SITT

9/11/23

Using Technology to Facilitate Learning Abstract Concepts

- Volumetric Visualization
- Time Sequencing Considerations
- Interpretive Behavioral Analysis
- Subjective Thinking Concepts in Construction Cost Estimating

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Construction Cost Estimating and Analysis
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Civil and Environmental Engineering
University of California, Davis

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ECI 181

Construction Cost Estimating and Analysis

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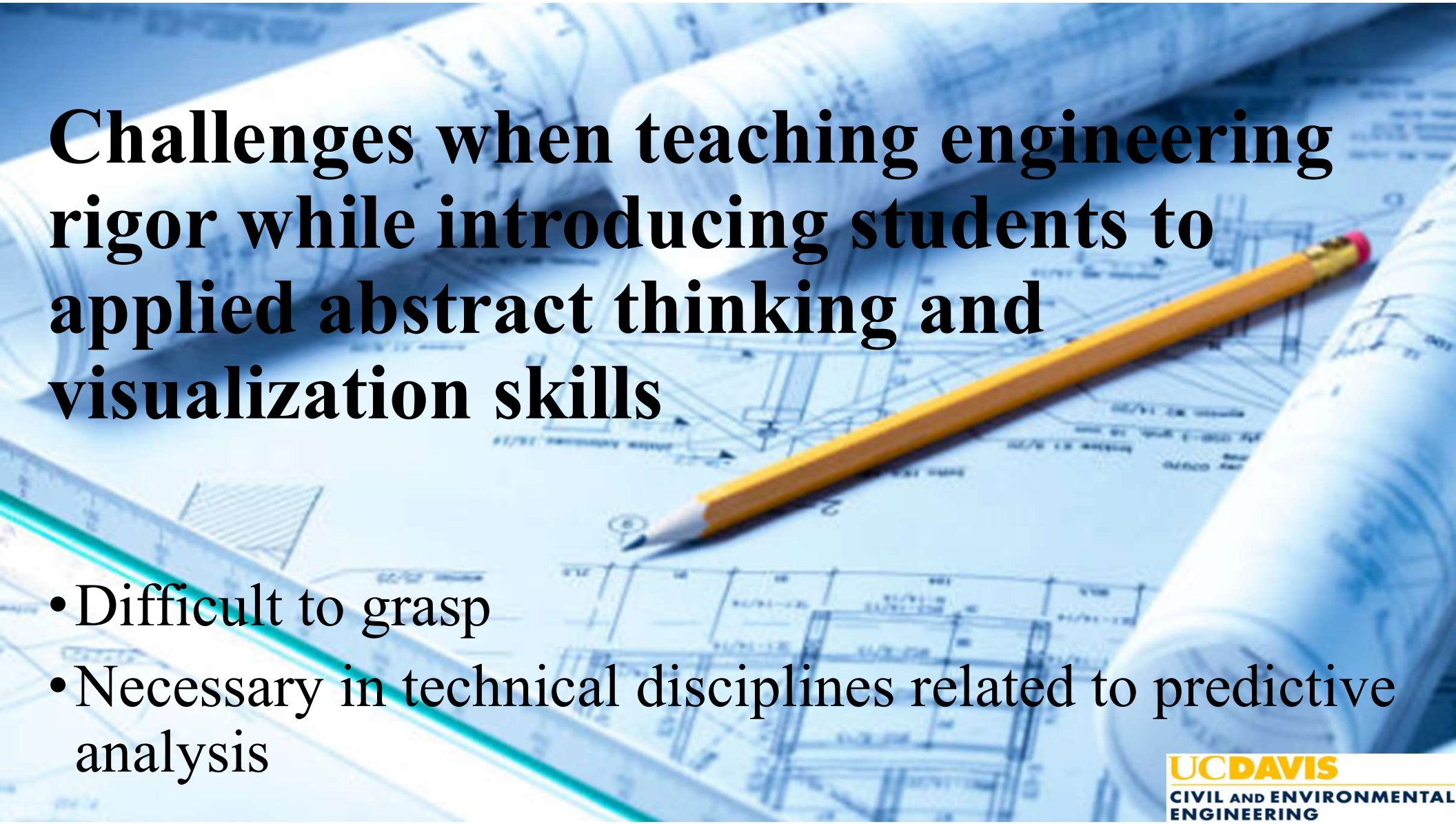

Challenges when teaching engineering rigor while introducing students to applied abstract thinking and visualization skills

- Difficult to grasp
- Necessary in technical disciplines related to predictive analysis

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Engineering undergraduate students are trained in objective analysis based on prescribed values and closed-ended solutions.

- Open-ended and subjective considerations analysis is likely required.
- Challenging to teach analysis which depend on visualization of a future multi-dimensional state.

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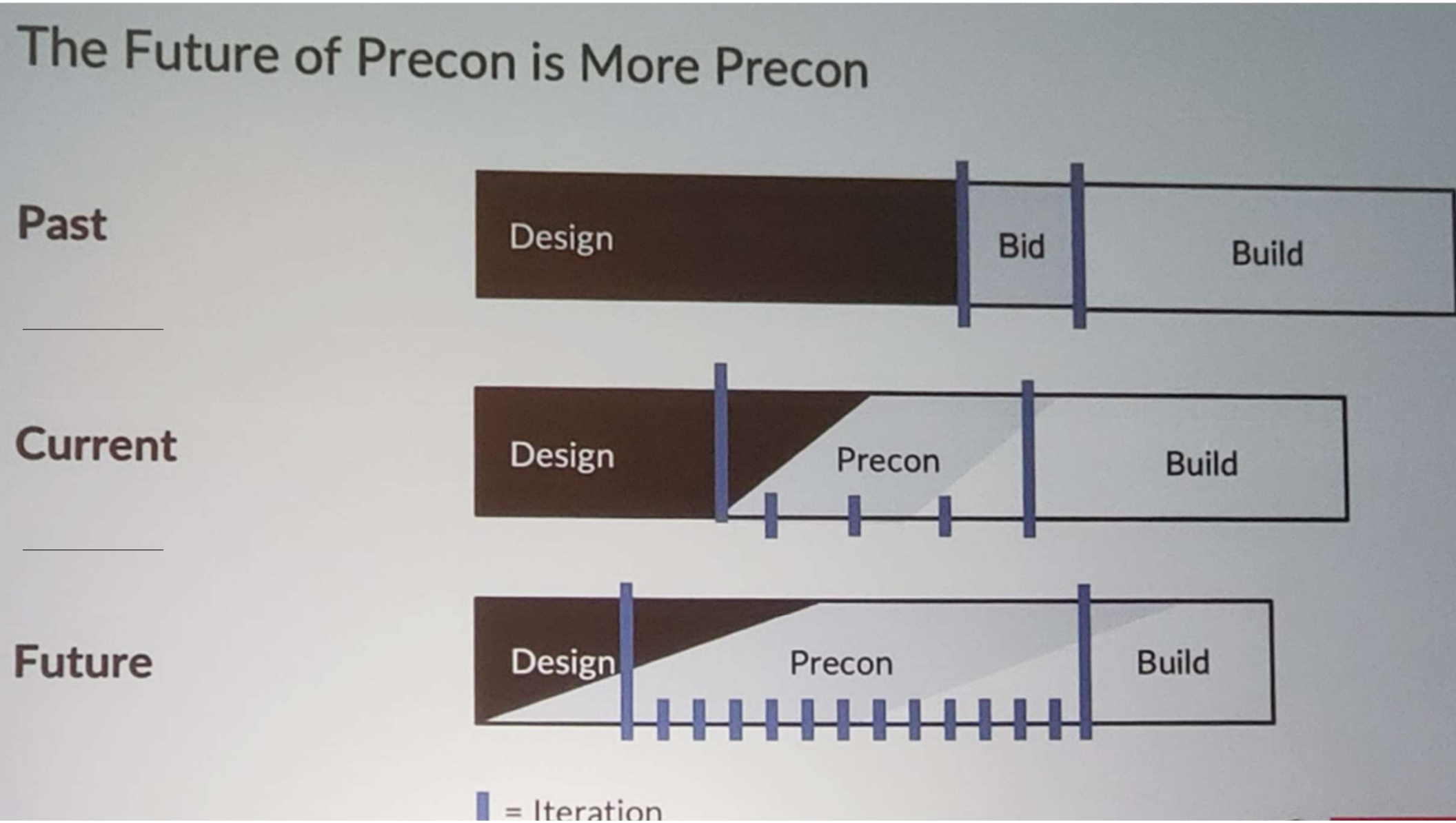
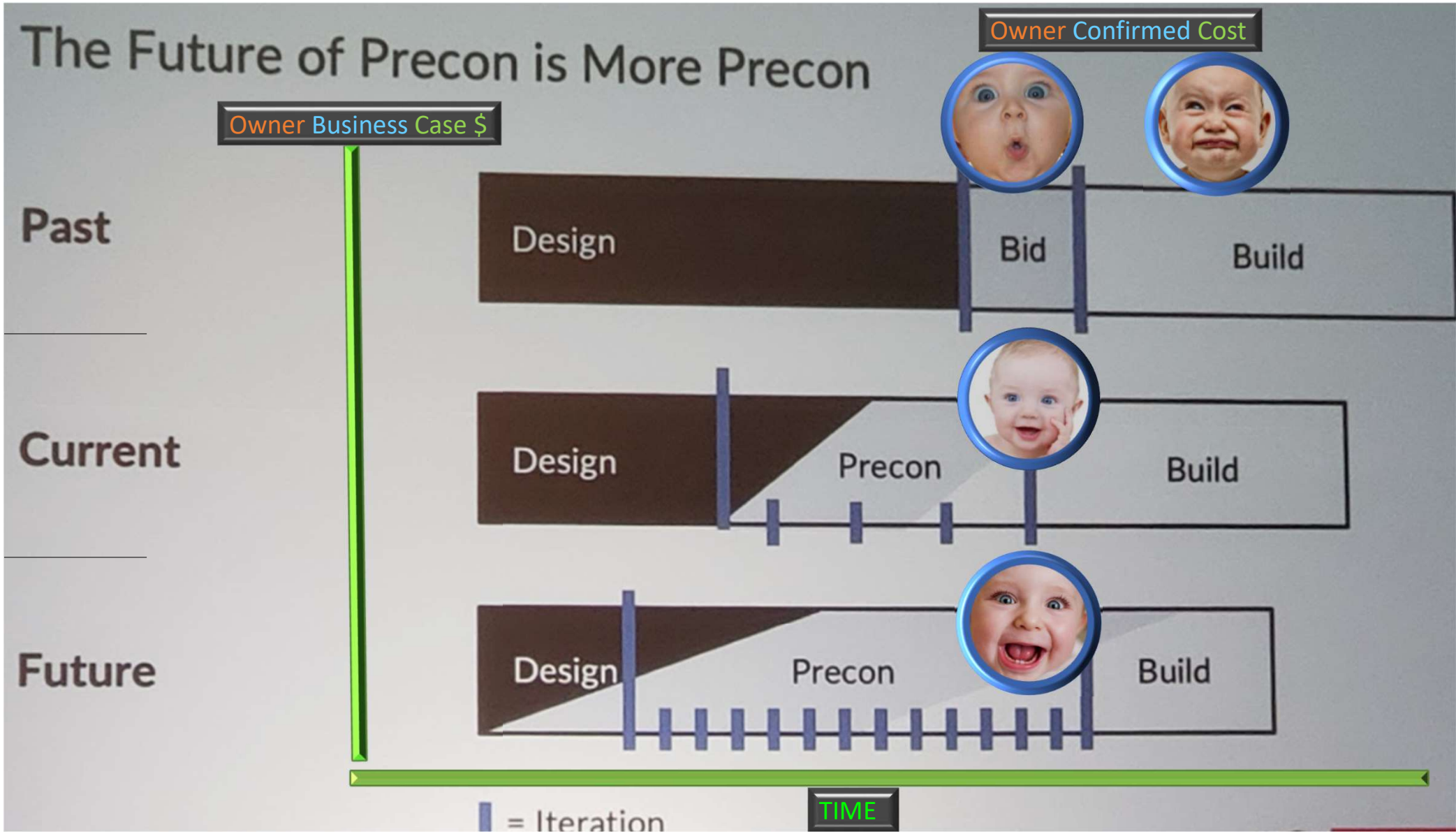
The Future of Precon is More Precon

