australia. One of the sandstone universities it includes faculties in Engineering, Computer & Mathematical Sciences, Health and Medical Sciences, Arts, Professions and Sciences. The university has five campuses and operates a number of independent research institutes in areas including economic studies and medical research.



The **UNIVERSITY OF WESTERN AUSTRALIA** was established in 1911 with its main campus in Perth and a branch campus in Albany. The original campus was located in the center of the city until 1932 when the campus was relocated to a new site in Crawley. Setting aside an early controversy about whether its policy of free education was compatible with high salary faculty, it has evolved into an important education and research center in Western Australia.



Middle East and African Universities

Tehran

KAUST

Hebrew

Stellebosch

Johannesburg

King Saud

Cape Town

Tel Aviv

Technion

Middle East and Africa

KING ABDULLAH'S UNIVERSITY OF SCIENCE AND TECHNOLOGY (KAUST) is a private research university located in Thuwai, Saudi Arabia. It was established in 2009 to provide research and graduate training programs taught in English with early leadership from Michigan (Fawwaz Ulaby) and Caltech (Jean-Lou Chameau). It focuses on research that applies science and techology to problems of human need, social advancement, and economic development.



KING SAUD UNIVERSITY is a public university in Riyadh, Saudi Arabia, founded in 1957, and originally known as Riyadh University. It was the first university in Saudi Arabia and created to train skilled workers. It was renamed King Saud University in 1982. Today it enrolls 40,000 men and women students (although women are provided with separate attention). Instruction is conducted in English and Arabic, depending on the major.



HEBREW UNIVERSITY OF JERUSALEM was established in Jerusalem in 1918. Today the university has three campuses in Jerusalem and one in Rehovot. The unversity has 5 affiliated teaching hospitals, 7 faculties, 315 academic departments and 100 research centers, and the world's largest Jewish studies library. Its first Board of Governors included Albert Einstein, Sigmund Freud, Martin Buber, and Chaim Weizmann.



Middle East and Africa

TEL AVIV UNIVERSITY was established in 1956 as a merger of three research institutes: The Tel Aviv School of Law, the Institute of Natural Sciences, and the Institute of Jewish Studies. As Israel's largest university it enrolls over 30,000 students. It comprises 9 faculties, 17 teaching hospitals, 18 performing arts centers, 27 schools, 106 departments, 340 research centers and 400 laboratories. Tel Aviv is ranked as the leading research university in Israel.



The TECHNION-ISRAEL INSTITUTE OF TECHNOLOGY was established in 1912 during the Ottoman Empire, Technion is the oldest university in the country. It offers degrees in science and engineering, architecture, medicine, industrial management and education. It has numerous research centers and teaching hospitals. In 2011, Technion joined with Cornell University to win the competition to build a new science and engineering institution in New York City.



TEHRAN UNIVERSITY was established in 1934. Iran's oldest and most prestigious modern university, it is known as "the mother university of Iran". Its main campus is located in the center of Tehran, with several other campuses scattered about the city. With an enrollment of 50,000 students, it offers 111 bachelors programs, 177 masters programs, and 156 PhD programs. The design of the campus in the Jalaliyeh garden provides a popular attraction.



Middle East and Africa

AL-AZHAR UNIVERSITY, located in Cairo, Egypt, was founded in 972 by the Fatimids as a centre of Islamic learning. It was one of the first universities in the world to survive to modern times. In 1961 Al-Azhar was given university status while today overseeing a national network of schools with two million students. Al-Azhar has a mission to propagate Islam and Islamic culture, but the university also offers a full spectrum of academic disciplines.



The UNIVERSITY OF CAPE TOWN was established in 1829 as the South African College, a school for boys. In 1918 the South African College was given full university status, awarding degrees. At that time it was renamed the University of Cape Town. It is the highest ranked African university with over 50,000 student and a broad spectrum of disciplines including science, engineering, commerce, and humanities.



The **UNIVERSITY OF JOHANNESBURG** was established in 2005, resulting from a merger between the Rand Afrikaans University, the Technikon Witwatersrand, and the Soweto and East Rand campuses of Vista University. The resulting instituion is one of the largest comprehensive universities in South Africa, with a student population of 50,000, of which more than 3,000 are international.



Middle East and Africa

UNIVERSITY OF STELLENBOSCH was established in 1918 in South Africa. Tracing back to Stellenbosch Gymnasium (1864), Stellenbosch College (1881), and Victoria College (1887). It acquired university status in 1918 and renamed University of Stellenbosch. With an enrollment of 29,000 students, many of its programs such as its MBA degree have international reputations. The University is also located near the famous Stellenbosh wine-growing region.

Japanese Universities

Kyoto

Tokyo

Nagoya

Tokyo IT

Hokkaido

Japan

The **UNIVERSITY OF TOKYO,** located in Bunkyo District of Tokyo was estabilised in 1877. In 1886-87 it was called the Imperial University, and from 1897-1947, the Tokyo Imperial University. It resumed its original name after WWII in 1947. Over 30,000 students are enrolled in a broad spectrum of disciplines. In 2012 the university launched two undergraduate programs entirely taught in English and geared toward international students.



KYOTO UNIVERSITY, a national university, was established in 1897. It is the second oldest Japanese university and one of Asia's highest ranked and leading research-oriented institutions. Kyoto produces world-class researchers. In 2004 Kyoto University was incorporated as a national university under a new law that applies to all Japanese universities. Its campus is adjacent to the beautiful gardens of Kyoto.


NAGOYA UNIVERSITY, located in Chikusa-ku, Nahoya was established in 1871 and chartered as an Imperial university in 1939. It traces its history to the 19th century when it was a temporary medical school. In 2004 Nagoya University became a Japanese national university. Its programs in physics, chemistry, biology, and biochemistry are highly ranked in global surveys. Its campus is in the heart of Nagoya.



