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ABOUT THE SELF PROGRAM



The Self Engineering Leadership Fellowship, created by Al and Lila Self is an undergraduate leadership development program designed to create engineering graduates with the ideal combination of a strong engineering background and keen business sense. The rigorous four year leadership program at the undergraduate level is unique to the University of Kansas School of Engineering, and develops its students into graduates with all the tools needed to lead their respective industries, or become entrepreneurs.

Students in the SELF Program embody a wide range of involvements and leadership qualities at the University of Kansas School of Engineering. In fact, the junior class of SELF Fellows alone represents fifty-two professional organizations as students. Ranging from members of Engineers Without Borders, KU Football, and KU Ambassadors to Student Senate, the junior class encompasses both involvement and leadership at the University of Kansas. The SELF Program also leads and supports many on-campus events, such as Engineering High School Design, Engineering EXPO, Flapjacks for Philanthropy, the Crunchy Chicken Challenge, Future Cities Competition, and Engineering Family Day.

INTRODUCTION



In August of 2010 the SELF Fellows embarked on an unforgettable trip to China to complete their capstone project. Project Shanghai centers around the connection between the unique opportunity of the World Expo in Shanghai and engineering students in Kansas. As part of the project, the main focus is to unite the ideas of the exhibitions of the World Expo to current and future students in engineering.

As the inaugural class of SELF Fellows we wanted to share our remarkable experiences and knowledge attained in China as well as leave a lasting legacy throughout the School of Engineering at the University of Kansas. We hope you enjoy this glimpse into our remarkable trip to China.

The 2011 Class of Self Fellows

ABOUT PROJECT SHANGHAI



Much of Project Shanghai centered around the connection between the unique opportunity of the World's Fair in Shanghai and engineering students in Kansas. As part of the project, the main focus was to unite the ideas of the exhibitions of the World's Fair to current and future students in engineering. The project took the form of a website, video documentary series, multiple presentations to high school students and alumni, as well as, exposure at the 2011 Engineering Expo at the University of Kansas.

The website was created to spark interest in the project. The site encompasses information about the students traveling, the itinerary of the trip, and a list of outcomes for the project. While traveling, the website served as a blog, allowing the SELF students to give people at home daily updates about the experiences in China and at the World's Fair.

The video documentary series focused on global challenges presented at the World's Fair as well as cultural and societal differences between the numerous countries on display. The areas explored consisted of: sustainable building design, urbanization, water resources, energy, international business, culture, and an overview relating the experience to the seven pillars of the SELF Program. Our aim is to give current students from all different departments at the University exposure to the ideas of the World's Fair as applicable solutions for the future of engineering and all other industries, as these upcoming challenges face mankind as a whole.



The documentary series will also reach one more audience with hopes of having the greatest influence of all. The video segments will be viewed at the University of Kansas Engineering Expo 2011. About 2,000 elementary, middle, and high school students come through EXPO every year. With exposure to prospective students, Project Shanghai's aim is to captivate and inspire high school students to consider the opportunities in engineering.

The University of Kansas will benefit in a number of ways through the project. As an extremely diverse community, the University already strives to promote awareness and education of different cultures. However, learning about other cultures is limited in the classroom environment. KU already values the onset of global awareness as shown by the great number of students that take part in a study abroad program. Upon return from the World's Fair in China, the fellows have had the opportunity to spread their experience and instill a new found global perspective in fellow students. This global perspective has quickly spread throughout the University by means of presentations and documentaries, furthering the acceptance and understanding between students of different nationalities.



WORLD EXPO DOCUMENTARIES





HISTORY OF THE WORLD EXPO BY DREW ROBINSON



The World Expo is a marvelous display of culture and innovation occurring in various cities throughout the world. It is routinely held every five years, with subsequent fairs and exhibitions. When it began in 1851, the World Expo was the first exhibition of manufactured products from countries around the world. The national pavilions are the main attractions at each Expo and participating countries are encouraged to design one that displays their recent innovations and cultural history. Countries are allowed to spend an unrestrained amount of money upon their respective pavilion, but the host country has the largest and typically the most expensive one. In terms of expense, the average pavilion cost for the Hannover Expo in 2000 was \$16.9 million.

The first Expo was held in London, England, in 1851 and was the work of Prince Albert. It was originally called the "Great Exhibition of the Works of Industry of all Nations" but was later shortened to "The Great Exhibition." This exhibition ran from May 1st through October 15th and was believed to have been organized in response to the French Industrial Exposition in 1844. The displays in the Exhibition included art and colonial raw materials, technology, moving machinery, and scientific instruments. The event was extremely successful with close to 6 million people visiting it throughout its duration.

The next large Expo was the Exposition Universelle. It was held in 1889 and located in Paris, France. The Expo covered an area of .96 square kilometers, with the entrance located under the nearly-completed Eiffel Tower. The Eiffel Tower was just one of the buildings constructed for the Expo. The Galerie des Machines was also constructed for the Expo and had an interior space that spanned a distance of 111 meters, which was recorded as the largest in the World at that time. The Expo had a few unique attractions, one being the 'Negro Village,' which displayed 400 indigenous people. Also, there was Opera Comique, an American 'Wild West Show' and an attraction called Imperial Diamond.

The Chicago World's Fair, or World's Columbian Exposition, was held in 1893 to celebrate to the 400th anniversary of Christopher Columbus' arrival to North America. The Fair had a great effect on a large portion of the city, including the architecture, the arts, American industrial optimism and Chicago's self-image. The Fair brought the addition of

almost 200 buildings created with classical architecture. With a running attendance of nearly 27 million people, it easily surpassed the previous Worlds' Fairs in scale and beauty. Forty-six nations participated in the event, encompassing an area of 2.4 square kilometers. One of the biggest attractions demonstrated was the use of electricity for the entire Fair. The Chicago World's Fair was also the first to have amusements for the visitors in addition to the exhibits. The amusements included a Ferris Wheel, lectures on animals, belly dancers, a Geissler Tube, the Idaho building, and a John Bull locomotive.

Not to be outdone, the 1904 Saint Louis World's Fair, or Louisiana Purchase Exposition, surpassed the Chicago World's Fair by covering an area of 4.9 square kilometers and boasting some 1,500 buildings. The event was intended to celebrate the centennial anniversary of the Louisiana Purchase but was delayed to allow more countries to participate. An interesting aspect was the presence of 'Human Zoos.' The United States had recently acquired Guam, the Philippines, and Puerto Rico and allowed those countries to display some of their native inhabitants. The point of the exposition was to highlight the influence of American rule and the call attention to the economic potential these nations had. There was also the Anglo-Boer War Concession where battles from the Second Boer War were re-enacted. This helped to raise nearly \$113,000 for the Fair.

Expo '67, or the 1967 International and Universal Exposition, was held in Montreal, Quebec, Canada. With an attendance in the range of 50 million people, it was considered the most successful Expo in the 20th century. Held as a main celebration for Canada's centennial, the Expo had 90 pavilions with the Soviet Union being the most popular in terms of attendance. Unfortunately, this Expo had quite a few problems, including threats of disruption from terrorists, Vietnam War protestors, and a 30-day strike by transit workers. In spite of these problems, there was a lodging shortage, so many visitors often stayed in indecent housing during their stay. Even with numerous problems, the Montreal Expo proved to be the most popular exposition yet.

Expo 2010, or Expo 2010 Shanghai China, is held in Shanghai, China on both banks of the Huangpu River. The theme is 'Better City- Better Life,' signifying Shanghai's place as the next great world city. Covering an area of 5.28 square kilometers, Expo 2010 is host to 190 countries and 50 international organizations. Shanghai spent an estimated \$48 billion to prepare the city for hosting the Expo, which included the removal of factories and relocation of families. The Expo began on April 30th with an opening ceremony consisting of both indoor and outdoor components. The mascot for the Expo is "Haibao," which resembles the Chinese character for man or person. The Shanghai Expo is scheduled to end on October 30th with an expected total attendance in the range of 70-100 million people.



AN ENGINEERING OVERVIEW

BY KELLY LOHMEYER



Engineering has been called the “invisible” or “stealth” profession. Everything around you and that you use every day has been engineered in some way yet you may not see the engineers behind the scenes or know much about engineering. Engineers take math and science from paper and the lab to invent, design, and build things that matter. They are team players with independent minds who ask, “How can we develop a better system to protect and enhance the environment we live in?” By dreaming up creative and practical solutions, engineers are changing the world all the time.