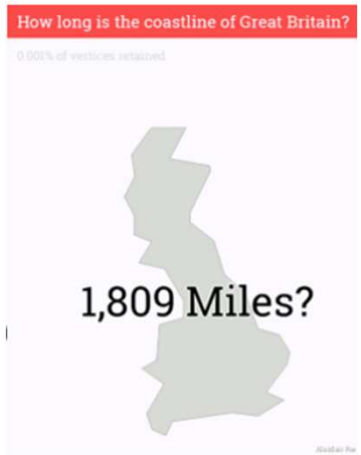


Owner Cost Awareness Measurement:

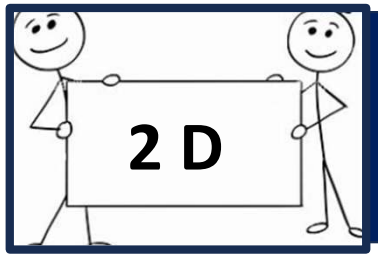
The BABY-O-Meter


The Future of Precon is More Precon
Owner Confirmed Cost
Owner Business Case $
Past
Design
Bid
Build
Current
Design
Precon
Build
Future
Design
Precon
Build
TIME
= Iteration

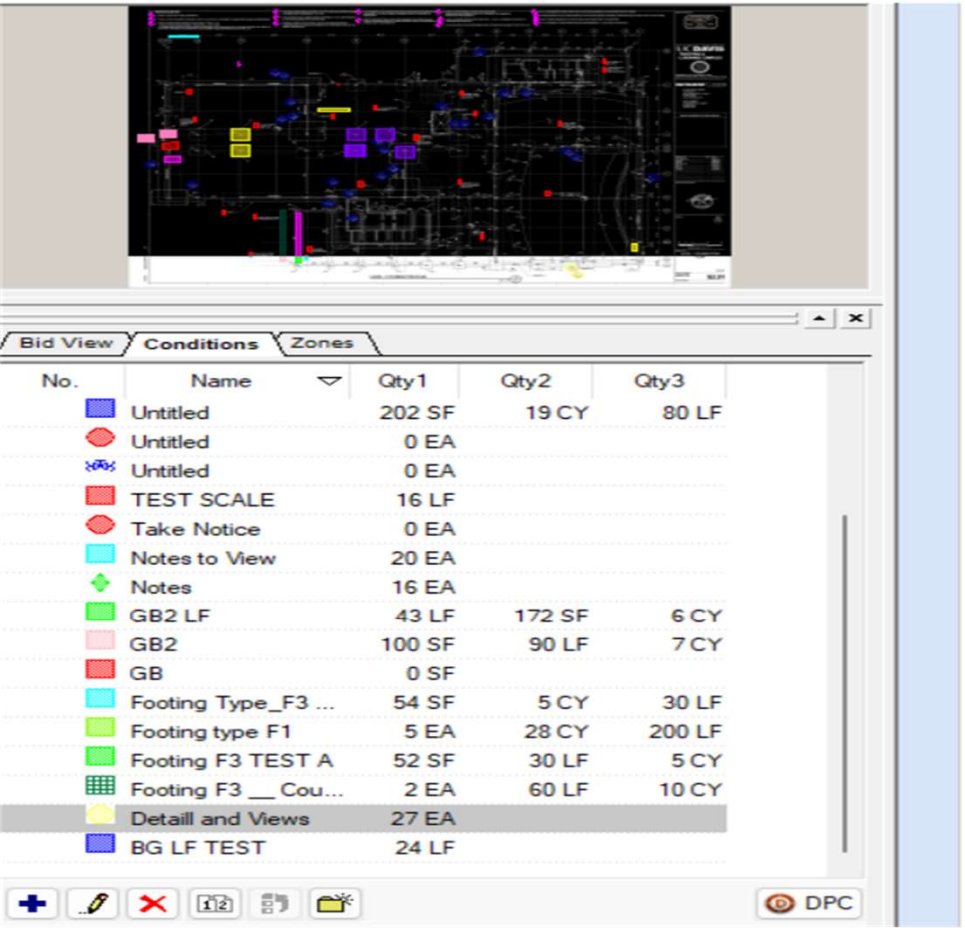
How long is the coastline of Great Britain?

