Master Plan Academic Program Vision 2030

College of Architecture and Environmental Design

Attached are the results of the visioning process from:
The College of Architecture and Environmental Design
Architectural Engineering
Architecture
City and Regional Planning
Construction Management
Landscape Architecture

[one of the design village projects of the 300 CAED interdisciplinary students in ARCH 133 rises in Poly Canyon]
College of Architecture and Environmental Design

How will factors affecting higher education impact fields associated with the built environment?

- Learn by Doing [LxD] experiences remain essential for an environmental design education, but will increasingly rely on knowledge provided by practitioners, practices and industry as partners, as well as faculty.
- In 2030, our faculty will spend more of their instructional time managing teaching processes and outcomes that involve external partners. Their teaching will expand to include mentoring and evaluating students in external settings and assessing asynchronous, and synchronous virtual LxD.
- To succeed in a future hyper connected world, we will offer high quality, just-in-time, anyplace, anywhere, on-demand instruction.
- To further diversity, access, and equity, we will attract a broader mix of students and better serve non traditional students. We will change teaching modes, develop more inclusive admissions practices and offer programs that address the needs of non-English or English as second language speakers.
- As modes of learning change and the location of learning becomes more flexible, we will remodel and expand our existing buildings and sites to increase the amount of space we assign to state-of-art shops and labs. These hands-on environments will further collaboration with adjacent meeting rooms that serve as think tanks for instruction and research. We will add flexible social space where students can collaborate and study.

- Faculty will continue to teach as individuals, but also as part of collaborations on campus, and in distributed open collaborative networks.
- The reach and impact of built environment disciplines will broaden to include new programs and interdisciplinary programs.
Design as a mode of inquiry, as a method of problem solving, and as a form of lateral thinking, will be applied to a multitude of areas of study, making design majors and minors more sought after and design as a foundation for graduate work in other disciplines.

Computing technologies used for instructional communications and disciplinary applications will be fully integrated into pedagogy and practice. The college will provide seamlessly coordinated computing tools accessible to all students, staff and faculty.

As expectations for scholarly productivity increases, we will increase scholarship opportunities through external partnerships, and invest in our teacher-scholars and student-scholars, giving them the time and resources they need to collaborate on research and creative practice.

Value-added degrees, such as licensure-upon-degree should be explored.

Programs will expand community-based service learning, design-build, and other outreach with concrete, valuable outcomes to targeted situations and communities.

To better communicate our identity and opportunities to the public and to prospective students, we will rebrand and rename the college.

Who will our future students be?

- We will continue as a predominantly residential undergraduate college, especially for entering freshmen and returning sophomores.
- Our traditional California high school base may decrease.
- Due to the recognition of our programs, we anticipate more international students.
- Due to immigration and outreach to underrepresented groups, we anticipate an increase in California students with an international cultural background.
- We anticipate more non-traditional transfer students.
- Due to continuing education, we anticipate students with low campus residency, and students in non-degree [ie. credential] programs.
- We anticipate graduate students with a new career degree.
- We anticipate graduate students with advanced study and research in their undergraduate discipline.
- Students will have competence in multiple languages.

Students in ARCH 131 ready to field measure and draw Harford Pier, Port San Luis
How does the global context affect fields associated with the built environment?

- Plan for CAED growth due to world demand for design, architecture, engineering and constructor expertise.
- There will be an opportunity to market our education programs globally.
- Prepare graduates to integrate in a global workplace and bring global content into the curriculum.
- We will look to partner with international schools for joint, dual degree programs, faculty and student research, and cooperative education experiences.
- Respond to global professional accreditation for disciplines.
- Improvements in virtual simulation and testing will raise the bar and expectations for building and built environment performance.
- Improvements in technology and democracy/affordability of prototyping equipment means affordable customization vs. mere mass production.
- Address impacts of global sustainability and integrate building and environmental performance into design.
- California as in increasingly Spanish-speaking population, and Central and South American economies advancing as markets for our graduates, suggest dual language paths, and double majors or concentrations in languages other than English.
- Graduate designers and constructors will remain subject to extremes of global and local economies and perceptions within the building industry.

What will future graduates be doing?

- Graduates will utilize design skills in other areas beyond traditional design and planning of the built environment.
- Graduates will increasingly work as ‘free agents’ on contract teams and in consulting, vs. long term relation with firm or institution.
- Our graduates will come back to school to expand core skills and knowledge, and gain additional credentials and lateral skills.
- Based on their strong grounding in their degree paths, graduates will teach themselves as life-long learners.
- Graduates will entertain more career options, move across multiple careers, and add emerging specializations in sustainability, life-cycle analysis, productivity, and environmental stewardship.
- Increasingly graduates will have the options to work locally, regionally, nationally or globally.
- Graduates will move fluidly in teams across disciplines, and have a base knowledge and respect of many disciplines, but specialize in-depth in one.
What will future students need to learn and what competencies will they need to have?

- LxD remains central - students continue the CAED experience of hands-on studio and shop-based empirical learning. These modes allow students interactions with peers, faculty, and staff unmatched in traditional modes. The meshing of experience and experimentation leads to …
  - Shop + Labs = the Think Tank
- Our students will need a common core, melding Engineering/Technology education with Design/Arts education. Students have the ability to converse across many “languages” yet obtain depth and specialization in their field of study.
- In 2030 students will learn design and project processes across a broad spectrum, from conceptual ideation through to concrete application.
- Students will continue to be testers and early adopters of ideas and methods that add value in the market place. This also will require faculty that can direct students towards trending topics.
- Curricula will incorporate state of the art technologies for each discipline to address current industry trends, while retaining adaptability that allows curriculum to change with future trends.
- Students will adapt general strategies to local and project specific contexts, utilizing customization to optimize life cycle costs, and environmental impacts and performance.
- Students will integrate computing with technological advances. Designs will be increasingly evaluated using a myriad of performance metrics and analytics to compliment virtual representation of visual and sensory experience.
- Students will understand the full life cycle impacts of a project, from inception to reuse/recycle/upcycle, which allows for expertise in, and collaboration across, a variety of fields/disciplines.
- Students will learn design is part of a larger ethical material cycle from design and material selection, through fabrication, construction, occupation, demolition, and recycling or upcycling of materials.
- Students will develop to be self-critical and self-directed. Graduates will learn how to assess themselves and by finding their passion, and it will lead and direct them to success in their profession.
- Students will develop alongside the teacher-scholar as student-scholars. Coursework will link research to application in the lab, classroom, and ultimately the workplace.
- Students will develop the skills to communicate their achievements, and articulate the value of those achievements graphically, verbally, and in writing.
- Students will need to become socially and culturally aware and respectful of difference, and incorporate strategies of clear, responsible, and sensitive communication in dealing with diverse publics and clientele.
- Students will have to develop speech, writing, and professional/technical competency in English, have the opportunity to do so in at least one additional language, and will be encouraged have basic conversational or reading capabilities in additional languages.
How can the college engage with emerging fields and interdisciplinary opportunities?

- Develop two new interdisciplinary majors:
  - Sustainability in Design/Built Environments would be a non-accredited degree allowing for the curriculum design which integrates environmentally conscientious topics from infrastructure and growth planning and policy, to performative design, to construction methods and facilities maintenance. Program would promote environmental stewardship, life cycle analysis, and material/space reuse, and develop comparative studies between field observations versus predictive and performance models.
  - Building Product Design would empower those students with entrepreneurial strengths, as well as an interest in making at a smaller scale. The program would bridge curricula from architecture, design, engineering, construction, packaging, manufacturing, and marketing.

- Develop a new Built Environments Management Masters that would link OCOB and CAED. The degree would develop the intersections between land development and design.
- Develop curriculum in climate engineering / environmental controls programs where building form, passive design and active mechanical, electrical, and plumbing systems are holistically explored, with possibility of multi-disciplinary collaboration between design, engineering, and construction fields.
- Integrate internships and industry partnerships at the undergraduate and graduate levels across the CAED majors. CAED could develop research/lab-based partnered services to investigate industry problems that companies cannot address due to resources, time, or equipment.
- Position CAED to become a Living Lab to export design solutions. Use of our own facilities, shop, and Poly Canyon as test beds for making, [sometimes breaking], and discovering.
- CAED can develop a common GE core for the built environment, based on interrelationships between society, ecology, and technology.
- Allow for students from across the college (and University) to study lower and upper division CAED GE packages/offerings off campus/internationally and in multidisciplinary cohorts.
- Develop a fusion of arts, design, and engineering to create the new Bauhaus and a new model for the team-as-master builder. CAED would explore intersections with other colleges in areas of art, biological science, and agriculture.
Memorandum

California Polytechnic State University
San Luis Obispo, CA 93407

To: Christine Theodoropoulos, Dean
   CAED

From: Al Estes, Department Head
       Architectural Engineering

cc: Assoc. Deans, CAED

Date: November 17, 2014

Subject: Master Planning Exercise Summary

The attached documents provide the detailed responses from ARCE faculty and students respectively for the current master planning exercise. The comments cover a number of topics and extend over many pages. The purpose of this memorandum is to summarize the four most salient points or ideas that come out of this analysis:

1. The college’s top priority needs to be the upgrade and synchronization of our laboratories and shop facilities. The Learn by Doing pedagogy that will continue to make us successful relies heavily on space and facilities. Three big ideas flow from this:
   - To support this hands-on learning environment, the college needs to upgrade and enhance the college shop, digital laboratories, project space, experimental laboratories, Poly canyon, and studio space
   - The college should acquire Crandall Gym as interdisciplinary project and shop space.
   - The university should consider a consolidated shop space on the same order and magnitude as the current Recreation Center. It would be making a bold statement on a national level about our Learn By Doing philosophy

2. The electrical, mechanical, and plumbing (MEP) disciplines should be incorporated into the college curriculum. Cal Poly has the only ARCE program west of the Rockies. There are a number of MEP firms in the western states that would embrace our graduates. With the MEP disciplines, the college would be represented by the entire design-construction industry.

3. Create a cohesive program that nurtures the Master Builder which combines the art and the science of building design. Reinvent the CAED to be the new Bauhaus School, where sculpture, painting, glassmaking, furniture design complements finite element methods, graphical statics, form finding through mathematics and efficient construction practices.

4. As part of this long-term planning process, the university should study and assess whether the CSU system is the higher level organization where Cal Poly is most likely to thrive.
To: Michael Lucas, Associate Dean
CAED

From: Al Estes, Department Head
Architectural Engineering

Subject: Master Planning Exercise Results

The following constitutes the Architectural Engineering response to the master planning exercise. We have tried to specifically answer the questions that were posed in your “Task for Fall: Futuring Narrative at Department and College Levels” dated 10/15/14.

1. What forces are shaping your discipline today? What trends are emerging what differences do you see?

- Increased complexity in building shapes
- Building Information Modelling makes design and construction planning more sophisticated and more challenging to validate the results
- Performance-based design
- Life-cycle costs and design
- Increased accounting for risk and uncertainty
- Increased knowledge of seismic effects
- Sophisticated optimization techniques (genetic algorithms, neural nets, multi-criteria optimization)
- Innovative contractual arrangements on projects
- Increased emphasis on sustainability
- Increased reliance on technological developments such as 3-D printing, digital fabrication, advanced BIM applications, compatibility of software across disciplines.
- With an increased trend towards collaboration and putting everyone together in a room, a separate discipline may emerge such as project integrator. The role of the architect as the leader of a project will increasingly come into question.
- Emphasis is changing from “what tools do we need to solve this problem” to “what problem should we be solving?” An example is the use of passive cooling and heating in building design, this often is the number one criteria deciding the shape and forms of the building; it no longer is an added on afterthought
- A trend is just beginning to create a building rating system for seismic performance. Soon all stakeholders may want buildings to be rated similarly to how food establishments are...
rated on cleanliness. This will cause our student to need some exposure to seismic rehabilitation and evaluation of older structures.

