HOW FAST IS TOO FAST?
presenters

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Principal, AIA, DBIA, LEED-AP BD+C, AC Martin

Albert Valdivia
Project Executive Clark Construction
agenda

• Project Introduction
• Delivery & Selection
• Tools for Speed
• Challenges of Speed
• Enemy of Speed
project goals

- Enhance the historic campus
- STEM courtyard for all the Sciences
- Flexible labs for research
- Teaching labs that anticipate the future
- Future Proof building systems
- Building that encourages collaboration
project description

- 90,000 GSF
- $50m construction costs
- $90m project costs
- Program:
  - Teaching labs
  - Research labs
  - PI offices
  - GS offices
  - Collaboration Spaces
  - Maker Space
  - Clean Room
  - MRI Suite
  - Café
SDSU Engineering & Interdisciplinary Complex
President Hirshman gave our Team 3 years

- $90 million Project Costs
- 50,000 ASF project size
- Move-in January 2018
- 3 Colleges
- STEM Showcase
California State University
delivery options
## Characteristics of each delivery method

<table>
<thead>
<tr>
<th></th>
<th><strong>CM @ RISK</strong></th>
<th><strong>DESIGN/BUILD Competition</strong></th>
<th><strong>(progressive) COLLABORATIVE DESIGN/BUILD</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Budget/GMP</strong></td>
<td>Budget ROM set after Design Phases with contingencies for change</td>
<td>Budget fixed &amp; set before design competition begins</td>
<td>Progressive GMP, budget fixed after DD</td>
</tr>
<tr>
<td><strong>Pre-work</strong></td>
<td>Conceptual program required to start design</td>
<td>Detailed program &amp; RFP completed PRIOR to competition</td>
<td>Design exploration in Program verification and Schematic Design</td>
</tr>
<tr>
<td><strong>Schedule</strong></td>
<td>Longer schedule due to less pre-work</td>
<td>Shorter schedule if pre-work is complete</td>
<td><strong>Shortest schedule</strong></td>
</tr>
<tr>
<td><strong>Design Control</strong></td>
<td>Allows maximum design control by owner, lots of time in design process</td>
<td>Allows the least design control by owner</td>
<td>Allows design control up front by owner</td>
</tr>
<tr>
<td><strong>O/A/C Team Communication</strong></td>
<td>Allows the most design communication between O/A/C</td>
<td>Allows the least design communication between O/A/C</td>
<td>Allows design communication from programming thru start of construction</td>
</tr>
<tr>
<td><strong>Building User Communication w/Design team</strong></td>
<td>Allows dialogue with building users, builder and design team</td>
<td>Allows the least dialogue with building users, builder and design team</td>
<td>Allows dialogue up front with users campus stakeholders and design team</td>
</tr>
<tr>
<td><strong>Changes</strong></td>
<td>Changes negotiated incrementally throughout design and construction phases</td>
<td>All changes after RFP are Change Orders</td>
<td>Early changes may be absorbed/traded, later changes in construction are Change Orders</td>
</tr>
<tr>
<td><strong>Risk</strong></td>
<td>Partnered approach controlling risk/costs O/A/C in open dialogue</td>
<td>Designed locked early, at award, responsibility for changes are the owners</td>
<td><strong>Flexibility in SD’s &amp; DD’s. Design locked down after DD, later changes are owners risk</strong></td>
</tr>
</tbody>
</table>
Evolution of CSU “Design Collaboration”
Selected Clark/ACM Oct 2015-Dec 2015
Project start Jan 20, 2015
Project Complete Dec 2017
Progressive GMP
selection process

- RFQ
- Shortlist to 5 teams
- RFP
- 2 Proprietary meetings
- Final Presentation
- Selection - tech, interview & fees
tools for speed

- Plan, plan, plan
- Visual schedules
- Use tools for timely decisions
- STRONG building committee
- VP level decisions and support
- Train your Team
Pull Planning with the D/B team right after the selection, scheduling all of our meetings with the D/B Team, consultants, agency reviews, campus facilities, user groups, vendor input.
Decision Schedule

Schematic Design #2 - March 10/11th

Arch:
- Site positioning/site constraints, site sections
- Location of building service / receiving
- Location of all elevator and stair cores
- Location of all exterior access points
- Major MEP equipment room positions
- Simple conceptual massing
- Program distribution

Lab:
- Decision on program distribution
- Location and adjacencies for all Teaching Labs approved
- Location of each of the Centers and confirmation of arrangement of labs and rooms in each cluster
- Decision on separate or combined fabrication shops for Entrepreneurial Center and Creative Design Center
- Location of PI offices and student work stations relative to research lab space
- Ratio of each type of research lab
- Density and location of fixed support rooms within research areas.
- Fume Hood density: Floor by Floor, wing by wing
- Issue equipment lists for each lab space for users to fill out

Landscape:
- Discuss exterior program/use opportunities
<table>
<thead>
<tr>
<th></th>
<th>Research 17.0 PI's</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Centers</td>
<td>3.0</td>
<td>3.4</td>
<td>3.4</td>
<td>3.4</td>
<td>3.4</td>
<td>3.4</td>
</tr>
<tr>
<td>Total</td>
<td>20.0 PI's</td>
<td>20.4 PI's</td>
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Overly Aggressive Ratio