As engineering students about to take the leap into industry to start their own careers, the SELF Fellows traveled to China to witness the innovative technology and engineering seen at the World’s Fair. This hands-on experience gave the students insight to many of the world’s greatest problems of our generation and generations to come. Below is a brief overview covering a range of of the engineering careers displayed at the World’s Fair.

Engineering professionals employ mathematical and scientific principles to develop effective solutions to real-world, technical problems. Engineers design, develop and build machinery and complex systems used in the production of a large variety of consumer goods. They are also instrumental in the development of buildings, interstate highways, and transportation systems.

Engineers are not only involved in designing and developing but also engaged in testing, producing and maintaining activities. They perform supervisory functions in industries and examine products and machinery to pinpoint the cause of quality-defects and breakdowns. Estimating the time taken to complete projects as well as the value of the completed projects is also determined by engineers. Technical aspects can be efficiently handled by engineers in the sales department and assistance in the plan, installation and usefulness of the product can also be rendered. They are also responsible for developing systems and machinery for extracting and processing many raw materials used by societies worldwide. They develop alternative power sources for mankind and are involved in finding new ways to take advantage of and apply the latest technological advancements. Engineers



are responsible for improving the quality of healthcare, ensuring the availability and safety of the food we eat and the integrity of critical operational, financial, and computer systems that support society. In essence, engineers are at the heart of everything important to the quality of human life.

Theodore von Karman said it best when he stated, "Scientist discover the world, engineers create the world that never was." With an engineering degree you could be the first to develop or try out a new technology, like a flying car or building an undersea house. An engineer could also design and build virtual reality amusement parks or discover and patent a new material that can mend broken bones or cure arthritis. Engineers are involved in making all the wonders of the future a reality. As you can see, the options are endless with an engineering degree, so now is the time to go ahead and discover creativity, passion, design, imagination and your future in engineering.

AN ENGINEERING OVERVIEW (CONTINUED)





ENERGY TECHNOLOGY BY BRIAN LARKIN AND JAKE HAMILTON



China's economy and population has been growing at a tremendous rate in the past decade, and they recently passed the United States as the largest energy consumer in the world. After wandering the streets of Beijing and Shanghai, experiencing the smog, severe traffic and just the sheer size of these two great cities, there was no question why their energy demands are so high. The improving way of life for the common-day Chinese citizen, coupled with the largest population on Earth is bound to have that effect on a country.

China consumes just over eight million barrels of oil each day. For comparison sake, that makes them the second largest consumer in the world behind only the US, which consumes almost 20 million barrels of oil a day. They require more than twice as much oil as any other country besides our own. They produce almost half of their consumed oil, so similar to the United States, they must import a significant amount each day. Their energy demands are significant as well. They continue to expand and build out wind, solar, geothermal and nuclear power. However, the energy industry in the country cannot seem to grow fast enough. The need for fuels and power has been skyrocketing in comparison to any other country on earth. At the current state of alternative energy, there just isn't enough incentive or capability to provide the amount of energy being consumed and the rate that the consumption is increasing.

The country has, naturally, turned to their most prevalent domestic resource for power: coal. The energy demands due to a large workforce and economic growth has driven their economy and need for more power, so their power generation has been primarily built around coal. In fact, it was common to be driving through parts of Beijing and Shanghai and see a coal plant right in the middle of the city. Because of this, China continues to lead the world in CO2 emissions, and any policy aimed at tackling this issue would be mute if China is not committed to the plan. As we learned from our visit to Black & Veatch, the country continues to build out coal plants at an incredible rate. With large coal reserves and no incentive to build out more expensive alternatives, this trend does not look like it will change in the near future.

The US is the only country with comparable energy needs and domestic resources as China, so tackling this problem together could be very beneficial for both countries. Our countries, together, will steer the energy debate and model the future of this industry. The reason the collaboration is necessary is due to the international and economic influence that both countries possess. They have already committed significant portions of their budget toward developing and implementing more advanced alternative energy, especially to limit the need for imported oil. This is why our relationship with China must remain strong, and our partnership on energy challenges remains critical.

The World's Fair showcased some energy solutions as well. It is such a far-reaching industry that virtually every country with a display about their economy mentioned their energy system. Saudi Arabia has built their economy on oil exports, mainly to countries like the US and China. Their pavilion was quite incredible and undoubtedly partially funded by money from oil exports. The United Arab Emirates had a similarly extravagant pavilion. Their country is another example of how critical the oil industry is to the global economy and just how valuable this resource is. Oil has provided the economic base for many Middle Eastern countries and will continue to do so. Qatar is a developing country with large reserves of oil and natural gas. Their pavilion featured a presentation on how important this commodity has been to their economic development in recent years. It is the lifeblood of their growth and will continue to fuel and uphold many other opportunities for growth in the country. Due to high demand, a still significant global supply, and the tremendous energy density of oil and natural gas, these fossil fuels will continue to play a larger part in our society than alternative energy. Make no mistake, though, renewable energy is an important part of our global energy portfolio. We will need every source available to us as we move into the future. Portugal was one of the countries that stressed the importance of renewable energy developments. They displayed wind energy, solar energy and a brand new electric car inside their pavilion. Japan also featured an electric car in their presentation, as many feel this is the solution to the world's addiction to oil. A variety of alternative energy solutions are ahead, and the World's Fair highlighted some of the most promising ones at this state of alternative energy technology.

While user-end solutions to fossil fuels are helpful, they are not the entire story. It is also important to help change the way that the energy is brought to households, cars, and people. Without major changes to the grid, any new technological advancement in alternative energy will be useless. This concept of a smart grid is something that both China and the US are currently researching and attempting to implement. With new technologies coming out every day that relate to the energy sector, an advanced grid capable of handling a major influx in energy usage is critical to the success of the green energy movement.



In a speech in 2008, President Obama said, “The country that leads renewable energy growth will lead economic growth in the 21st century”. This issue has far greater implications than people realize, and to understand its importance, one cannot let the industry stand on its own. It touches every other industry that makes up our economy; energy development is tied to a country’s development. The energy system shapes how countries grow and develop, so an improved energy system means a significantly improved way of life, just as the Chinese have realized in the past two decades. Energy is at the heart of the global economy, and for the US to lead that economy, we must have a strong energy industry.

Tied into this mission is a strong, collaborative relationship with China, because our two countries will lead the global economy. As shown at the World Fair, the amount of alternative energy technology is advancing at a tremendous rate. Yet our two countries must balance the responsible implementation of this resource with the price tag on the technology. We must responsibly use the fossil fuels available to us and push increased awareness and efficiency in the energy industry. Only with an international approach—by sharing technology and policy solutions—will the world be able to successfully create a sustainable, responsible energy portfolio. China and the US play a central role in this sharing of technology and policy solutions and must maintain our strong relationship and encourage this collaboration in the future.

ENERGY TECHNOLOGY (CONTINUED)





CULTURAL RELATIONSHIPS BY KEVIN SHIPLEY AND BRANDIE RHODES



Culture is what makes each country unique. The framework of religion, history, and beliefs are what make people who they are. Experiencing a new culture was the largest component of this project, and that experience proved to be very insightful. Travelling to China, the SELF Fellows were able to experience more than one culture at the World Expo and to see a great vision of Chinese culture on the streets of Beijing and Shanghai. At the World's Fair, Japan, France, Qatar, and Australia presented unique values of their culture. Some presented advancements in technology while others focused on religion; some even focused on food and art. By visiting these places as well as other historic Chinese locations, the SELF Fellows were able to learn about the various cultures around the world.

The first glimpse of the Expo revealed one thing: lines. These were not ordinary lines either, as they spanned city blocks and involved hours of waiting with some spanning upwards of nine hours. These lines were a major part of the Expo and provided a look into what it means to be a part of such a large population. Japan was the first pavilion the SELF Fellows explored after waiting in line for four hours. Energy was a major focus within the Japanese pavilion. Also, stepping platforms that created electricity were exhibited. Even ideas to harness energy from the sun using microwaves were presented, and new waste water treatment cycles were demonstrated. Technology was another strong focus, especially with its integration into human life. This was especially evident in a demonstration made by the Toyota robot playing the violin (Figure 1). During these demonstrations, face recognition software was utilized, allowing for a very personal and interactive computer system. Finally, an opera was performed with unique costumes and video. The opera focused on the releasing of an endangered bird. These displays showed that Japan finds importance in technology advancement as well as cultural and environmental preservation.