- Increased complexity in building codes
- Performance based design requires more sophisticated analyses pointing to a much higher demand for Master’s degrees.
- ASCE is pushing for the Master’s degree as base line education.
- Clients are demanding increased services and at the same time there is pressure for lower fees driven by competition, automation and outsourcing. Our students might be better prepared to deal with this with appropriate Business courses – perhaps at the graduate level.
- Integration of new materials

2. In review of Vision 2022, how do the themes apply to your discipline?

- If you want the brightest faculty and staff, you have to pay a competitive wage
- It may be necessary to secede from the CSU system to be successful
- The teacher scholar model must be modified specifically to Cal Poly. We should greatly enhance undergraduate research opportunities, we should strive to make this a major selling point of our program, i.e. the possibility of co-authoring a peer reviewed paper as an undergraduate
- Preparation for success in a global economy: The building construction industry is one of the last hold-outs in significant globalization, but that may be changing soon and our students need to be prepared.
- Constantly improving means to correct current salary stagnation and inversion.
- Maintain the UNIQUE (as noted in Vision 2022) curriculum of ARCE – IT WORKS. Current efforts appear to make ARCE program look like all other programs
- Administration has to be more accepting of the robust and potentially expensive styles of teaching – currently oppressive.
- Cal Poly’s current model for encouraging research is inadequate - $250,000 for the entire campus is not a serious amount. The theme of innovative research and partnerships does not apply with full time teaching.
- It is necessary to break down barriers between colleges and departments to facilitate innovative cross discipline thinking and acting

2a. Who will your students be in 2030?

- Increasingly international and out-of-state
- Increased number of minority students
- Predominately undergraduate
- In 2030, there will be fewer undergraduates and an increased number older citizens who need continuing education to keep up with the new developments in the industry and with technology. We will need to choose whether to go after that market or to keep our
emphasis on the undergraduate population that has been our strength. Do we stick with our strength where we currently compete successfully or do we go after a different demographic group recognizing that others will be doing the same? Or do we develop a strategy that combines these?

- We should foster a deeper and closer relationship with Vilnius Gediminas Technical University, to the point of making it a sister school, we could share graduate students, we could do faculty exchanges in ARCE, in ARCH as an immediate starting point
- The CSU system is supposed to be “commuter” universities, it is unknown at this time if the CSU system will change their mission or not.
- More graduate students by demand
- 3rd to 5th year students. We will no longer teach statics and mechanics, perhaps no longer basic materials timber, steel, concrete because these will be taught in mega classes on-line. Faculty need to highly specialize.
- Students coming from vastly different high school experiences

2b. What will you be preparing your graduates to do?

- Succeed in a career in structural engineering or related design field
- Be well-rounded and confident enough to switch career fields
- Get licensed and attend graduate school
- To be advocates and champions of our program, to contribute financially to our program, to encourage new students to consider our program, to be a vibrant alumni group
- To be leaders
- Contribute to their broader community

2c. What level(s) of education will they need?

- Master’s degree will become necessary
- Clients are demanding increased services and at the same time there is pressure for lower fees driven by competition, automation and outsourcing. Our students might be better prepared to deal with this with appropriate Business courses – perhaps at the graduate level.

2d. What will your students need to learn to be successful?

- Ability to learn on their own
- Communicate effectively (speaking, writing, graphically)
- Grounded in calculus, physics and engineering theory
- Effective use of latest tools and technology
- To be proficient in 2D and 3D design in its broadest sense, to attack design problems using established design pedagogical tools
- Critical thinking skills
• Awareness of the value of different perspectives in solving problems, identifying solutions

3. What forms of pedagogy are key to enable teaching success?

• Understanding of underlying theoretical principles
• Hands-on demonstration of principles
• Use of computers to model and solve complex problems
• Personalized small-group instruction in critical areas
• Collaboration with other disciplines
• Real world projects included in the curriculum
• Balance between practical and theoretical (balance on the faculty)
• In the ARCE department, we are caught between two models. We embrace the concept of studio and laboratory instruction that involve small class sizes and strong student-faculty interaction, which happens to be more expensive. The rest of the academic world is moving toward a different model with more students in the classroom, increased use of teaching assistants and more reliance on technology to deliver instruction. We need to experiment with and adopt the latter to be allowed to keep the former. We need to use the more efficient delivery means on the fringes to be allowed to protect the core of the curriculum. If we stick to a model that we know to be effective, our case will be proven over time and those who follow the latest fad will realize that we were right. But our model has to evolve to accommodate and effectively use new technology.
• It is important keep up with technology. The industry is currently experimenting with advanced applications of BIM, 3-D printing, digital fabrication, robotics, etc. We need to be at the leading edge of those developments and we are not.
• The studio atmosphere is the critical component of our program. It begins in the first year architecture studios, it continues in design labs (studios) and it carries on into design studios at the graduate level.
• Subjective feedback based on experience
• Setting for experiential learning beyond the classroom

4. How does the evolving teacher-scholar model impact learning?

• Faculty time needs to be allocated for research
• Make undergraduate research a top priority, make it a marketing tool, provide incentives to faculty and students to allow it to flourish
• Teaching load too heavy to have meaningful research.
• In a predominately undergraduate university, those most successful in employing the teacher-scholar model will be those who find a specific niche of research; exploit it across all domains of teaching, scholarship and service; involve undergraduates in the effort; and collaborate with other faculty members.
• The resource for research for faculty MUST NOT be cumbersome to obtain. Currently faculty have to compete amongst themselves – this is a burden and it does not support seamless research. It is a stop and start model. Currently the faculty have to find or fight for resources, this takes time anyway from research efforts.
• Add for extramural funding application
• Increased summer funding of faculty research is needed
• Acknowledgement and credit for cross-disciplinary work needs to be integrated into value system

5. Do you see avenues for discipline-specific continuing education as impacting the department?
• We do not have the resources or time for this
• Currently California does not required professional development (continuing ed) points to maintain licensure (unlike many other states); yet if this changes there will be a strong demand for courses aimed at the profession. Private industry usually steps in to fill this need, but there will be opportunities for engineering programs who have ties to the profession.
• Currently a Structural Engineering license (as opposed to a Professional Engineer’s license) is only necessary for public schools and hospitals, but is never the less sought after as a credential of greater worth for employment. There is a move underfoot in California and other states to significantly increase the types of buildings that require a licensed Structural Engineer. Cal Poly ARCE is the only program in the nation that focus on an education geared towards this license, and might find opportunities if the Structural License become more in demand.
• Modeling life-long learning through continuing education offerings seems natural
• Continuing education for faculty is also natural

6. Do you see public-private partnerships having a meaningful presence in the program?
• With the addition of an MEP component, the opportunities to seek industry support and develop partnerships expands considerably. There are far more suppliers of electrical and mechanical components than there are structural components.
• Few universities teach HVAC and electrical power distribution in buildings. ARCE programs typically teach this. As the only program west of the Rockies, there are a number of MEP firms that would embrace our graduates if we taught these disciplines
• We looked briefly at partnering with an existing firm to leverage a new shake table and conduct testing on smaller items of equipment. It did not work out but the model makes sense.
• With available student labor and licensed faculty members, we are an attractive partner for conducting various materials tests on a contract basis.
• Yes, sponsorship of our labs must continue and hopefully grow. We should be seeking an endowed professor position, preferably one sponsored by powerful companies like SOM or ARUP
• YES – if proper resources are given to develop – TIME!!!
• Potential for co-operative (CO-OP) learning through public-private partnerships. The CO-OP and internship programs could be formalized to be given course credit and be used to assess student performance and readiness for professional practice

7. Do you see emerging opportunities for interdisciplinary learning within the college or within the university?

• Figure out how to take advantage of the opportunities we already have
• Add MEP disciplines to the department giving CAED all areas of the building structures
• We should have more of a presence in the architecture studios, there are huge opportunities for collaborative studios, especially in the fifth year.
• We should consider a master’s of architecture specifically designed for students who have a structural engineering bachelors, make it a 3 year degree that allows one to sit for the architecture licensure exam
• We should take the studio art program totally into CAED. The opportunity to use the glass making studio, the sculpture, the painting and the drawing will lead to a new Bauhaus school that will give us an international reputation.
• Of course – but opportunities take resources and the university talks a good game, but does not provide meaningful resources.
• Possibility of integrating GE content into courses – report writing into experimental labs

8. Other Department specific issues.

• Need facilities and additional resources (people, facilities, funds) to take on any growth or expansion of mission
• Infrastructure and lab equipment are outdated and need repair, replacement, renovation
• All of the metrics upon which we are being judged have to do with efficiency (i.e., graduation rates, SCU/WTU, cost effectiveness). There needs to be a companion set of metrics that measure program quality of instruction such as: industry satisfaction of graduates, performance of graduates, department reputation, percent employment, learn by doing elements in curriculum, etc. Otherwise, we all enjoy in a very efficient slide towards mediocrity.
• We must reinvent the tradition of master builder, this can only be done by reworking the curriculum to more closely blend architecture, ARCE and CM
• It may be time to consider differential tuition or additional fees for higher cost programs. We appear to have a customer base that has opposed cuts to the program and would pay the price to maintain current class sizes and modes of instruction. We should consider
letting some programs raise their cost to maintain quality and see what the market will bear. ARCE would be willing to be a test case.

- The higher cost disciplines also seem to be the ones that society claims to need most. We continually hear about the shortage of STEM graduates. The State could create a list of critical disciplines needed to advance the nation and continue to make us competitive on the world market, and then subsidize those students who choose them. Readjust financial aid to target those disciplines that the marketplace most needs. The Army does this all the time by awarding bonuses for soldiers willing to transfer into critical specialties.
We asked 36 students to answer these same questions as a classroom exercise. The results below are a consolidation of the responses we received. We have attempted to avoid repetition and capture the comments that had the greatest insight and value.

1. What forces are shaping your discipline today? What trends are emerging? What differences do you see?

- I see the codes and laws becoming stricter and more refined meaning that the knowledge a student must have will increase and resources used also will increase.
- Technology is making structural analysis a lot easier and much more accurate.
- Students are trying to be more involved in opportunities that take place outside of school, and that they are trying to get more real world experience earlier on.
- The trend to be more environmentally friendly.
- *The discipline is being shaped slowly by technology. BIM software reduces the need for many jobs within the industry, such as CAD drafting. Sections, details, and renderings can be created with greater ease because of BIM. Many jobs may be lost if BIM is fully integrated in the industry.*
- Influence of the internet and social media. Many companies are moving into having online profiles that get their names out to potential employees and students wanting to work for them. I also have noticed the trend of engineers as a collective group wanting to let the world know how important the work we do is to the building as a whole.
- Leaving as little material waste as possible, ensuring buildings are more energy efficient, more communication between the architect, engineers and contractors to reduce costs
- LEED designs and project receive high praise and are becoming more and more common. Being green, through both building practices and technology paper savers, is popular and in demand worldwide
- Firms work employees extremely hard. 50-60 hour weeks for several weeks on end
- Amount of communication and coordination skills that are required between architects, structural engineers and contractors in order to provide a product that the building owner is happy with is definitely a shaping force in our discipline
- Technology including structural analysis software has allowed engineers to develop intricate models of extremely complicated structures faster and more accurately.
- An availability of composite materials that are being engineered for certain tasks in a structure.
- The idea of “generations” in terms of respect seems to fade away little by little. “Equality” is emphasized more and more in any shape or form
- With the recent natural catastrophes that have been occurring, regulations have begun to increase.
- The economy is shaping every project in our society
- Environmental safety has become a large concern in the engineering business
- Increase of blast-proof and terrorism proof buildings. If America continues fighting this “war on terror,” future engineers will need to be more versed in these types of construction and code.
- A few alternative construction materials are being developed. Including both hi-tech composites, as well as greener building techniques, like CEB or Adobe.
• Changes in fabrication will also have a big impact on the fiels. With CNC beamlines and plasma cutters, the steel industry is changing rapidly. Automated welders are making tapered beams cheaper and easier than ever before to produce.
• Being as financially efficient as possible
• The rise of a globalized economy and the increased use of IT and computer-based analysis. Both will require future ARCE students to be more capable of accessing and working with massive amounts of data from several sources, from any location. Computer technology enables them to work on projects on different continents and allows much more complex structures to be generated.
• Super-tall skyscrapers and huge complexes of all sorts are rising on every continent at an increasing rate.
• Factors such as cost, efficiency, and competition
• The recent high profile earthquakes (such as in Japan) have put a huge focus on updating buildings that were not built to the standard required today. I think that retrofitting buildings will continue to be a large park of structural engineering, both for financial and historic reasons.
• Push towards incredibly large and “bold” structures, and it seems the entire world is in a competition to build the tallest and most elaborate building
• It’s important to be able to effectively compete in multiple sectors of the market, as demand for structural services by sector tends to be cyclical.
• Trend towards more organic forms and shapes and really pushing the limits

2.