Japan

HAKKAIDO UNIVERSITY was established in 1876 as Sapporo Agricultural College and was chartered in 1918 as an Imperial University. The School of Medicine was established in 1919, followed by the Faculties of Agriculture, Engineering, Science and in 1947 Law and Literature. Since 2004 the university has joined other Japanese universities as a National University Corporation, which has given it increased financial independence.



The **TOKYO INSTITUTE OF TECHNOLOGY** was established in 1881. It began as a Vocational School to develop craftsmen and engineers. Following WWII, Tokoyo Tech has expanded to three campuses and has trained scientific researchers, engineers and many social leaders, while its programs and research laboratories have been reorganized to address the needs of Japanese industry.



Chinese Universities

Peking

Tsinghua

Shanghai Jaio Tong

Hong Kong

Fudan University

Nanjing

Beijing Normal

Wuhan

Zhejiang

China

PEKING UNIVERSITY, located in Beijīng, was originally established as the Imperial University of Peking in 1898, as a replacement for the ancient Imperial College. For a brief period after 1949 the People's Republic of China restructured its universities, moving some and merging others. Peking University's campus was moved to the gardens of the Summer Palace renown for its beauty of traditional Chinese architecture. It absorbed Beijing Medical University in 1963.



TSINGHUA UNIVERSITY, was established in 1911 in Beijīng. Quoting from its motto: "With Self-Discipline and Social Commitment, Tsinghua University is dedicated to academic excellence, the well-being of Chinese society, and global development". Thanks to educators such as Michigan's James Angell, the indemnity paid by China in 1909 for the Boxer Rebellion was used to fund students at universities such as Tsinghua, helping to build it into one of the world's great universities.



SHANGHAI JIAO TONG UNIVERSITY was established in 1896 as Nanyang Public School by an imperial edict. The word "Jiao Tong" means transportation or communication, and reflects the university's roots. Today the University has developed strong international relationships with other leading universities, including the joint programs in engineering it conducts in Shanghai with the University of Michigan.



China

The **UNIVERSITY OF HONG KONG** was established in 1911. The Hong Kong government and business sector were eager to learn "the secrets of the West's success" and gave it strong support. Today the university's 10 academic faculties include accounting & finance, biomedicine, dentistry, education, humanities, law, linguistics, political and social sciences . Instruction is given in English. The university's biomedical sciences program isolated the corona virus in 2005.

NANJING UNIVERSITY was established in 1902 and is one of the oldest and most prestigious institutions of higher education in China. In the 1920s it became the first modern Chinese university combining teaching with research, following the Humboldtian model of European universities. As such, it became a pioneer in higher education in China, setting the foundation for the modern educational system of China.

FUDAN UNIVERSITY, located in Shanghai was established in 1905. Fudan has five campuses in downtown Shanghai, Handan, Fenglin, Zhangliang and Jiangwan, sharing the same central administration. 32,000 students are enrolled across 17 schools, numerous research centers, and 10 teaching hospitals, Fudan has evolved into one of China's leading research universities. Its programs in international relations and public affairs are particularly strong.

China

WUHAN UNIVERSITY was established in 1893 in Wuhan, Hubei, China. With campus architecture as a blend of Chinese and Western, Wuhan is considered one of the China's most beautiful campuses, surrounded by heavily wooded hills, cherry blossoms and fragrant flowers. In 2000 Wuhan was restructured as a merged of four major universities with particular strengths in engineering and medicine.



ZHEJIANG UNIVERSITY was established in 1897 in Hangzhou. Like several other Chinese universities, in the 1950s it was first split up into a number of single-discipline colleges and then remerged with several institutions after 2000. Today it is a comprehensive research university and includes 12 academic programs: agriculture, art, economics, education, engineering, history, law, literature, management, natural sciences and philosophy.



BEIJING NORMAL UNIVERSITY was established in 1902 as a "normal school" that trained teachers. The name was retained after it received university status and extended its academic programs beyond education fields and more recently has been given a priority for funding by the Chinese government to elevate its reputation to the level of a "world-class" university. Today it has numerous research centers in subjects ranging from education to engineering.



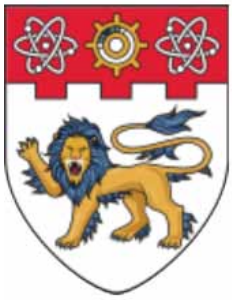
Asian Universities

KAIST

Sungkyunkwan

Seoul National

IIT Madras



Nanyang Technical

IIT Bombay

Karachi

National of Singapore

Quaid-i-Azam

Asia

SUNGKYUNKWAN UNIVERSITY is a private research university originally established in 1398 as a Confucian academy in Hanseong, or modern-day Seoul. Today, the university has two campuses: the Humanities and Social Sciences programs reside in Seoul and the Natural Sciences in Suwon (1978). In addition to traditional academic discplines, it also has the top medical school in Korea and offers Korea's first fully English-taught Global MBA.



The **SEOUL NATIONAL UNIVERSITY** was established in 1946. It is located on three campuses: Gwanak (main campus), Daehangno and Pyeongchang. There are sixteen colleges, one graduate school and nine professional schools enrolling 17,000 students. It is one of the most generously supported universities in Korea, holding a memorandum of understanding with the World Bank and an exchange program with the University of Pennsylvania.



The **KOREAN ADVANCED INSTITUTE OF SCIENCE AND TECHNOLOGY (KAIST)** was established in 1971 as Korea's first research institution of science and engineering. KAIST enrolls 10,000 students with full scholarships given to all students and has evolved rapidly to become the Korean analog to MIT, both in breadth and quality. It has strong relationships with universities in Europe and America, including MIT.

Asia

The **NATIONAL UNIVERSITY OF SINGAPORE** was established in 1905 as a medical college. Today, it has evolved into a comprehensive research university with the largest student enrollment in Singapore (38,000) and an unusually wide range of disciplines, including the sciences, medicine and dentistry, design and environment, law, arts and social sciences, engineering and music. It is ranked as one of the top universities in the world.