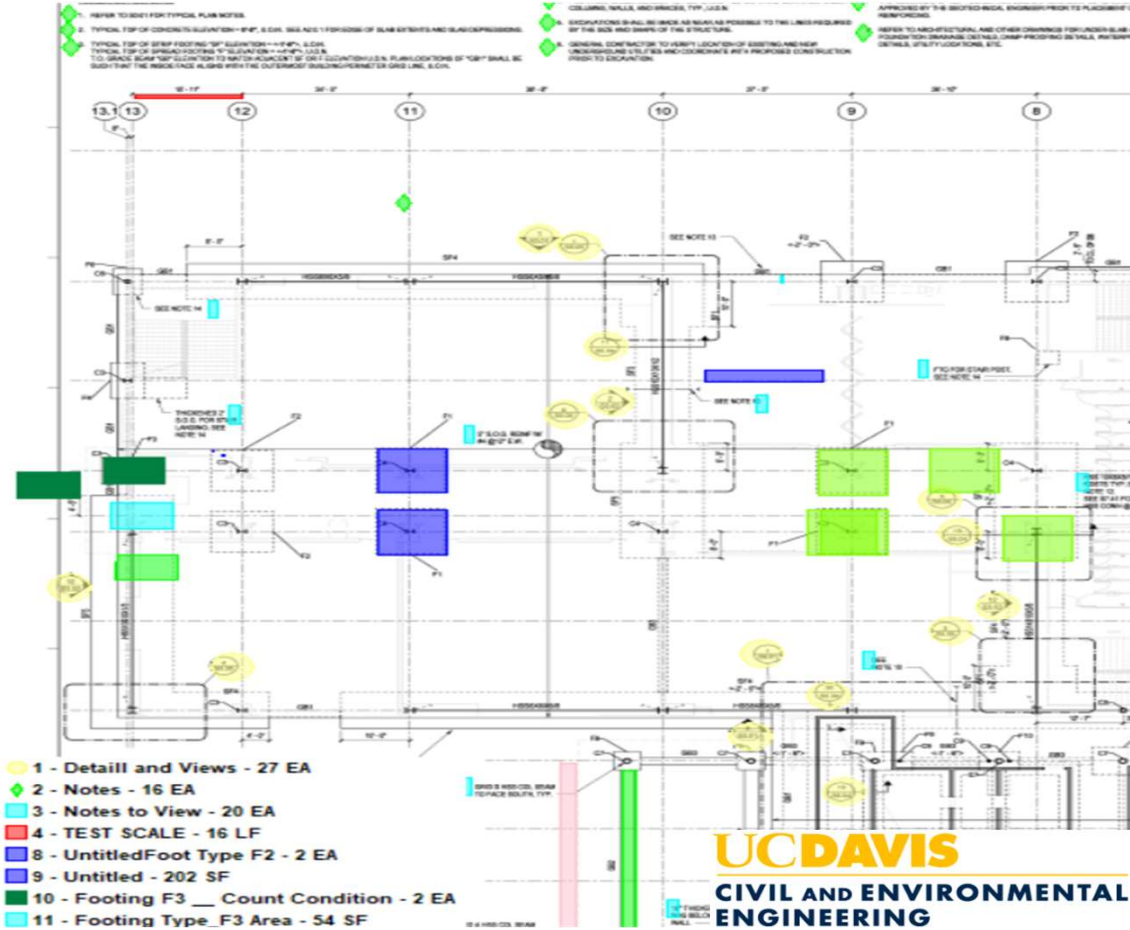


- Credit: Alastair Rae 2016

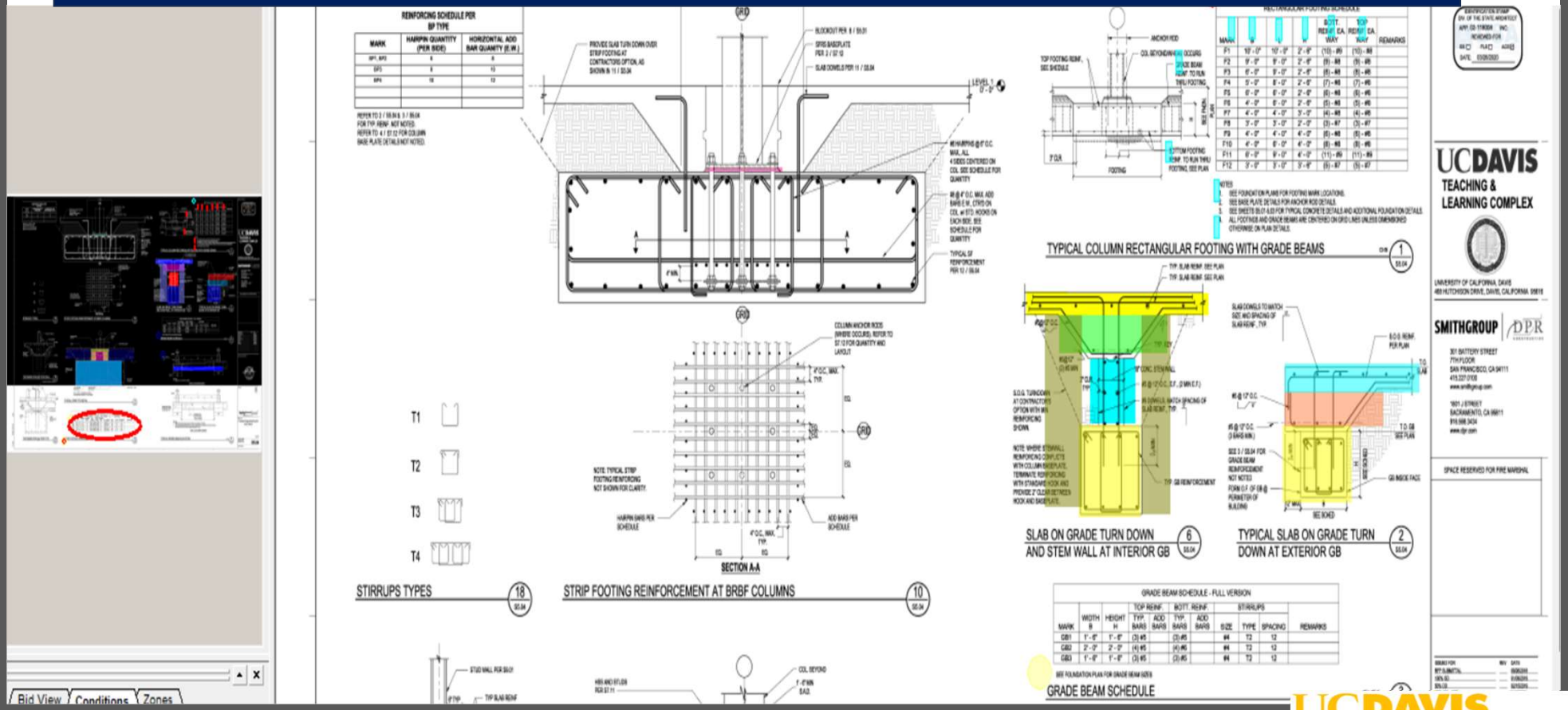


STRUCTURAL FOUNDATION PLAN





STRUCTURAL FOUNDATION DETAILS



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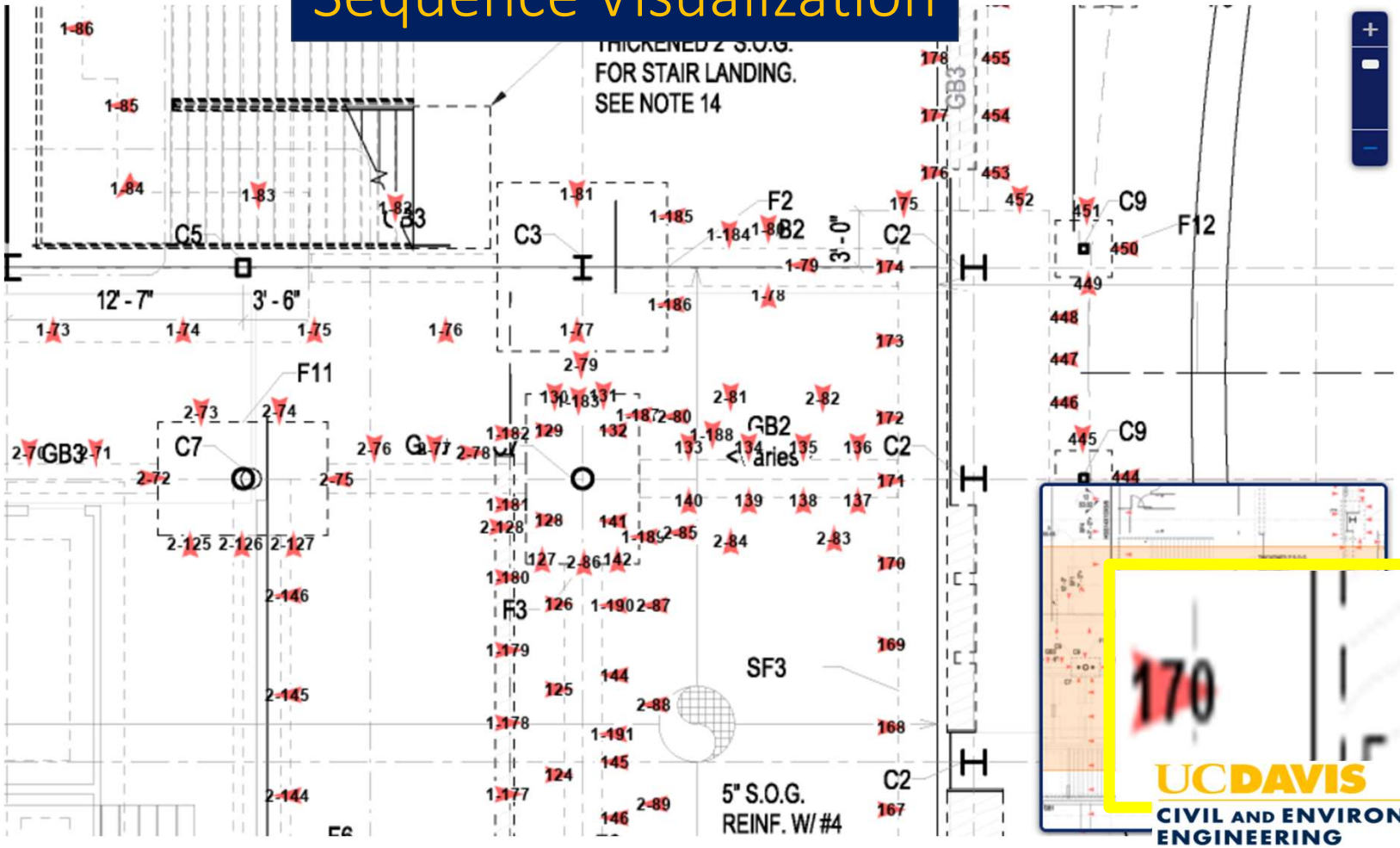
Sequence Visualization



