



Committee on Land and Buildings

Land, Buildings and Real Estate

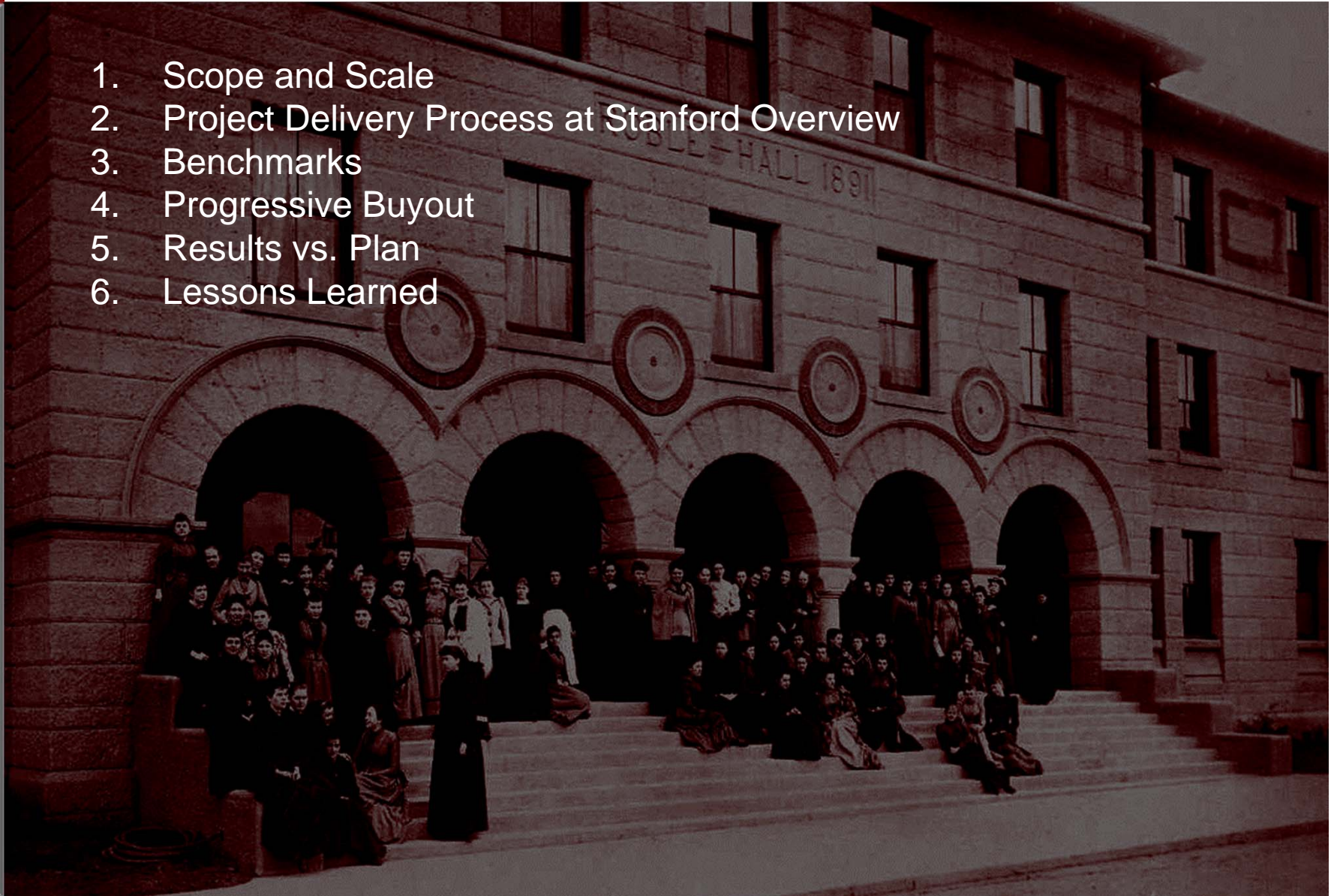
December 9, 2013



Project Delivery Process at Stanford

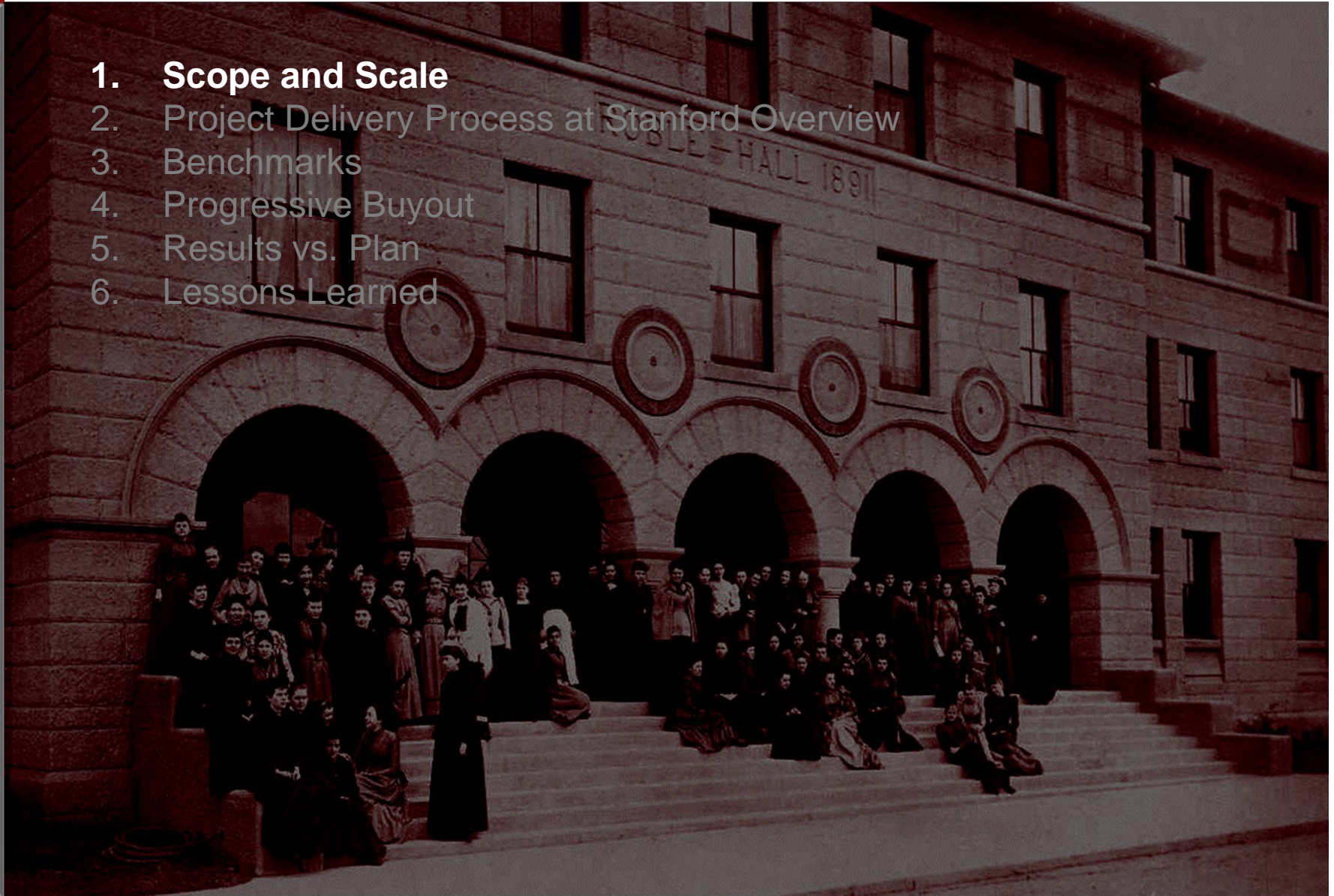
Agenda

1. Scope and Scale
2. Project Delivery Process at Stanford Overview
3. Benchmarks
4. Progressive Buyout
5. Results vs. Plan
6. Lessons Learned



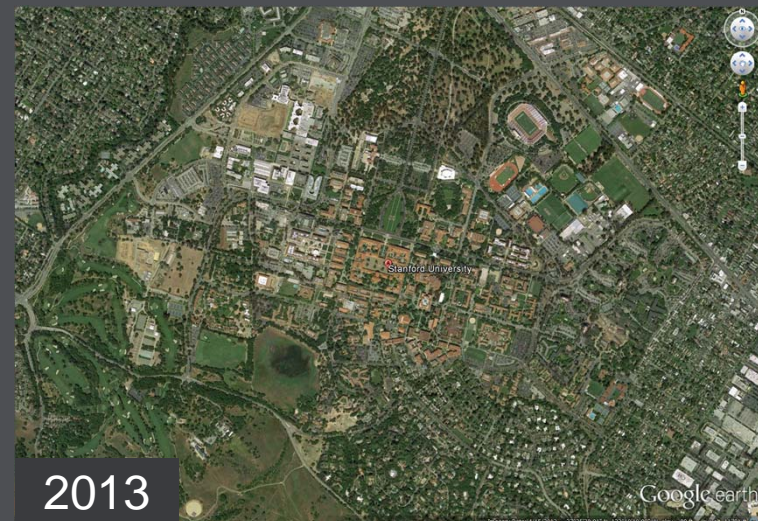
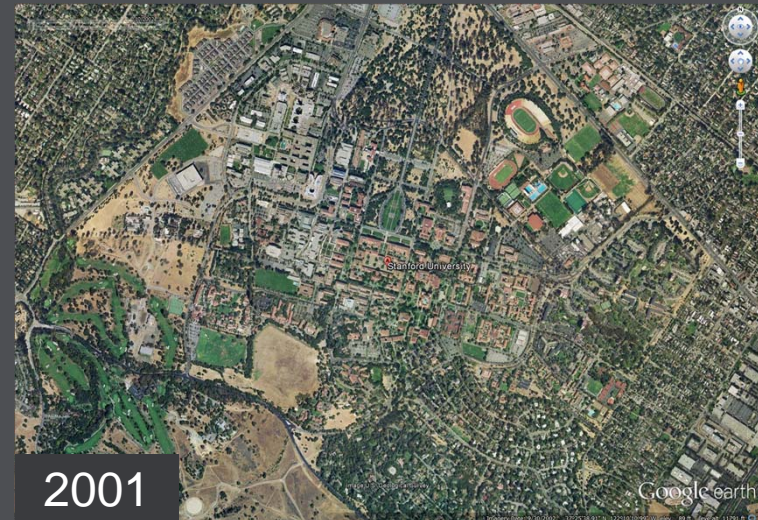
Agenda