The **UNIVERSITY OF KARACHI,** located in Karachi, Sindh, Pakistan is one of the oldest universities in Pakistan, being established as a federal university in 1951. As a public research university, it enrolls 24,000 students, with multi-disciplinary research in science and technology, medicine and social sciences. The university spans 54 departments and 19 research institutes operating under nine faculties.


The **QUAID-I-AZAM UNIVERSITY,** was founded as the University of Islamabad in 1967 Originally a postgraduate institution, it expanded in the 1980s to include four faculties, with 38 departments, institutes, schools and centers and an enrollment of 13,000 students. It is nationally known for its research, technological advancement, and intellectual interaction with several international institutes including the United Nations and the University of Tokyo.



Asia

The **INDIAN INSTITUTE OF TECHNOLOGY MADRAS,** a public engineering institute located in Chennai, Tamil Nadu, was established in 1959 with the assistance of Germany. It is a residential institute that occupies a campus in a protected forest, part of the Guindy National Park, home to rare wildlife. IIT Madras was the third Indian Institute of Technology established to provide education and research facilities in engineering and technology.

The **INDIAN INSTITUTE OF TECHNOLOGY BOMBAY**, a public technology and science university, located at Powai, Mumbai, India, was established in 1958 with the assistance of UNESCO and the Soviet Union. IIT Bombay has a comprehensive graduate program offering doctoral degrees in science, technology, engineering and mathematics. It is known for its innovative short-term courses through continuing education and distance education programs.

The **NANYANG TECHNICAL UNIVERSITY** is an autonomous university in Singapore, established in 1981. A comprehensive, research-intensive university, enrolling over 33,000 students, is organized into eight colleges and schools. NTU is home to several autonomous institutions in international studies, environmental life sciences engineering, Earth observatory, and the Institute on Asian Consumer Insight. Nanyang Business School is one of the world's top business schools.

Latin American Universities

São Paulo

UFRJ

Rio de Janeiro

Chile

UNICAMP

Campinas

Buenos Aires

National Autonomous Mexico

Latin America

The **NATIONAL AUTONOMOUS UNIVERSITY OF MEXICO**, established in 1910, was proceeded by the Royal and Pontifical University of Mexico. UNAM received autonomy in 1929 giving it the freedom to define its curriculum and manage its budget. Its highly decorated campus by several of Mexico's leading architects and artists has been declared as a UNESCO World Heritage Site. It is Mexico's leading research university.



UFRJ

The **FEDERAL UNIVERSITY OF RIO DE JANEIRO** was established in 1920. It traces its origins to the Royal Academy of Artillery, Fortification and Design founded in 1792. The UFRJ is responsible for 7 museums, 9 hospitals, 100s of laboratories and 43 libraries. It enrolls 67,000 students with satellite campuses in 10 Brazilian cities. It has been instrumental in the formation of the Brazilian intellectual elite.



The **UNIVERSITY OF SÃO PAULO** was established in 1934 from the merger of several existing schools. The university has eleven campuses: four of which are in São Paulo. With 92,000 students, it is one of the largest universities in Brazil, ranking in reputation among the top five institutions in Latin America. It is involved in teaching, research, and university extension in all areas of knowledge, offering an unusually broad curriculum.



Latin America

The **UNIVERSITY OF BUENOS AIRES** is the largest university in Argentina, established in 1821. The university has no central campus, with the university's programs scattered through Buenos Aires. It consists of 13 departments, 6 hospitals and 10 museums. Entry is open to anyone with a high school diploma. There is no tuition for graduate & undergraduate students, including foreign students.



The **UNIVERSITY OF CAMPINAS,** commonly called UNICAMP, was established in 1962 and located in Sao Paulo, Brazil. The university was designed from scratch as an integrated research center unlike other Brazilian universities usually created by the consolidate of previously existing institutions. Its research focus is indicated by the fact that half of its students are in graduate programs.



The **UNIVERSITY OF CHILE,** located in Santiago, Chile was founded in 1842, a continuation of the colonial Royal University of San Felipe established in 1738. The institution has five campuses, serving 40,000 students through 60 undergraduate, 116 masters, and 38 doctoral programs. It is recognized as one of the top universities in Latin America in science, technology, social sciences, and the arts through the functions of teaching, research, and extension.



Chapter 8

The Taxonomy and Zoology of Universities

There are many ways that one can characterize and catagorize universities throughout the world, for example:

By historical origin: Medieval, Renaissance, Enlightenment, government action (land-grant), information age...

By origin: religious, colonial, government,

By funding character: public, private, for-profit

By priority given various missions: teaching, research, service (or learning, scholarship, engagement)

By structure: single campus, distributed system, cyberspace

By type: comprehensive, baccalaureate, polytechnic, community college

By leadership role: pathfinder, trail-blazer, pioneer, settler (i.e., leader or follower)

In this document we have focused primarily on leading or "flagship" comprehensive universities, but it is important to acknowledge this is only one of many possible models for the university.

Beyond characteristics such as size, quality, and financial sustainability that can be tracked over time through quantitative data, there are other important characteristics of a university that require a more subjective approach. Universities are complex organizations that develop over time unique cultures not only influencing their fundamental missions of learning, discovery, and engagement with society, but also how they function as communities. In many cases these characteristics are not only unique to the institution but soon become evident to visitors, usually associated with the institutional "saga" of an institution, developing over a long period of time. Other characteristics such as how an institution accepts new members or sustains community activities or operates in making decisions or commitments are more subtle and can change significantly over a few years because of external or internal events.

In fact, perhaps the core mission and compentency of the university is its capacity to create learning communities. As a consequence there are many communities within the institution that are key to its intellectural, cultural, and social life. Some are organized along academic lines through faculty clubs, institutes, centers, symposia, and salons. Others are organized about events, such as athletics and performing arts. Most require resources such as meeting places, performance venues , and athletic complexes.