While visiting the French pavilion, a different aspect of culture was presented. The focus was not on technology but fashion and cuisine: both of which are items that immediately come to mind when thinking of France. An entire section of the pavilion was devoted to Louis Vuitton. Another section even featured an army of French cooks who



CULTURAL RELATIONSHIPS (CONTINUED)



were creating expert cuisine behind glass windows. Both of these showcases revealed important aspects of life beyond technology advancements. As stated in the pavilion, "One cannot invent if one cannot eat."

The Qatar pavilion brought religion to the forefront. Islamic art and practices were displayed throughout the building, and a Koran was displayed prominently in the center of the pavilion. They also focused heavily on their main exports: oil and pearls. The Qatar pavilion provided a more thorough perspective on Middle Eastern culture with a large focus on growth and advancement.

The Australian pavilion provided an energetic and relaxed perspective. The Australian guides, in particular, made it a fun environment by getting the crowd excited. The featured presentation focused on youth and Australia's vision for the future. The vision presented a globalized perspective where youth grow up immersed in many cultures with unlimited opportunities. This is comparable to the increased global involvement we see today.

The Expo was not the only provider of rich culture. Visiting cities in China offered even more cultural perspectives. Beijing gave off an aura of ancient history and tradition. The artistic detail seen at Tiananmen Square and at the royal gardens showcased the large influence of social hierarchy on culture. Social class and the rules governing each class were very important. By observing the height of entryways, one could determine the status of those who entered them. It was evident that ancient religion and polytheism also played an influential role. Mirrors were placed around the home to ward off demons. Guardian statues were also used to protect from bad events. The Great Wall also provided a view of Chinese culture as well as history. The wall represented the constant struggle for power that has taken place in China. The sheer size of the wall represents China's ability to do amazing things. Millions of Chinese were involved in building this wonder of the world over thousands of years. Unfortunately, many died during the building process. Another cultural perspective experienced was bartering. While visiting the silk market, the SELF fellows learned the meaning of being a consumer in China. Getting a fair price took

a tremendous amount of work, which is not something faced in the American culture. This bartering system really bestows a value to what is purchased.

Cuisine was another cultural aspect experienced in China. The traditional restaurants in Beijing provided an array of dishes a tourist would expect to see, as well as some unexpected entrees. The normal white rice, lo mein, chicken, pork or beef, and vegetables were all a part of the expected dishes. The SELF Fellows also encountered unexpected dishes, which included duck's feet, thousand year old egg, intestine, and liver. All the meals were served family style on a large turntable called a "lazy susan." Portions were taken straight from the turntable and placed on small dishes. Though different, this was a nice change from a traditional restaurant-style American meal, since there was an opportunity to sample every entrée on the table. Tea was also very prominent aspect of Chinese culture and was served at every meal. Fruit, usually consisting of watermelon, was served for dessert. Every meal the SELF Fellows shared together brought a new adventure and was a great way to experience the Chinese culture first hand.

The SELF Fellows were immersed in globalization the minute they stepped foot off the plane in Beijing. The infamous Bird's Nest could be seen towering among surrounding buildings. The spread of American companies--like Google, Black & Veatch, KFC, and McDonalds--was seen everywhere. All of these companies contributed to a more globalized China. Globalization also means a greater need for transportation considering that 22 million people live in Beijing. Common modes of transportation are cars, bicycles, walking, and electric trains. Due to music and movies, American entertainment has become a large part of Chinese culture. That being the case, Americans are easily recognized on the street and are approached often for pictures.

While Beijing had many globalizing aspects, Shanghai could be considered a more international city. The layout of Shanghai was more like one would expect in Europe or the United States. Many modern skyscrapers specked the skyline as well as international company insignia. One of the noticeable differences in Shanghai was the music. In Beijing, more traditional music was played throughout public areas, but in Shanghai, American music could be heard everywhere. Shanghai was very capitalistic which was surprising coming from such a socialistic nation. An extensive amount of money, about 40 million RMB, was invested into Shanghai for the World's Fair. This advanced Shanghai's transportation system by nearly ten years and spurred major amounts of development.

Visiting China during the World's Fair allowed the SELF fellows to experience a myriad of cultures. The trip also allowed for the broadening of perspective and understanding of globalization without the necessity of actually visiting each country. Ultimately, much knowledge was gained about China's history, traditions, and future growth.



INTERNATIONAL BUSINESS
BY KATHLEEN ARMISTEAD
MARKIE MCCONKEY, STEVEN QIU



China has one of the fastest growing economies and the world's largest population, which makes it a prime location to study international business. The Project Shanghai experience included visits with several international businesses including Ion Geophysical, Google China, Black & Veatch, and Ao-Shi Sports Timing Inc. Attending the World Expo also allowed for observation of economic displays from countries around the world. The visit to Black & Veatch gave an overview of international business from the perspective of a global engineering firm. The Beijing location predominantly works on projects around the globe whose major interest uses Chinese-manufactured equipment and contractors. Black & Veatch provides a major service by checking lists of manufacturers and contractors capable of meeting certain standards and timelines. Predominantly an energy company working on power plants, the Beijing branch has a lot of experience with international business practices. They have witnessed many advantages and disadvantages of doing business in China. Some of the disadvantages include communication barriers, contracts not consistently being followed, and needing more ex-patriots in the beginning. The advantages include better prices, an expanding market, a chance to be more internationally competitive, and a large people resource base.

Business practices in China often differ from those in the U.S. From a litigation standpoint, there is not much accountability for contracts in China. Many are argued in court, and decisions are made on a case-by-case basis because Chinese business and legal transactions are heavily influenced by guanxi (relationships); whereas in the U.S., contracts are viewed as concrete and are normally upheld in court.

Many attempts were made to eliminate these foreseeable problems as an U.S. based engineering firm. Black & Veatch realized that it was vital to adapt to the Chinese market rather than standing with Black & Veatch's old ways. However, this adaptation was carefully planned to make sure the correct ethics and integrity were applied the same way in the Beijing office as in the Kansas City headquarters. These attempts include extensive headquarters training programs in the U.S. for Chinese-hired employees, ex-patriot assignments to China to instill the values of Black & Veatch internationally. With these basic steps, Black & Veatch was able to fill in the gap between them and their respective clients.

In the past few years they were able to position their operation strategy “China Engineering Export” to succeed in the competitive Chinese economic market.

The visit to Google China showed the different challenges that engineers face dealing with a different market and government censorship. A very small percentage of the Chinese population is online; however, because of China’s large population, the number of people using the internet is much larger than in the U.S. Google China has to restructure its search engine to cater to the Chinese market, and working with Chinese characters creates some obstacles. Chinese consumers would rather look through Chinese character headlines than have to type the Roman alphabet version of their words, so engineers have adapted to the market and made formatting changes to the search engine to make it easier to search using the traditional Chinese characters. Government censorship is also a big obstacle for Google China. Since moving its base to Hong Kong, many of the problems have been alleviated.

While visits with both Black & Veatch and Google China presented a good view of international business from the angle of a United States-based engineering company, visiting Ao-shi Sports Timing Inc. revealed the other side of this intricate relationship. As a Chinese based company, Ao-shi faces similar challenges dealing with foreign companies worldwide. These challenges include language barrier, culture differences and different engineering practice standards. Facing these difficult challenges, Ao-shi Sports Timing Inc. has increasingly adapted its company culture and employees to resolve these problems. Second-language abilities became a requirement for the current and future employees in an attempt to lower the language barrier. Moreover, Ao-shi has created a great program to expose their employees to the different cultures around the world. This program allows the younger and less-experienced employees to shadow one of the more-experienced employees on a business trip to become more knowledgeable with the global culture. Through these attempts to better connect with their respective foreign clients, Ao-shi is able to better fill in the gap between the differences in engineering standards for smoother project execution.