2a. Who will the ARCE students be in 2030?

• The students of 2030 will be computer savvy students with a heavy emphasis on computer literacy. CAD and analysis programs transforming the way we build so students need to be able to use and understand these programs. Analysis of structures may change as well with the aid of these programs.
• In 2030, the ARCE students will be smart, motivated and willing to learn.
• Technologically literate and have a broad understanding of the evolved industry
• students will not only be able to design buildings within the confines of the codes and guidelines that have already been set, but will be able to analyze and develop new boundaries that have never been explored
• More computer literate because of early exposure to computers and the high school programs available
• Some kind of engineering program through high school, can gain general skills in programming, CAD, electronics, construction, and so on, meaning they will have a greater knowledge base to build on
• 2030’s tech minded students are going to have trouble with communication. Growing up with an iPhone in hand will cause short attention spans and discomfort in group communication
• Students who come into the school with Advanced Placement classes are at an advantage to stay on track with the course work. This is an emerging trend with schools like Cal Poly that require a lot from their students.
• Kids who did really well in math and science courses, who hope to be able to make products which last.
• A high percentage of students who are interested in working in construction in the long run, and who have absolutely no interest in ever being an engineer by profession.
• Well rounded students, by this I mean students who excel both in academics and in extracurricular activities.
• Students may begin to lack in the social skills needed to work with other disciplines

2b. What will the ARCE program be preparing your graduates to do?

• The program will continue to prepare students for real world application of skills learned in the classroom. It will continue to use technology to propel students into both structural design and theoretical design as the availability of materials changes and the availability of more intricate and precise structural members becomes available.
• The ARCE program here will be preparing the students for going out and working in the real world.
• To go straight into the real world and make an impact, no matter their career choice.
• Have an interdisciplinary background that allows us to work well with other professions, such as architects and contractors, and convey messages effectively
• College education from Cal Poly will give students the critical thinking skills and experience to tackle alternative job options as well as graduate school.
• Be the next generation of firm owners and principle’s
• Design a structure using structural software. They also should have a proper foundation on which they could derive and create new programs that perform functions that is specific to the project they are working on.
• The ARCE program may be preparing students for grad school.
• Understand basic construction techniques.
• Preparing graduates to earn degrees, get jobs and then succeed in the workplace as licensed structural engineers.
• Leave the ARCE department with a good understanding of structural analysis, and the ability to learn and adapt to a constantly changing industry

2c. What level(s) of education will they need?

• Programing becoming a more intricate part of the education since computational analysis will continue to be used more and more.
• The average student of 2030 will need education beyond a BS degree in ARCE. Obtaining a master’s degree as a minimum will become the norm.
• People who get their Doctorates degree will increase and then become the norm
• I feel that they will need at the minimum their Masters and most likely be taking other higher education to have a good standing in the work force and to have a better understanding of the leading trends.
• A master’s level degree is often preferred. In my discussions with senior executives of larger structural engineering firms, PhD level candidates are sometimes viewed as less productive and
over analyze structures; thus, in general, tend to be less profitable to the firm. Knowing what’s “good enough” is an important distinction.

2d. What will your students need to learn to be successful?

• Theoretical studies going on today being applied in the classroom in the future.
• “Green” building practices increasing as we move forward into the future and becoming an intricate part of the code, laws, and how we relate to the structures created.
• The students will have to learn to be disciplined, organized, and willing to work hard.
• Students need to learn how to think critically and communicate with confidence. A successful student will explain why they chose a certain solution and accept constructive criticism.
• Learn how to adapt to new situations and how to find a solution when a unique problem arises. They will also need to learn how to communicate with others, and not be afraid to ask for help.
• Learn about costs of buildings and their economic impact. To be a truly successful engineer, some business courses should be incorporated to the program.
• Learn the proper social and professional skills that get them out from behind the desk and advancing within their companies.
• Cal’s Poly’s “learn be doing” approach allows us to see the types of things we are designing and analyzing helps us to visualize better what needs to be done.
• Knowledge of materials and sustainability.
• Retrofitting and reparation of older structures will as be important as our buildings get older and infrastructure slowly crumbles.
• Learn how to implement time management. This includes more than just finding time to complete work but also finding time to enjoy hobbies and friends.
• Communication skills, as well as technical skills. However BIM Modeling seems to be making a huge impact on structural engineering.
• Learn how to research, using the resources we have right now. Learn from others.
• Don’t be afraid of failure. “Learn by failing”, then make changes to make it work.
• Important for students to learn how to learn.
• Informed on all the different code books used throughout the United States and possibly other major countries.
• Interact and work well with others (clients) and bring in new business.
• We are constantly working with other people (contractors, architects, etc…), I believe that one of the most important things to learn while in school is how to work with other in a productive manner. The focus on collaboration.

3. What forms of pedagogy are key to enable teaching success?

• The practical/hands-on approach of this department is being both necessary and practical for our discipline.
• Financial, political, and environmental restraints will always affect this discipline and should continue to be addressed in the classroom.
• Small class sizes are key as they keep students engaged. When you start throwing students in lectures of hundreds of students, there is a sense of disconnect between students and teacher. There is no communication; the teacher is simply lecturing, not so much teaching. A smaller
class size also puts students in a more comfortable environment to ask questions. Lastly, lab classes help with teaching success because students are applying their knowledge to real world applications.

- Teachers who are excited about what they teach and happy to answer questions
- Learn by doing is definitely the best possible way to teach structural engineering. Our design labs should definitely continue the model making and testing of structures as well as our material labs proving to us that what we learn in the books and giving us a tangible to relate the concepts too.
- Physical examples are important
- The best forms of pedagogy are those which unifies the theory with practice
- Interaction with students. Instructors need to make themselves available to students to answer any questions they might have.
- As many design labs as possible. Model making will never go out of style. Having a physical model to reference makes a huge difference towards understanding concepts like bracing and moment frames.
- Here we have a pretty low ratio, which makes it better because we actually get to communicate with the teacher more often.
- Problems that mimic the real, professional world are also helpful,
- Try to maximize the usefulness of computers and do hand calculations sparingly. Once the basics have been learned by hand, they should transition to computer work as soon as possible.
- Hybrid classes that leverage prerecorded lecture content. Difficult concepts can be viewed over and over until it makes sense to the student. I consider “online” education the wave of the future.
- Visual learning is key.

4. How does the evolving teacher-scholar model impact learning?

- If the teacher is actively leaning, he or she may be more motivated during their teaching. Also, I feel that if a teacher is actively learning, they will be able to relate more to students and any struggles they may have. I also think that by having the teacher actively learning, he or she will be up to date on all of the latest codes and regulations.
- Professors will set good examples for their students by setting up good role models as a lifetime learner
- If students had a greater opportunity to get involved with this research it would be beneficial to all by providing students will more real world experience and application
- It impacts learning negatively when you start getting grad students teaching classes. However, the material is cutting edge and everything learned is on the forefront.
- Important for teachers to have background in the actual engineering world. Further, for them to be updated and current with engineering projects keeps them sharp.
- Changing trends and hot topics in the work force greatly affects how and what material should be taught. So both students and professors should be up to date with the trends out there.
- Students tend to need to be a lot more self-reliant in the classroom. From my brother’s experience at UCSD, it seems to really lower the quality of the instruction students get,
• I believe it does more damage than good because you lose the communication between the students and faculty.
• Balance is key here. Faculty that is always aware of the frontier of research in their department will be better able to prepare students for a modern real world. However, it is imperative that they are still there for students to convey these concepts as opposed to having a grad student or TA cover lectures for them.
• The more time the professor can spend with the students the better. This means that Cal Poly should continue to resist the trend towards larger classes, and keep the student/faculty ratio as low as possible. As long as research does not detract from this, it is fine, but the student interaction should be a priority. However, it is a benefit when the faculty can stay up to date on the newest trends in their field.
• Beneficial if the majority of research was an integration of a student & teacher

5. Do you see avenues for discipline-specific continuing education as impacting the department?

• Continuing education will affect the department.
• Like open universities or massive-open online courses would bring positive impacts, since it offers people some exposure into the program
• Continuing education would be a very useful addition to the current ARCE program. Not only would practicing engineers be able to stay up to date on new trends but undergraduate students would be able to get to know structural engineers.
• Having these classes will take away from the strength of the undergraduate program at Cal poly by taking away very knowledgeable professors from teaching undergraduate.
• With how fast technology is changing the world the only way to keep up with the change is to have the availability of continued education.
• Will create more diversity in the classrooms, having much older students with different backgrounds, which could only benefit. Further, I wouldn’t mind having the opportunity later in life to come back and take a few classes to keep me updated.
• Continued education is important in that in can broaden ones understand of their field. The field of engineering can change quickly such as how quickly computers changed our major or how earthquake disasters have changed that design of connections.
• The program could benefit from having both discipline-specific continuing ed students and undergrad/graduate students work together

6. Do you see public-private partnerships having a meaningful presence in the program?

• It offers students a lot of different opportunities, such as job offers, internship opportunities and scholarships. The partnerships also show that the school is well known, and involved with companies, and is not just involved with what goes on in just the school.
• Opportunities for students and be another way to introduce some of the latest innovations in the field
• I can imagine many companies sponsoring seniors so they will research a particular topic for them.
Private enterprises are the machines that drive the profession outside of school, so having their presence in the university would not only add resources, but would give students a more accurate taste of the real world.

Integration of educational content from such industry leaders is a valuable part of education and keeps us at the cutting edge of trends in the industry.

7. Do you see emerging opportunities for interdisciplinary learning within the college or within the university?

- Technology is bringing us closer together and I think it is a natural move to continue teaching interdisciplinary studies.
- CMs, ARCHs, and ARCEs will all be collaborating with each other to build our worlds new cities. Sadly, at the college level, these majors constantly compete and try to prove which is better. Hearing about projects like Solar Decathlon, it seem not only the students but also the teachers can’t seem to push aside their major affiliations and work together.
- With poly canyon possibly being closed down I do not see any avenues for interdisciplinary projects. I know that students have done bridges at golf courses, however I don’t see an avenue for students to actually design and build a small scale structure or have a co-op with companies in order to gain more knowledge and field experience.
- Tuition is too expensive to take unnecessary classes when I am trying to graduate on time.
- A beneficial opportunity for ARCE students would be to work with the College of Agriculture before designing a structure with rooftop gardens or complex irrigation systems at its base.
- If one of the high level design courses partnered with an architecture studio and spent a quarter working with their designs
- It is during these courses where students first witness and experience the conflict-management tasks that are seen every day on the field.
- More interdisciplinary learning during the middle years of our college experience. We get a nice amount first you with studio, but during out 2nd and 3rd year of school we only see interdisciplinary projects in extracurriculars such as clubs.