Changes in academic communities tend to occur slowly, particularly in the faculty culture, because of its complexity and diversity. Fundamental academic values—academic freedom, intellectual integrity, striving for excellence—still dominate this culture, as they must in any great university. Yet today fewer faculty members look to the university for long term academic careers and instead became nomadic, moving from institution to institution in an increasingly competitive academic marketplace.

Student communities change more rapidly, dependent in part on the nature of the student body. For example fraternities and sororities have become more important as the student body has come from wealthier backgrounds (particulary those paying out-

of-state tuition). So, too, student communities are more sensitive to challenges facing our society, e.g., conflicts, inequities, diversity, and the challenges of finding a job after graduation.

The contemporary university is much like a city, comprised of a bewildering array of neighborhoods and communities. To the faculty, it has almost a feudal structure, divided up into highly specialized academic units, frequently with little interaction even with disciplinary neighbors, much less with the rest of the campus. To the student body, the university is an exciting, confusing, and sometimes frustrating complexity of challenges and opportunities, rules and regulations, drawing students together only in major events, such as athletic events or campus protests. To the staff, the university has a more subtle character, with the parts woven together by policies, procedures, and practices evolving over decades, all too frequently invisible or ignored by the students and faculty. In some ways, the modern university is so complex, so multifaceted, that it seems that the closer one is to it and the more intimately one is involved with its activities, the harder it is to understand its entirety and the more likely one is to miss the forest for the trees.

But a university is also a diverse community of many families: students, faculty, staff; deans and executive officers; office staff and even presidents. While most universities enjoy an intense loyalty among these families, it can also be a tough environment for many. These institutions are very large and complex, frequently immersed in controversial social and political issues. Senior academic and administrative leaders not only become members of these families but also must assume responsibilities to understand, support, encourage, and protect these communities, to understand their concerns and their aspirations, and to advance their causes.

The Zoology of Universities

Oxbridge
...Harvard, Yale, Princeton
...Duke, Vanderbilt, Dartmouth
...St. Andrews, Sydney

Multiversities
...Michigan, UC Berkeley, Washington
...Texas, Virginia, North Carolina Chapel Hill
...Paris, Munich, Berlin
...Vienna, Barcelona

Urban Universities
...Columbia, NYU, Chicago
....London, Rome, Bologna
...Madrid, Paris, Copenhagen

University Systems
...U California, U Wisconsin
...SUNY, U Texas
...U Paris, U London

Technical Institutes
...MIT, Caltech, GaTech
...EPFL, ETH
...IIT, KAIST, Tsinghua, KAUST

Academic VIllages
...Ann Arbor, Austin, Madison
...Cambridge, Oxford
...Gottingen, Tubingen

For-Profit and Proprietary
...U Phoenix, Laureate,

Online
...Open U, Coursera, EdX, Udacity
...Apple U, OpenCourseware

Types of Universities

Urban Universities

Columbia University

University of Bologna

University of Madrid

Multiversities

UC Berkeley

University of Vienna

University of Michigan

Residential Colleges

Yale University

Cambridge University

University of Sydney

Types of Universities

University Systems

State University of New York

University of Paris

University of California

Academic Villages

Gottingen

Cambridge

Hanover (Dartmouth)

Technical Institutes

MIT

EPFL

Technion

University Characteristics

Students

University of Michigan

University of St. Andrews

UC Berkeley

Faculty

McGill University

University of Vienna

Cambridge University

Teaching

Moscow State University

Heidelberg University

University of Paris Sorbonne

University Characteristics

Architecture

University of Virginia

Cambridge University

MIT

Libraries

University of Vienna

Yale University

University of Chicago

Commencement

Columbia University

Cambridge University

University of Michigan

University Activities

Sports

Laval University

University of Michigan

University of Wisconsin

Traditions

Cambridge University

École Polytechnique

Yale University

Bicycles

Tsinghua University

University of Wisconsin

University of Copenhagen

Chapter 9

Tomorrow's Challenges

Although the university has existed as a social institution for almost a millennium, with each historical epoch it has been transformed in very profound ways. The scholasticism of early medieval universities, first appearing in Bologna and Paris, slowly gave way to the humanism of the Renaissance. The graduate universities appearing in early 19th century Germany (von Humboldt's University of Berlin) were animated by the freedom of the Enlightenment and the rigor of the scientific method. The Industrial Revolution in 19th America stimulated the commitment to education of the working class and the public engagement of the land-grant universities. The impact of campus research on national security during WWII and the ensuing Cold War created the paradigm of the contemporary research university during the late 20th century.

Although the impact of these changes have been assimilated and now seem natural, at the time they involved a profound reassessment of the mission and structure of the university as an institution. But the pace of change in our world is accelerating, with the impact of rapidly evolving technology, changing demographics, and the impact of humankind on our planet. These will pose great challenges to our universities in the next few decades.

Challenges of Today

Developing a vision for the future of the American university is a challenging exercise, both because of the unusual size, breadth, and complexity of our institutions and because of the important leadership role they are expected to play for our society. Today we are challenged to adapt the university to a post-industrial, knowledge-based society as our economies are steadily shifting from material- and labor-intensive products and processes to knowledge-intensive products and services. In this knowledge economy, where the key assets driving prosperity are intellectual capital, education has become a powerful political force, both nationally and on a global scale. The key technologies enabling the global knowledge economy, e.g., information technology, biotechnology, and nanotechnology, all evolve at an exponential pace, and are also reshaping the learning and scholarship on our campuses.

Our universities are also challenged by the rapidly changing nature of our population as our current population ages, similar to other developed nations in Europe and Asia. Yet here the United States stands apart because of a second and equally profound demographic trend: immigration. As it has been so many times in its past, America is once again becoming a highly diverse nation of immigrants, benefiting immensely from their energy, talents, and hope. Yet, while of great value, this increasing diversity of our population is complicated by social and political factors such as prejudice and segregation.