1. **Scope and Scale**
2. Project Delivery Process at Stanford Overview
3. Benchmarks
4. Progressive Buyout
5. Results vs. Plan
6. Lessons Learned



Construction Metrics: 2001-2013

- 3M gsf new construction
- 1M gsf renovation
- 800K gsf demolished
- 500 projects
- 30+ projects over \$10M
- \$4.2B budget / \$4.0B actual
- \$500M in “avoided costs”
- Major projects completed 3.8% on average under budget
- One claim settled for \$300K



Internal Environment

Conditions

- Decentralized and diffuse decision making environment
- Matrix organization
- Burden on staff to “over” communicate
- Accountability and responsibility sometimes blurred
- Capital is sometimes perceived as limitless by support staff and end users
- Unique requirements
- “Wants” vs. “Needs”



Management

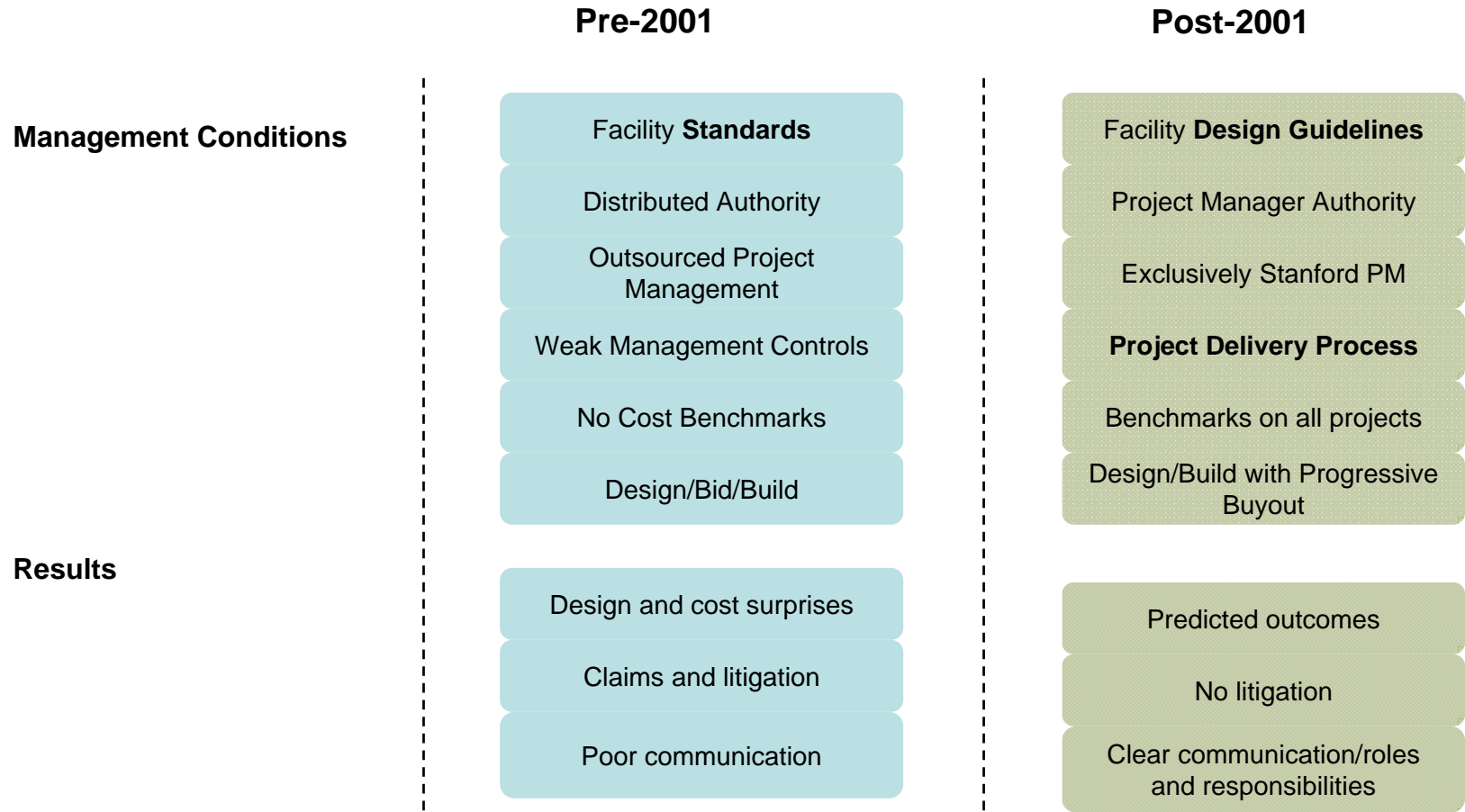
- Strong controls
- Management authority and accountability
- Discipline and Transparency
- Predict Outcomes
- A defined Project Delivery Process (PDP)

Agenda

1. Scope and Scale
- 2. Project Delivery Process at Stanford Overview**
3. Benchmarks
4. Progressive Buyout
5. Results vs. Plan
6. Lessons Learned