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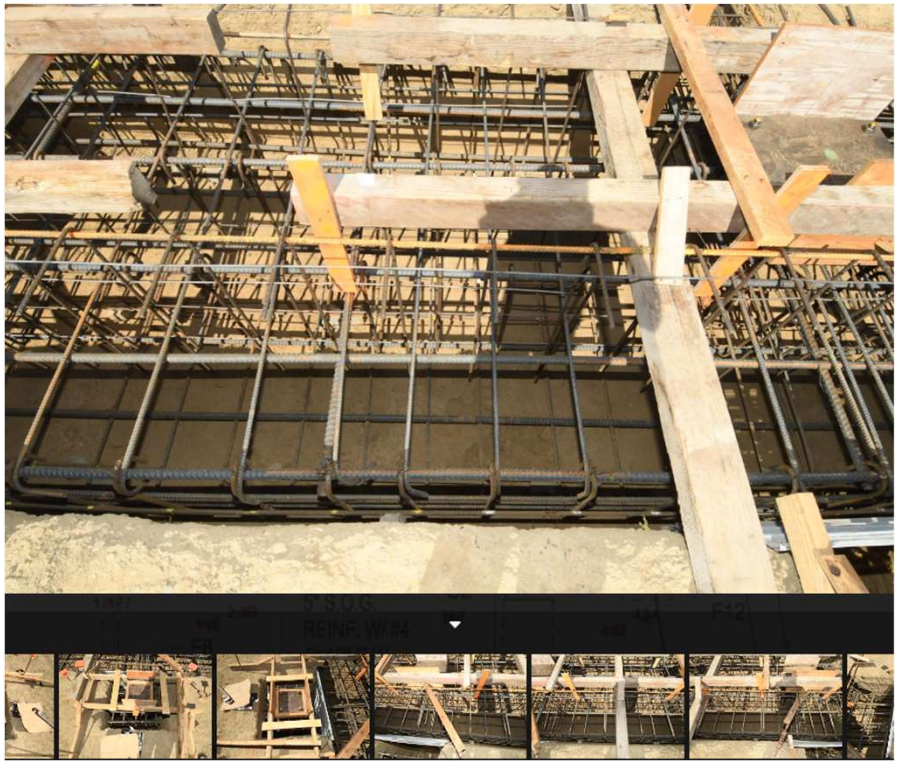
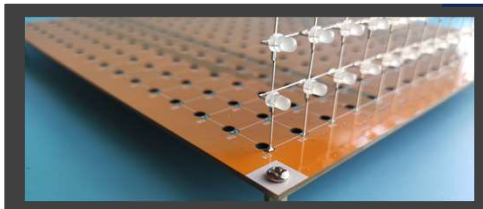
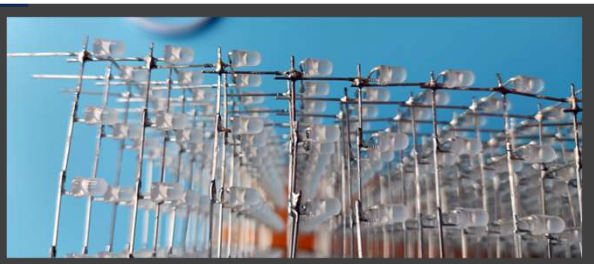
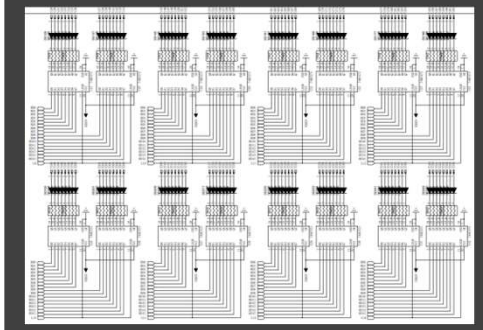
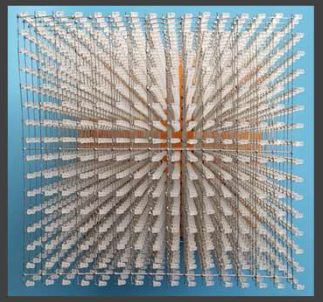


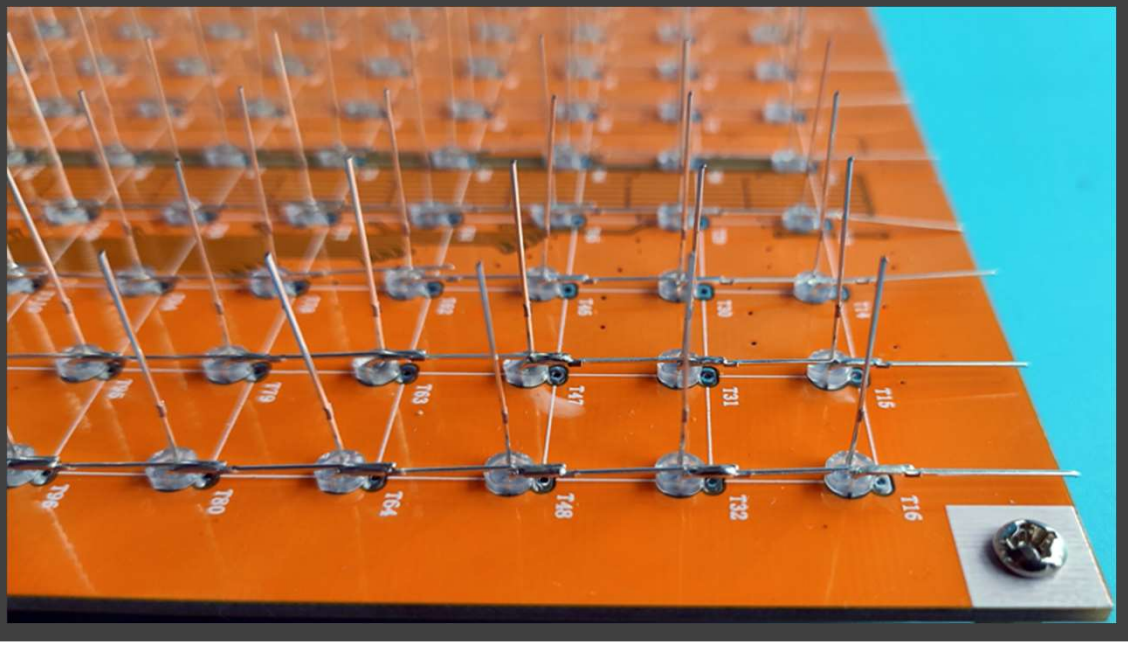
The “CUBE”

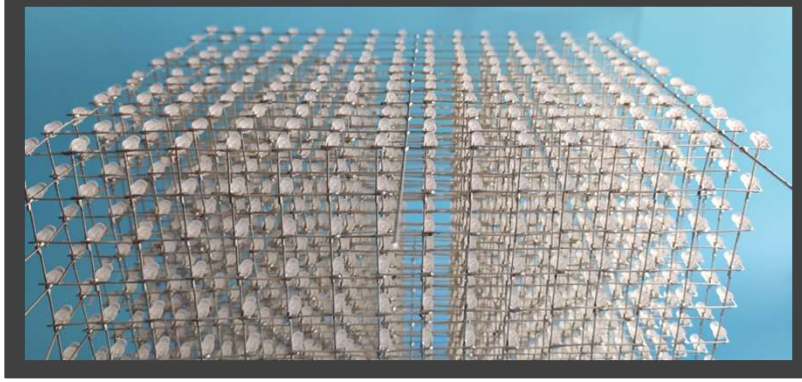












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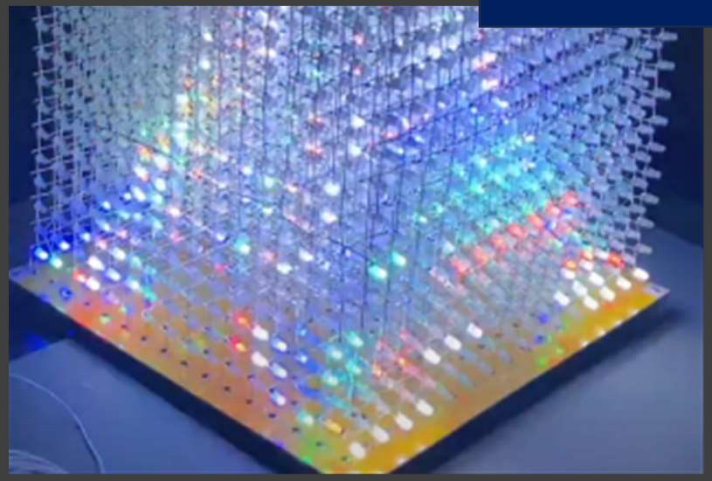