Added to these broad changes in our world and nation are specific challenges currently faced by American higher education. Today much of the earlier commitment of public funds that built our great research universities in the 20th century has eroded. Over the past decade, state support of our public universities has dropped by roughly 35%. After a brief surge in federal support of research during the late 1990s, both federal and corporate support of basic and applied research have fallen significantly in recent years, while fields such as the social sciences have been savaged by conservative political forces. And perhaps most telling of all, the inequities characterizing educational opportunity have become extraordinary. Today most of

those responsible for public policy at both the federal level and among the states have ignored the public good character of higher education. Instead, and in sharp contrast to most of the rest of the world, most Americans view a college education primarily as a private benefit for individuals aimed at providing them with good jobs. Hence it is accepted that their education should be paid for through student fees, and increasingly funded through personal debt, rather than through public investment. (Holliday, 2012)

While most nations are facing–or at least coping with–the ongoing challenges of massification, academic competition, and limited public resources, culture, tradition, and local politics shape their particular approach. Because of our origin as a federation of independent colonies (and then states), the United States continues to rely on a highly decentralized market-driven approach to higher education, with little strategic direction from the federal government. In fact, with the recent change in our federal government in 2017, education has not only dropped low on the list of nation priorities, but it has come under attack because of its efforts to sustain the important academic values such as truth, evidence, and the scientific method that undergird its learning and scholarship.

Possibilities for Tomorrow

Demographics

Demographers project that global population will continue to increase for several more decades, rising to 8.5 billion in 2030, then 9.7 billion in 2050, and 11 billion in 2100. Growth will be limited in developed nations in Europe, Asia, and North American where aging populations and depressed fertility rates are likely to lead to declining populations (with the notable exception of the United States with its unusually high immigration rate).

In sharp contrast, developing nations in Asia, Latin American, and particularly Africa (where population is likely to double) will be characterized by young and growing populations with exploding needs for education. Unless developed nations step forward and help address this crisis, billions of people in coming generations will be denied the education so necessary

Higher education is rapidly globalizing..

to compete and survive in the knowledge economy. The resulting despair and hopelessness among the young will feed the terrorism that so threatens our world today.

But there is another important demographic trend: the lengthening of human lifespan driven by the progress of biomedical science, particularly in developed nations. Those in today's Millennial generation (those born between 1980 and 1995) have an expected lifespan into their 90s, while today's young children have a 50% chance to live to 100 or longer. (Gratton, 2016) While certainly encouraging from a public health perspective, the downside is the fact that even prosperous societies will simply be unable to afford supporting decades of retirement beyond the age of 70. Longer lives will require more years of work. Yet it is also clear that an education received in one's youth will likely not be sufficient to sustain employment 50 years later. Hence lifelong education and continually retraining will become essential, and this will pose new challenges to higher education. (The Economist, Lifelong Learning, 2017)

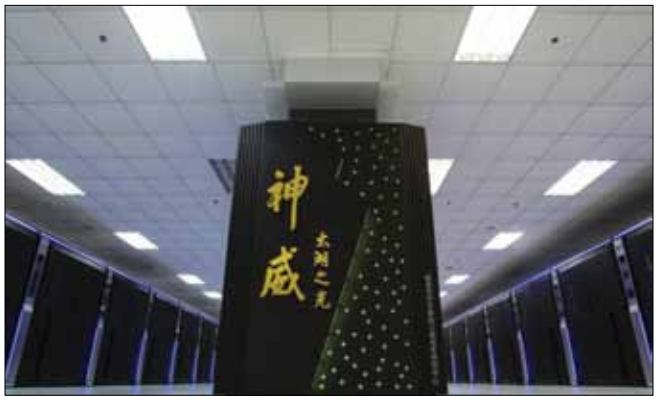
Technology

The technologies of today–cyberinfrastructure, big data, artificial intelligence, clouds, and soon

quantum computing–have the disruptive feature that they continue to grow in power at exponential rates, increasing 100 to 1,000 fold each decade. (Kelly, 2016) The rapid evolution of digital technology not only accelerates conventional economic activity, but it creates entirely new ventures such as social media, virtual and augmented reality, intelligent agents (Siri and Alexa), and sophisticated data management and access. (The Economist, Technology Quarterly, 2017) Furthermore as the technology continues to evolve, so too do the ambitions of those organizations that exploit it such as Google (to make available all the world's knowledge to all people), Facebook (to connect all the people of the world), and Amazon (an everything, everywhere store).

While such technologies have had great positive impact on our lives, they also threaten our current activities. For example, increasing power of AI clouds, the Internet of Things, and other automation technologies are transforming our economy (what Schwab calls the Fourth Industrial Revolution), (Schwab, 2015) eliminating more routine jobs in fields such as construction, manufacturing, and services. More generally there is a strong concentration of wealth driven by the new technologies, since the return on capital and technology is greater than for labor, leading to not only jobless economic growth but also increasing income disparities. In fact, some suggest that in a future that may have only 20% of today's jobs, the real challenge will become how to create meaningful lives in a world with rapidly increasing machine intelligence. (The Economist, Special Report on Artificial Intelligence, 2016) With our current education system, most citizens will not have the skills for the new jobs. Of course, we might argue that there will always likely to be some jobs that can be performed better by humans than AI systems, particularly those involving empathy or social interaction. In fact, one might suggest that such "human traits" should be given a much higher priority in learning organizations such as universities.

Today, a rapidly changing world demands a new level of knowledge, skills, and abilities on the part of our citizens. Just as in earlier critical moments in history when our prosperity and security was achieved through broadening and enhancing educational opportunity, it is time once again to seek a bold expansion of educational opportunity. But this time we should set as the goal



IBM Summit supercomputer
(Oak Ridge National Laboratory)

providing all citizens with universal access to lifelong learning opportunities, thereby enabling participation in a world both illuminated and driven by knowledge and learning.