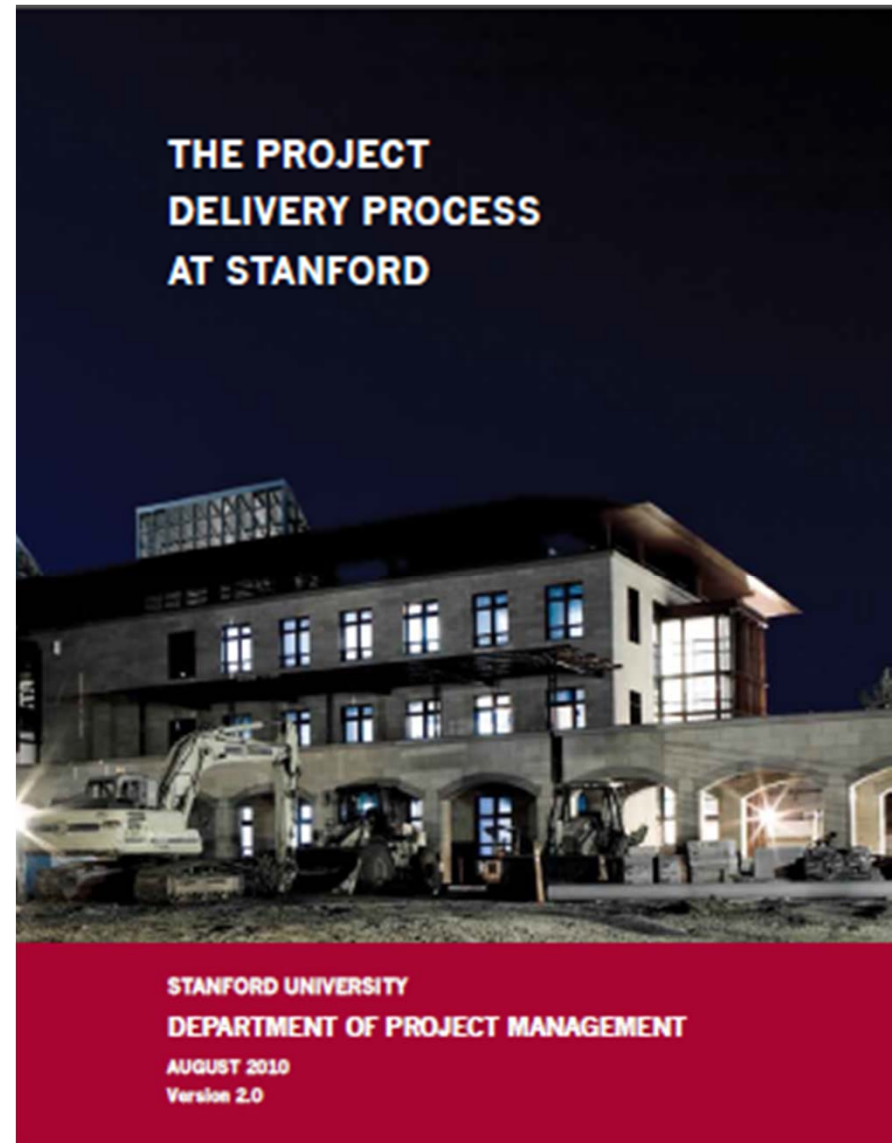


Capital Project Delivery Process

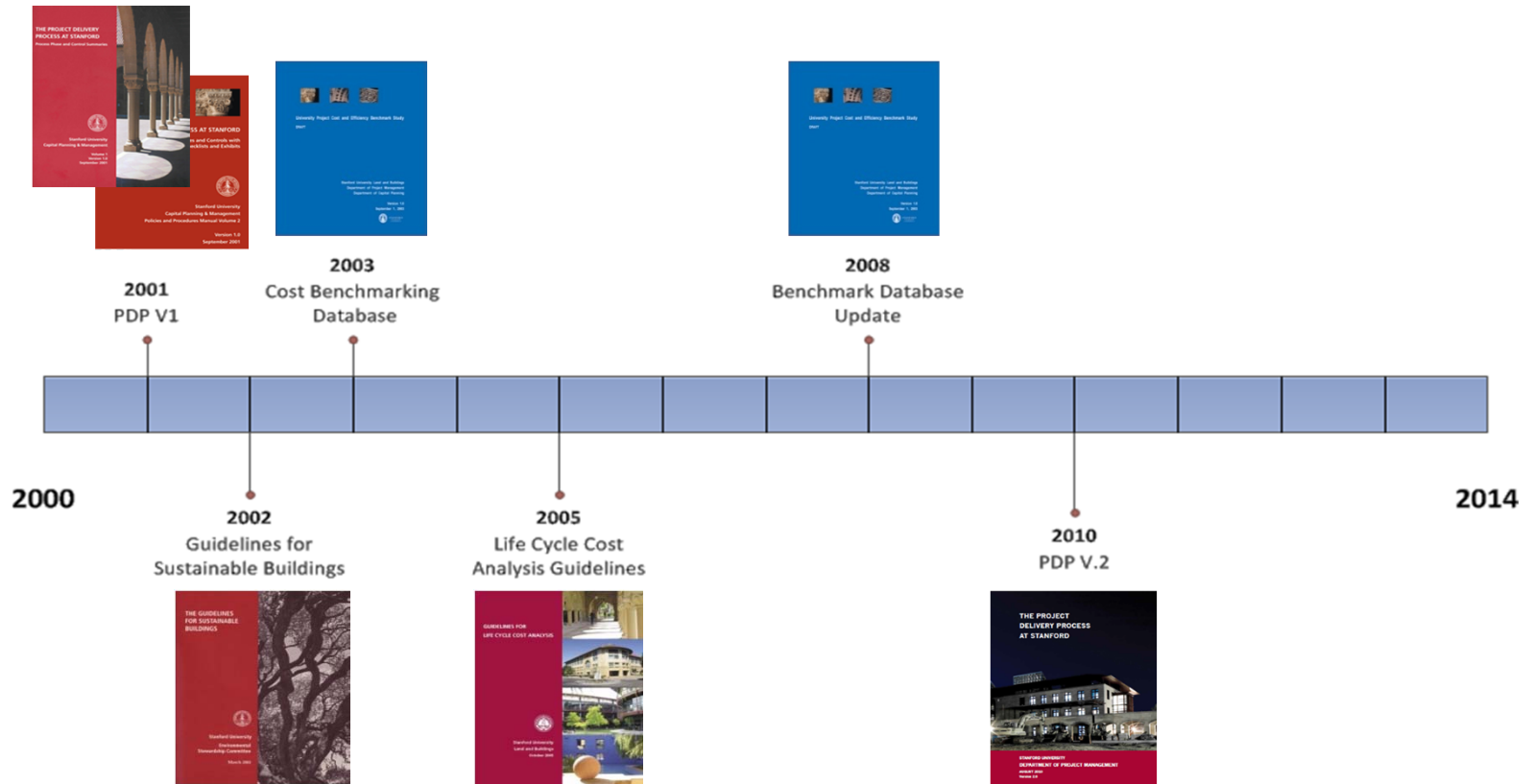


Core Principles

- Informed decisions
- Manage to desired outcome
- Find solutions
- Continuous improvement



Management Tools

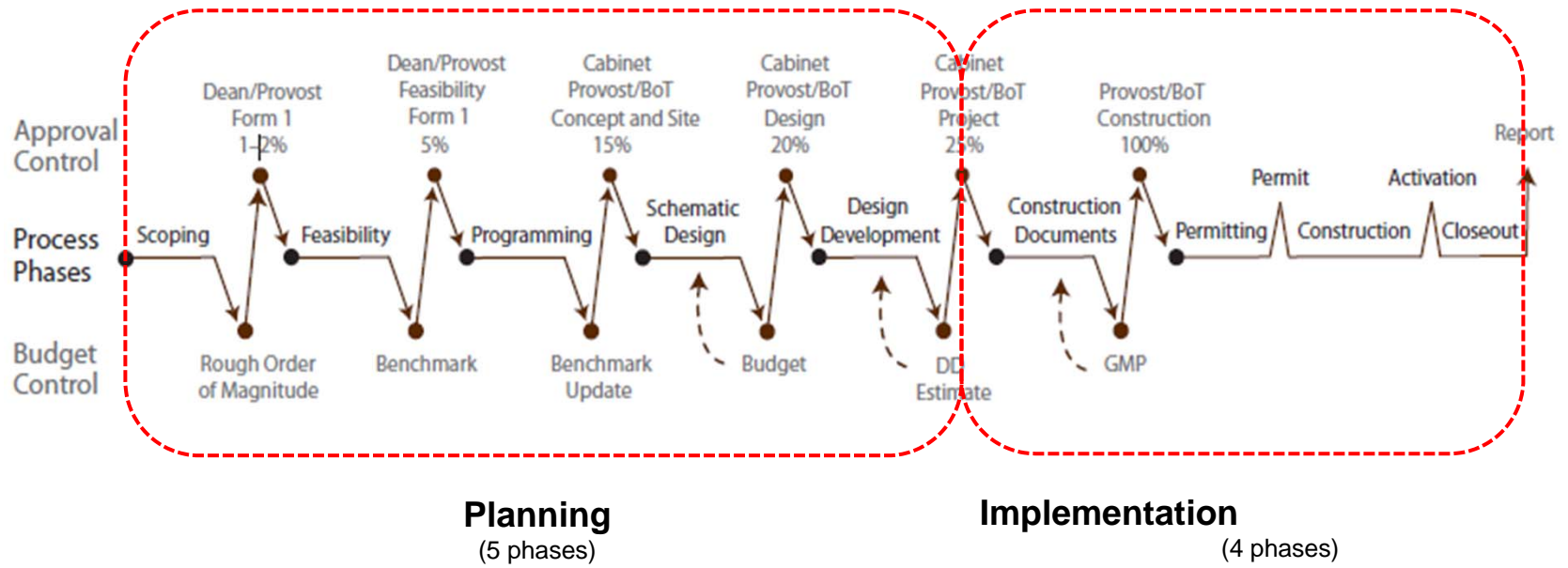


Additional Resources:

Space Guidelines
Facility Design Guidelines
Landscape Guidelines
Architectural Guidelines

Seismic Engineering Guidelines
Main Quad Guidelines
Maintenance Service Levels
Grounds Service Priorities

The "Heartbeat"



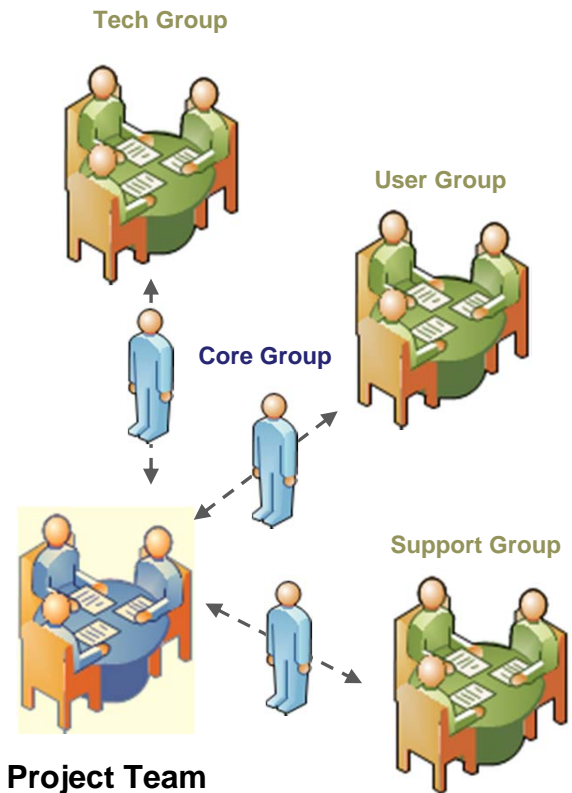
The Communicators

Pre-PDP



Project Team?