8. Other Department specific issues. Include any issues for the future that you view as relevant to the ARCE program.

- The number of required general education classes is excessive. The benefit from classes such as philosophy and literature are not worth the required effort.
- One major issue I see, is that if in the future more students are being accepted, the class sizes and amount of classes offered is not sufficient to accommodate all the students. It is very hard, even now, to get even major classes, and stay on track with the flowchart. Also, the unit to workload ratio is off, and it really hinders students from taking a decent course load, when one class consumes 10+ hours a week of work and is only worth 1 or 2 units.
- In 2030 the average lifespan will be nearing 100. Yet there is still a demand to push students out of college as quickly as possible.
- College years have the most potential for developing as a person. Study abroad and classes other than ARCE and the GE courses you take online “just to pass” should all be encouraged. College is a place to grow and become excited about learning. Not a place to get hammered by
work and prepared for more work in the future. A change to a 5 year program instead of a 4 (and a quarter) could have a wonderful positive affect.

• Our school in general is becoming much too impacted. It is too difficult to enroll in classes we need for graduation.

• Class availability. I have seen more people being accepted into Cal Poly but every year it gets harder and harder to get into classes.

• The course load seems to be way too high for the students taking design labs. One of my friends in the timber lab said EVERYONE in her class, minus 2-3 students pulled an all nighter on a recent submittal. That is just ridiculous. No student should be expected to work that many hours for one class.

• With that high of a workload, students cannot pursue any other interests than school, making them rather incomplete as human-beings. Very few ARCE students are involved in clubs (except SEAOC) or have meaningful part time jobs.

• In the next 10 years the classrooms may need to be expanded and likewise the teaching staff will need to be increased.

• We should start discussing potentially tearing down Engineering West and building a new and more structurally expressive building to house our department (and CRP...)

• Freshman year studio should still be re-worked. As it is now, ARCE students are thrown in a class series designed to weed out some first-years in a different department, not seeing material from their own major for essentially the entire first year. An alternative would be to introduce classes like ARCE 211 and 212 in the first year, and require a 2nd year architecture studio that has a lighter work load.

• The main concern that I have is that the department could become too crowded with students that it would warrant increasing class sizes. This should be avoided at all costs. Also, I hope that the units required to graduate do not get cut any further, I think that the comprehensiveness of our curriculum really sets Cal Poly apart.

• I think there is a strong demand for "online" education. I think Cal Poly in general needs to reassess its goals here and develop a strategy to better serve its students in the future. I think a hybrid model of teaching, which includes some "online" prerecorded content/lectures and some in class time for questions and projects, is a very efficient and effective way to learn.
Master Plan Academic Program Visioning 2030 – Academic Plan for Enrollment

Architecture Department
Executive Summary

19 November 2014

Programmatic Themes Emerging from Futuristic Scenarios

- **Collaborative design/design process**: Become a net exporter of design thinking in a way that promotes inclusivity of multiple disciplines and new applications of our unique skill set (including tools and techniques), knowledge-base, and abilities and the studio teaching model. Focus areas for the future include:

- **Sustainability and resiliency**: net-zero futures, performance-based design, environmental impacts of material culture, social issues, and more complex, informed and integrated decision making.

- **Making**: from current endeavors in furniture design, site/building model-making, to new ventures in product, industrial, graphic, and related design methods.

Growth of Digital Fabrication and Cultures of Making and Design Thinking

- Become a net importer of design making in a way that also promotes inclusivity of multiple disciplines but with the CAED as a hub for this activity. Crandall Gym and the Natatorium with the adjacent outdoor spaces make a prime location (and anchor) for these activities along the maker axis from South Perimeter to Highland Drive along Campus Way as it intersects the campus. Other on or off campus locations may exist as well, or an inter-college approach to shared physical facilities.

Future Degree Programs and Opportunities

- Related to programmatic themes, explore a broadening experience for students through collaborative, problem-based learning through GE pathways, professional electives, major and support courses. New minors (such as an Architecture Minor) or new design-based GE (such as a large lecture on ‘Design Matters’) would extend our influence to a wider campus audience. New degree partnerships could include: Art & Design, Industrial Technology, Theatre, Business, Materials Engineering, Mechanical Engineering, as well as Kinesiology, Biology and Science, Technology, and Society. At the same time, there needs to be a deepening of knowledge areas to operate in a data and information rich society. Future degree programs need to acknowledge the ease of access to information, but not always with skillful and deeper understanding that higher education and experience can provide.

- In addition to broadening, exploration of architectural education as a path to licensure is also on our table as a concentration in the MS Arch, a new M Arch, or related to the B.Arch as either a concurrent pathway or co-curricular activities.
In order to develop an updated campus master plan for the next 25 years, departments were tasked at the program level to explore issues, opportunities and challenges that reflect changes in programs, people, and space at Cal Poly. In response to this charge, the Architecture Department conducted a series of three discussion sessions that engaged potential themes seeded by: (1) a broad view of futurist scenarios and their potential impacts on curricula, (2) a specific look at digital fabrication and design (termed ‘d.school’) thinking as an area for continued growth and development, and (3) degrees, certificates, and minors as opportunities and the disciplinary/interdisciplinary nexus. Faculty members Meredith Sattler, Dale Clifford, and Mark Cabrinha were instrumental in facilitating these conversations.

First, to set the context for this summary, there are several noteworthy trends in college admissions and future employment for our disciplines. The Bureau of Labor Statistics in their employment predictions from 2012 to 2022 indicates a 17.3% increase in demand for architects (excluding naval and landscape architects). Within our professional society, there is a greater emphasis on emerging professionals because projections do not show sufficient progress to licensure that will replace retiring practitioners. Lastly, in terms of significant trends, admissions data nation-wide is showing decreased interest in architecture as a major based on College Board Enrollment Planning data for 2014 where fewer prospective out-of-state and in-state applicant respondents to their survey (namely, high school sophomores and juniors from the classes of 2015, 2016, and 2017) have selected architecture and related disciplines as an intended CAED major.

Programmatic Themes Emerging from Futuristic Scenarios

In our futurist survey, faculty described both broadening and specializing trends (the classic “T” model for education) that need to be considered as we design curricula for the next 25 years. Here are some of the remarks from the survey.

*Architecture students are already beginning to leave the architecture profession for roles in virtual design, product development, construction management, and even marketing and graphics. The Architect’s office could very well become the proverbial “DESIGN” office serving everything under the sun.*

*Also described was education capturing “design innovation (that) incorporates performance metrics of many kinds: environment, cost, manufacturing”, “larger societal issues”, and “highly digitized communication and thinking.”*
Sustainability and what might be termed ‘resiliency’ were also expressed themes in the survey responses. Faculty remarked,

The impact that the built environment has on the overall global environment will come much more into focus. From appropriate land use to energy efficient design, construction and building performance, and appropriate material usage all will be scrutinized by a larger arena of professionals.

As we implement progressively more restrictive energy and carbon related codes, the idea of ‘add on’ sustainability or after market fixes to glaringly underperforming buildings will no longer be tolerated. Our students are going to be held to a higher standard than any before them, requiring a superior understanding of tectonics as well as systems level thinking abilities. With the potential shift to licensure at graduation this puts an incredible burden on the institutions to prepare students with the full breadth of knowledge and capabilities that they will need to enter the 2nd most litigious profession.

Students may choose to study architecture for different reasons than they have in the in the past. They choose architecture because they think it will help make a difference in the world.

**Growth of Digital Fabrication and Cultures of Making and Design Thinking**

Along with the studio, in 2030 the shop expands upon the culture of making that is endemic to the identity of the CAED. Digital fabrication extends this long-standing hands-on shop culture into the 21st Century. The speed and precision of digital fabrication affords a renewed and empowering experimental culture demonstrated through full-scale prototypes while developing academic / industry partnerships. Cultivating this experimental culture also requires and expanded notion of the shop not just as a support facility, but as a piece of critical infrastructure integrated with the design curriculum. To support the increasing technological sophistication of digital fabrication, formalized teaching is brought into the shop, and conversely studio “think-tanks” are brought into the shop. The shop becomes a multi-disciplinary hub for student prototypes across scales and across colleges.

The infill opportunity exists within the existing CAED precinct from Building 05 to the Construction Innovations Center (CIC) on a north south axis and Crandall Gym to the CIC in an east-west direction. In addition, more collaboration with the CENG would suggest extending this zone to include Mustang 60 and the yet-to-be-sited Aero Hangar replacement Fabrication Shops. Redesign of the connecting networks and nodes to the larger campus offers potential integration for landscape (storm water, public space, interaction zone) design.

There is also a trend toward miniaturization in digital fabrication that is improving access for all students (and practitioners) to the integration of this technology into the
studio environment at lower cost and with a smaller footprint. In a sense, the future is here now, and we need to participate more fully in these trends.

**Future Degree Programs and Opportunities**

Interdisciplinary collaborations are partnerships were seen as the wave of the future. These can be accomplished through new alliances with current departments to share courses, majors, minors, faculty, and students, or creation of new majors that fill a unique and emerging need. Specific examples of prospective partnerships include collaborations with existing departments at Cal Poly such as Industrial Technology to create an industrial design emphasis with new faculty, and the Art & Design Department, both of which currently occupy shared space and equipment in Engineering West and Dexter, respectively. In addition, other majors in the College of Liberal Arts may build new linkages in areas of common theoretical and practical interest. This includes minors such as Theatre Arts and those in Science, Technology, and Society.

New majors that might evolve from these partnerships are those focused on solving societies’ complex and wicked problems in the cross-disciplinary realms of social, environmental, economic, technological and built environment. A new major that includes the studio/problem-based learning environment with other modes of teaching could bring a new interpretation of the traditional 24/7 space-intensive model of design studio. This new degree could bring in design areas not part of the present university such as: industrial design, product design, and/or urban design. Other areas ripe for future development are humanitarian design where students can impact geographical areas of the world’s greatest need. And, lastly, related to the above, are communication studies focusing on global and cross-cultural competency that emphasizes collaborative design process working with diverse populations.

A new minor in Architecture or the Built Environment would also allow our department to be a more visible participant campus-wide. (There was an EDES Minor that was sunset a few years ago with the rise of the Sustainable Environments Minor.)

These are all potential areas for curricular development that incorporate the integrative nature of architecture in the public realm.

The NCARB and NAAB are also shaping the landscape of architectural design education with a proposition regarding licensure upon graduation. Schools are being asked to consider how the 3-E’s of education, experience, and exam come together to prepare a licensed architect. As this proposal takes shape at Cal Poly, it suggests several opportunities including: (1) creating a practice concentration in our current MS Architecture, (2) bringing back the M.Arch. with an optional professional track that might include off-site teaching, or (3) offering a co-curricular pathway concurrent with
the B.Arch. which represents an intensive undergraduate design experience leading to many different career paths.