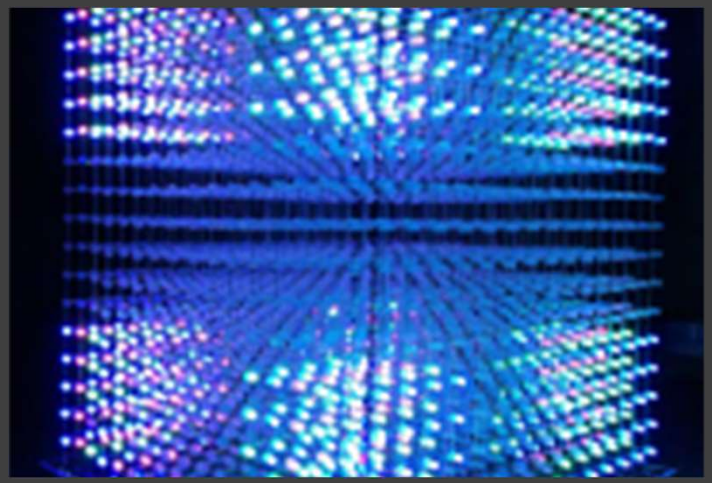

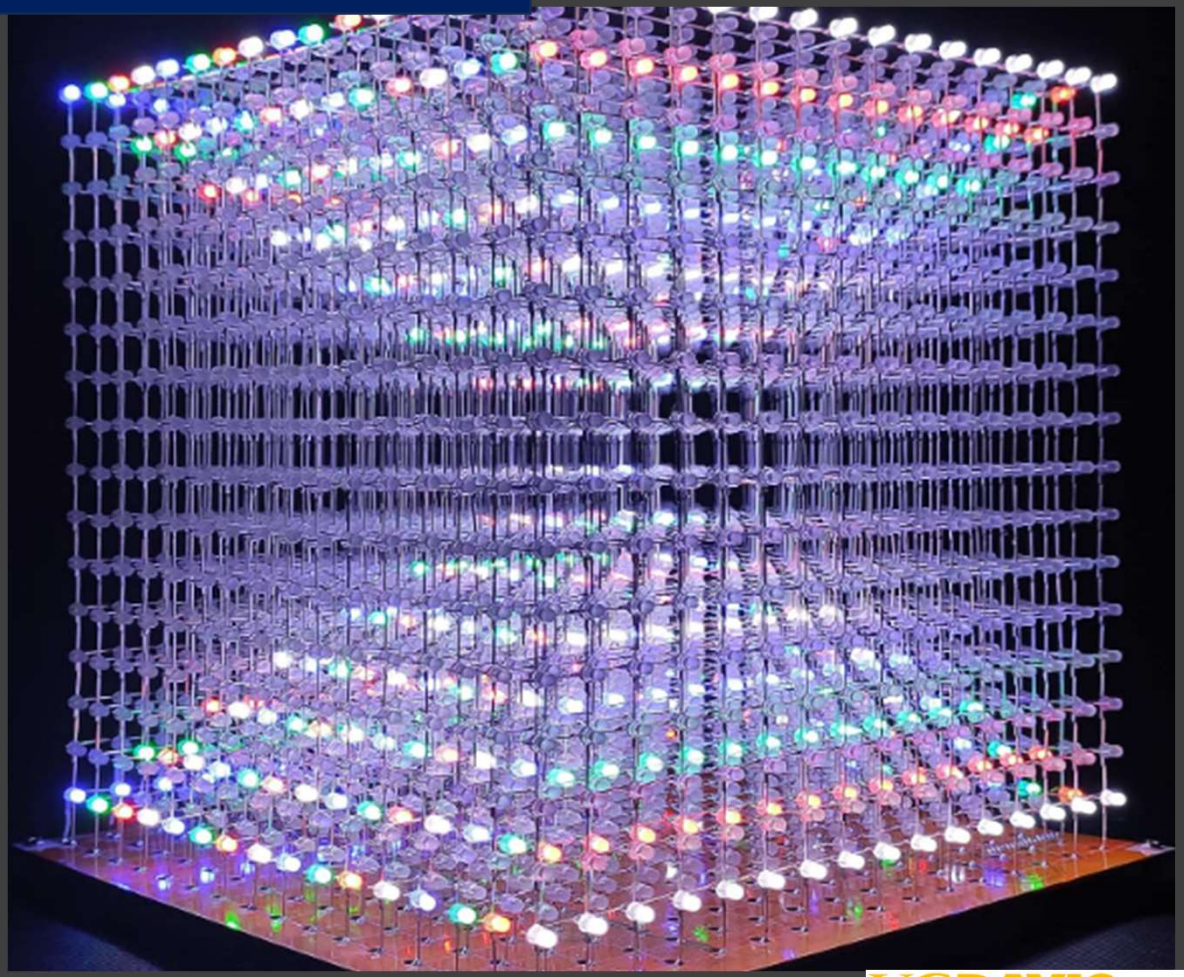

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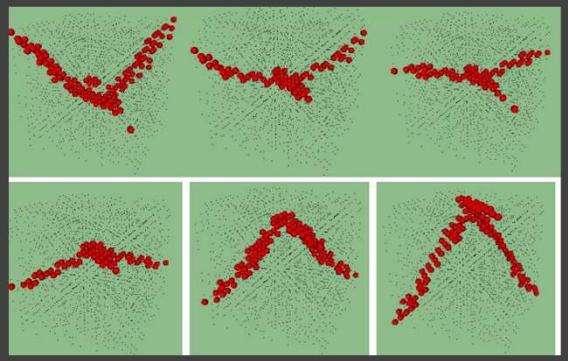

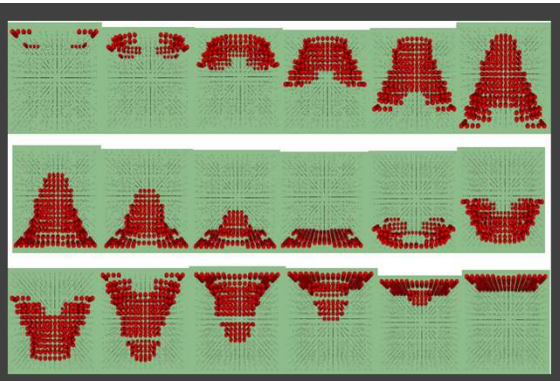

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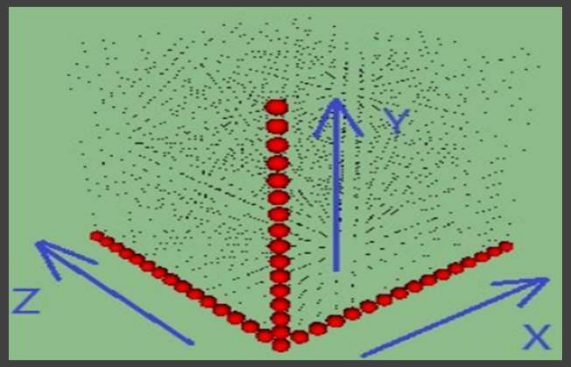

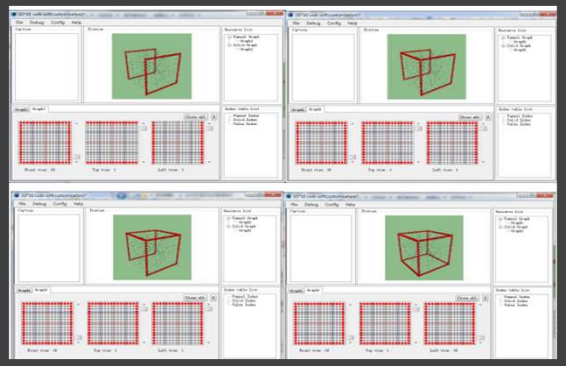

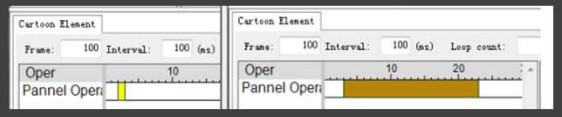

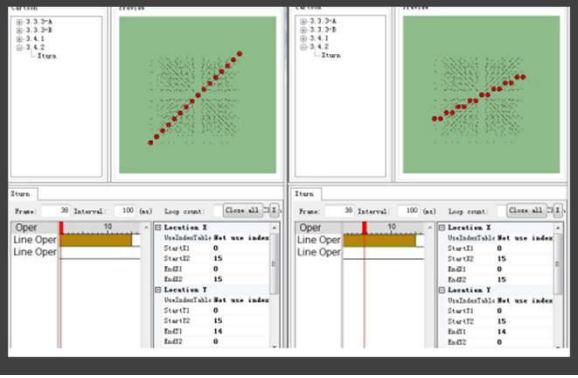

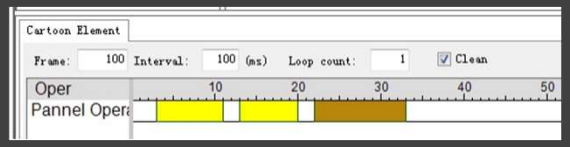

Multiple Disciplinary Opportunity for Teaching

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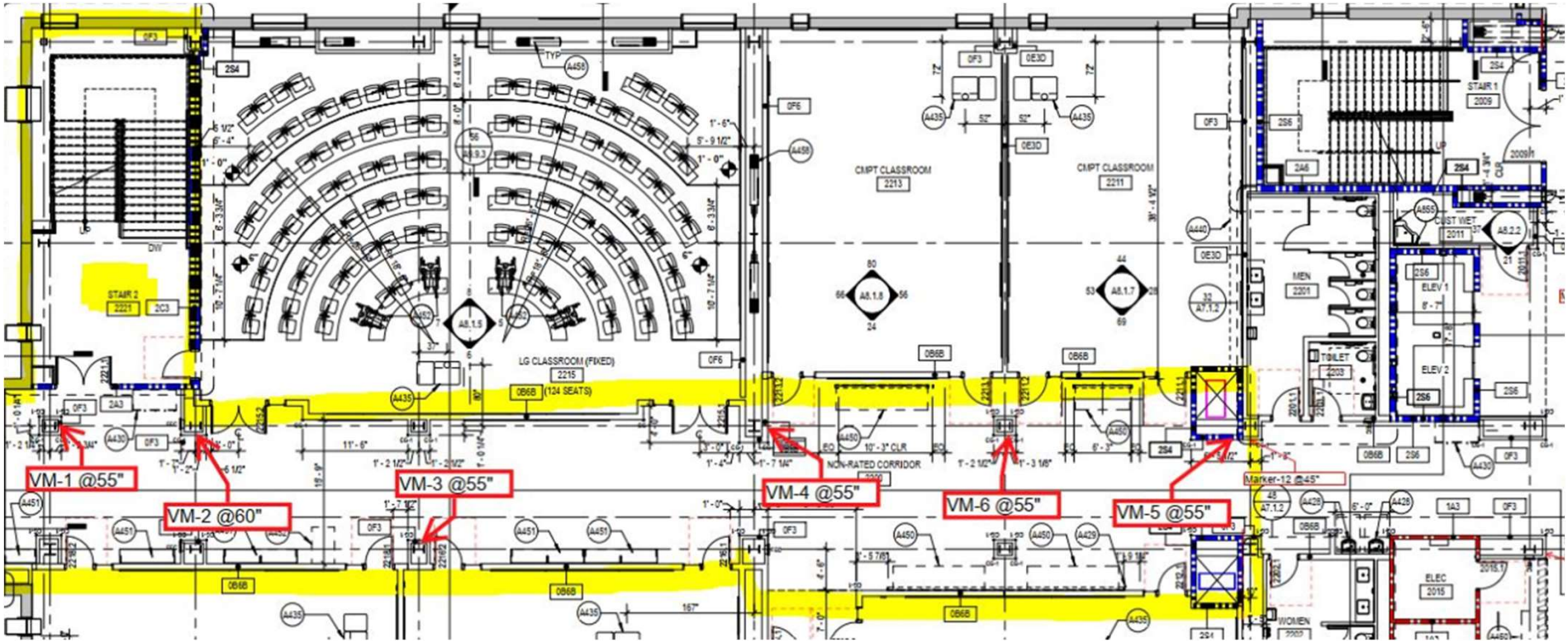
UCD TLC ESTIMATING ANALYSIS AR LAB