Post-PDP



Project Team

The Bull's-eye

PRIMARY COMMUNICATIONS



The Project Manager



Project Coordinator



Project Engineers



Quality Control/Assurance



Financial Analyst

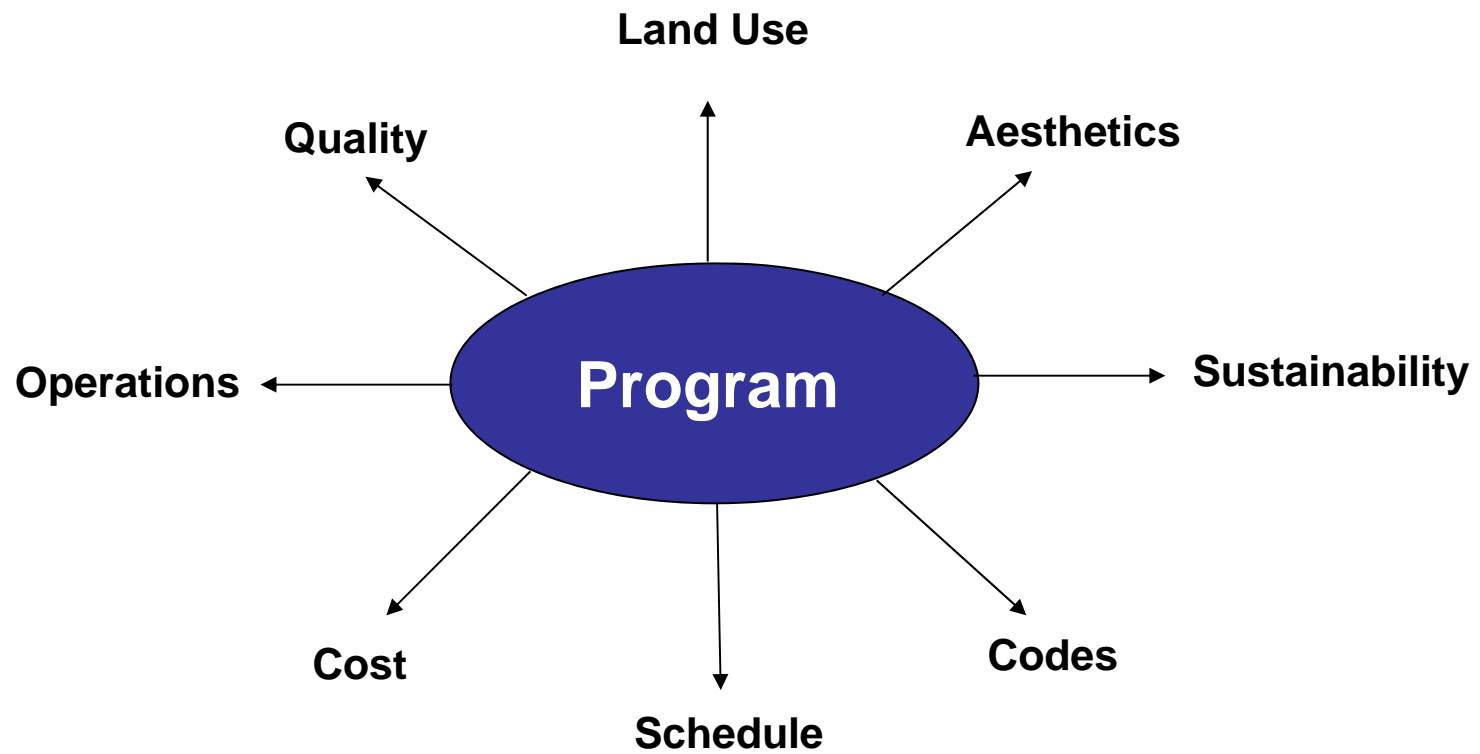


Stanford Experience: **12 - 15 years**

Projects: **10 - 12+**

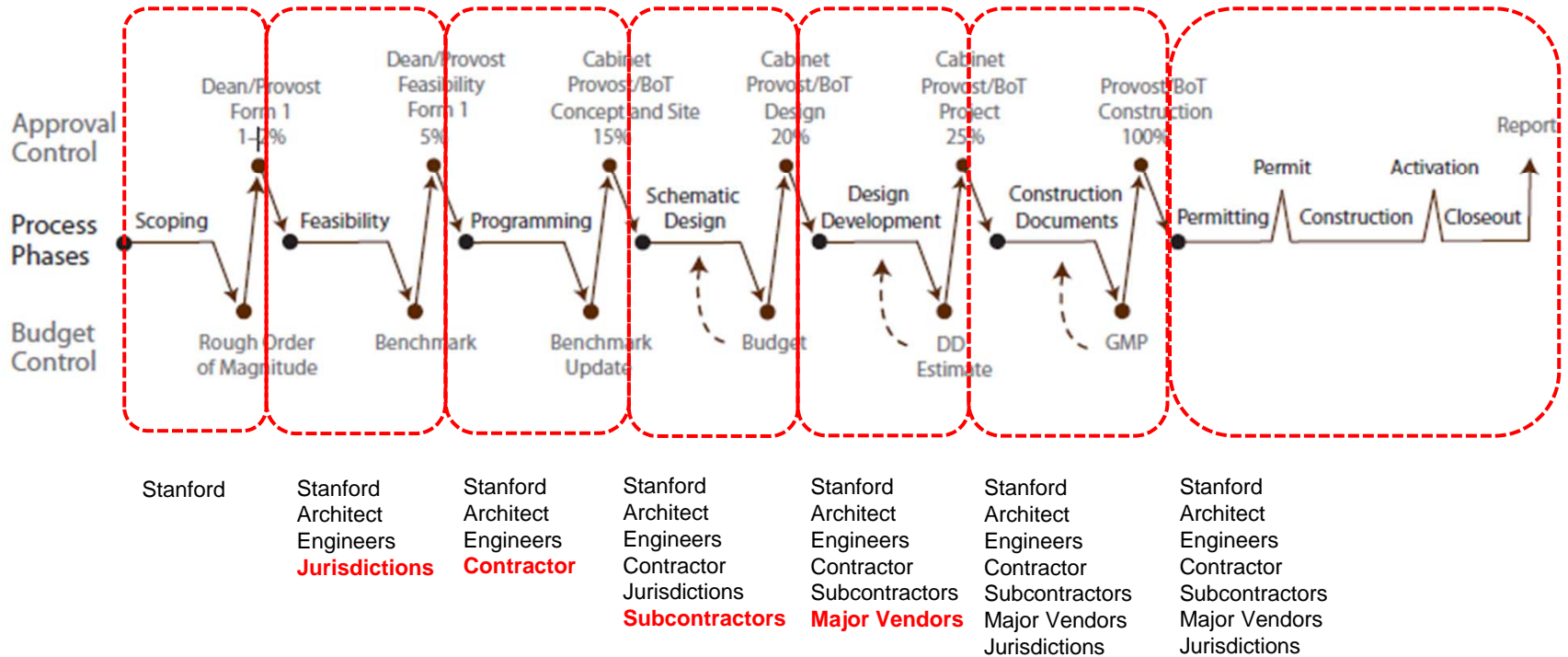
Portfolio Value: **\$100M - \$300M**

Competing Priorities



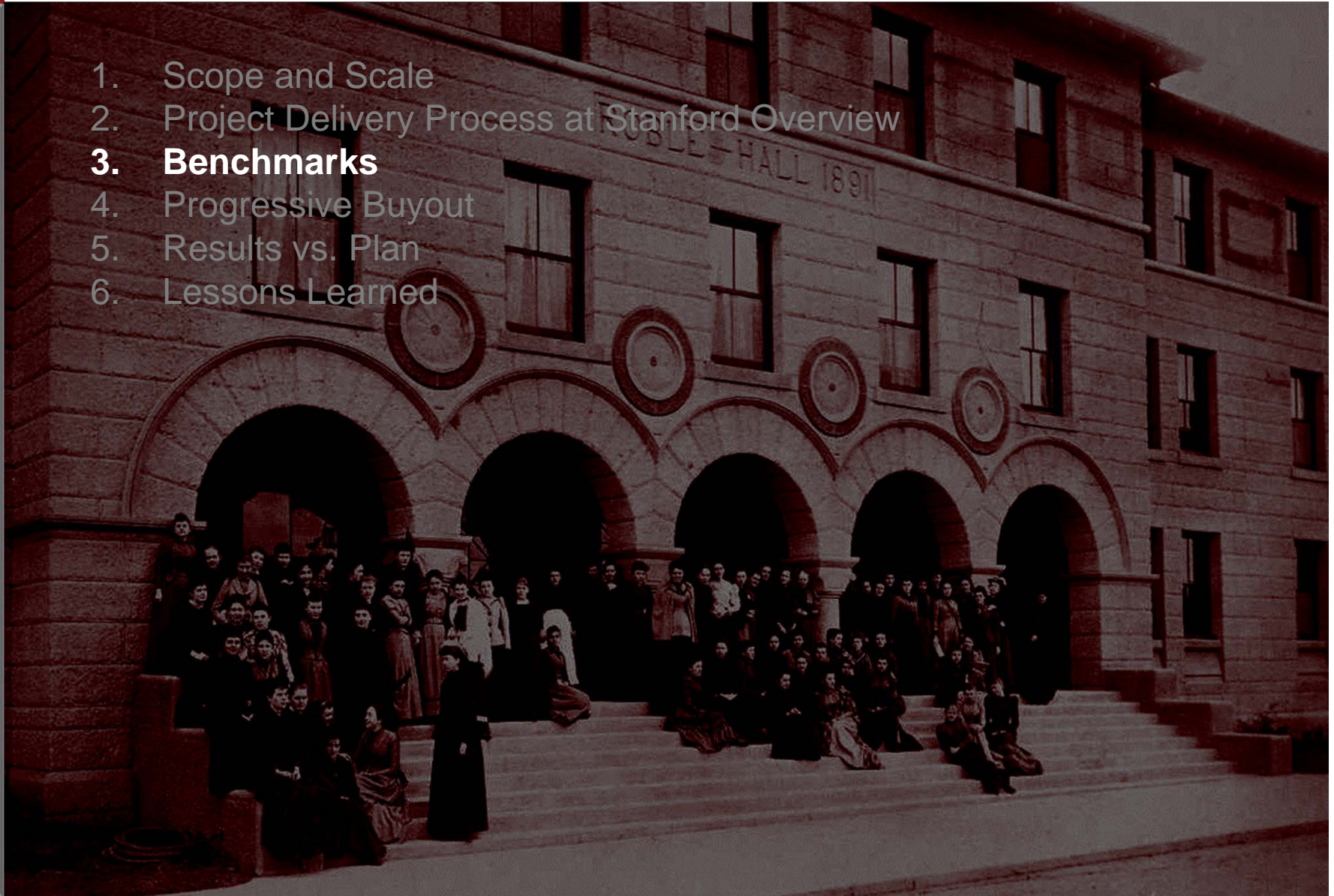
A Defined Process with an Integrated Team

PROJECT HEARTBEAT



Agenda

1. Scope and Scale
2. Project Delivery Process at Stanford Overview
- 3. Benchmarks**
4. Progressive Buyout
5. Results vs. Plan
6. Lessons Learned



Benchmark Cost Principles

- **Early planning tool** that helps predict desired costs
- **Based on the average cost** from a pool of similar building types (wet lab, dry lab and classroom)
- **Targets are deliberately aggressive** and require discipline and trade-offs if they are to be successfully achieved
- **LBRE provides choices** to schools, departments, administration and trustees for their consideration and trade-off of scope
- Future escalation is assumed at 3% per year **plus risk to escalation**
- Benchmarks are **adjusted each year** to account for actual escalation
- Budgets are set at **BOT Design Approval** (Schematic Design)

Benchmark Uses

- **Capital Plan**

- Early forecast
- Updated as projects progress

- **Target Budget**

- Average of normalized construction cost
- Initial design forecast
- Choices and trade-offs define budget

- **Comparables**

- Projects of similar scope and scale
- Normalized for time and location
- Peer institutions preferred

Benchmarks and the Capital Plan

FY2015 Capital Plan Benchmark Costs in \$/GSF (3% Projected Annual Escalation) November 18, 2013				
	FY2014 Benchmark		FY2015 Benchmark	
	Construction	Project	Construction	Project
Wet Laboratory				
New Construction	\$597	\$854	\$615	\$879
Renovation	\$516	\$738	\$532	\$760
Dry Laboratory				
New Construction	\$465	\$665	\$479	\$685
Renovation	\$318	\$455	\$328	\$469
Offices/Classrooms				
New Construction	\$476	\$681	\$491	\$702
Renovation	\$364	\$520	\$375	\$536
Undergraduate Housing				
New Construction	\$348	\$498	\$359	\$513
Renovation	\$371	\$531	\$383	\$547
Graduate Housing				
New Construction	\$332	\$475	\$342	\$489
Renovation	\$371	\$531	\$383	\$547
Performance Halls				
New Construction	\$792	\$1,132	\$816	\$1,166
Renovation	\$533	\$762	\$549	\$785
Libraries				
New Construction	\$455	\$650	\$468	\$670
Renovation	\$274	\$392	\$282	\$404
Modulars				
New Construction	\$216	\$309	\$222	\$318
Renovation	\$135	\$193	\$139	\$199
Childcare Center				
New Construction	\$354	\$506	\$364	\$521
Off-site Fit-outs (Office)				
Renovation	\$163	\$234	\$168	\$241
Demolitions	\$32	\$46	\$33	\$48