<table>
<thead>
<tr>
<th>GSF</th>
<th>Delta GSF</th>
<th>87.616</th>
<th>1.568</th>
</tr>
</thead>
<tbody>
<tr>
<td>87.616</td>
<td>Delta GSF</td>
<td>101.360</td>
<td>13764</td>
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<tr>
<td>73.788</td>
<td>Delta GSF</td>
<td>80.843</td>
<td>76773</td>
</tr>
<tr>
<td>81.545</td>
<td>Delta GSF</td>
<td>82.318</td>
<td>75289</td>
</tr>
</tbody>
</table>

Interdisciplinary Science Building
Clark Construction
San Diego State University
Research Facilities Design
Managing design consultants

- *Clear communication*
- *Homework with deadlines*
- *Encouraging “best guess based on experience”*

1. **Take the 3 options for heating/cooling the bedrooms** and elaborate with LCC information and pros and cons. For each option define, size, location, make-up air options, cost magnitude and other factors that will help SDSU make a GOOD decision
   - FCU
   - Chill Beam
   - Valance
   - Other

2. **For equipment listed below provide**: size, type, site position and required clearances
   - Emergency Generator
   - Transformers and switches
   - Fire Booster Pump
   - Sewer pump
   - Other large exterior equipment required
   - Roof top make-up air units
   - Bathroom exhaust fans and shafts
   - Stair pressurization fans
   - Other required roof top equipment
bring D/B subs on early

- 2 steps - RFQ, RFP
- Program and 50% SD drawings
- overlap design engineers and D/B subs
- Involve team in selection
- Maintain appropriate contingencies
RFP scoring for d/b subs

Project Approach
- Staffing plan
- Availability
- Design Management
- Project Challenges
- Delay mitigation
- Schedule

Project Team,
- narrative &
- staff experience

VE ideas
- Creativity
- Feasibility

Interview
- Estimate Review
- Project Approach
- Unique qualifications
challenges of speed

• Being inclusive
• Designing w/o users
• Chemical quantities
• SDSU – vacating existing buildings
• Preparing temp spaces
inclusive process

- Use town hall meetings
- President & VP level decisions
- Build campus support for the big ideas
- Involve the Development team
designing without users

1. Large group (20+) discussion, “areas of study” in Energy research

2. Medium group (10-15) discussion about the future of Energy research

3. Medium group (8-10) discussion looking at lab layout precedents and partnerships with other disciplines

...a process of listening, finding strengths and intersections for collaboration
Designing with out users

- Don’t over-customize
- How would 7/10 PI’s use this space?
- Trust your team’s experience
- Benchmark peer institutions
- Don’t over think the small stuff
ENGINEERING RESEARCH BUILDINGS

- STRUCTURES & MATERIALS ENGINEERING BLDG
  University of California, San Diego
  Concrete Frame/Shear Wall
  Floor to Floor Heights: Level 1: 7' - 7''
  Level 2: R: 7' - 7''

- PHYSICS & NANOTECHNOLOGY BUILDING
  University of Minnesota
  Concrete Frame/Shear Wall
  Floor to Floor Heights: Level 1: 16' - 0''
  Level 2: R: 16' - 0''

- Sandler Neurosciences Center 19A
  University of California, San Francisco
  Concrete Frame/Shear Wall
  Floor to Floor Heights: Level 1: 7' - 7''
  Level 2: R: 7' - 7''

- HEALTH SCIENCE BIOMED RESEARCH BLDG 2
  University of California, San Diego
  Concrete Frame/Shear Wall
  Floor to Floor Heights: Level B: 21' - 0''
  Level 1: R: 17' - 0''

- MATERIALS SCIENCE & ENGINEERING BLDG
  University of California, Riverside
  Concrete Frame/Shear Wall
  Floor to Floor Heights: Level 1: 20' - 0''
  Level 2: R: 15' - 4''

- CLEAN TECHNOLOGY LABORATORY BLDG
  Washington State University
  Concrete Frame/Shear Wall
  Floor to Floor Heights: Level 1: 16' - 0''
  Level 2: R: 16' - 0''

- SCIENCE & ENGINEERING BUILDING 2
  University of California, Merced
  Steel Frame/Braced Frame
  Floor to Floor Heights: Level B: 18' - 0''
  Level 1: R: 15' - 0''

- ENGINEERING VI PHASE I
  University of California, Los Angeles
  Concrete Frame/Shear Wall
  Floor to Floor Heights: Level B: 18' - 0''
  Level 2: R: 15' - 6''

- ENGINEERING RESEARCH BUILDING
  University of Texas, Arlington
  Concrete Frame/Shear Wall
  Floor to Floor Heights: Level 1: 16' - 0''
  Level 2: R: 16' - 0''

- INTERDISCIPLINARY SCI & ENGINEERING BLDG
  University of Delaware
  Concrete Frame/Shear Wall
  Floor to Floor Heights: Level 1: 16' - 0''
  Level 2: R: 16' - 0''
MRI Suite—Shell or build out?
• Future PI
• Vibration sensitive
• Magnetic fields
• Large moving objects
• Elec rooms/Elev

Materials Imaging
Shell or build out?
• Future PI
• Vibration sensitive
• Unknown equipment
“Dr. Marty Sereno, a psychologist and cognitive neuroscientist is a pioneering figure in the world of functional MRI...his successful recruitment provides SDSU with a wonderful opportunity to synergize research strengths in the cognitive neurosciences...”