While many pavilions at the Expo had impressive displays, the South Africa Pavilion in particular was very interesting from a business perspective. Its theme, “The Rise of a Modern Economy”, discussed its economic development up to and including the preparation for hosting the 2010 FIFA World Cup. Not long after South Africa was released from the apartheid, it began to trade freely in global markets. By 2007, they had had eight consecutive years of economic expansion. South Africa was ranked 34th out of 183 countries for its ease of doing business by The World Bank, Doing Business Report. Because of their conservative banking, credit control systems and solid stimulus packages during the recent recession, their economy has remained stable and is suitable for doing business with the manufacturing, oil and gas, agriculture, textiles, financial service, and many other industries. Their government partners with private enterprises in key industries to maximize their growth, as well as assisting small to medium-sized enterprises by replacing income, provisional, capital gains, secondary, and value added tax with a “Turnover Tax.” Their government policies and business practices have allowed for steady development an innovation regarding modern technologies such as biofuels, wind power, and solar power.



**SEVEN PILLARS OF THE
SELF PROGRAM**
BY ABBY RIMEL, COLIN DAVIDSON,
CAROL FITTEL, ADAM VIEUX



The seven pillars representing the vision of the SELF program (interpersonal, business, communication, managerial, entrepreneurship, engineering, and leadership skills) were chosen because of their prevalence in successful American businesses. As an emerging nation, it is in China's best interest to develop these qualities in its citizens. Here are a few thoughts after experiencing the Chinese business culture firsthand.

INTERPERSONAL

Dining in Chinese culture is quite the interpersonal affair. It is very common to eat at large, round tables. Meat, vegetable dishes, and soup are served all at once. Eating only begins after everyone is seated and the host has taken his or her first bite. All the dishes are commonly set in the center on a turn-table and everyone dishes up food using their chopsticks. Chopsticks are used to eat everything except for soup, in which case a flat bottomed soup-spoon is provided. There are many manners that accompany chopstick-use that may not be obvious to visitors. Chopsticks should not be twiddled, licked, or pointed at another person nor used to stir up food.

Tea is served with every meal, morning to night. Liquor, wine, and beer are also served, especially for special occasions. Meals are often started with a toast from the host, and it is polite to stop eating and take part in toasts when they are offered mid-meal. The word 'ganbei' is spoken before drinking to the toast, meaning 'bottoms up!' The table structure and family style meals truly facilitate good conversation and camaraderie during meals. In Chinese culture, the dinner table is a place to engage in conversation and spend time with close family and friends.

BUSINESS

Chinese food for nine days straight: could it be done? As circumstances would have it, American food was available on the other side of the world. On day seven at the World Expo, I found a Turkish restaurant selling a vegetable-style lasagna with cheese. Throughout the World Expo and other popular shopping districts in both Beijing and

Shanghai, the western world of fast food flourishes. Starbucks, McDonald's, Papa John's, and KFC were all spotted throughout our trip. Apparently accustomed to a difficulty in understanding orders, most fast food restaurants offered laminated menus similar to a child's placemat for pointing at while holding up the quantity on the other hand. A chocolate milk-shake from McDonald's and a small cheese pizza from Papa John's were ordered using this method. Comfort foods are especially comforting in another country.

Even in China these international businesses had to adapt to the local cuisine and customs to keep afloat. At Papa John's I noticed most of the customers eating what seemed to be a rice bowl with pizza toppings. For a country whose diet includes practically no dairy, the locals seemed quite happy with a healthy dose of processed cheese on top of their rice.

Other businesses chose different ways of handling their foreign setting. At Starbucks a much greater emphasis was on their tea, rather than on their coffee like here in the states. As comforting as it may have been to see and eat foods from home, even these popular chains had to adjust their business to the Chinese environment.

COMMUNICATION

The spoken Chinese language is a branch of the Sino-Tibetan family of languages and has quite a complex written form. There are varying regional dialects of Chinese language throughout the country. The People's Republic of China recognizes standard Mandarin as the official language. Mandarin and Cantonese are two of the most commonly spoken Chinese dialects. When writing the Chinese language, the same symbol can have completely different associated words for the same meaning across regional dialects. Although the Chinese characters may look like small pictures, the characters are very rarely intended to look like a picture of what they mean. The characters actually contain combinations of phonetic components. According to Xu Shen, who wrote the first Chinese dictionary in the year 100, Chinese characters can be broken into six categories: pictographs, simple ideographs, compound ideographs, phonetic loans, phonetic compounds and derivative characters.

More casual forms of communication are also unique in Chinese culture. When meeting someone in China, it is customary to introduce yourself with your full name and a hand shake. Handshakes should only be offered with the right hand while standing, with the left hand kept out of the pocket, and without wearing a hat, gloves, or sunglasses. Phatic communication, in which words are spoken for social means, but not to convey information, is common when speaking in passing. It is acceptable to offer a salutation without the expectation of a response out of courtesy. In urban areas, many posted signs are in Chinese and English for cross-cultural communication. Communication—in gestures and spoken language—is crucial for positive interaction with locals and successful travel about China.



SEVEN PILLARS OF THE SELF PROGRAM (CONTINUED)



MANAGERIAL

The structure of the Chinese government offers a lot of insight into aspects of the business world. The simple fact that 1.3 billion people are able to live together in one country is a testament to the managerial effectiveness of the Chinese government.

While the country is in principle communist, the free market is taking hold in many areas. Twenty years ago the government owned everything and set prices accordingly. Today there are numerous small shops that are mostly family-owned (or “leased” from the government for 70 years) and price products competitively. Wal-Mart stores are showing up in big cities and have been wildly successful. All this is due in part to the government’s “hands off” approach in these free markets.

Businesses can do something similar when they empower their lower-level leadership by staying less involved in the details of how jobs get done (i.e. avoiding micromanaging). When done correctly, management feels empowered, spends less time interacting with upper management, and ideally focuses on getting the jobs assigned to them done. Senior management resources can also be devoted more to keeping an eye on the big picture and staying ahead of current production. This creates an empowered workforce and a management force with the time and resources to address legitimate concerns as they come up. The end result, much like in China, is that productivity and morale improve tremendously.

ENTREPRENEURSHIP

Thinking about becoming an entrepreneur can be daunting. The cost of opening a business, following regulations, targeting the need of a population, and pulling a profit involves a multitude of variables, time, and money. In China, as in many countries worldwide, the most basic entrepreneurial efforts are made by women in the informal economy.

From street corners to small shops, water, fans, and umbrellas are all sold from the most unlikely of places.

A woman in the middle of the Forbidden City sat selling a frozen bottle of water while her small daughter sat close beside her. Another woman had her children showing off her merchandise of postcards and umbrellas to tourists walking nearby in Tiananmen Square. When a bottle of water was needed at any time of day, a small street corner shop was available and inhabited with three generations of women handling the store. Previously, when the Chinese government enforced strict regulations on small businesses, shops were obligated to fixed prices and hours of operation. Currently small shops are able to set their own price and operate anytime, day or night.

Now, with less regulation and the entrepreneurial drive of the local Chinese, the need for a bottle of water or a foot massage can all be found even late at night. These small-niche markets allow for many Chinese citizens to make money on a flexible schedule that also allows individuals to care for family members. These small companies, although not always legitimately included in the overall Chinese economy, help the city's poor from the bottom up.

ENGINEERING

Engineering is the process of identifying a problem and designing a creative solution for the betterment of society. In Imperial China, the largest threat to public welfare was invasion from the north. The engineers of the time counted the resources available to them: a large mountain range, plentiful sources of labor, and an abundance of wood and stone. Spanning mountains, deserts, and plains, The Great Wall is the ingenious product of these engineers's thinking.

The first sections of the Great Wall were a series of small fortifications built at the local level. Not until China was unified under the rule of Qin Shi Huangdi in the 3rd century BC did the first unified walls appear. The Great Wall is not a single wall stretching from eastern to western China. Rather, it is a series of sometimes overlapping walls that were built by various emperors throughout China's Imperial history.