Notes: Per LBRE, FY15 benchmarks are FY14 costs escalated by 3%

- Average of building type pool is the benchmark
- 19 project types
- Updated annually
- Escalated 3%/year

Sample Benchmark Pool

FY14 Benchmarks
Wet Labs - New

School	Project Name	Completion Date
Princeton University	Frick Laboratory	Jul-10
University of California, San Francisco	Institute for Regenerative Medicine	Jan-11
Harvard University	Biological Research Infrastructure	Feb-05
University of California, Los Angeles	CNSI Court of Sciences Building	May-07
Princeton University	Neuroscience and Psychology Buildings	Apr-13
Princeton University	Icahn Laboratory	Feb-04
University of California, Berkeley	Li Ka-Shing Biomedical Research	Mar-10
University of California, San Francisco	Cardiovascular Research Institute	Jan-10
Harvard University	Laboratory for Interface Science & Engineering	May-06
University of California, Santa Cruz	Biomedical Research Facility	Nov-09
Stanford University	Lucas Center - 7T MRI and Cyclotron	Oct-04
University of Southern California	Broad CIRM Center for Regenerative Medicine and Stem Cell Research	Sep-10
Virginia Tech	Signature Engineering Building	Dec-12
Yale University	Chemistry Research Lab	Jul-05
University of Washington	Molecular Engineering Interdisciplinary Academic Building	Jul-12
University of California, San Francisco	Dillar Cancer Center	Jul-08
Stanford University	Lorry Lokey Stem Cell Building	Jun-10
University of California, Irvine	Irvine Biomedical Research Facility	Jul-09
Yale University	Yale Biology Building (YBB)	Jul-11
Virginia Tech	Life Sciences I	Apr-08
University of Chicago	Knapp Center for Biomedical Discovery	Jan-08
California Institute of Technology	Schlinger Laboratory for Chemistry and Chemical Engineering	Dec-09
University of Michigan	Biomedical Science Research Building	Nov-05
New York University	Biomedical Research Building	Oct-05
University of Washington	Bioengineering and Genome Sciences Bldg	Jan-06
University of Southern California	Harlyne J. Norris Research Tower	Aug-07
University of California, San Francisco	QB3 (Byers Hall)	Feb-05
Brown University	Life Sciences Building	Jan-06
University of Southern California	Tutor Hall	Dec-04
Duke University	French Family Science Center	Dec-06
University of Southern California	Ray Irani Hall	May-05
University of Arizona	Keating Bioresearch Building	Mar-07
Cornell University	Animal Health Diagnostic Center	Jul-10
University of California, Berkeley	Stanley Hall Replacement	Jan-06
University of California, Davis	Genome Biomedical Science Facility	Jul-04
Stanford University	Environment and Energy	Oct-07
San Francisco Bay Area Commercial	Lab # 10	Oct-04
Penn State University	Life Sciences Building	Jun-04
Florida State University	Basic Science Complex	Dec-05
Arizona State University	AZ Biodesign Institute Phase I	Aug-04
University of California, San Diego	Leichtag Family Foundation	Jan-04
Duke University	Fitzpatrick Center	Aug-04
University of Oregon	Biomedical Research Lab	Oct-05
Ohio State University	Biomedical Research Tower	Dec-06
University of Arizona	Medical Research Building	Jun-06
Iowa State University	Roy J. Carver Co-Laboratory	Aug-04
University of California, Santa Barbara	Life Sciences Technology Building	Aug-04
University of Chicago	Gordon Center for Integrative Science	Jun-05
University of Notre Dame	MDRB	Jan-13
University of Michigan	Cardiovascular Center - Phase I	Dec-06
University of California, San Diego	John and Rebecca Moores Cancer Center	Jul-04
Emory University	Rollins School of Public Health	Jul-10
University of Notre Dame	Jordan Hall of Science	May-06
Colorado College	Wet Laboratory / Classroom Building	Jul-04
Thomas Jefferson University	Academic Research Building	May-07
Purdue University	Birck Nanotechnology	Jul-05
University of Notre Dame	Raclin Carmichael Hall	Jun-05
Oregon State University	College of Veterinary Medicine Expansion	Jul-04
University of Notre Dame	Harper Hall	Jan-11

**\$597
Average**

- 150 universities
- 600 projects
- Construction costs only
- Normalized for time and location
- Trimmed pool, average determines benchmark
- 70% construction cost, 30% soft costs

\$597 x 1.43 = \$854

Average Construction Cost 70%/30% Split Grossing Factor Project Cost Benchmark

Stanford University

Saylor Index

Q3 2013

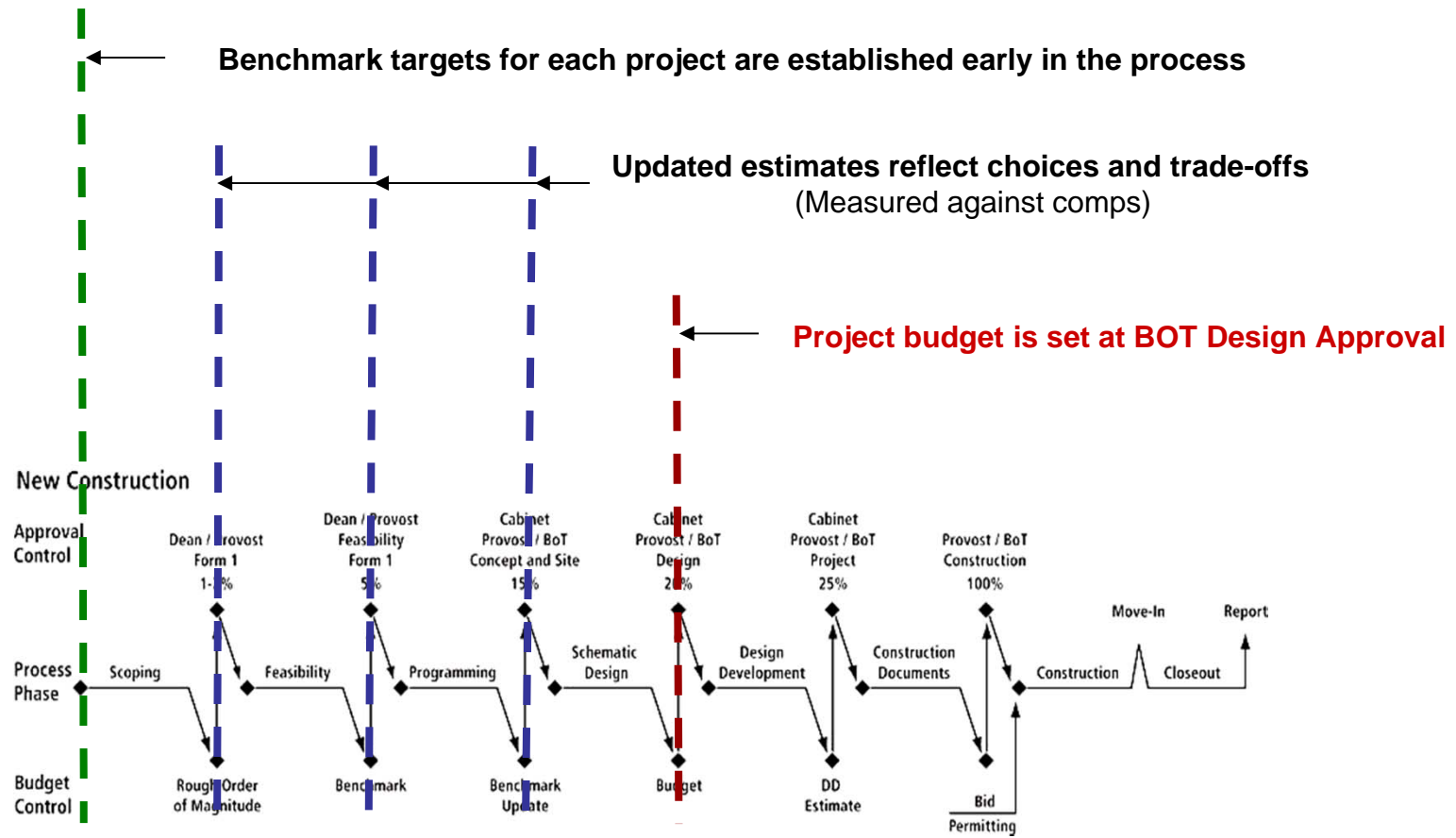
	Calendar Year									
Historical Escalation (1)	2004	2005	2006	2007	2008	2009	2010	2011	2012	3Q'13
Saylor Material/Labor Index (1967 base year index of 100)	685.7	724.9	769.5	790.2	816.1	824.7	836.5	870.0	880.2	889.6
Yearly Escalation (non-compounded; for reference only)	7.3%	5.7%	6.2%	2.7%	3.3%	1.1%	1.4%	4.0%	1.2%	1.1%
Cumulative Escalation (Compounded)	29.7%	22.7%	15.6%	12.6%	9.0%	7.9%	6.3%	2.2%	1.1%	0.0%

Project Budget Components Example

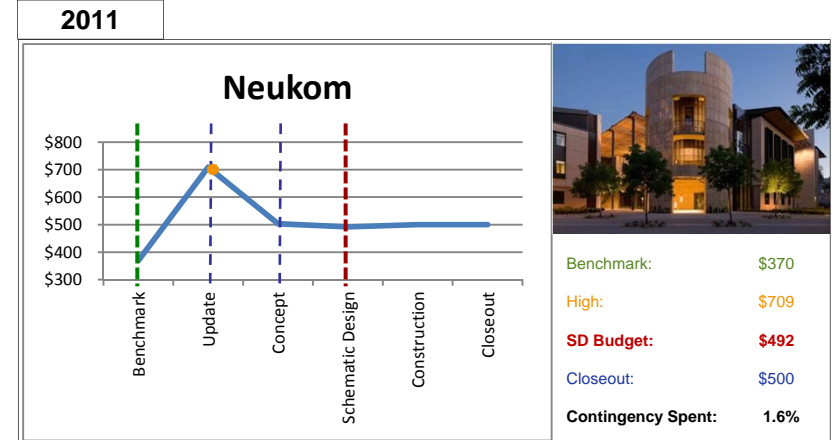
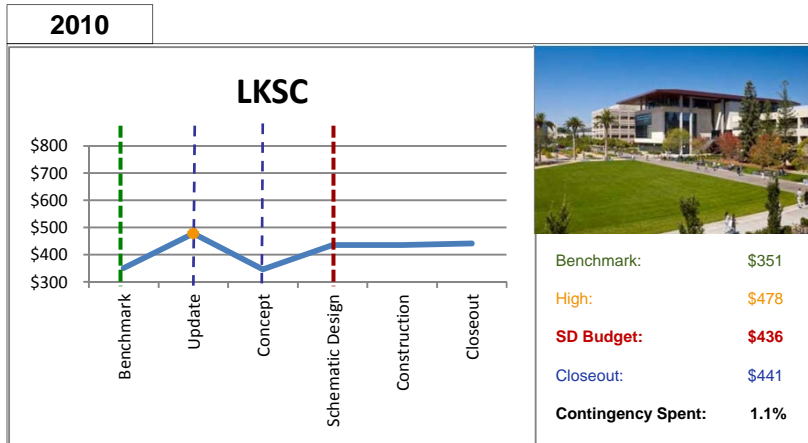
Science Teaching and Learning Center (Old Chem Renovation) 76,275 gsf