Creativity, Communication, and Convergence

The professions that have dominated the late 20th Century—and to some degree, the contemporary university—have been those which manipulate and rearrange knowledge and wealth rather than create it, professions such as law, business, accounting, and politics. Yet, it is becoming increasingly clear that the driving intellectual activity of the 21st Century will be the act of creation itself.

We now have the capacity to create new objects literally atom by atom. With new methods in molecular biology such as CRISPR/cas9 and gene drive, we can not only precisely modify the DNA code for a living organism, but we can actually cause it to propagate through a species to change future generations (a frightening thought when human gene editing is considered). (Baltimore, 2015) The dramatic pace of evolution of information technology shows no sign of slowing, continuing to advance in power from 100 to 1000 fold a decade, enabling not only new forms of analysis such as augmenting the traditional tools of experiment and theory with the sophisticated tools of data analysis (big data). Indeed, the tools of artificial intelligence not only are rapidly progressing, but they have stimulated fears of eventual sentient behavior of machines.

Already we are seeing the spontaneous emergence

of new forms of creative activities, e.g., the "maker" fairs providing opportunities to showcase forms of artistic, recreational, and commercial activity; the use of "additive manufacturing" to build new products and processes atomic layer by atomic layer; and the growing use of the "app" culture to empower an immense marketplace of small software development companies. In fact, some suggest that our civilization may experience a renaissance-like awakening of creative activities in the 21st century similar to that occurring in 16th century Europe.

The determining characteristic of the university of the 21st Century may be a shift in intellectual focus, from the preservation or transmission of knowledge, to the process of creativity itself. If so, then the vision for the university of 2030 should stress characteristics such as creativity, innovation, ingenuity and invention, and entrepreneurial zeal. But here lies a great challenge. While universities are experienced in teaching the skills of analysis, we have far less understanding of the intellectual activities associated with creativity. In fact, the current disciplinary culture of our campuses sometimes discriminates against those who are truly creative and do not fit well into our stereotypes of students and faculty.

Yet another feature of our information rich society is our capacity for communication. The internet and related technologies such as smartphones and cloud computing make it cheap and easy not only to communicate but also to collect, store, and analyze immense quantities of information. But while facilitating communication and communities, such technology also has its downside. Always on, always used communication consumes the attention of individuals. Indeed, this attention is the valuable commodity needed by advertisers that actually funds these communications networks.

Finally, the very structure of knowledge is continuing to shift as fields such as biology, physics, mathematics, and the social sciences are converging. (Sharp, 2014) Today physicists and engineers have as much impact on the evolution of biological science as biologists do on chemistry and computer technology (e.g., the deep learning algorithms derived from neural networks). The emergence of convergence (or consilience, as E.O. Wilson would term it) is challenging the disciplinary fragmentation of the University into departments, schools, and colleges.

Any vision proposed for the university in 2030 must consider the extraordinary changes and uncertainties of a future driven by exponentially evolving information and communications technology. The extraordinary connectivity provided by the Internet already links together the majority of the world's population. To this, one can add the emerging capacity to capture and distribute the accumulated knowledge of our civilization in digital form and provide opportunities for learning through new paradigms such as MOOCs and AI cognitive tutors. This suggests the possible emergence of a new global society no longer constrained by space, time, monopoly, or archaic laws and instead even more dependent upon the generation of new knowledge and the education of world citizens. In such an era of rapid change, it has become the responsibility of democratic societies to provide their citizens with the learning opportunities they need throughout their lives, at costs they can afford, as a right rather than a privilege. (Germano, 2010)

Social and Political Change

Even as our world becomes increasingly dependent upon knowledge, the very technology that is key to creating, archiving, and making available knowledge is ironically being used to attack and undermine it. In the Trump era, social media not only has become a powerful tool of American politics, but it provides the capacity to distort knowledge and truth, the "alt-truth" phenomenon that allows a tidal wave of anger built on the social media Twitter to not only win a presidential election but to build a powerful, almost mythological force capable of challenging the evidence-based truth critical to a democracy. (Brooks, 2017) While counterforces such as Wikipedia and digital libraries were thought of as power technologies capable of distributing facts and truth, the worry today is that the alt-truth deluge from social media may in fact be eroding American democracy. (The Economist, Technology and Politics, 2016)

Xenophobic and racist energy creates a hostile electorate that is not only unwilling to accept truth established by evidence, but has largely abandoned

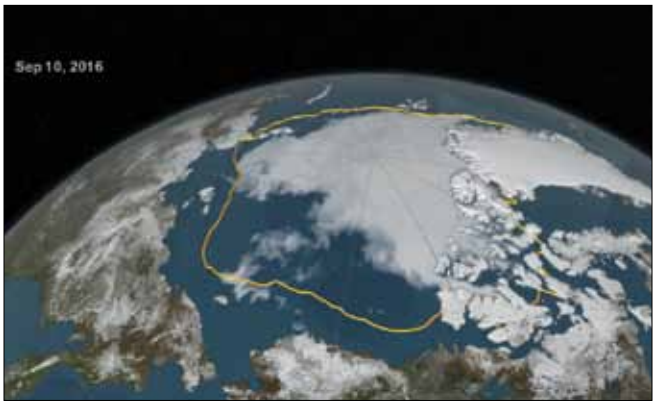
the scientific method (with only 25% of Americans now expressing confidence in scientific discovery). (Miller, 2016) Both parents and young people are beginning to question the value of higher education. Indeed, one wealthy billionaire is even trying to bribe students not to go to college.

Policy makers, determined to serve their "populist" constituencies, are erecting barriers to higher education based on race and class. Nearly two decades into our new century, there are unmistakable signs that America's fabled social mobility is in trouble—perhaps even in serious trouble. "We are faced with a challenge to liberalism by populists who are challenging the ideas of freedom, equality, human rights, representative democracy and globalization with our current post-truth age in which expertise on matters such as climate change is rubbished and institutions are deemed untrustworthy."(Gitlin, 2017)

Broader Challenges

Over the longer term there is compelling evidence that the growing population and invasive activities of humankind are now altering the fragile balance of our planet. The concerns are multiplying in number and intensifying in severity: the destruction of forests, wetlands and other natural habitats by human activity, the extinction of millions of species and the loss of biodiversity; the buildup of greenhouse gases and their impact on global climates; the pollution of our air, water and land. We must find new ways to provide for a human society that presently has outstripped the limits of global sustainability.