The grandest sections of the Great Wall were built during the Ming Dynasty between 1368 and 1644. Engineers during the Ming Dynasty aspired to create a wall that would repel any attack from invaders, as an earlier wall failed to do against the Mongols in the 13th century. Learning from the mistakes of the earlier breach, engineers set forth not only to fortify the countryside with a wall but also to fortify the wall itself with new technologies and military methods. Watch towers were added to the wall to provide high points for sentries to survey the land, barracks for soldiers manning the wall, and space to store food and munitions. Additionally, towers were strategically placed so that any point of the wall was within an arrow shot. This left no section vulnerable to attack. As seen in Europe, ramparts were used on the top of the wall to provide defenders an advantage in firing down on invaders while staying protected. The Ming Dynasty was



SEVEN PILLARS OF THE SELF PROGRAM (CONTINUED)



also the first to employ the use of cannons in the defense of the wall. Should any attack occur on a section of the wall, signal beacons could be lit resulting in the lighting of subsequent beacons which would lead to a quick notification of the attack in progress.

The other benefit of the wall is that it could be used in multiple ways, including as an ancient highway system. Upon learning of an attack, soldiers could quickly be transported along the wall from all over the country to the section under duress. Similarly, it led to a quick transmission of information and goods across the country. Ultimately, the wall was breached by the Manchu in the 1600s, but for centuries, the Great Wall provided a sense of security to the Chinese people. Today, the majority of the wall is in ruins, but sections have been restored in recent decades to provide visitors a feel of the enormity of the challenge that engineers of the past faced and to view their significant success at the same time.

LEADERSHIP

In July 2010, the Chinese economy overtook Japan's becoming the second largest in the world. In terms of GDP, China is expected to surpass the US in the next few years, and many argue that they already have. Regardless of if or when the Chinese economy overtakes the US, it is interesting that before the US became the global economic leader, China held the position. Over 100 years ago, China had the largest economy, because the global economy was agricultural, and by virtue of its large population, China had the largest economy. It was only through the Industrial Revolution, fueled largely by the free market, that the US was able to be propelled to the top economy in the world.

Since the markets opened up in China in the early 1990s, the Chinese economy has grown at about 10% per year as infrastructure and manufacturing are built as quickly as possible. At present, the Chinese have a lot to be proud of, and they have taken many opportunities to show the world they are a global player, as opposed to a third-world country. From the Olympics in Beijing, the World Expo in Shanghai, and big city skylines that rival some of the greatest cities in the world, the Chinese have taken every opportunity to showcase their leadership in engineering and culture.



ARCHITECTURE & BUILDING TECHNOLOGY BY JOEY MEYER



Architecture, throughout history and in many forms, has symbolized culture. Unlike art, architecture is a form of expression that must fulfill a practical purpose. But beyond that purpose, the expression of architecture has given meaning to people and places and is especially representative when many nations come together to showcase their own architecture in the World Exposition.

Since the inception of the World's Exposition, many famous works of architecture have transcended their temporary status to become well-known and celebrated pieces of a time and place. Works such as the Crystal Palace by Joseph Paxton at the 1851 Great Exhibition in London guided innovations in modular design using repeating glass and steel sections. The now famous Crystal Palace was completed under a limited schedule at a rapid pace of construction, due to its novel use of modular design. In a similar manner, the Expo '67 in Montreal (after which all World's Fairs were called 'Expos') brought the creation of Habitat '67 by Moshie Sofdie which exhibited a modular design for living. The repeatable, yet unique, sections furthered innovations in building technology that spread worldwide through the backing of the World Exposition.

Architecture at the World Expositions has also given rise to new movements. Works such as world-renowned architect Mies van der Rohe's Barcelona Pavilion in 1929 marked an important point in the history of modern architecture. The German Pavilion's use of simple planar geometries with rich materials offered a radical shift in architecture and spoke to a progressive spirit of the German people in the late 1920s. In the earlier World's Columbian Exhibition in Chicago of 1893, Louis Sullivan brought about a renewed classical movement in architecture that came to define the city's self-image and helped create a neoclassical spirit in America. Along with historical movements, the World Expo has showcased symbolic meaning.

Exhibition works from the World's Fairs have left symbolic marks that still today stand to symbolize cultures through architecture. The Eiffel Tower was built as part of the Exposition Universelle in 1889 in Paris and still serves a symbolic focal point of the city. The Space Needle, built in Seattle in 1962, also remains a landmark of the Pacific Northwest



ARCHITECTURE & BUILDING TECHNOLOGY (CONTINUED)



after its creation for the 1962 World's Fair. While the motive and inspiration for many of the World's Fairs pavilions range widely, many nonetheless have held lasting impressions as symbolic marks of people, places, and periods in human history.

The Expo 2010 in Shanghai, China, brought about record marks in worldwide interest and tourism. The Expo included more than 190 countries and over 50 international organizations, featured in dozens of pavilions. The Expo is to become the most visited in history, with projections estimating over 70 million visitors. While the Expo itself was the largest in history (over five square kilometers), the 14 SELF Fellows who traveled as part of Project Shanghai were able to cover over 50 pavilions in three days. While each pavilion brought a unique perspective and emphasized various aspects of its respective culture, some pavilions emphasized its cultural identity, some covered the latest in building technology innovation, and others brought to light the importance of the role of architecture and engineering in the future of our world.

Throughout Expo 2010, the pavilions represented various aspects of the respective countries and cultures in showcasing the 'national brand.' With a global increase in communications and an unprecedented ease for worldwide information exchange, it has never been easier to connect with others globally. With that advance has come increased international travel and living. In an attempt to build interest and tourism, many countries made strong use out of their pavilion as a way to exhibit their national brand or commercialize their specific culture. The USA Pavilion, for example, was rooted in American ideals and the aesthetics of the pavilion reflected those ideals. As an eagle spread its wings, the USA Pavilion rose and opened in greeting to visitors who sought the experience. Inside, the pavilion further showcased the "American dream": owning a home, living in unique and beautiful environments, living sustainably, and living happily. Though the steel exterior cladding did well to exhibit an industrialized and progressive means of architecture, the softer interior with wide, spacious volumes offered a welcoming gesture and a showcase of the country.

Just as the USA Pavilion opened as a representative welcome, other pavilions too

represented a culture. While traveling throughout both Beijing and Shanghai, there were many advertisements that made use of the Chinese Pavilion, a large red inverted structure that expands as it rises. It made use of the Chinese dougong style, which features wooden bracketing and is a predominate feature in traditional Chinese architecture. The pavilion itself has become a focal point and a symbol for the Expo 2010, as it was apparent through our travel in China that the inverted red pavilion has become a source of pride.

While many pavilions were themselves embodiments of cultural architecture, some also exhibited the latest in building technology. With the Expo theme of “Better City, Better Life,” many countries showed the latest in sustainability and the measures that have been implemented to ensure a sustainable future. The Portugal pavilion described innovation solutions to use photovoltaic heating energy as an integrated appliance for use in residential and service buildings. The panels replace other construction materials, offer renewable energy, and are created in a seamless manner that eases installation and has appeal in itself.

Aside from energy-efficient system displays and innovative ideas in energy-saving technology, the use of sustainable materials was also widespread throughout the World Expo. The Spanish Pavilion was sheathed in a flexible weaved skin, fabricated in the same process as basket-weaving. The Portuguese Pavilion incorporated cork in the modular design of the ‘Transportable Tourist Tower’ as part of the exhibit, while other countries such as Sweden incorporated cork as the primary exterior layer. Cork reduces impact of construction and is an easily renewable material at low cost, thus making it a strong candidate for use as a green building material. Pavilions such as the Luxemburg Pavilion also offered integrated sustainable solutions within the pavilion itself, especially with the use of a green roof. Gardening and green roofs also offer a relief from the urban heat island effect, as well as provide subtle retreats from the industrialized urban landscape. The Italian Pavilion held a display for sustainable urban living, which featured a zero carbon emission home for 100,000 euro.

While many countries made great use of their respective pavilions as a way to showcase the ongoing efforts towards sustainability and innovative building technologies, the pavilions themselves are a showcase to our time and place in human history. Architecture has long been affected by new engineering technologies, such as the invention of the elevator and reinforced concrete in the early 20th century. In today’s environmentally conscious world, the importance of energy and the proper use of energy in buildings has created a strong push for realistic solutions to reduce waste.

The World Expo 2010 in Shanghai offered many various solutions and ongoing innovations that will change the structures around us. How can we balance the challenges of thermal, structural, electrical, and additional demands of the buildings we live in while still offering the best in energy efficiency, construction, cost and quality? As the structures around us become more sophisticated, it takes engineering innovation and architectural imagination to continue to move architecture in a realistic, innovative, and sustainable direction. While giving a varied architectural experience through the many pavilions from around the world, the World Expo 2010 in Shanghai also offered a glimpse into the future of building technology and innovation.