In summary, we anticipate maintaining the core educational experience of design thinking that is centered on solving complex and diverse problems with greater feedback from the tools, techniques, and utilizing the studio model as a platform for engagement with other non-traditional disciplines (biology, liberal arts, theatre, health, materials engineering, graphic communications, etc.). We see ourselves to continue as a professional degree-granting program that would support both a path to licensure and a rigorous design education that is more widely applicable to other career paths beyond architecture. In a physical sense, this vision requires more collaborative space that support studio and shop-based teaching and learning and that possesses a ‘residential’ component where students are provided a ‘home base’ on campus as a work-study-create environment for learning.
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<tbody>
<tr>
<td>1</td>
<td>finding the relevance of design in larger societal issues. Saving energy or money alone won't be enough. we need to re-design systems. Architects/ designers need to find a place at the table.</td>
<td>10/29/2014 11:33 PM</td>
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<td>2</td>
<td>1. The impact that the built environment has on the overall global environment will come much more into focus. From appropriate land use to energy efficient design, construction and building performance, and appropriate material usage will all be scrutinized by a larger arena of professionals The tech shift will continue to bring more automation into design and fabrication. Designers will coordinate more with manufacturers and constructors. The design/ build process will become much more of a coordinated effort throughout. The tech advancement also will bring about a change in architectural language from the urban landscape to individual spatial experiences</td>
<td>10/29/2014 7:54 AM</td>
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<td>3</td>
<td>The architectural practice will dramatically shift in the next 15 years as the older generations leave the profession (AIA estimates over 45% will retire in 5-10 years). The client base is also dramatically evolving to include large percentages of people that once would have never been able to afford design services. Architects are beginning to find innovative ways to serve the “other 99%” of the client base, as it is a very untapped resource. Architecture students will most likely be seeing more opportunities to work within collaborative design offices, as many of us hypothesize that there will begin to be an evolution of what the typical architectural office looks like. Architecture students are already beginning to leave the architecture profession for roles in virtual design, product development, construction management, and even marketing and graphics. The Architect's office could very well become the proverbial “DESIGN” office serving everything under the sun. There seems to be less liability and more profitability in this model.</td>
<td>10/29/2014 7:50 AM</td>
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<tr>
<td>4</td>
<td>design innovation incorporates performance metrics of many kinds: environment, cost, manufacturing. This requires increasing specialization while importantly challenging the architect to make their design intentions inspiring and relevant. Tragically, time is a major issue requiring much more in much less time. There is a huge gap between mega firms and small agile design firms which challenges how we educate students.</td>
<td>10/28/2014 5:43 PM</td>
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<td>5</td>
<td>licensure upon graduation</td>
<td>10/28/2014 3:09 PM</td>
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<td>6</td>
<td>keeping up with climate response code issues... sustainability will be recognized as the fourth Vitruvian ideal...along with firmness, commodity and delight we will consider resiliency self-evident...housing 8 billion people in the next 15 years and 9 billion in the next 30 years will be a monumental challenge.</td>
<td>10/28/2014 11:17 AM</td>
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<td>7</td>
<td>Continuing increase in awareness and desire for sustainable design, integrated/multiple degrees with other CAED departments as well as business. Highly digitized communication and thinking. Greater interest in social reform.</td>
<td>10/28/2014 9:38 AM</td>
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<td>8</td>
<td>I feel the architecture will become more of consultant for sustainable and environmental ways in which we live, work, communicate and understand.</td>
<td>10/27/2014 10:20 PM</td>
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<td>9</td>
<td>As we implement progressively more restrictive energy and carbon related codes, the idea of add on sustainability or after market fixes to glaringly underperforming buildings will no longer be tolerated. Our students are going to be held to a higher standard than any before them, requiring a superior understanding of tectonics as well as systems level thinking abilities. With the potential shift to licensure at graduation this puts an incredible burden on the institutions to prepare students with the full breadth of knowledge and capabilities that they will need to enter the 2nd most litigious profession.</td>
<td>10/27/2014 4:54 PM</td>
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**Q2** Who will our students be in the next 5, 10, 15 years? Please consider demographic, pre-architecture preparedness, interests, disposition.

Answered: 9 Skipped: 0

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<tr>
<td>1</td>
<td>Students may choose to study architecture for different reasons than they have in the past. They may choose arch. because they think it will help make difference in the world.</td>
<td>10/29/2014 11:33 PM</td>
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<td>2</td>
<td>2. Student population has changed quite a bit in my 35 years. The biggest change is in the male to female ratio. Thirty-five years ago it was rare to have a female in a studio of 20 students, today it is close to equal. Minorities are starting to get a larger percentage but at a lower rate. I believe this shift will continue. Cal Poly in general is lagging in general demographic mix. With advancement is the tech side and material exploration I think we will start to see more students arrive with interests in more specific areas of architecture. It seems that the playing field is getting bigger and we will soon not be able to educate generalists, but will start seeing many different paths as specialists.</td>
<td>10/29/2014 7:54 AM</td>
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<td>3</td>
<td>I think this is a scary question. These students are growing up in an increasingly digital age, but within 15 years our students will also be those raised in a post-Occupy Wall Street, post-Osama Bin Laden, post-oil world. They are going to be very tech savvy and used to relying on technology for everything. The students in the next 15 years will be less likely to excel in business or client management due to today's technology allowing them to have full conversations with friends, families, and clients without ever talking on the phone or meeting them in person. As long as Cal Poly continues to take the cream of the crop then we should continue to get the students most likely to succeed in design, but the ever changing landscape of the profession leads me to believe that more emphasis will need to be placed on business and cultural teachings.</td>
<td>10/29/2014 7:50 AM</td>
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<td>4</td>
<td>Students will no longer be selected only on test scores and grades, but will be identified for both a portfolio and a statement of interest in how they wish to influence the environment. Optimistically, their k-12 education will cultivate entrepreneurial spirit, asking big questions. Pessimistically, they are upright grade grabbing robots. Which is why we changed our admissions process to attract those that have a passion to make a difference.</td>
<td>10/28/2014 5:43 PM</td>
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<td>5</td>
<td>hopefully california students with a 10% contingent from outside</td>
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<tr>
<td>6</td>
<td>50% young Californians matching state demographics (with the exception that our latino/latina population will exceed national demographic averages but fall short of state demographic population percentages...and we will fall way short on the african american demographic)...another 40-45% of out-of-state students coming primarily from blue states and/or states in or west of the rockies. We will have very few southerners or mid-westerners. The final 5-10% will be international students. They will mostly have known that they want to be an architect from their high school or junior college days or they will be returning to school after a short career in construction. Some will be more interested in art and some more interested in issues of sustainability</td>
<td>10/28/2014 11:17 AM</td>
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<tr>
<td>7</td>
<td>Highly digitized students, who have a reduced feel for the human connection, physicality/tectonics. Hopefully a bigger ethnic and international student mix.</td>
<td>10/28/2014 9:38 AM</td>
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<td>8</td>
<td>They will, without a doubt be the most technologically savvy humans every to inhabit this planet, possibly discovering life and the ability to move beyond our own planet.</td>
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<td>9</td>
<td>With the national shift to the Common Core curriculum I anticipate a substantial shift in our students ability to work in teams and to apply technical concepts on a project basis. They will have grown up being asked to graphically conceptualize mathematics and to generate multiple solutions and strategies around a singular concept. This experience is very different from the high stakes testing environment that today's students grew up in and will have a big impact on problem solving capabilities AND student expectation around PBL integrated into the curriculum.</td>
<td>10/27/2014 4:54 PM</td>
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Q3 Students typically experience at least a 10 year time-lag between the start of their architectural education and the point in their career when they have the experience and authority to substantially impact the projects they work on. Given this lag, and the shifts in the profession identified above, what knowledge/ methodologies/ skills are critical to deliver during their education today? In 5 years?

Answered: 9  Skipped: 0

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<td>1</td>
<td>In addition to a well rounded professional program students could specialize in something (maybe a minor.) This doesn't need to be something within the traditional boundaries of architecture. They choose the topic. This encourages students to take a more active role in their education.</td>
<td>10/29/2014 11:33 PM</td>
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<td>2</td>
<td>3. The biggest thing we need to focus on is what we always have; problem solving. Things are moving fast in the tech and environmental arenas and the new grad will need to stay abreast of these changes as they intern towards a full professional. As Marshall McLuhan said in the 70's the Medium is the Message (Message). That is ever present today to the point where the medium is often driving the message. There is danger in this. The professional will need to keep their eye on the ball and not let this get out-of-hand.</td>
<td>10/29/2014 7:54 AM</td>
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<tr>
<td>3</td>
<td>In the architectural profession, students need to be exposed to more offerings in using BIM technologies and understanding building systems. Also, our students will increasingly be looking to diversify their offerings within offices in the coming decades. Therefore, design education will also need to include many other disciplines such as business, marketing, and graphic design.</td>
<td>10/29/2014 7:50 AM</td>
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<td>4</td>
<td>First, the premise is false - now as always students need the skills to be a productive member of a team, and the disposition to ask difficult questions, the vision to not acquiesce and a burning desire for life-long learning. This requires not only &quot;learn-by-doing&quot; but an increased historical/theoretical perspective, and wider reading/perspective in global issues.</td>
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<td>5</td>
<td>they need to learn to think for themselves, to research the answer, to have an understanding of tools in general</td>
<td>10/28/2014 3:09 PM</td>
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<tr>
<td>6</td>
<td>We need to support creativity, flexibility, resiliency, adaptability, work ethic, artistic endeavor, good climate response instincts and lack of deadline fear.</td>
<td>10/28/2014 11:17 AM</td>
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<td>7</td>
<td>more emphasis on pre-design learning and strategies. more opportunities for and improvement in the delivery of integrated studios with CM. AE and Landscape. more emphasis on social architecture and less on iconic architecture all design teaching must integrate sustainability</td>
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<tr>
<td>8</td>
<td>Patience</td>
<td>10/27/2014 10:20 PM</td>
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<td>9</td>
<td>See question #1. Our students will graduate into a Net Zero Energy reality. While past generations (and current to some extent) have succeeded by depending on others (engineers, contractors, etc.) to get our projects to perform without an adequate depth of understanding of their work, that will be a luxury we can no longer afford. Not only will our students be asked to understand systems more deeply, they'll also be asked to consider solutions more broadly as the typical solutions of efficient HVAC, carefully selected materials and excellent design solutions may not be sufficient to the problems they will be asked to solve. I would expect greater collaboration outside the &quot;typical disciplines&quot; into Materials Engineering, Industrial Engineering, Biology and Resource Management just to name a few.</td>
<td>10/27/2014 4:54 PM</td>
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### Q4 What would our program need to look like [people, programs, place] to deliver that knowledge, those methodologies/skills? In 5 years? In 10 years? In 15 years? Please consider teaching, research, and service.