Of comparable concern are the widening gaps in prosperity, health and quality of life characterizing developed, developing and underdeveloped regions. To be sure, there are some signs of optimism: a slowing population growth that may stabilize during the 21st century, technological advances such as the "green revolution" that have fed much of the world, and the rapid growth of developing economies in Asia and Latin America. Yet it is estimated that one-sixth of the world's population still live in extreme poverty, suffering from diseases such as malaria, tuberculosis, AIDS, diarrhea and others that prey on bodies weakened by chronic hunger, claiming more than 20,000 lives daily. These



Increasing signs of global climate change.

global needs can only be addressed by the commitment of developed nations and the implementation of technology to alleviate poverty and disease.

There are other possibilities that might be considered for the longer-term future. Balancing population growth in some parts of the world might be new pandemics, such as AIDS or an avian flu virus, that appear out of nowhere to ravage our species. The growing divide between rich and poor, the developed nations and the third world, the North and South hemispheres, could drive even more serious social unrest and terrorism, perhaps armed with even more terrifying weapons.

Technology could present new challenges that seem almost taken from the pages of science fiction. Clearly if digital technology continues to evolve at its current pace for the next decade, creating machines a thousand, a million, a billion times more powerful that those which are so dominating our world today, then phenomena such as the emergence of machine consciousness and intelligence become very real possibilities during this century. In fact some even suggest that we could encounter a "technological singularity," a point at which technology begins to accelerate so rapidly (for example, as intelligent machines develop even more intelligent machines) that we lose not only the ability to control but even to predict the future.

Clearly phenomena such as machine consciousness, contact by extraterrestrial intelligence, or cosmic extinction from a wandering asteroid are possibilities for our civilization, but just as clearly they should neither dominate our attention nor our near-term actions. More generally, it is clear that as the pace of change continues to accelerate, learning organizations

and innovation systems will need to become highly adaptive if they are to survive. Here, we might best think of future learning and innovation environments as ecologies that not only adapt but also mutate and evolve to serve an ever-changing world.

We cannot predict these things…but we can make sure that our descendants are equipped with the education and skills to handle them!

How Do We Lead Our Universities into the Future?

As many leaders in higher education have come to realize, our changing environment requires a far more strategic approach to the evolution of our institutions at all levels. It is critical for higher education to give thoughtful attention to the design of institutional processes for planning, management, leadership, and governance. The ability of universities to adapt successfully to the profound changes occurring in our society will depend a great deal on the institution's collective ability to develop and execute appropriate strategies. Key is the recognition that in a rapidly changing environment, it is important to develop a planning process that is not only capable of adapting to changing conditions, but to some degree capable of modifying the environment in which the university will find itself in the decades ahead. We must seek a progressive, flexible, and adaptive process, capable of responding to a dynamic environment and an uncertain—indeed, unknowable—future.

But, today, incremental change based on traditional, well-understood paradigms may be the most dangerous course of all, because those paradigms may simply not be adequate to adapt to a future of change. If the status quo is no longer an option, if the existing paradigms are no longer viable, then transformation becomes the wisest course. While universities have always successfully managed the balance between preserving and propagating the fundamental knowledge sustaining our cultures and civilizations and not only adapting to but actually creating the paradigm shifts that drive change, the time scales characterizing these roles are becoming ever shorter. The centuries it took for earlier forms of learning as scholasticism to humanism and enlightenment to evolve contracted to decades for the industrial revolution and globalization and now have been compressed to a generation or less for the age of knowledge as the technologies of our times now evolve at an exponential pace. Put another way, during the transition from Generation X to the Millennials, info-, bio-, and nano-technology have increased in power a million-fold and will do so yet again with Generation Z.

To succeed, we strive for a more flexible culture, one more accepting of occasional failure as the unavoidable corollary to any ambitious effort. We must learn to adapt quickly while retaining the values and goals that give us a sense of mission and community. Many view the current rigid and hierarchical structure of the university as obsolete. To advance, we must discover ways to draw upon the unique and vibrant creativity of every member of our community. Our challenge is to tap the great source of creativity and energy of outstanding faculty, students, and staff, working at the grassroots level of the academic enterprise of the University in a way that preserves our fundamental missions, characteristics, and values.

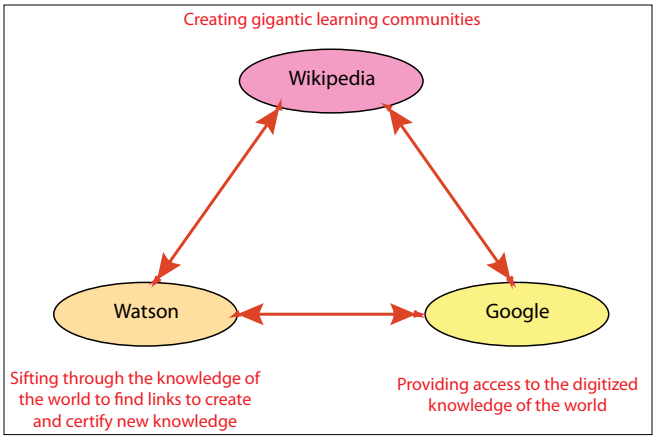
A Puzzle

To illustrate the implications of such a re-definition of the university, consider a learning ecosystem represented by the diagram of three elements: Wikipedia, Google, and Watson (the IBM computer that used artificial intelligence to beat the champions of the game-show Jeopardy). Each of these elements addresses a key core competency of the university:

Wikipedia represents the capability to create enormous learning communities with a collective ability to digest and analyze information, self-correcting and evolving very rapidly through crowd sourcing as an emergent phenomenon.