	Total Cost	\$ psf	
1. Construction			} 69% Hard Cost Includes Design Contingency ~5% at Concept 0% at Permit
a) Building	\$42,800,000	\$561	
b) Site Work	2,200,000	29	
c) Other Construction	1,100,000	14	
2. Professional Services			} 31% Soft Cost
a) Architect(s)	4,950,000	65	
b) Other Consultants	1,540,000	20	
3. Other Costs			
a) Stanford Internal Cost	1,899,650	25	
b) FF&E	3,100,000	41	
c) Surge Costs	0	0	
d) Agencies and Ext. Fees	805,000	11	
- BMR Housing Tax*	0	0	
- School Impact Fee*	0	0	
e) Activation	1,386,000	18	
f) SIP	2,933,270	38	
g) GUP Entitlement Fee*	0	0	
h) Construction Financing	325,000	4	
4. Contingency	2,861,080	38	} 6.3% -Field Allowance (1.3%) -Project Contingency (5%) -Program Contingency (0%)
5. Risk to Escalation	800,000	10	
Total Project Budget	\$66,700,000	\$874	} 1.6% (Eliminated at buyout)

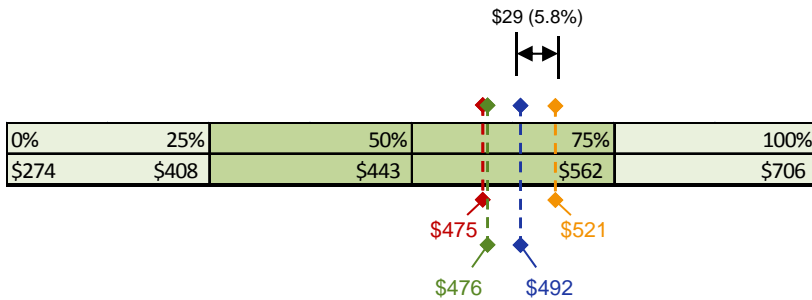
Setting the Budget



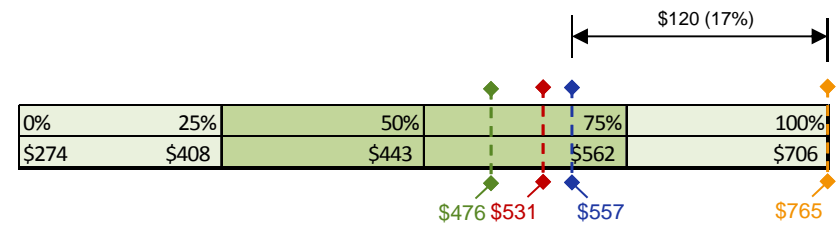
Benchmark Budget Examples (Construction Cost \$/GSF)



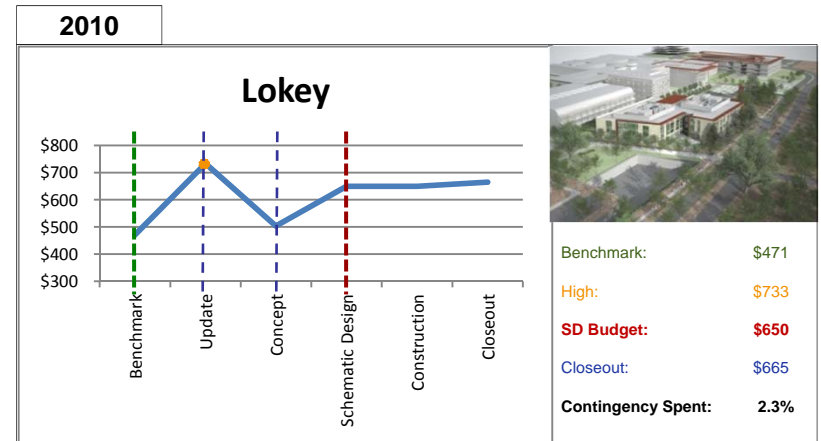
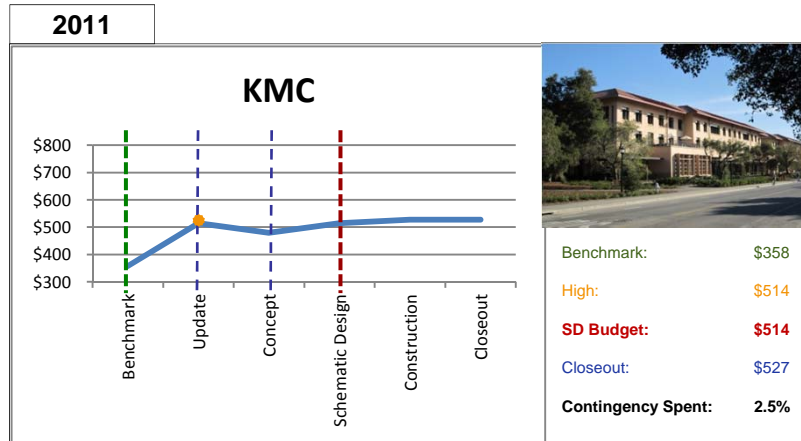
Office/Classroom (2014)



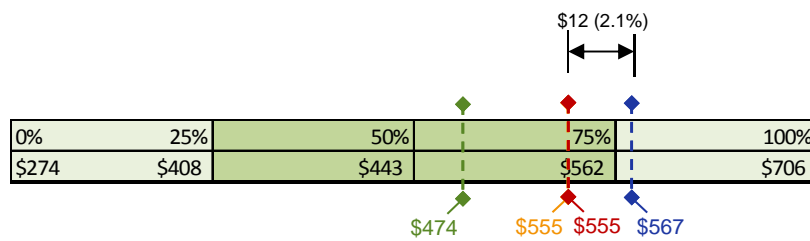
Office/Classroom (2014)



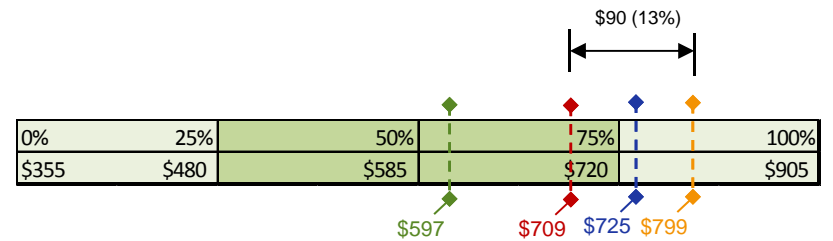
Benchmark Budget Examples (Construction Cost \$/GSF)



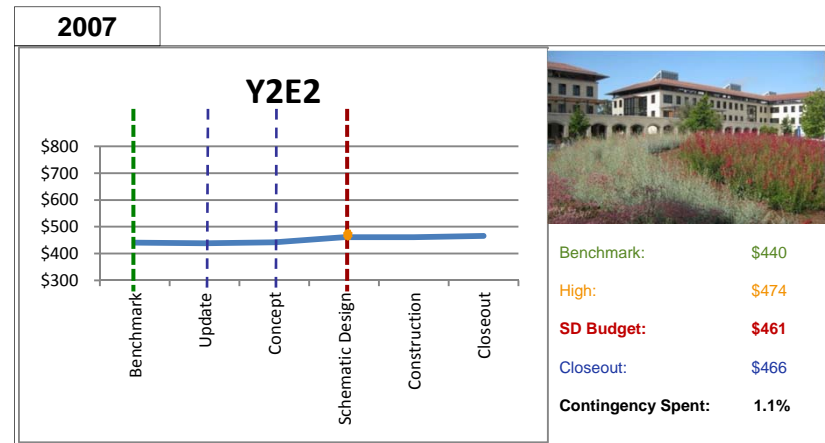
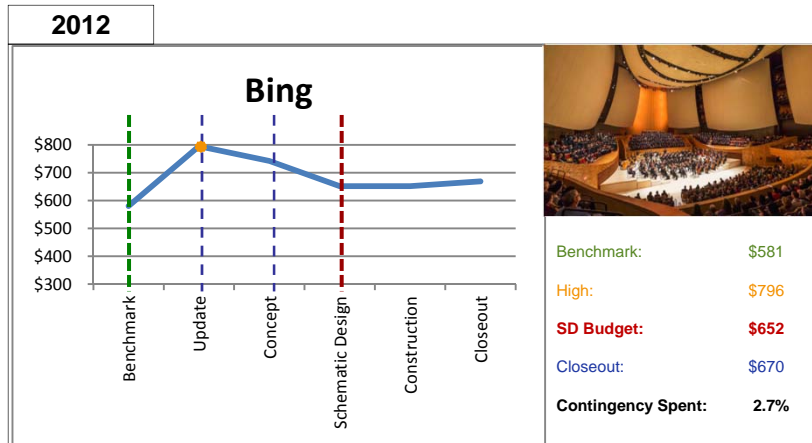
Office/Classroom (2014)