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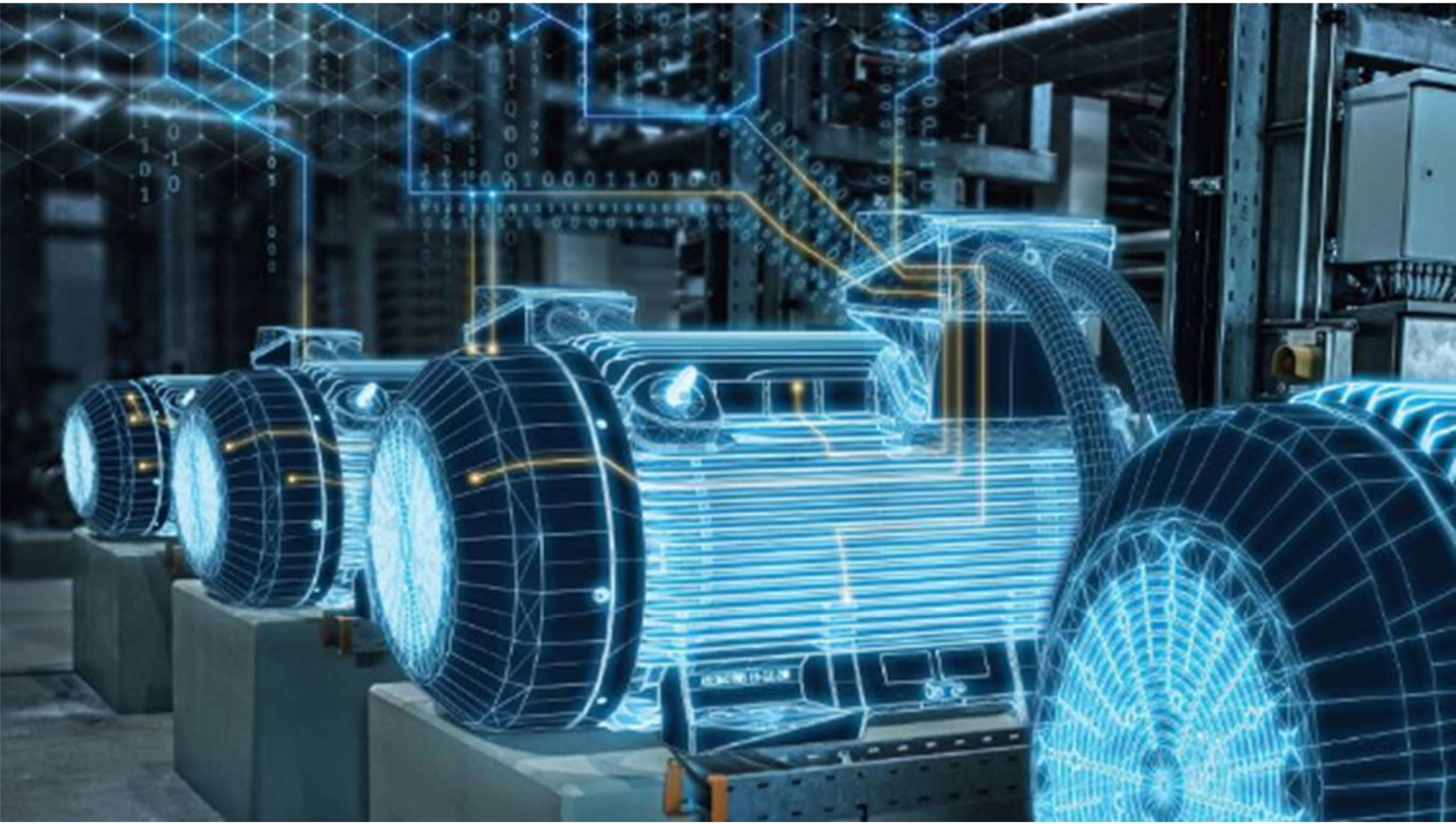