Steve Welter VP of Research @ SDSU
“Swing Space”

- EIS demolition displaced 35 faculty
- $6m budget for “Swing Space”
- 8 months to plan, design, bid, build and move into space for 35 people
- 12 different construction projects
  - Built a new building
  - Heavy renovation in 9 buildings
  - Went over budget by $1million
- **Lessons Learned:**
  - Make the move decisions earlier
  - Start planning earlier
  - Budget with more contingency
enemy of speed

- Academics
- CSU Peer Reviewers
  - Mechanical
  - Seismic
  - Design Engineer
- Independent Plan-check
- Health Department
- DSA
- Local Fire
- State Fire Marshall
Peer Reviewers – are not built for speed

*Things to consider*

- Share your overall schedule w/each reviewer
- Consider number of bid packages carefully
- Possibility and cost of “in-person” reviews
- Enlist University support w/reviewers
- Consider the plus/delta of new/unfamiliar systems
State Fire Marshall – is not built for speed

How to plan

• Review SFM process with your teams during selection
• Code consultant required, budget for this
• Schedule meetings w/SFM upfront & regular
• Consider number of packages carefully
• Consider the plus/delta of new systems
State Fire Marshal – is not built for speed

*What to do when reviews are moving too slow*

- SFM can change their minds
- Do not escalate, solve at the team level
- Stay calm & negotiate
- Keep the BIG PICTURE of schedule in mind
- Maintain appropriate contingencies, it will cost $$$
What did we lose -
What did we gain -
with SPEED?
<table>
<thead>
<tr>
<th>CM @ Risk 5 Years</th>
<th>D/B Collaboration 3 years</th>
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<tbody>
<tr>
<td><strong>+</strong></td>
<td><strong>+</strong></td>
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<tr>
<td>Aligns with CSU procedures</td>
<td>Escalation savings</td>
</tr>
<tr>
<td>Lots of time for SFM</td>
<td>Quick results, happy donors</td>
</tr>
<tr>
<td>Academics like more time</td>
<td>Users see immediate progress</td>
</tr>
<tr>
<td></td>
<td>Subs on-board early</td>
</tr>
<tr>
<td></td>
<td>Progressive GMP allowed changes</td>
</tr>
<tr>
<td></td>
<td>D/B team energy remains high</td>
</tr>
<tr>
<td><strong>−</strong></td>
<td><strong>−</strong></td>
</tr>
<tr>
<td>Long drawn out process</td>
<td>CSU Peer Review is challenging</td>
</tr>
<tr>
<td>Bid after drawings are complete</td>
<td>SFM is NOT built for speed</td>
</tr>
<tr>
<td>Owner responsible for changes $</td>
<td></td>
</tr>
<tr>
<td>More time ✖ better decisions</td>
<td></td>
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</table>
New Project: $85m, Student Housing, 28.5 months
10 months Prop-CD’s, 20 months construction, 5 separate packages

What will we do differently? (Feb 2017)
- Less time on program options – SDSU knows what they want
- Starting with “Entire team” Pull Planning
- Programming /Schematic - single phase
- Selection of D/B subs earlier
- Info sharing for early packages NOW
- Homework for consultants
- Starting SFM package earlier
How were we able to improve our process?

Plus Delta what’s working? (May 2017)

- (−) Less time on program options – SDSU knows what they want
- (+++) Starting with “Entire team” Pull Planning
- (+/−) Programming /Schematic - single phase
- (-) Selection of D/B subs earlier
- (+++) Info sharing for early packages NOW
- (+) Homework for consultants
- (+++) Starting SFM package earlier
New Project: $85m, Student Housing, 28.5 months
10 months Prop-CD’s, 20 months construction, 5 separate packages

- **Soils:** Poor soils + tight site = $$$$  
  - **Soils -** More site investigation before issuing RFP

- **EIR:** EIR is concurrent with Design – RISK  
  - **EIR –** Best to complete prior to RFP

- **Utility connections:** Central Plant connection $\$, City water requires major upgrade $$$$  
  - **Utility connections:** Study utility options and connections prior to RFP to allocate the budget

- **Food Service:** Program was not well defined, changing, team behind on this element  
  - **Food Service:** Check-in with users before work with the D/B team to solidify direction

- **Modern to Mission Style:**  
  RFP Stage – Modern architectural style $$$$  
  Selection – Changed to Mission Style $$$$$  
  - **Modern to Mission Style:** Change in style slows D/B team, has major effects on the budget
Questions