**Answered:** 9  **Skipped:** 0

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<tr>
<td>1</td>
<td>Identify tracks within the program that students can choose (urban, energy, ecosystems, computing, making (digital and hand), policy). This adds depth to the traditional architecture issues. Partnerships would need to be formed with related departments.</td>
<td>10/29/2014 11:33 PM</td>
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<td>2</td>
<td>4. The professionals for the built environment in the upcoming years are going to go further in the direction of specialists. New concentrations of study will pop-up. The program needs to become more integrated starting with Curriculum of the 5 current schools. A basic education in years one &amp; two and then into specialties the following years.</td>
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<td>3</td>
<td>I can’t really imagine 10 to 15 years out yet, but I can consider 5 years. I believe we should start taking the steps to begin to cross our studios with more disciplines - and not just in the college. Students potentially could learn a lot from working on projects with business, graphic design, and even liberal arts students. The grass roots movements in the profession (such as public interest design, humanitarian design, etc) involve the professionals on an extremely interdisciplinary level. Architects not only need to be designers in these movements, but they must also be advocates, grant writers, office managers, and much more. These movement will continue to grow in strength over the next 5 years. Therefore, the program will need more interdisciplinary programs and general eds/upper divisions that begin to teach how to work within the profession. These programs – even if Journeyman International were to get involved – could give more opportunities for research and service in these grass root movements.</td>
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<td>4</td>
<td>The program must leverage coordination and exactitude in delivering core content, to afford flexibility to pursue - rigorously - project-driven research via teacher-scholar model. Not only does this require coordination, it also requires physical space to develop these longterm, AND intellectual / time space to give a proper commit to this work.</td>
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<td>5</td>
<td>In 15 years we will need to be teaching to the licensing test. First year will look similar if not more intense, second year will look like third year, third year will actually be, to quote T Fowler, “5th year on steroids,” fourth and fifth year will disappear into test preparation.</td>
<td>10/28/2014 3:09 PM</td>
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<td>6</td>
<td>We will need artists, technologists, climate experts and architects,... we will need more shops, more studios and more large lecture spaces so that we can increase efficiencies with more large lectures and Hearst Lectures (I missed the last Hearst lecture because of lack of space and I have not had a seat in years...it is always standing room only at the top of the stairs).</td>
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<td>7</td>
<td>Reintroduction of hand sketching, painting, skills and the social impact of architecture in the first year curriculum. Dedicated research lab space for daylight analysis and teaching, materials research, skin research, structural systems, renewable energy collaborative research, etc. This space needs to be large enough to include hands on experimentation and mock-up construction space.</td>
<td>10/28/2014 9:38 AM</td>
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<td>8</td>
<td>How we teach will become the biggest question, not just what we teach. Can we keep up with their technology and their thirst for information first lifestyles?</td>
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<td>9</td>
<td>I would expect to see many more cross College joint programs, such as a B.Arch with Mat.E. Biology, IT minors or concentrations for example. Areas where we currently lack depth (energy performance, performance based modeling, etc.) will need to be shored up.</td>
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<tr>
<td>1</td>
<td>The six futures scenarios for architectural/environmental sectors are pertinent and explain the coming design and construction issues within our profession's future. Only the last scenario (Economy, Employment, and Means of Production) really focuses on the professional model of the architectural office increasingly seem broken. The AIA is currently in a marketing effort to help redefine what architects “do”. From recent polls the AIA has even shown that there are not enough emerging professionals to replace the retiring generation. The figures are said to be almost 45% of AIA members will be retiring in the next 5-10 years. Students coming out of architectural programs are simply finding work in other fields. If we are to vision the next 15 years should we not ask ourselves “what should we be teaching to redefine the architectural practice in order to retain emerging professionals to become architects?” In the meeting on the 23rd of October, Dale Clifford brought up the point that there is a growing number of Grassroot movements that architectural students and professionals have begun to work with. Theses groups, many of which focus on public interest design or social impact design, respond to the growing need for design services for communities and clients around the world that can't afford the typical services of architects but still deserve the same design attention. There are many growing business models that still make this work profitable for architects and designers, but architectural education is not adjusting as quickly to teach the pertinent business and design skills needed to work with these clients. Therefore, it is my recommendation to examine not only the type of work architectural students will be encountering but also the client. 10/29/2014 7:50 AM</td>
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<td>2</td>
<td>Specialization tracks through selectives give depth to the breadth of studio education. This enables students to develop their identities and trajectories, while being a platform for innovation in teacher-scholar format. This requires physical space, on-line space as a platform of communication, space in the curriculum to do this, and faculty time / incentive to do this. Importantly, these selectives should dovetail with GE courses, not simply peripherally, but as collaborators. 10/28/2014 5:43 PM</td>
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<td>3</td>
<td>design studio will be compressed into three years with the help of iArchitect, a software/hardware package with capabilities of representation, fabrication, prototyping, and simulation (so the designer will know the building works under varying conditions). this will primarily come to play in 3rd year and prepare the student theoretically for the technical knowledge they will need to finish out the next two years. 10/28/2014 3:09 PM</td>
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<td>4</td>
<td>I think we should create a mandatory GE course for all non-creative majors that fills Spanos Theatre (400 students per class) that teaches the benefits of Total Design, the Gesampkunstwerk and answers the question why &quot;Design Matters&quot;. The target demographic is every major outside of Architecture, Landscape Architecture, Art + Design and possibly Graphic Communications. The sole purpose of the class will be to illustrate WHY architecture + design are important to the general public whether they are aware of it or not. They will discover that design is all around them. It's the clothes they wear, the cars they drive, the bikes they ride, the smart phones they use...their laptops and tablets and YES it is the cities and buildings they occupy. The above mentioned majors will be exempt because we would be preaching to the choir, but they would be welcome to take it for GE credit if they so choose. This one class would increase our efficiency to the point we could retain our proven studio teaching methodology for all other coursework. The course could be taught in similar fashion to our new EDES course in the sense that we could take turns giving lectures and bring in guest lecturers as well. 10/28/2014 11:17 AM</td>
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<td>5</td>
<td>Minor in architecture for students in sister CAED departments. Lots of electives such as photography, architectural programming, architectural writing and publishing, various research topics listed above, design theory, historical analysis and many more 10/28/2014 9:38 AM</td>
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<td>6</td>
<td>Long term, we need to understand our growth more clearly? Is growth ultimately worth the lost in the ability to control how, what and the type of environment we teach in? 10/27/2014 10:20 PM</td>
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- CM majors will need to broaden their base of education to prepare for more collaboration, more of the project life cycle, more sustainability, and more emphasis on productivity. This broader education will also enable them to better withstand the volatility in the market by providing more career options than are currently presented to them.

- We need to make sure that protect the core of CAED instruction that has ensured our success. This includes "learn by doing", industry partnerships, and project-based, experiential curricula that are flexible due to the nature of studio instruction.

- A management based Masters' degree would serve our students the best. I think the best option for CM - and one that would serve the entire College well - is a Specialization in the MBA entitled "Built Environment Management" to replace the current two "Tracks" in Architectural Management and Landscape Architecture Management. This would be built in parallel with the existing Specializations in Agribusiness and Graphic Communications Document Systems Management and utilize graduate level coursework throughout the College as the Specialization Required Courses and the Advisor Approved Electives.

- I believe we should take this planning opportunity to rename the College to reflect more than half he departments in the College. My suggestion would be the College of Built Environment. I generally do not like other potential College names that are a list of the departments, such as, College of Architecture, Planning, and Construction, so we need a name that reflects what we all do.
In addition to the specific listing of thoughts provided below, what became clearer in conversations among the faculty is that there are two overriding trends impacting the construction profession and construction management at Cal Poly for the next 15 years: “more” and “volatility.”

What seems apparent is that the next 15 years will bring “more” of the major developments that have been shaping our discipline for the past 15 years. Constructors will be collaborating “more” with other professionals in the built environment – with architects, engineers, planners, suppliers, technical specialists and others in ever more creative project delivery alternatives. Whether these arrangements are called design-build, integrated project delivery, the “big room”, agency CM, or alliance contracts, the fundamental message is the same: the domination of a low bid mentality driven by just one of these professionals is a thing of the past. Owners realize the benefits of having constructors in the room as the design is being developed – and of designers in the field as the project is being constructed – and the advantages of this type of collaboration will continue to drive the project delivery process.

Constructors also will continue to be involved in “more” of the project lifecycle. The “bid day to warranty” approach to construction management will increasingly become an attitude of the past. As noted above, constructors will participate more actively in design development, whether part of a formal program management effort or at the invitation of the project owner. After completion, facilities management is increasingly becoming part of construction management curricula as we play a role throughout the “living” phase of the life cycle. There now is even planning for demolition during the design process in recognition that all buildings will outlive their intended use at some point.

Related to this is “more” emphasis on sustainability in infrastructure in all of its forms. The constructor is not leaving sustainability to the design team – LEED accreditation is now part of the expected credentials for contractors throughout the country. Limited resources threaten to stop some development projects while providing the urgent impetus for others. During the current record drought in California, the lack of clean drinking water and the inability to treat waste water is stopping development in Cambria, leading planners to consider public grey water distribution systems, and relocating water intensive industries to other parts of the country. At the same time, the recently passed billion dollar water infrastructure bond issue will provide incentive for new projects and serious conversations about desalinization – Morro Bay is considering reopening its long-mothballed plant if the drought continues. Of course all of this has to be done with more limited use of other resources (desalinization is energy
An interesting aspect of construction economic volatility is just how unpredictable it remains. Certainly, during the boom cycle in the middle of the last decade, just about everyone knew the bubble would burst, but no one seemed capable of predicting when and by how much. In 2006, just before the single family housing market fell a shocking
75% in less than four years, the best industry forecasters at the National Association of Home Builders were predicting a 10 to 20% adjustment. Arguably, this is the most volatile of all the construction sectors, but no sector has yet to return to the dollar value of construction put in place at the peak of the sector markets in 2006 to 2008.

Clearly, this cyclicality will continue, and there is nothing the master planning at Cal Poly can do about it. However, after seeing the impact on enrollment and graduation rates of this latest downturn, there may be lessons to be learned related to planning for this volatility in the future. Starting in the late 1990’s, construction management on this campus grew its graduating classes from 50 to 70 per year to 100 to 120 in 2008 to 2010. These latest graduates came out into the construction depression described above. For the first time in its history, the department lost its claim on 100% placement of its graduates seeing placement rates of just 40 to 50%. In a department that is as career oriented as construction management, the impact was immediate and devastating. Applicant pools shrunk from just under 300 to 170. The number of new students in the fall went from 97 in 2008 to just 49 in 2010. That, of course, had the predictable impact on graduation rates leading to just 60 graduates during the current academic year.

Perhaps just as predictable is the current reversal of these numbers. While partly explained by increased recruiting efforts and greater success at converting interest to application to new fall enrollees, the improving construction economy in California is once again driving enrollment figures up. This year’s (fall 2014) applicant pool of 240 represents a 40% increase in just one year. We just welcomed the largest freshman class in the history of the department with 102 new students plus an additional six transfers. This is an increase of over 50% from fall of 2013. Graduates have been back up to 100% placement rates again for the past several years. We see nothing on the horizon that would change these numbers in the short term, so we are predicting getting back to the desired graduation rates of 100 to 120 students per year by 2018.

So, if we can’t fix construction volatility and we are tied to it, what do we do when planning for it? First of all, we should be careful not to overlearn the lesson of the past eight years – this was literally a once in a lifetime cycle not likely to be repeated during this planning horizon. Construction remains a viable career path for many young people and increasing applications from a more diverse pool of students will provide Cal Poly with a strong supply to meet this demand. We are confident that we can place all of our graduates during the normal cycles that influence the market. However, it would be wise to broaden the education we provide to develop in our students more transferable skills and a wider array of career options after graduation.

Tying these two overarching trends together may lead us to the same conclusion. If our graduates will be expected to do “more” – more collaboration, more of the project life cycle, more sustainability, and more emphasis on productivity – they will need a broader education to be successful in a world that will be different in unknown ways. If our
graduates are to survive the “volatility” of the sector that we can’t change, they will need a broader education to prepare them for career paths that are unpredictable when they started their university career during a stronger market. The critical question – to be postponed until a later time for now – is what do we take out to make room for this broader education? And what do we risk by making the education so broad that we no longer provide the immediate, employable value that our employers are counting on from us? Through this change, it is clear that we need to tend to the base: maintain “learn by doing”, reinvigorate our partnerships with industry, and continue to build a project-based, experiential curriculum that can adjust to changes in technology and management systems. But, that is for the next phase of this planning cycle; for now, this is our best guess for what is coming at us in the near future.

1. What forces are shaping your discipline today?
   • Collaborative working environment versus individual silos.
   • Technology is inserting itself into every aspect of the construction business.
   • Declining field workforce the loss of craft field workers.
   • Replacing and/or making labor as efficient as possible both in the field and the management.
   • One-stop shop for all built environment services from inception-design-procurement-building-facility maintenance-renovation-demolition.