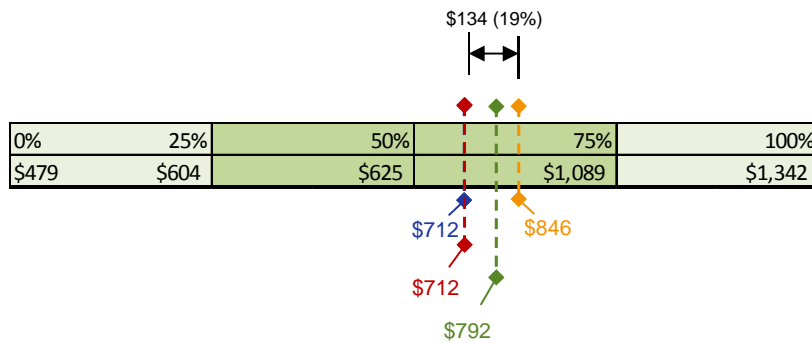
Wet Lab (2014)



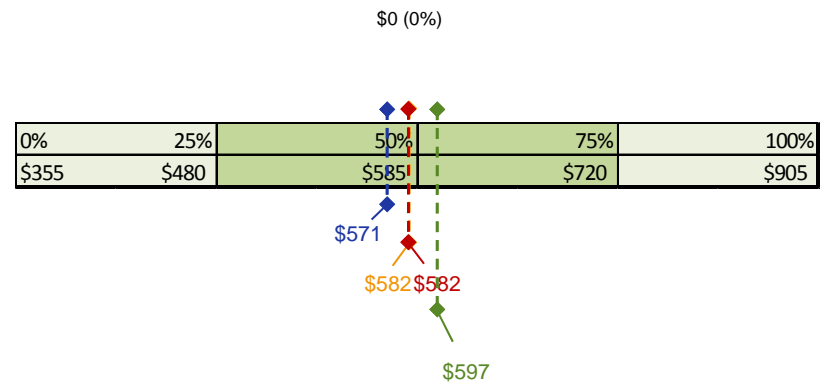
Benchmark Budget Examples (Construction Cost \$/GSF)



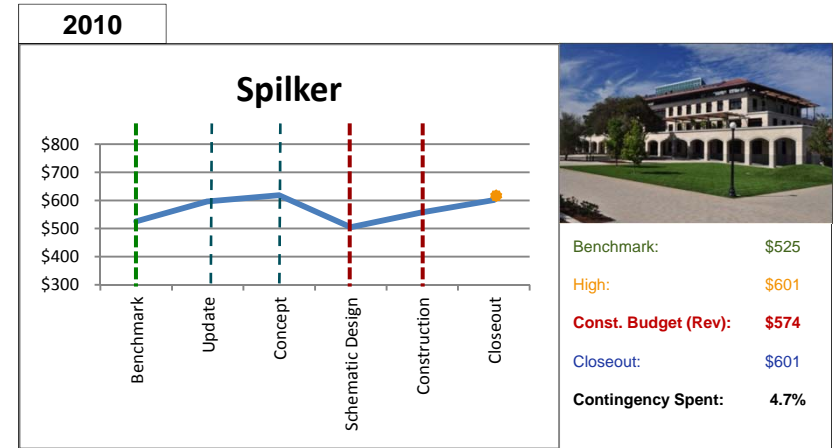
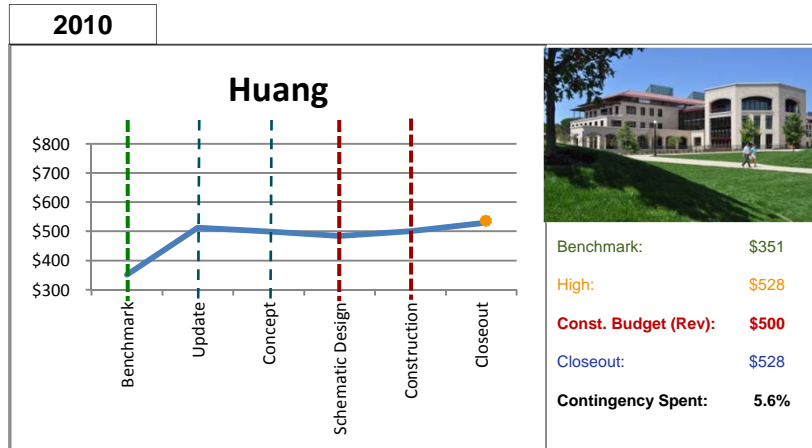
Performance Halls (2014)



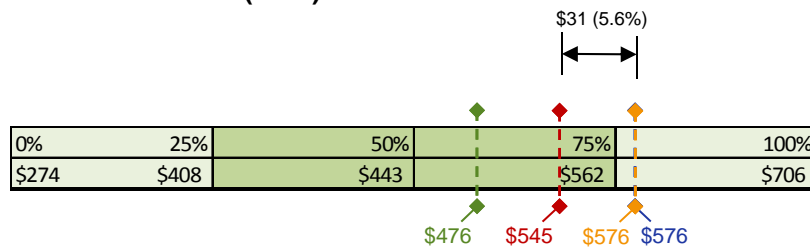
Wet Lab (2014)



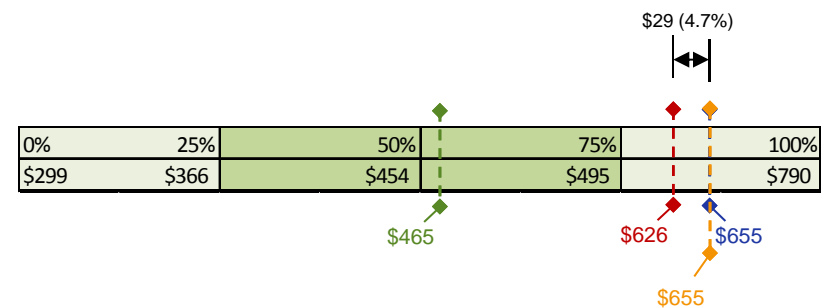
Benchmark Budget Examples (Construction Cost \$/GSF)



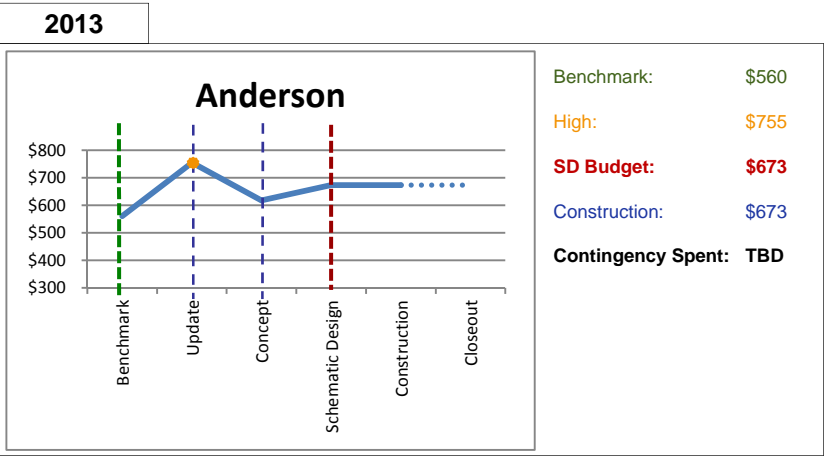
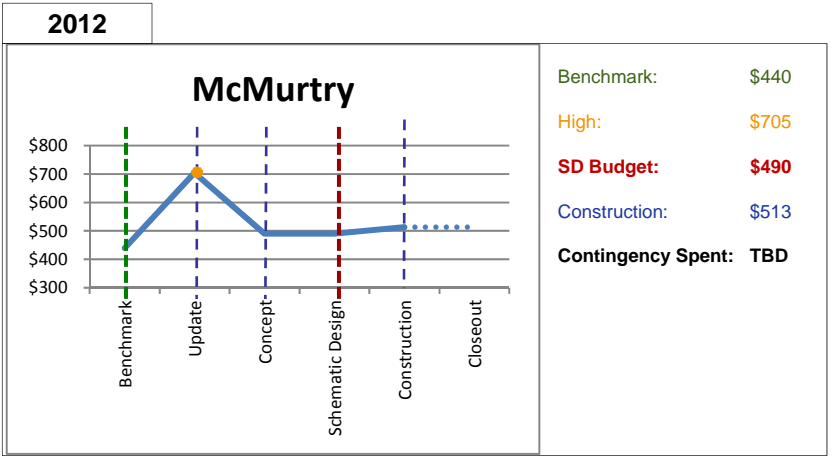
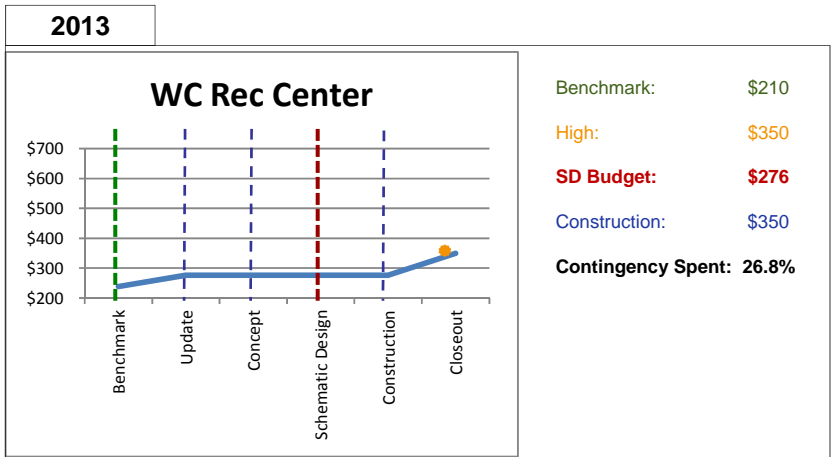
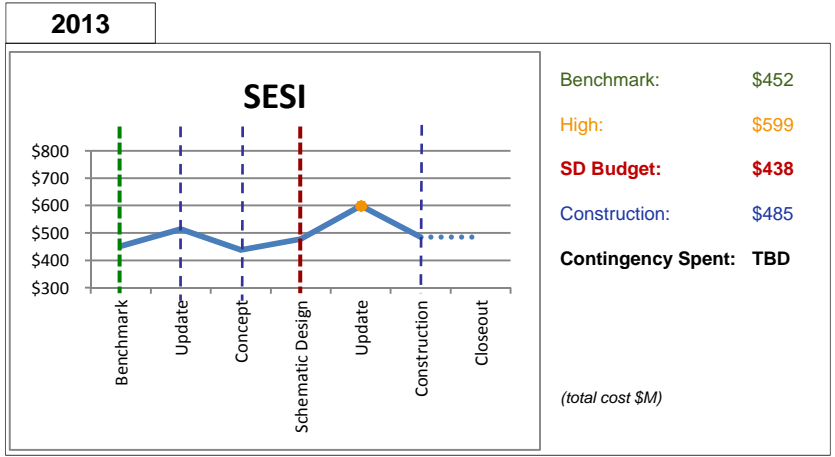
Office/Classroom (2014)