URBANIZATION
BY KATHLEEN ARMISTEAD
MARKIE MCCONKEY, STEVEN QIU



Urbanization is defined as “the physical growth of urban areas as a result of global change.” Urbanization was the overall topic of the World Expo, Shanghai China. Almost each and every pavilion touched on the urbanization efforts of their country and how they are using urbanization to develop into thriving nations. On top of the specific country pavilion we visited that highlighted urbanization, there were also theme pavilions with the sole purpose of developing the idea of urbanization and its general effects. The theme pavilion “Urbania” was an accumulation of all things related to this overall topic.

Urbania had five major themes within the exhibit: family, work, contact, learning, and health. Each theme was displayed in a way to show that increased emphasis and development on the individual sectors helps to create better living for the people of that nation. “Family” displayed the raw need for urbanization. Without families in need of better living and better lives, there would be no need to develop these regions. “Work” was focused on different jobs of those within a community and the necessity of varied jobs to expand and grow. “Connection” referred to people helping people, and the interaction between all walks of life in the continuing restoration of cities. “Learning” focused on education and the importance of literacy and schooling systems and how they are a necessity in the urbanization process. Lastly, “health” emphasized the significance of a healthy population. This had to do with clean water systems, clean air, and medical attention.

All the other pavilions we visited fell into an Urbania category. The United Arab Emirates pavilion was all about work and how their work has evolved over time. They displayed the unique types of jobs that people in UAE have and how they contribute to society. The urbanization rate of UAE is nearly 86%, which is well over the international average. Dubai is the main reason for this high number, which is partially because of its status as one of the largest man-made harbors in the world. Oil and natural gas are the riches behind the progress of this great nation. The USA site also had flashes of urbanization. One of the main themes of this site was “connection”—how people working together can sustain growth within a community. The USA also has extremely high urbanization rates, nearing 90%. Urbanization in American was brought to life during the

industrial revolution of the 19th and 20th centuries. Large numbers of immigration in the south, at that time, also aided in the urbanization process. The effects of that development are still evident today and account for the great success of the country. Brazil's pavilion focused primarily on "work" and how different jobs come together to create a foundation for the economy and way of life for Brazilians. Videos showed a "day in the life" of four different workers and how their jobs—though seemingly unrelated—all ended up coming together to create the big picture that is Brazil, which boasts an urban population around 80%. The formation of the domestic market in the mid 1950s accounts greatly for the urbanization and development of the country; jobs created the stability necessary to urbanize.

Spain's site was focused on "learning" and how far the country had come over the years. The main exhibit of the Spain pavilion was a "larger than life" baby. Standing over 10 meters tall, this life-like machine had the appearance and motion of a human. In the past five years, Spanish companies and institutions have sharply increased their focus on biotechnology. New companies, new products, and new research centers are all ways Spain has increased their contribution to this field, stimulating growth in their nation. The most valuable lesson on urbanization was being in China itself. China has a population over 1.3 billion, making it the most populous country in the world. We started off in Beijing, and seeing the amount of people stacked in one urban region was truly phenomenal. Although China's urbanization rate is about average compared to the rest of the world, the pace at which it has urbanized is unprecedented. And even though urbanization rates in China seem low, the population is so large that more people live in urban areas than the total population of every other country in the world, except India.

The second city visited by the SELF Fellows was Shanghai. Shanghai was similar in terms of a crowded urban area, but it was better kept and more put together. The two cities we visited were two of the largest urban cities in China, so we did not get to venture through the rural areas. The Fellows did take a train ride from Beijing to Shanghai, which was a great opportunity to see rural areas and compare them to the urban areas. Some of the rural areas looked like ghost towns, and it is apparent why urbanization is crucial in China. Without a good public transportation system, a lack of good water systems, and many other necessities, it is no surprise there is a crucial urbanization movement. Hopefully this movement will have an impact on the state of rural and urban areas of China alike. The state of urban areas is not ideal, and the rural areas are even worse. After seeing the state-of-living of the Chinese, there is a glimmer of hope that the Expo's theme had a positive influence on the future of the Republic.



WATER SOLUTIONS

BY ABBY RIMEL, COLIN DAVIDSON,
CAROL FITTEL, AND ADAM VIEUX



Water has quickly become as valuable a resource as oil, or gold. Hundreds of millions of people around the world lack easy access to clean water for drinking, bathing, and farming. At the World Expo in Shanghai, China, the issue of water resource management was evident throughout many national pavilions. The feasibility of safe tap water in China, adequate water for agricultural use in Africa, the clean-up of polluted bodies of water, and Singapore's quest for water independence were all topics presented at the World Expo and can be applied to many similar situations around the world. Domestic water use makes up a very small part of the world's freshwater demands, whereas agriculture uses the majority of freshwater in both the developed and developing world. In sub-Saharan Africa, most areas do not receive the required rainfall for crop production. According to a recent United Nations study, 60 percent of sub-Saharan Africa could benefit from increased irrigation. Furthermore, sub-Saharan Africa is presently using only one percent of its renewable or water resources, while Northern Africa is draining underground aquifers at an alarming and unsustainable rate.

Unfortunately, many countries lack suitable economic resources for the development of their water resources. Furthermore, without agriculture their economies suffer, and without a stable economy the necessary investment in water resources cannot occur. Feasible solutions exist including local rainfall catches, tapping underground wells, and using aqueducts to ferry water from areas of heavy rainfall to drier regions. Without increased investment in the region from outside, these ideas—no matter how creative or effective—will never be implemented. Many countries at the World Expo acknowledged this problem in their pavilions, yet only a few regions have invested in water resource development. On a continent where most of the population has to walk a considerable distance just to obtain drinking water, a small investment in providing water for irrigation and household uses would pay dividends to an extremely impoverished region of the world. While urban development can be great for economies and job markets, it can also call for creative solutions to ensure there are sufficient quantities of treated water and adequate wastewater treatment systems. There is also the vast problem of human-caused pollution.

Industrial waste, wastewater, and other types of industrial pollution are major factors for deteriorating water quality. Everyday waste pollutes the cleanliness of nature's largest water supplies. Marine pollution has become an overwhelming concern as dilution is no longer a viable solution to pollution in the oceans. When garbage feeds into the oceans, currents often collect the trash resulting in large "garbage patches."

These discouraging realities are being combated everyday with alternative solutions. In Izmir, Turkey, a coastal region comprised of 12 towns, pollution has caused devastating affects to city life. Growing industry, aging infrastructure, and overpopulation lead to immense amounts of pollution and ecosystem disturbances. The Grand Canal Project was implemented to rescue the Izmir Bay from its polluted state and restore the natural ecology. Nearly 4,150 kilometers of pipelines were implemented to collect wastewater and pump it into two main stations where it could be treated. This project is considered a great step toward cleaning the chronic pollution problems, providing primary water treatment to many areas, secondary, or biological, treatment facilities in five towns and even a full, operational tertiary water treatment facility on site. After implementation of the project, an increase in species sensitive to pollution were recorded along with an increase in the number of exotic animals. Considering this, there appears to be a direct correlation to the improved water quality. This great project was awarded "The best Environmental Practices Award" from the Turkish ministry of Environment in 2004.

In Chinese urban areas, a plan for semi-centralized supply and treatment systems has been considered for cleaning wastewater and providing freshwater to homes. The system involves the co-fermentation of sewage sludge and biodegradable organic waste paired with energy recovery and gray water treatment. The system would be modular to meet the needs of large populations and would supply potable water while reusing provisional water for industrial uses, toilet flushing, and irrigation. Extensive research has been conducted for this type of system and information has been provided to the Chinese government. This creative solution exemplifies recycling as water, nutrients, and energy are reused throughout the process.