1. What trends are emerging (new forces) which may come into play by 2030?
   • Continued influence of technology (and most of the list above).
   • Taking these ideas to a logical conclusions:
     o Quantity take-offs unnecessary
     o All information fully available (pricing and productivity)
     o Bidding and pricing process fully automated through BIM
     o Scheduling fully automated through BIM or virtual reality
     o Automated building construction (most)
     o A few multi-dimensional firms which cater to one-stop-shop for all built environment services.
   • A great decrease in demand for offices and homes as a result of decreasing population trends and remote (telecommute) work environments.
   • The trend in mega complex projects will continue to develop while small projects will dwindle.
   • Renovation work will be a constant – re-inventing buildings for a new purpose.
   • Technology is going to feed into the field crews

2a. Who will your students be in 2030 and what will be their expectations?
   • Students will be from wealthier families the ones that can afford a residential community campus living away from home.
• They will likely continue to feel more entitled as the young become more “precious” to society.
• They will obviously be more tech savoy and want to work in that realm.
• They will likely come prepared to handle the challenges of an academic environment fairly well but less able to handle the social and maturity aspects of college life.
• The campus demographics will continue to look more and more like California with a heavy increase in the Hispanic population.
• Make progress on expanding the variety of our incoming student pool to include more minorities, women, out of state, and international.

2b. What will the global and regional economy look like and how will it affect our discipline?
• Globally more interconnected with outsourcing tasks becoming more and more prevalent as technology allows.
• Regional economy will see little change.... Small coastal town with little industry. But, if people can perform their work anywhere they may choose to locate in the best places to live. Think that is part of what is going on out at the airport.
• Little change means being a residential campus and an “isolated” campus to a degree, these challenges and opportunities will likely continue.
• Safe place to send your kids and allow them to grow-up and mature in a healthy environment.
• Construction will likely continue to have its boom and bust mentality with large swings of good and bad times.
• Consolidation in the industry is inevitable with the haves and the have-nots becoming much more clearly delineated.
• We will continue to be cyclical industry which means as a department must broaden our student placement to a greater variety of potential positions.
  o Commercial, Residential, Heavy Civil, Specialties (done)
  o Design Management
  o Facilities Management
  o Real Estate Development
  o Industrial Construction
  o Demolition/Building Renovation
  o Sustainability and Built Environment

2c. What will you be preparing your graduates to do in 2030?
• Construction management will still be feeding the construction industry new talent both in the field as assistant superintendents and field engineers and in the office with office engineers.
• The roles and activities that those individuals play in the field of construction management will vary and evolve slightly in the future but essentially remain the same.
• The CM graduate’s role is going to continue to greatly expand. It already has with design-management involvement from DB and IPD contracts. This will continue with facilities management, building renovations, and building demolition.
• Whole building environment system thinkers taking into account sustainability, surrounding environment, MEP incorporation, building material selection, etc. etc.
• We will be preparing them to do MORE:
  o 5 year program
  o Specialty Niche Focus
  o MBA
  o Masters

2d. What will your students need to learn to be successful in 2030?
• The entire built environment process from inception to grave.
• Soft skills will be more and more important:
  o Leadership
  o Communication
  o Critical Thinking
  o Working in Teams
  o Social Skills = Work Environment
  o Work ethic and empathy
  o Ethical Behavior

2e. What are the implications of emerging fields and integrated learning which goes beyond traditional disciplines?
• The concept of system thinkers which have no time-line boundary of Design-Build-Maintain. Structural systems, mechanical, sustainability, water, electrical, surrounding environment, etc.
• BIM is the linchpin which will allow this to all come together.
• Product design is an opportunity for integrated learning with engineering and business.
• Digital fabrication and 3-D printers may also start to play a role in CM just not sure how yet.

3. What forms of pedagogy are key to enable teaching success?
• 100% on-line learning is not Cal Poly and I think it will differentiate us rather than impede us as a University.
• The right mix of hybrid teaching for efficiency and freeing-up time for class activities and interaction is exciting.
• Students (just like faculty) need to also embrace pedagogical change if it is going to be successful. Students come here paying for and expecting to be taught a certain way and are disappointed, resistant and resentful to some degree when not.

4. How does the evolving teacher-scholar model impact learning?
• Teacher-Scholar model is a winner in the way it is being implemented on this campus. It is “learn-by-doing”; it is learning how to think; it incorporates well with senior project at least in the CM Department.
• University needs to give all of us (students and faculty) more time to allow this concept to percolate, grow, and be leveraged as part of a students and faculty teaching and learning experience.

5. Do you see avenues for discipline-specific continuing education as impacting the department?
• What is and how are we defining continuing-education? If you mean summer then our department is very much in favor of a year around school year. If you mean graduate programs and certificates then our department is in favor of getting construction education to as many folks as possible through an MS-Arch or an MBA-specialty or a Certificate Program.
• Broadening our CM curriculum to be inclusive of all types of construction and all phases of the building process might only be achieved as discipline-specific OR might be very general and interdisciplinary depending on the goal.

6. Do you see public-private partnerships having a meaningful presence in the program?
• Yes

7. Do you see emerging opportunities for interdisciplinary learning within the college or within the university?
• Yes

8. Other Department specific issues.
• See the introductory statements above.
Academic Plan for Enrollment City and Regional Planning 2030

Written to describe CRP in 2030 – a scenario

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OUR 2030 STUDENTS

The CRP undergraduate students are more Hispanic and Asian than in 2014, with the majority remaining Anglo, African Americans have a minimal representation. The students are older, more having gone to community college. Women are in the majority. Students utilize the Internet as a primary source of information on the world, their studies, and their views on what influences the form and function of urban areas. The CRP graduate students are more Hispanic and Asian than in 2014, with the majority remaining Anglo. There will be 200 majors in the BSCRP degree. At least 15% of the 80 graduate students will be from out-of-California, and there will be a small, international presence of 3-5% of the student body. There are more dual degree students due to expanded links to the Transportation Engineering program and also Civil and Environmental Engineering. CAED masters students now take 2-3 classes in CRP as a result of shared faculty among the departments.

Students from the new CAED Environmental Design Studies degree, which is CRP managed, will reflect the overall CAED profile. There will be 120 majors in this degree program that focuses on analysis of the built environment and a broad based understanding of urban systems, with an underlying sustainability ethic. This will not be a professional degree and not directly linked to an “industry segment.”

The continuing education student taking CRP courses will come from throughout the region. A set of courses will be offered, through a mix of on-site and off-site and digital modes of instruction. Interactive courses are common through embracing digital technologies. Special educational offerings for groups US and abroad will also be part of the overall educational offering. External clients request educational content, and we develop and deliver it in a variety of ways.

Our students are distinguished by a strong desire to create positive change for the communities around them and those that they hope to serve. Just as in 2014, they adhere to the motto “Get an Education, Get a Job, Make a Difference.” The faculty supports these values through direct work with a broad set of community and professional partnerships.
These are children of the Millennials, *grandchildren* of baby boomers. Communication technology is no longer a widespread distraction, as they have garnered a code of behavior instilled in high school and before. In addition, the technology is fully integrated into the pedagogy. All of their instructors know what these media can offer and how they are best managed. We have accepted the web and utilize it on a continuous basis. CRP has established strong links with Internet based planning enterprises such as Planetizen.

OUR 2030 EDUCATION

The 2014 CRP undergrad curriculum was built up off of an older California general plan model. This has changed. The 2030 curriculum model is built on an understanding of three knowledge areas: place making (the placement and use of buildings and the space they occupy), the environment (protection and adaptation), and transportation (multi-modal means of transport linking places for social and economic purposes).

Added to this knowledge area are skills courses at professional levels, and values courses to inform the planner’s perspective. Making communities better (in multiple ways, including safety and resilience) is the thread that ties components together and forms the fundamental discourse within the degree programs. Technology is used as a cross cutting language for skills development and communications. Planning values are those of equity and community betterment.

The education model combines flexibility and collective efforts. For example, there are simultaneous studios with other colleges and deeper utilization of off-campus education linkages. We are more “attached” in 2030 than in 2014. The San Francisco and Los Angeles Programs have expanded now deliver on the value of an urban experience for a planner. CRP utilizes these options for 6-8 students a year. At times we mount our own urban community focused studio if the client base is there.

The skills sets for planners include higher communications capabilities: oral, graphic and written. CRP utilizes input from all the subsections of the California Chapter of the American Planning Association to make adjustments in the curriculum model that reflects professional needs. More emphasis is given to the use predictive analytics to do planning. These analytics express themselves visually as well as numerically. The student have become, in part, “geo-designers”; coupling the creation of design proposals with impact simulations informed by geographic contexts. This is a technology expression of the three knowledge areas: place making (the placement and use of buildings and the space they occupy), the environment (protection and adaptation), and transportation (multi-modal means of transport linking places for social and economic purposes).
Adding to our traditional commitment to Plan Making instruction is plan implementation through fiscal, participatory and collaborative mechanisms has become a key component in our professional model.

Flexibility:

Our curriculum is more flexible due to increasing number of transfers. While the BSCRIP curriculum is still built around freshmen, we have fully integrated the transfer student into our program, assuring them a reasonable graduation time. We offer summer courses to bring the transfer “up to speed.” Flexibility allows for more international education, although this normally is not more than 5% of the BSCRIP total units.

The university will have an increased its share of community college transfers and ICMAs, and CRP benefits from this policy. If we want students to travel internationally, we need to be more flexible. If we convert to semesters, we should use this opportunity to be more flexible with the schedules. The 2014 focus on “studio” as the core delivery method has changed. Studios now are among a series of methods, including the “project” that can deliver content and integration experiences. All learning in 2030 does not occur in “the studio.”

If Cal Poly adds 5,000 students, CRP’s count will have grown by at least 80%. In order to accommodate that kind of growth, we need to teach differently than we do now. Flexibility will be key.

Other Pedagogy:

In 2030 CRP uses a “learning outcomes” approach where students can choose among many courses to demonstrate competency in becoming a professional planners. We accept many modes of instruction under this model. University College London has set up a series of modules online that teach them the basics of drawing. One and two day workshop courses are offered.

“Learn by doing” continues to be the core philosophy and we do more applied work by a wider range of means to achieve this. We continue to meet the accreditation requirements. In 2030 our program remains the most applied in California, and students continue to be ready to start a job when they graduate.

2030 PLACES OF WORK
In 2030 the urban and problems of transportation, place making, and environmental protection are of greater interest due to more people and increased demands for communities that can serve the needs of an aging California, and a more global citizenry.

There is ample work for our graduates. The Department of Labor estimates 10% job growth for urban and regional planners between 2012-2022, with California being up by 14%. Due to California legislated planning requirements there is a constant demand for labor, although subject to periods of recession and expansion. California remains the preferred work place for our students, but now the entire western region employs our graduates. Due to the large number of retirements in the private and public planning offices, more graduates hold high-level jobs in government and the private sector. Using our better-placed alumni provides for better job placements and more intense alumni relations. We are closer to the profession than anytime in our history.

Work place competencies remain the same: strong analytical thinkers equipped with design and data mining tools still provide the entry to the first job. Our students are now recognized as understanding urban system dynamics (multiple influences in urban areas, being very good at communications and working with diverse publics).

After our students, planning professionals are our customer base. We connect with them virtually on a regular, if not a weekly basis. This is a result of 15 years of building relations through the Advisory Board mechanism and through more focus on professional networking, as opposed to academic networking. At least one studio per year studio is done in conjunction with professional firms who wish to try out new ideas and strengthen relations with quality students.

2030 RELATIONS IN THE COLLEGE

CRP works with CM, LA and Architecture, strengthening joint interests in understanding of how to manage the built environment and its assets: buildings, roads, parks and people. It also works with CM in the areas of: built asset management, and integrated project delivery (IDP) which as begun to be embraced as a way to promote resiliency and sustainability. Alliances and joint work with other departments has increased due to common interests in the application of technology (such as Geo-Design) and the establishment of common core courses within the college.