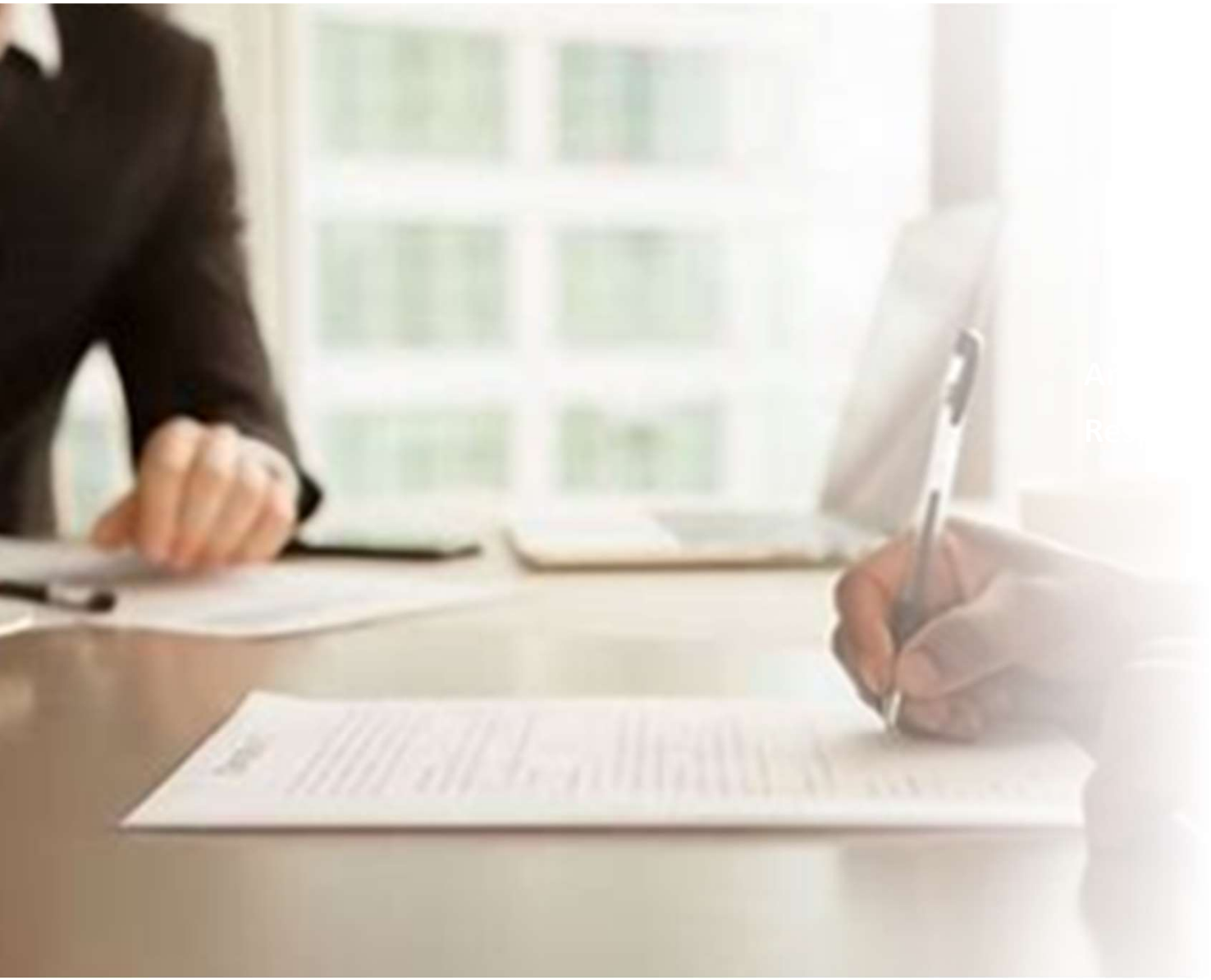

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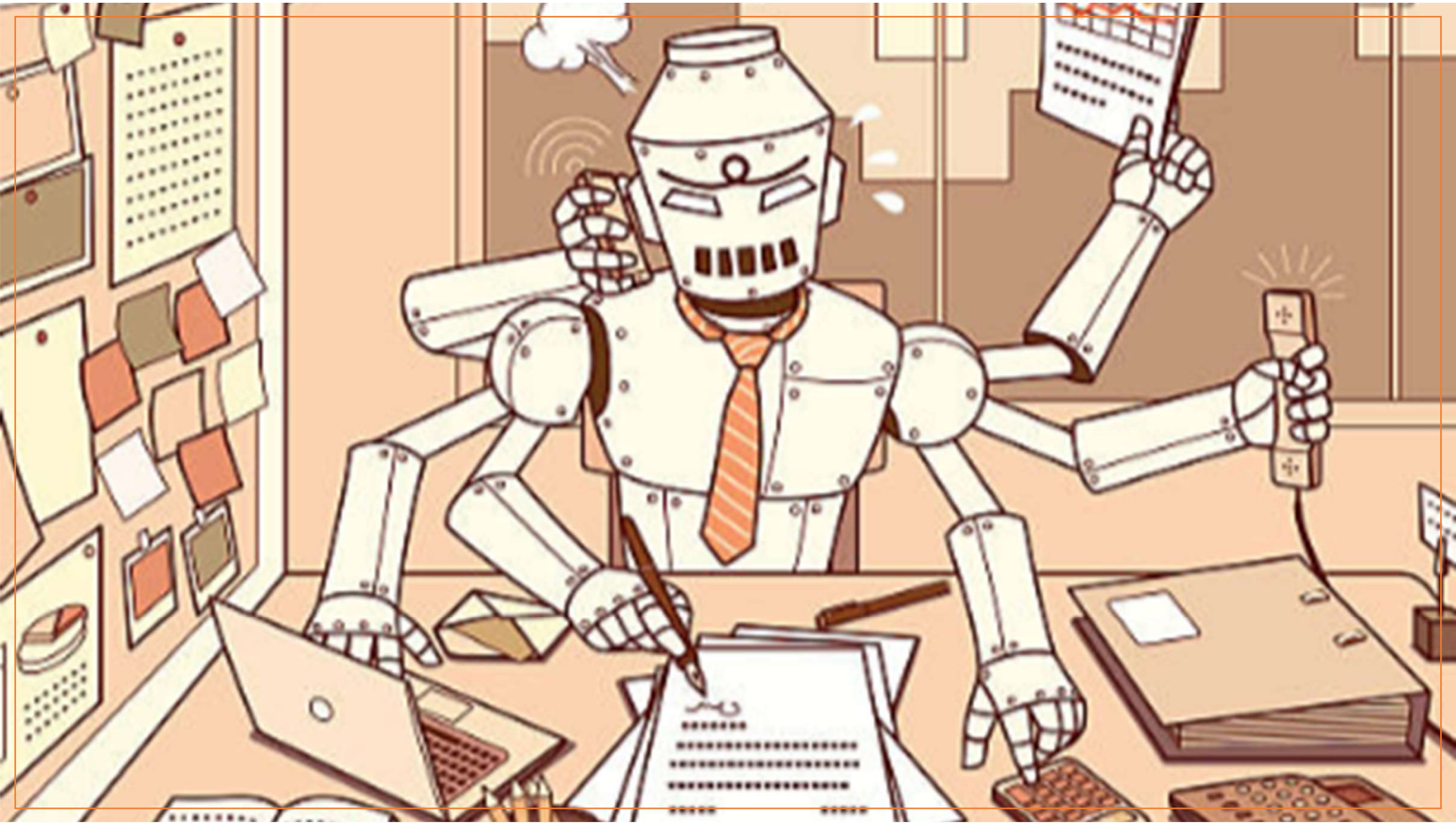
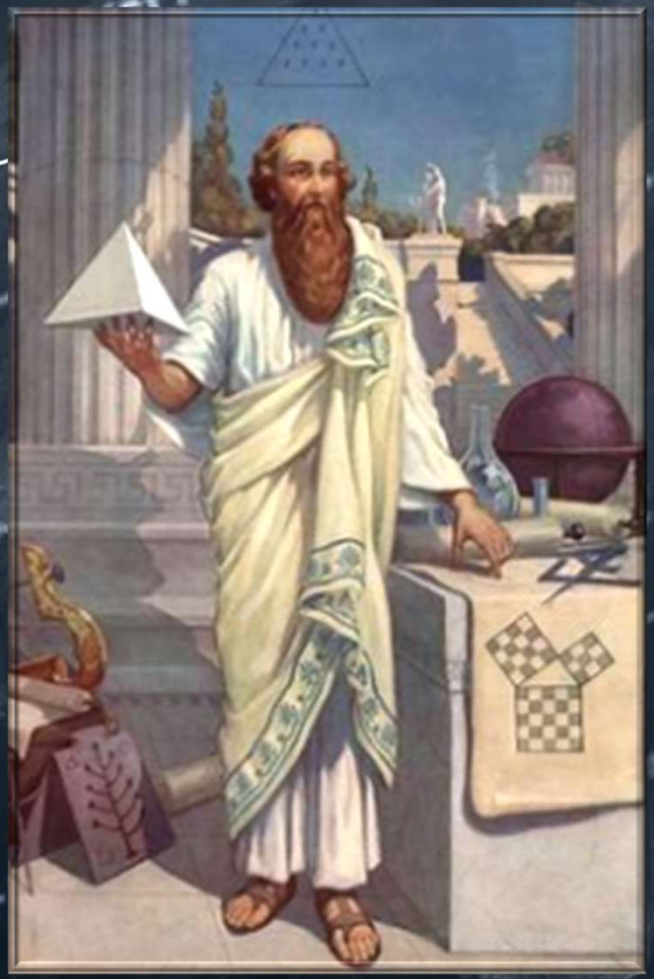



Behavioral Analysis



Pythagorean tuning

22 languages

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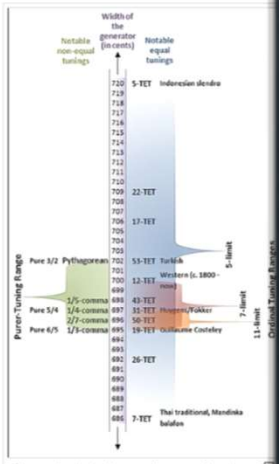
From Wikipedia, the free encyclopedia

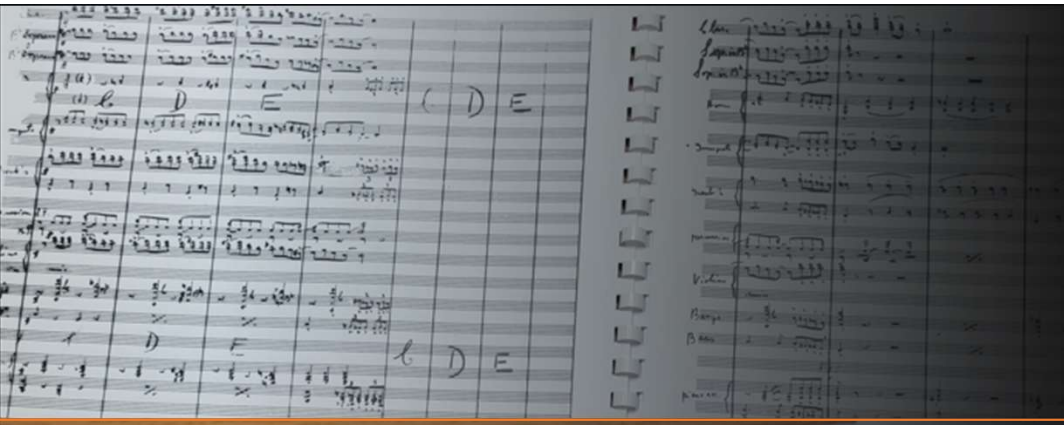
Pythagorean tuning is a system of musical tuning in which the frequency ratios of all intervals are based on the ratio 3:2.[2] This ratio, also known as the "pure" perfect fifth, is chosen because it is one of the most consonant and easiest to tune by ear and because of importance attributed to the integer 3. As Novalis put it, "The musical proportions seem to me to be particularly correct natural proportions."[3] Alternatively, it can be described as the tuning of the syntonic temperament[1] in which the generator is the ratio 3:2 (i.e., the untempered perfect fifth), which is ≈ 702 cents wide.

The system dates to Ancient Mesopotamia;[4] see Music of Mesopotamia § Music theory. The system is named, and has been widely misattributed, to Ancient Greeks, notably Pythagoras (sixth century BC) by modern authors of music theory, while Ptolemy, and later Boethius, ascribed the division of the tetrachord by only two intervals, called "semitonium", "tonus", "tonus" in Latin (256:243 × 9:8 × 9:8), to Eratosthenes. The so-called "Pythagorean tuning" was used by musicians up to the beginning of the 16th century. "The Pythagorean system would appear to be ideal because of the purity of the fifths, but some consider other intervals, particularly the major third, to be so badly out of tune that major chords [may be considered] a dissonance."[2]

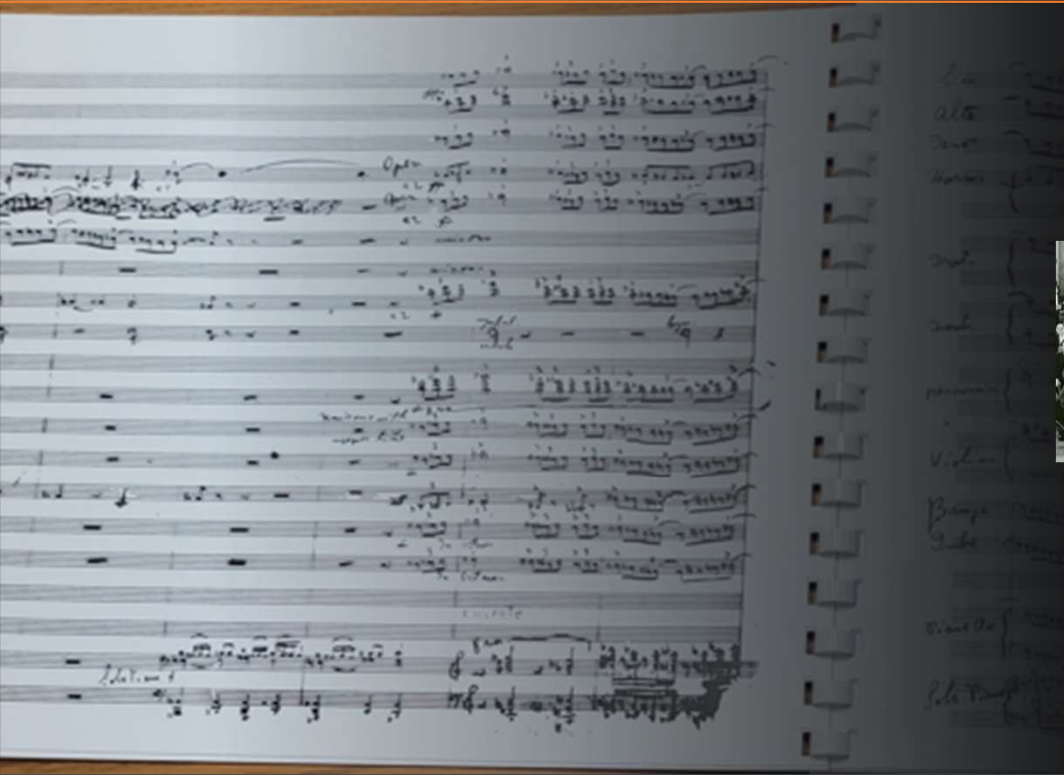
The **Pythagorean scale** is any scale which can be constructed from only pure perfect fifths (3:2) and octaves (2:1).[5] In Greek music it was used to tune tetrachords, which were composed into scales spanning an octave.[6] A distinction can be made between extended Pythagorean tuning and a 12-tone Pythagorean temperament. Extended Pythagorean tuning corresponds 1-on-1 with western music notation and there is no limit to the number of fifths. In 12-tone Pythagorean temperament however one is limited by 12-tones per