Google represents a future in which all knowledge is available in the cloud, digitized, accessible, searchable–everything ever printed, measured, sense, or created–big data to the extreme.

Watson represents the capacity to use artificial intelligence to analyze information, trillions of transactions per second, identifying correlations, curating information, authenticating knowledge, certifying learning, and providing ubiquitous access.



A puzzle: Is this a possible future for the university?

What is this? A postmodernist university? A new epistemology for the 21st Century? The foundation for a 21st analog to the Renaissance or even the Age of Enlightenment? A technological singularity...

Or perhaps something else...

An Emergent Civilization

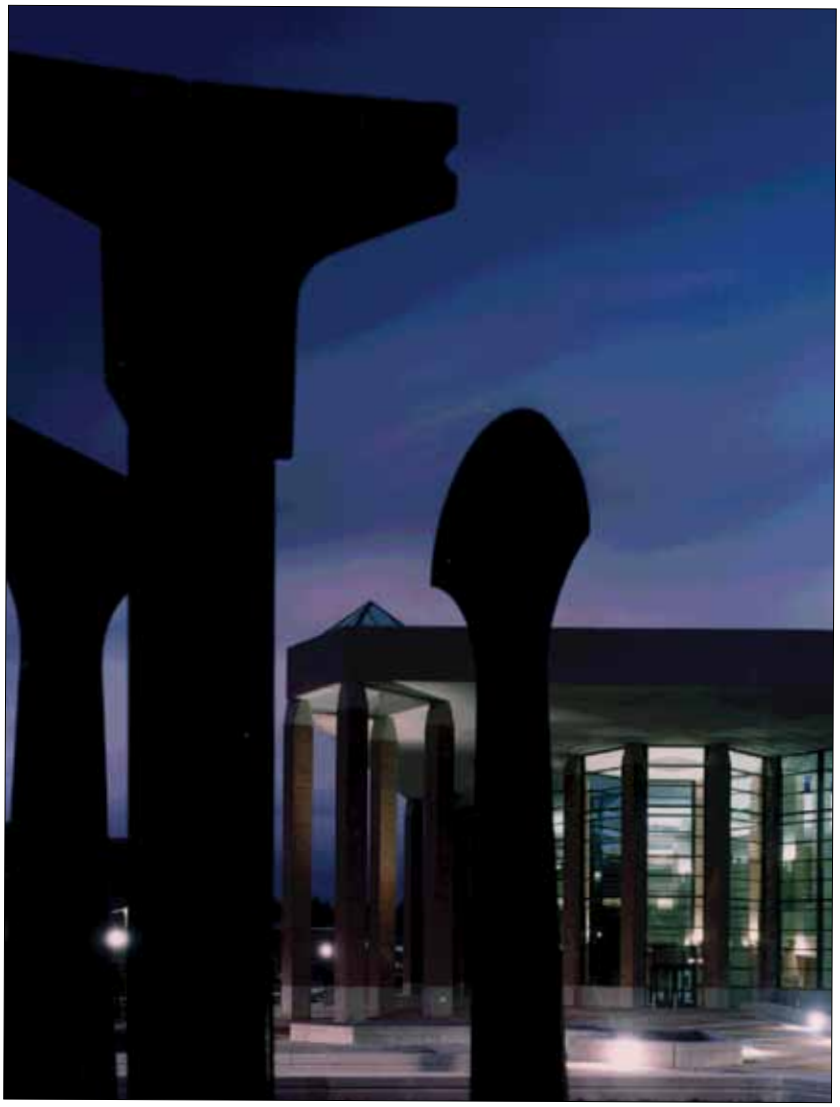
So what might we anticipate over the longer term as possible future forms of the university? The monastic character of the ivory tower is certainly lost forever. Although there are many important features of the campus environment that suggest that most universities will continue to exist as a place, at least for the near term, as digital technology makes it increasingly possible to emulate human interaction in all the senses with arbitrarily high fidelity, perhaps we should not bind teaching and scholarship too tightly to buildings and grounds. Certainly, both learning and scholarship will continue to depend heavily upon the existence of communities, since they are, after all, high social enterprises. Yet as these communities are increasingly global in extent, detached from the constraints of space and time, we should not assume that the scholarly communities of our times would necessarily dictate the future of our universities.

Imagine the linking together of billions of people with limitless access to knowledge and learning tools enabled by a rapidly evolving scaffolding of cyberinfrastructure, which increases in power one-hundred to one thousand-fold every decade. This hive-like culture will not only challenge existing social institutions such as corporations, universities, nation states, which have depended upon the constraints of space, time, laws, and monopoly. But it will enable the spontaneous emergence of new social structures as yet unimagined–just think of the early denizens of the Internet such as Google, Facebook, Amazon... In fact, we may be on the threshold of the emergence of a new form of civilization, as billions of world citizens interact together, unconstrained by today's monopolies on knowledge or learning opportunities.

Perhaps this, then, is the most exciting vision for the future of knowledge and learning organizations such as the university, no longer constrained by space, time, monopoly, or archaic laws, but rather responsive to the needs of a global, knowledge society and unleashed by technology to empower and serve all of humankind. And all of this is likely to happen during the lives of today's students. These possibilities must inform and shape the manner in which we view, support, and lead higher education. Now is not the time to back into the future.

Yet we also might remember a quote from the 2010 Glion Declaration:

"For a thousand years the university has benefited our civilization as a learning community where both the young and the experienced could acquire not only knowledge and skills but also the values and discipline of the educated mind. It has defended and propagated our cultural and intellectual heritage, while challenging our norms and beliefs. The university of the twenty-first century may be as different from today's institutions as the research university is from the colonial college. But its form and its continued evolution will be a consequence of transformations necessary to provide its ancient values and contributions to a changing world" (Rhodes, 2010).



A university for the 21st century...

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