In Japan, a company called Sekisui Aqua Systems is utilizing microorganisms to aide in wastewater treatment. Microorganisms slowly decompose substances in the wastewater to allow for a safe and hygienic drinking water supply. In order to ensure a plentiful water supply for the citizens of Japan, desalinization is utilized through evaporation and reverse osmosis. Through evaporation, excess steam from power plants is used to produce freshwater. This promising process has been implemented on quite a large scale. Reverse osmosis is a very promising option as well as it can be used on water from the ocean, lakes, and even underground. The Japanese Corporation Hitachi Zosen has become an expert in desalinization processes. In order to successfully transport the water supply to citizens, Taisei Kiko Co., Ltd. Is specializing in pipeline engineering and has developed a method known as Under Pressure Construction allowing for an uninterrupted water flow in pipelines. The company produces specialty pipe fittings the can be installed and serviced when the pipe is under pressure conditions.



WATER SOLUTIONS (CONTINUED)



The rise of Singapore from a small British trading outpost in 1824 to the most globalized country in the world in 2006, according to A.T. Kearney, is nothing short of impressive. This rise to global prominence was fueled in large part by Singapore's innovative solutions to complex issues. Singapore is an island city-state in Southeast Asia covering nearly 270 square miles. With just over 4.6 million inhabitants, it is the second most densely populated country in the world (after Monaco). An entire country covered by urban landscapes poses unique challenges such as food production, affordable living spaces, and pollution control. The most pressing challenge currently addressed by Singapore, however, is water resource management. This combination of geography and demographics makes Singapore a perfect case study, which was made evident from experiences at Expo 2010 in Shanghai, China.

With no natural surface lakes or aquifers to tap, the rapidly urbanizing country has needed to find increased water supplies quickly and economically. Today, a "Four National Tap" plan exists to provide sufficient water quantities. These four sources, or "taps," include importation of water from Malaysia, rainwater catchment systems, wastewater recycling, and desalination.

The initial response to curb the rising demand for water in the country was to import water from neighboring Malaysia. For years, this option provided over 50 percent of the water used in the country. However, relying on a foreign nation for a resource as vital as water raises great concern. Therefore, Singapore has implemented three methods to decrease the percentage of water used from importation to 40 percent with the goal of complete water independence by 2061.

The second largest source of water for the country is reclaimed water, accounting for 30 percent of the water supplied. Wastewater is processed using ordinary treatment methods followed by reverse osmosis and ultraviolet treatment technologies. This processed wastewater, or "NEWater" as the brand is called, is primarily used in industrial applications. The quality of NEWater, however, surpasses the standards set by the World Health Organization for drinking water, and some does get diverted from industrial

applications to enter the potable water supply.

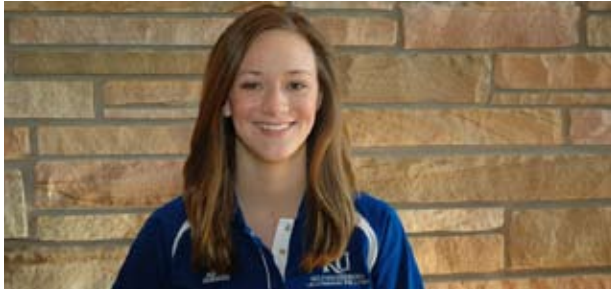
Twenty percent of the water supplied to Singapore comes from rain water catchment systems. Due to the lack of natural lakes and aquifers, man-made reservoirs have been built to hold and distribute rain water. Catchment areas around the city are linked together to form a large network for distribution. Difficulties with this method will continue in the future, however, as land scarcity becomes more valuable.

Lastly, desalinization has been a recent addition to the water supply chain. In 2005, the country commissioned its first desalinization plant capable of supplying 30 million gallons of fresh water per day. This accounts for the final 10 percent of the water supplied to Singapore. This final method looks very promising as desalinization requires less space than rain water catchment systems and lacks the negative publicity of processing wastewater. In the end, it will take all three of these methods will have to combine to bring Singapore complete water independence.



THE 2011 SELF FELLOWS





KATHLEEN ARMISTEAD

**Senior, Mechanical Engineering
Aurora, Colorado**

A graduate of Cor Jesu Academy in St. Louis and KU junior, Kathleen is involved on campus beyond her interests in engineering. She's a member of Alpha Delta Pi Sorority, the American Institute of Chemical Engineers, the Engineering Student Council, and is a Telecounselor for KU Admissions.

As part of a study abroad in the summer of 2009, Kathleen participated in materials engineering through the University of Akron in Mexico. This past summer, she interned as a field engineer with Schlumberger in Oklahoma.



BRIAN BLACKWELL

**Senior, Mechanical Engineering
Herington, Kansas**

Originally from Herington High School, Brian is a junior with an interest in alternative energy in third world countries. He spends his time as part of the Jayhawk Leadership Academy, Golden Key Society, American Society of Mechanical Engineers, National Society of Collegiate Scholars, the Engineering Student Council, and the KU Football Team.

Brian has taken part in supporting the Student Union Activities' Late Night Price is Right, Grocery Bingo, and Engineering Student Council's Dodgeball Competition.



COLIN DAVIDSON

**Senior, Mechanical Engineering
and Business Administration
Overland Park, Kansas**

Colin embodies many of the leadership qualities of the SELF Program in his involvement at KU. As a graduate of Blue Valley Northwest, he is the Co-Coordinator for Engineering Expo with the ESC, the Recruitment and Community Service Chair for Theta Tau Professional Engineering Fraternity, in Tau Beta Pi, and is the Vice President of Pi Tau Sigma.

Colin plans to build on his interest in alternative power generation, as he has intered for his second summer at Burns & McDonnell's Process & Industrial Global Practice in Kansas City this past summer.



CAROL FITTELL

**Senior, Civil Engineering
Lawrence, Kansas**

As a junior in from Free State High School, Carol is involved in numerous organizations including the Rock Climbing Club, Engineers Without Borders, KU Environs, and serves as the President of KU's Yoga Club. She stays involved with the community by helping local scouting groups. In addition to backpacking and rock climbing across the country, she has traveled to Bolivia with Engineers Without Borders to help improve sanitation in the Andes.

Carol is interested in sustainable water infrastructure projects in developing countries and is considering joining the Peace Corps. This past summer, Carol to backpacked through the Pacific Northwest during breaks working on the Konza Groundwater Monitoring Project.



JAKE HAMILTON

**Senior, Electrical Engineering
Topeka, Kansas**

Jake is interested in many opportunities surrounding power management. As a junior in electrical engineering from Washburn Rural High School, Jake has been involved as Webmaster of the KU Chapter of IEEE, and is a member of KU Racquetball Club, as well as Engineers Without Borders.

Jake has a growing interest in smart power grids, and took part in the National Wind Power Conference in 2009. This past summer, he continued research on a dual vocal pitch analyzer developed on campus.



BRIAN LARKIN

**Senior, Mechanical Engineering
Garden City, Kansas**

In addition to being part of Big Brothers Big Sisters, ASME, and part of the KU Biofuels initiative, Brian keeps involved as the Intramural and Philanthropy Chair for the Beta Theta Pi Fraternity.

As part of his fraternity, Brian helped collect care packages for soldiers abroad during over the 2008 holiday season. Brian has also traveled significantly, including a study abroad trip to Germany, trips to London and Mexico, and a mission trip to Pine Ridge, South Dakota. He is a graduate of Garden City High School.



KELLY LOHMEYER

**Senior, Chemical Engineering
Osage City, Kansas**

As a junior in chemical engineering from Osage City High School, Kelly is a leader on campus. She is a member of the American Institute of Chemical Engineers and the Society of Women Engineers, a Beauty Ambassador for Bare Escentuals, and a member of Toastmasters.

With SELF, Kelly has helped pioneer Flapjacks for Philanthropy, volunteer for the Future Cities Competition, and helped lead the 2009 High School Design Competition. This past summer, she interned with ExxonMobil in Fairfax, Virginia. Her professional interests include alternative energy, tissue engineering, and developing new skincare and cosmetic products.



MARKIE MCCONKEY

**Senior, Mechanical Engineering
Lincoln, Nebraska**

Markie uses her interest in mechanical engineering as a basis for involvement at KU. As a junior from Lincoln, Nebraska, she is the only marketing and technology representative at KU for Microsoft Student Partner.

In addition to her involvement with Microsoft and acting interactive discussion coordinator for the SELF Program, Markie helped establish the "Wings for a Wish" philanthropy event for her Chi Omega Sorority last year, which raised over \$14,000 for the Make a Wish program.