The syntonic tuning continuum, showing Pythagorean tuning at 702 cents [1]



- An American In Paris
- George Gershwin
- 1928

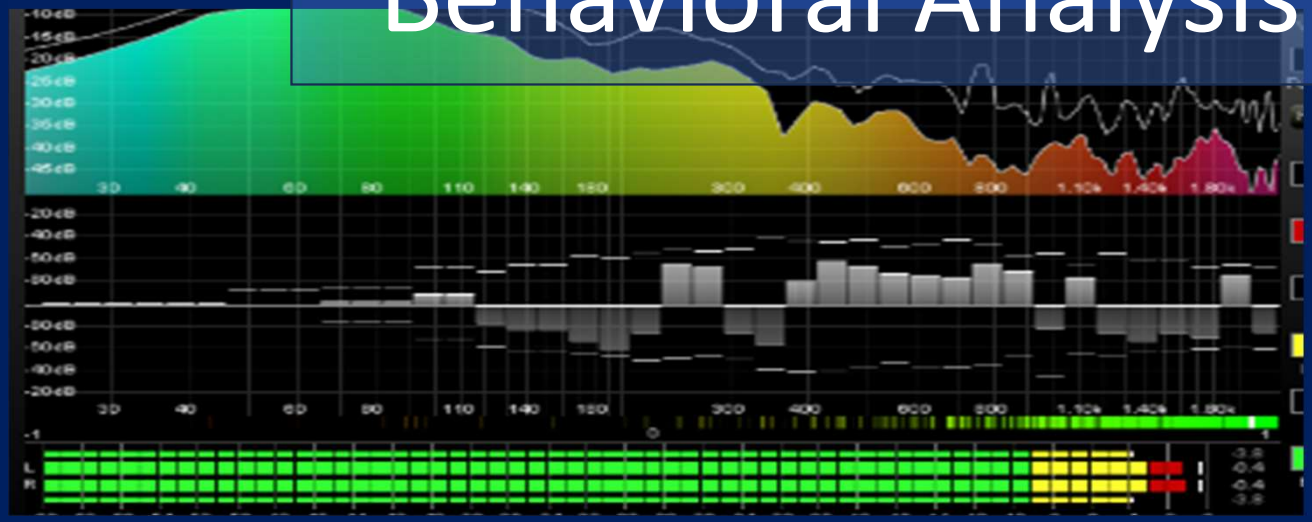


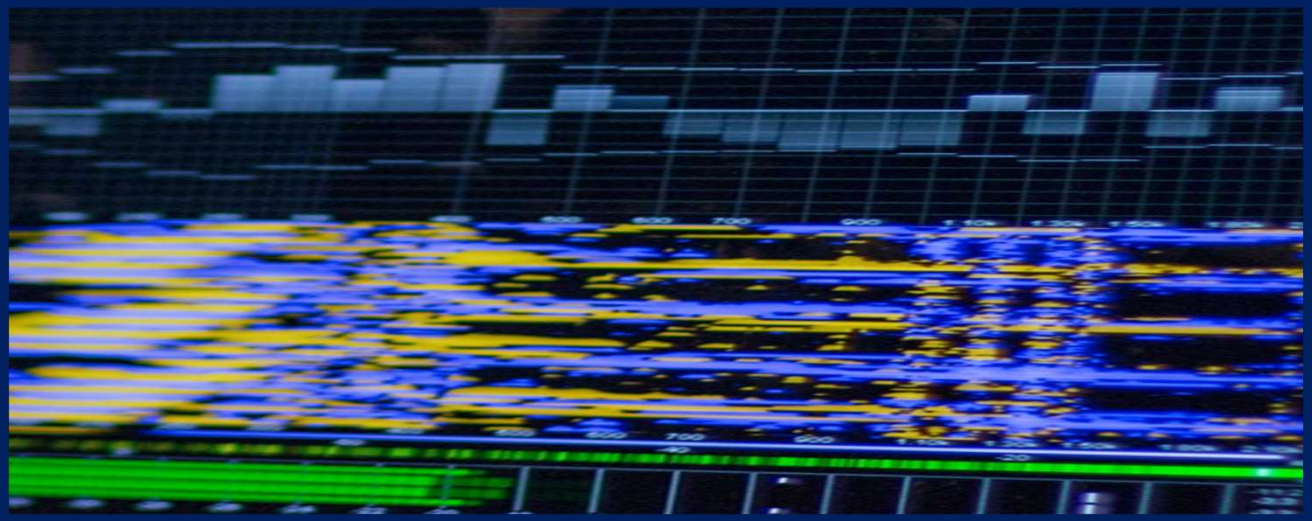
New York Philharmonic

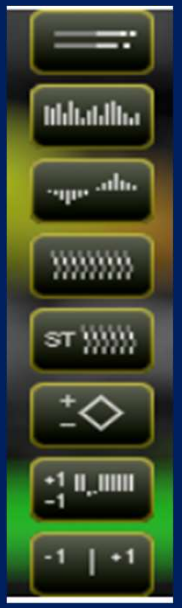
1928

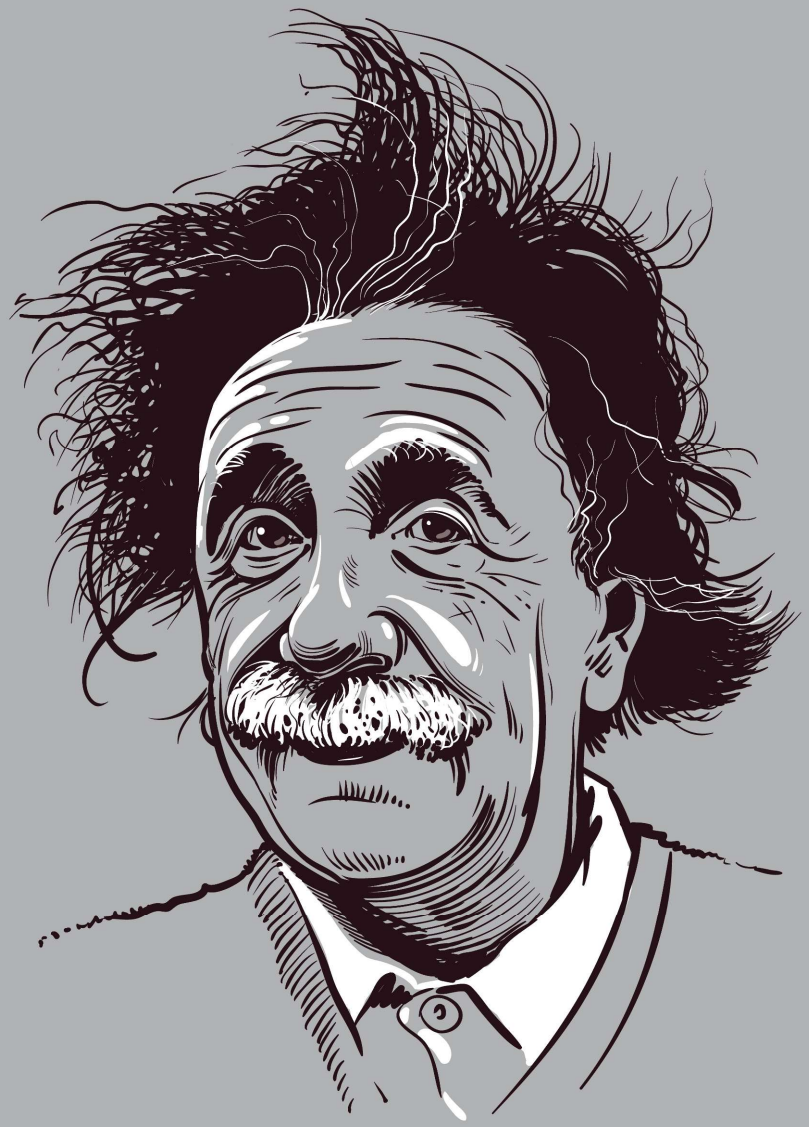
1959

Behavioral Analysis









"Not everything that counts can be counted, and not everything that can be counted counts."

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THANK YOU
Questions
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