How The 2022 Vision Influences CRP Thinking

In 2030 only parts of the 2020 Vision will be present. The 2022 Objective: Recruitment and retention of faculty and staff will be driven by professional development opportunities and competitive salaries/benefits has not occurred in the CAED. It remains a challenge, as the 2014
structure of retention lacks a commitment to this. More entrepreneurship however is present, resulting in a wider gap between those that have and those that do not. CRP faculty engage in more contract service consulting to augment lagging salary structure.

More than 50% of CRP students engage with faculty in research, due to the adoption of flexible course delivery and more utilization of the teacher-scholar model where students are an element of success.

11/17/14
After extensive discussions the Department of Landscape Architecture has engaged in futurist modeling to create a vision for our program in 2030. The faculty, the department advisory council (LADAC), and students have been engaged in the process through a variety of mediums to bring into focus a clearer picture of where we need to be by 2030.

The summation of our department vision for 2030 includes:

- **A Living Laboratory**: a new space for teaching, research, interdisciplinary collaboration, and experimentation
  - Exterior space (5-10 acres) for experimentation of landscape performance issues and holistic ecological systems design in the built environment
  - Interior space:
    - that brings the shop experience into the classroom in a seamless and effortless manner
    - for new studio formats that permit the choreography of technology to advance learning outcomes
  - Space that supports flexibility and collaboration

- **Engaging an expanded, and more diverse student body including**:
  - Increase student enrollment in landscape architecture
    - International students
    - Non-traditional aged students
    - Students from out of state

- **Providing bi-lingual course offerings within the curriculum to support international students**

- **Expanded course offerings for the college and university with international academic and professional partnerships embedded**:
  - Hybrid internship/design studio courses with professionals
  - A permanent quarter abroad experience led by a department faculty member that is available every academic year
  - Meaningful ongoing partnerships with departments in other colleges and universities by providing courses that

- **New curriculum and degree options that are responsive to an ever changing discipline and profession**
  - Continuation of the undergraduate degree
  - Addition of:
    - First Professional masters degree
    - Second Professional masters degree
    - Minor in landscape architecture
Vision 2030
Department of Landscape Architecture

After extensive discussions the Department of Landscape Architecture has engaged in futurist modeling to create a vision for our program in 2030. The faculty, the department advisory council (LADAC), and students have been engaged in the process through a variety of mediums to bring into focus a clearer picture of where we need to be by 2030. The department’s response to the dynamic pressures shaping the future of our profession, college, and this university is centered on the transformation of the program into a living laboratory. Housed in a new environ that integrates man-made spaces with natural spaces in a seamless environment for academic exploration and achievement, landscape architecture will successfully meet the needs of the future. This living laboratory will support an immersive student experience with flexibility, featuring the ability for students to choose and explore their level of education.

Discussions with our department advisory council articulated an encompassing picture of the cultural, physical, and philosophical challenges our profession will face in the upcoming years. The effects of climate change, water scarcity, and growing populations will precipitate the need for innovative repurposing and the restoration of every project’s embedded ecosystems. The health and wellness of our society will come to the forefront in issues of housing density, urban agriculture, and the heightened need for place making. Global boundaries will shift and fall, and the pressures of diminished resources will require us to focus on more sustainability oriented economies.

The department advisory council also identified key skills students needed for success in the profession upon graduation. They will need strong communication skills with an emphasis in the realm of writing and verbal presentation. They will also need proficiency in research methods. Students need to be able to research all aspects of the profession, utilize case studies, and data based on landscape performance to inform their process. Critical thinking skills for analysis, exploration and discourse are required for them to develop a true and complete vision for the projects they undertake. Finally, students will need leadership skills for project planning and team coordination in the future.

LADAC also identified that an aging population and infrastructure coupled with a diminished appreciation for open space will be primary concerns for the profession in the future. Monetary polices, economic fluctuations, and government regulations were identified as major contributors that currently influence the discipline, and will continue to do so in the future. Additional concerns were raised that the value of open space will shift to a purely financial assessment that is based on its cost to maintain, and the amount of water resources it consumes. Technological changes
affecting how we interact with the landscape and economic trends will become leading considerations that influence the overall design process. The profession will have to embrace and exploit new social media venues as the millennial generation comes into its own as the primary force in the economy. There will be less homeownership and more renters in the market place, contributing to the opportunity to advance higher densities in urban areas. They see the promulgation of human scale settlement patterns with village-based designs versus the land consumption sprawl of current development. This will be followed by a paradigm shift that requires us to address urban and rural issues with decisions that are not based on the automobile.

The advisory council also identified as a central theme of the need for interdisciplinary approaches that can address sustainability, stormwater management and utilization of holistic systems to counter changes to hydrologic conditions due to climate change. Issues facing the design disciplines need to translate into public policy with the landscape no longer being seen as a decorative solution but as a valuable resource for solutions. Examples of this philosophical change include the integration of natives and other appropriate planting design solutions that require little or no water. Another is the prioritization of urban agriculture with more organic foods. Adherence and reliance by our profession on the founding tenets of the American Society of Landscape Architects provides direction for addressing these issues of the future.

Student, faculty and staff conversations identified issues facing the academic program through examination of the demographic future’s projections that was provided, an on-line survey, and a series of discussions over a five-week timeframe. The original tier one and two questions were synthesized into seven questions of relevance to the department that asked:

- Who do we want to teach?
- How do we want to teach?
- Where do we want to teach?
- What are the resources we will need?
- What degrees/programs do we want to offer?
- What do we want to be known for?
- What do we want our students to be known for?

The remainder of the report communicates the conclusions that were developed for these questions.

Faculty discussions brought forward numerous issues, goals, solutions, and questions on how the resulting concepts could be implemented. Subsequent synthesis of the ideas yielded short-term achievable items and long-term future vision items. The vision of “who do we want to teach” is encapsulated by the concept to broaden and expand our market share of the student population. In the future we see that we would be teaching primarily students from California, and
based on future demographic projections they will be native born and bi-lingual. 
International students will also comprise a larger percentage of our enrollment than 
they currently do making support for English as a second language more significant 
than it is today. ESL support could be enhanced by providing for the integration of 
bi-lingual course delivery within the curriculum.

We would see in the future the department expanding our presence on campus by 
providing more courses to the students of the College of Architecture and 
Environmental Design. We also see the opportunity to help programs in other 
colleges by teaching courses that are currently being underserved or not offered. 
Additionally, expanding the availability of our courses to all of the student body to 
fulfill GE credit requirements at Cal Poly will grow our offerings to the larger campus 
community.

Our conversation on “how do we want to teach” saw agreement between faculty 
and students alike. Both groups identified the design studio framework as the 
preferred pedagogical format to achieve continued academic success in the future. 
This was the most significant conclusion, and framed the remainder of the 
discussion on this question. It was expressed how technological advances could 
permit experimentation within the studio framework to improve learning outcomes. 
Digital technology could be integrated and utilized to choreograph studio time for 
enhancement for faculty research and student learning outcomes. 
Faculty identified that blended learning and increasing hybrid courses would be 
dependent on improvements and expansion of existing computer labs, and an 
overall reconfiguration of the existing studio landscape.

Embracing future possibilities, the question of “where do we want to teach” yielded 
an expansive series of responses that illuminated additional venues and delivery 
methods for studio based courses. Studio opportunities need to be developed in 
off campus locations in California, across the United States, and internationally to 
facilitate an immersive landscape experience. Implementing the Cal Poly motto of 
“Learn by Doing”, students learn best about landscape issues when they are an 
active part of that landscape.

The faculty identified the need to develop new teaching experiences in our rural and 
urban landscapes. Cal Poly’s location provides ready access to rural landscapes 
but urban experiences are less accessible, and new partnerships are required to 
advance this type of teaching. Partnerships with other universities could facilitate 
landscape immersive studio opportunities in the curriculum to address the need for 
urban experiences. Other new relationships need to strengthen public-private 
partnerships exemplified by a hybrid studio structure that would integrate a 
student’s internship with the studio. Involvement with the profession in tandem with 
their academic experience will contribute to meeting future challenges. The 
integration of Cal Poly based study abroad opportunities that are permanently
embedded in the curriculum was considered a vital component to teaching endeavors. Developing an appreciation of global issues facing our discipline was considered of equal importance with the understanding of regional issues. Financial support resources for international study need to be cultivated to make it accessible to all the students in our program.

The faculty, staff, and students also reviewed what resources are required to implement future programs. Affirmation of current issues facing the department and the university and the identification of projected physical, procedural, and policy factors from the discussion led to the faculty identifying the need for a living laboratory. The lab would be a new flex space facility that integrates both the interior and exterior for experimentation and interdisciplinary research. The exterior would permit exploration of landscape performance issues that would examine how the landscape changes, grows, and evolves over time highlighting stormwater management and urban forestry issues. The experimental fields would provide the ability to test new holistic systems design alternatives to address global issues our society will be facing. The space would support additional faculty research efforts ranging from collaborations on art projects to partnerships with engineering, horticulture and soil science. It would allow students the chance to get their hands dirty, test their designs, and experience them at full scale. It would also visibly communicate our research to the public and, in conjunction with demonstration gardens, be an active contributor to the overall educational experience of the Cal Poly community.

Interior space would permit the implementation of new studio experiences in response to the evolution of advances in technology. A new shop would help translate students’ ideas from paper into physical form to better understand issues of materiality and performance. The new flex space would support faculty needs for a place to meet with peers to explore and realize collaborative efforts. Students would also be afforded the same opportunity, as the living laboratory will be a home for interdisciplinary experiences reaching out to the student body of other colleges on campus.

Discussion of procedural and policy issues centered on how to generate resources to support faculty contributions to an evolving Cal Poly. Creating flexibility within the curriculum for scholarship, and generating release time were considered the most significant issues to address. There is a need for mentorship within the department, college, and university to identify synergies that exist between faculty members, and illuminate potential relationships outside of Cal Poly. There needs to be a campus clearinghouse that tracks grant opportunities and matches them to appropriate faculty members.

The degrees and programs of the department’s future living laboratory would provide students with multiple options ranging from the current undergraduate
degree to a postgraduate degree in landscape architecture as well. The postgraduate options would provide the option for either a first and second professional degree. Additionally, a minor in landscape architecture would be developed to provide non-major students exposure to the profession and the global issues that were identified earlier. The minor would serve as the foundation for a core of courses offered to the general student body focused on sustainable environments, urban agriculture, stormwater reclamation, and climate change.

In answer to the last two questions; the department envisions itself and our students as a manifestation of our mission statement where a learning-centered approach develops professional skills and knowledge to make valuable contributions to a changing global society. Through our commitment to excellence in teaching and the core values of the profession, our students will develop an appreciation for life-long learning and an interdisciplinary approach to landscape architectural design.

The summation of our department in 2030 would include:
- An expanded, and more diverse student body
- Expanded course offerings for the college and university with international academic and professional partnerships embedded
- New space for teaching, research, interdisciplinary collaboration, and experimentation
- New curriculum and degree options that are responsive to an ever-changing discipline and profession

The living laboratory of the department of landscape architecture would not only embody a physical entity, but a philosophical paradigm that emphasizes an understanding of natural and cultural systems and our stewardship role with respect to the environment. An underlying foundation of flexibility will permit the department to respond quickly to the ever-changing challenges and opportunities that are presented, keeping us at the forefront of the discipline. Interior and exterior space of the lab would foster the proliferation of experimentation as we strive to create solutions for tomorrow’s problems. Addressing cultural, natural, political and economic issues the living laboratory will attract students from all over to secure Cal Poly’s continuance as the place that produces Landscape Architects as leaders of tomorrow.