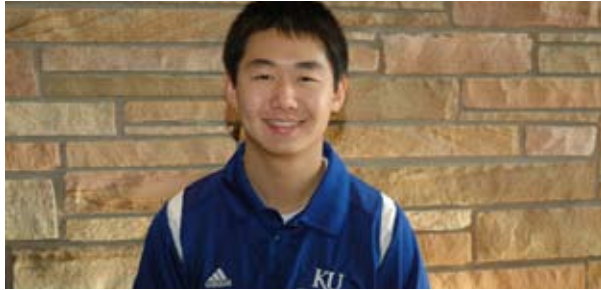


JOEY MEYER

**Senior, Architectural Engineering
St. Louis, Missouri**

Joey is interested in creating opportunities on campus. As a junior from Lafayette High School in St. Louis, he is the Campus Relations Coordinator for Theta Tau, a member of the Society of Fire Protection Engineers, and President of KU Habitat for Humanity.

With Habitat, Joey coordinated the Collegiate Challenge Spring Break Trip in 2009, has helped restructure and build the chapter, as well as founded the first Crunchy Chicken Challenge in September of 2009. This past summer, he interned with Bick Group, a specialist in networking and data systems in St. Louis.



STEVEN QIU

Senior, Chemical Engineering
Beijing, China/Overland Park, Kansas

Steven embodies the ability of leadership, even across cultures. Since moving to the United States at the age of 11 without knowing English, he takes pride in adaptation and perseverance which he now regularly applies with his leadership in the SELF Program.

As a graduate of Blue Valley High School, Steven is a member of Engineers Without Borders, Engineering Student Council, and is Food Board Manager for the Department of Student Housing. This past summer, he interned at Baytown Chemical Process Facility with ExxonMobil.



BRANDIE RHODES

Senior, Aerospace Engineering
Shawnee, Kansas

With an interest in rocket propulsion and space launch vehicle design, Brandie Rhodes recently applied her knowledge as part of an internship in New Zealand for Rocket Lab. In addition to her experience in New Zealand, Brandie also studied abroad in the Czech Republic studying international research and marketing.

While also focused on a business minor, Brandie is involved as the President of the KU Chapter of the American Institute of Aeronautics and Astronautics, and is the Secretary of the Experimental Balloon Society at KU. She is a graduate of Mill Valley High School in Shawnee.



ABBY RIMEL

Senior, Mechanical Engineering
Aurora, Colorado

Abby, a senior in mechanical engineering from Aurora, Colorado, is involved as the Vice President of the KU Engineering Student Council, a member of Kappa Alpha Theta Sorority, an Engineering Ambassador, and plays on the KU Women's Lacrosse Team. As part of a study abroad program, Abby was in Swansea, Wales, in Fall 2008.

Abby enjoys traveling, snowboarding, and spending time with her family. With an interest in energy, Abby interned with Chevron Phillips Chemical Company in Texas this past summer.



DREW ROBINSON

**Senior, Mechanical Engineering
Prairie Village, Kansas**

Drew takes an active role at KU as a junior in mechanical engineering from Shawnee Mission East High School. He is a part of the Engineering Student Council, KU Men's Rugby Club, and the KU Chapter of Habitat for Humanity.

Drew enjoys restoring classic cars, racquetball, and mountain biking in his free time. He traveled to Corpus Christi, Texas, with KU Habitat for Humanity to help build a home during spring break in March of 2010.



KEVIN SHIPLEY

**Senior, Aerospace Engineering
Lincoln, Nebraska**

With an interest in aircraft and spacecraft propulsion systems as well as flight controls, Kevin is actively involved in aerospace engineering. He is a member of the American Institute of Aeronautics and Astronauts, International Friends, and is the Fundraising Coordinator for Engineers Without Borders. He also makes composite parts as a research assistant for KU's Meridian UAV program.

Kevin has also taken an active role in service, helping restore Greensburg in January of 2009 as well as building latrines in Bolivia in June of 2009 for Engineers Without Borders.



ADAM VIEUX

**Senior, Civil Engineering
Lawrence, Kansas**

Adam Vieux just finished his last year of study as a civil engineer at KU. He has served on two submarines with the US Navy since his enlistment in 1999 following his graduation from Lawrence High School.

At KU, he is the Drug and Alcohol Programs Advisor for the Naval ROTC, in the Semper Fidelis Society, and is a member of the Board of Elders at Redeemer Lutheran Church. After graduating last spring, Adam began his appointment as an officer in the US Navy.



ALEXIS MCKINLEY JONES

**Director of Recruitment
Olathe, Kansas**

As Director of Recruitment, Alexis McKinley Jones is also involved with retention and study abroad initiatives at KU. She is an Academic Senator for the KU Unclassified Senate, as well as Co-Founder and Member of the Kansas City Corporate Challenge Committee.

Alexis graduated with her undergraduate and graduate degree in Psychology and Teaching & Leadership - English as a Second Language, respectively, at the University of Kansas.



LUCY MCGILLEY

**SELF Program Director
Overland Park, Kansas**

As program director, Lucy McGilley has the privilege of working with some of the best students KU Engineering has to offer. Lucy was hired at the inception of the program and brings experience in program development after creating two regional recruiting offices for the University of Missouri, her undergraduate alma mater.

In addition to her position with the SELF program, she serves on the Regional Planning Committee for FIRST Robotics, is a member of KU Unclassified Senate, and is pursuing her masters degree in Higher Education Administration at the University of Kansas. Lucy is passionate about helping her students develop skills to succeed.



THE EXPERIENCE IN PHOTOS





VISITS & DINNERS
BEIJING



OLD TOWN
& YU GARDEN
SHANGHAI





FORBIDDEN CITY
& OLYMPIC VILLAGE
BEIJING



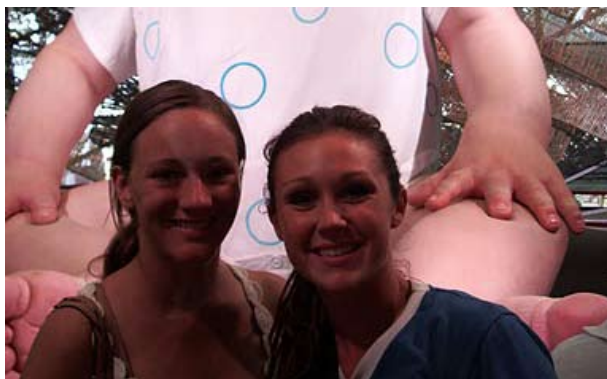


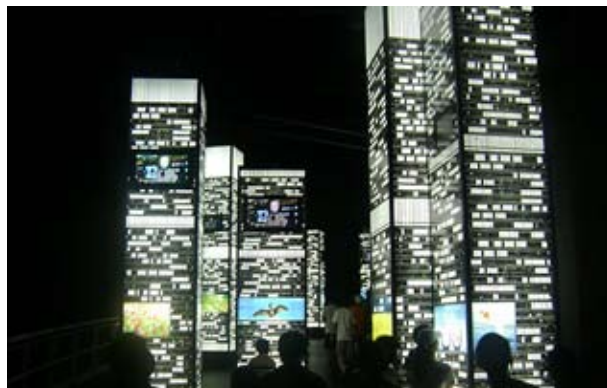
THE GREAT
WALL OF CHINA
BEIJING





EXPO 2010
SHANGHAI



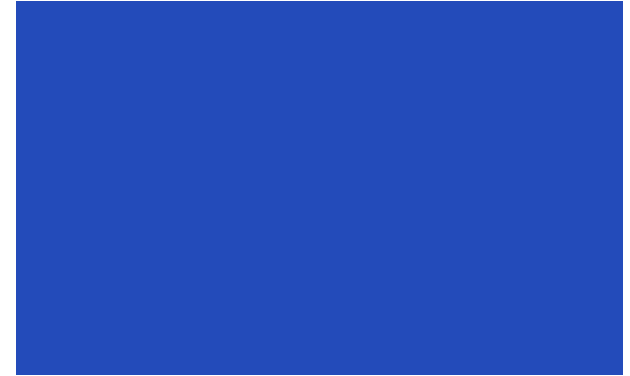




KU SELF ENGINEERING
LEADERSHIP FELLOWS

The University of Kansas

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Project Shanghai Trip Portfolio composed by:

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For more information, please visit our website at www.engr.ku.edu/self.