Dry Lab (2014)



Benchmark Budget Examples (Construction Cost \$/GSF)



Factors Influencing Benchmarks and Budget

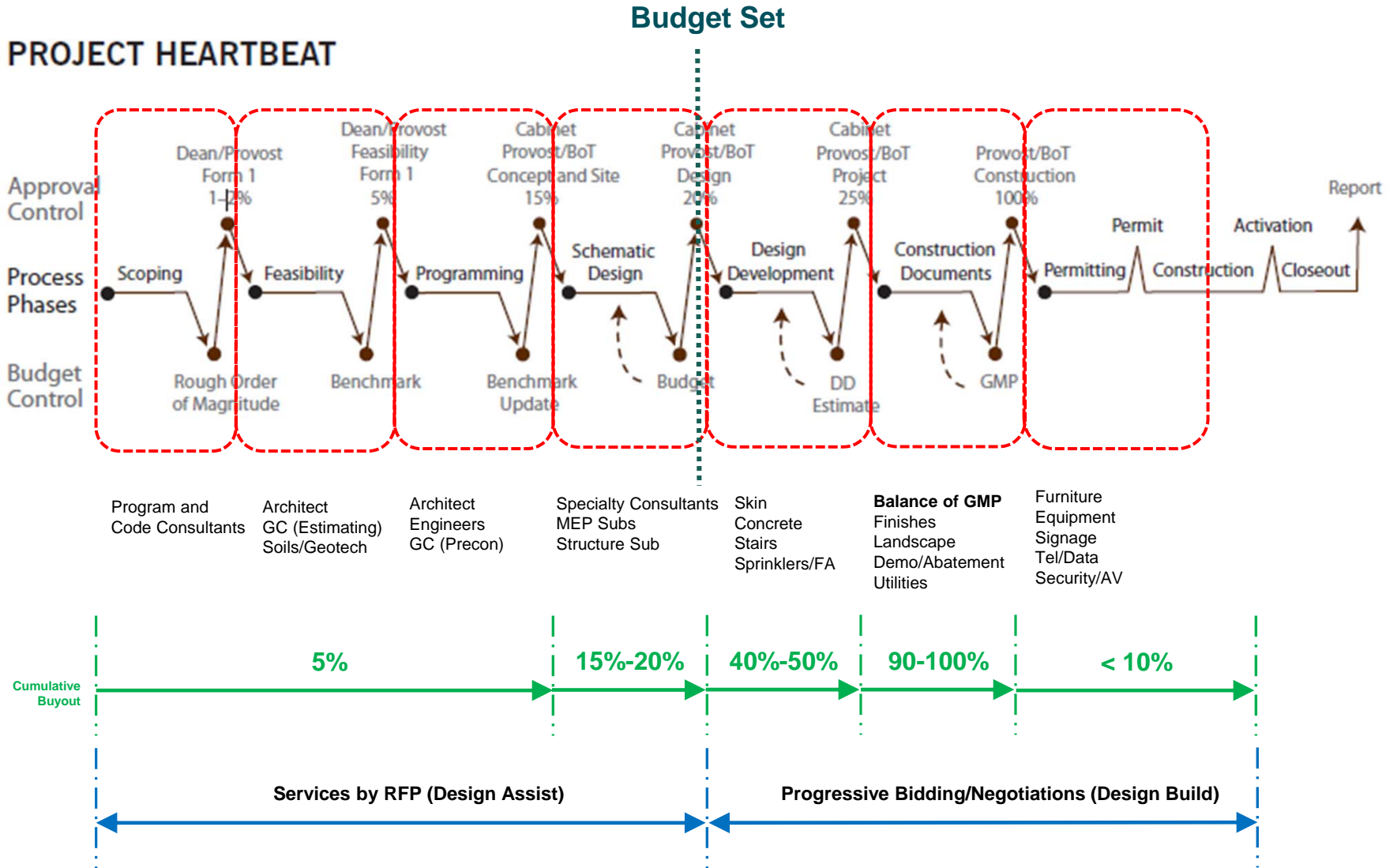
- **Leadership's mandate to lower building costs – Benchmark average**
- **Environment**
 - Multiple participants
 - Committee decisions
 - Desire for building flexibility
- **Premiums above average benchmark**
 - World-class program requirements
 - Stanford's architectural tradition – Quality and “sense of place”
 - Life cycle cost analysis
 - Sustainability goals
- **Experience shows that the average benchmark building is not desired by users, trustees and stakeholders**
- **Resistance to aggressive targets from Users means Project Manager is often alone in driving the process**

Agenda

1. Scope and Scale
2. Project Delivery Process at Stanford Overview
3. Benchmarks
- 4. Progressive Buyout**
5. Results vs. Plan
6. Lessons Learned

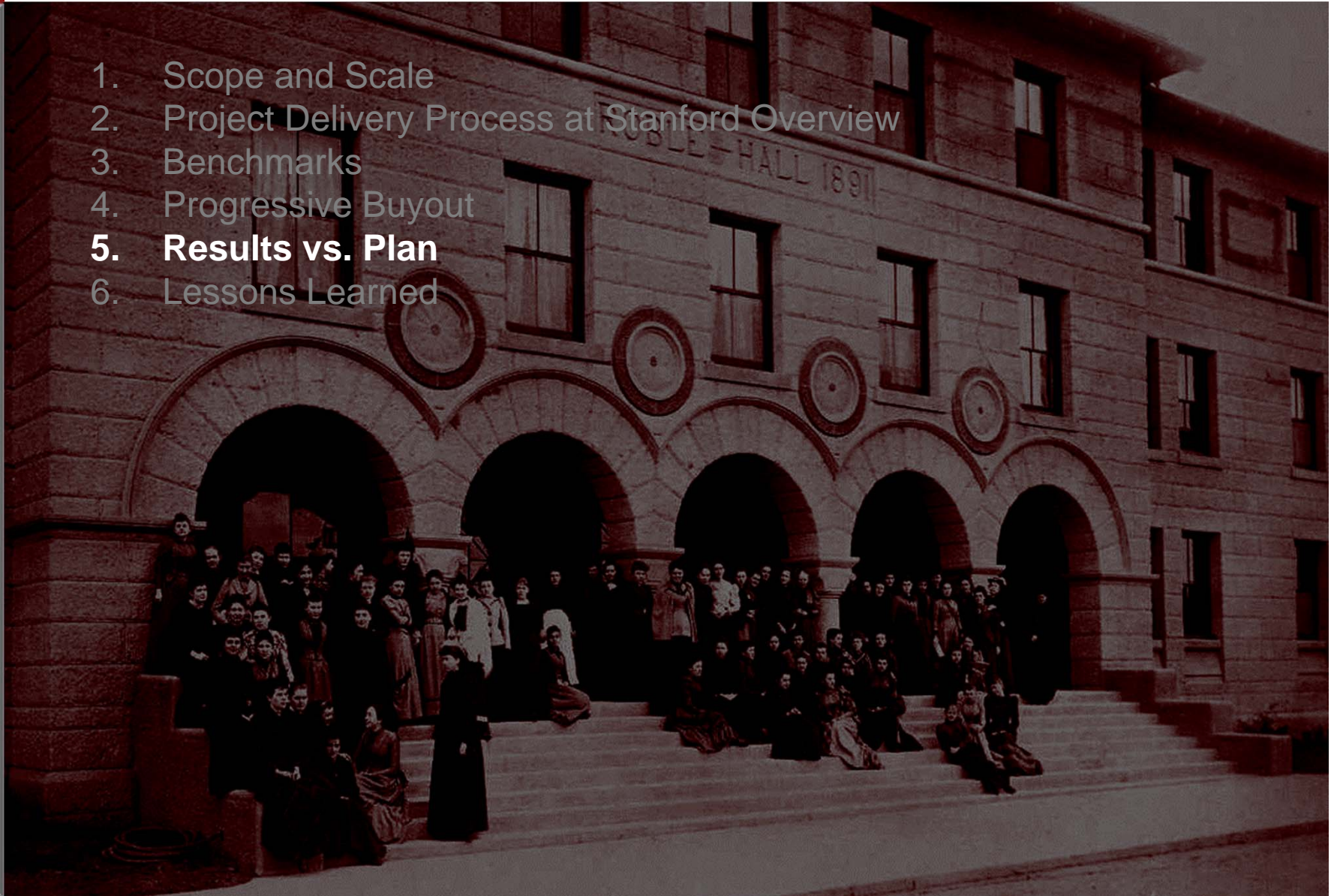


Buyout Strategy



Agenda

1. Scope and Scale
2. Project Delivery Process at Stanford Overview
3. Benchmarks
4. Progressive Buyout
- 5. Results vs. Plan**
6. Lessons Learned



Capital Project Results 2001 - 2013

Year	Project Budget	Project Cost	\$ Variance From Construction Approval	% Variance From Construction Approval
2001/2	\$ 165.8	\$ 156.1	\$ 9.7	5.9%
2002/3	329.0	307.0	22.0	6.7%
2003/4	46.7	44.9	1.8	3.9%
2004/5	134.2	127.3	6.9	5.2%
2005/6	196.0	196.8	(0.8)	-0.4%
2006/7	192.6	181.6	10.9	5.7%
2007/8	121.5	115.9	5.6	4.6%
2008/9	241.9	231.2	10.8	4.5%
2009/10	645.9	603.9	42.0	6.5%
2010/11	491.3	472.8	18.4	3.8%
2011/12	115.4	110.6	4.8	4.2%
2012/13	305.6	293.9	11.6	3.8%
Active Projects	1,418.6	1,418.6	(0.0)	0.0%
Total	\$ 4,404.4	\$ 4,260.5	\$ 143.8	3.3%

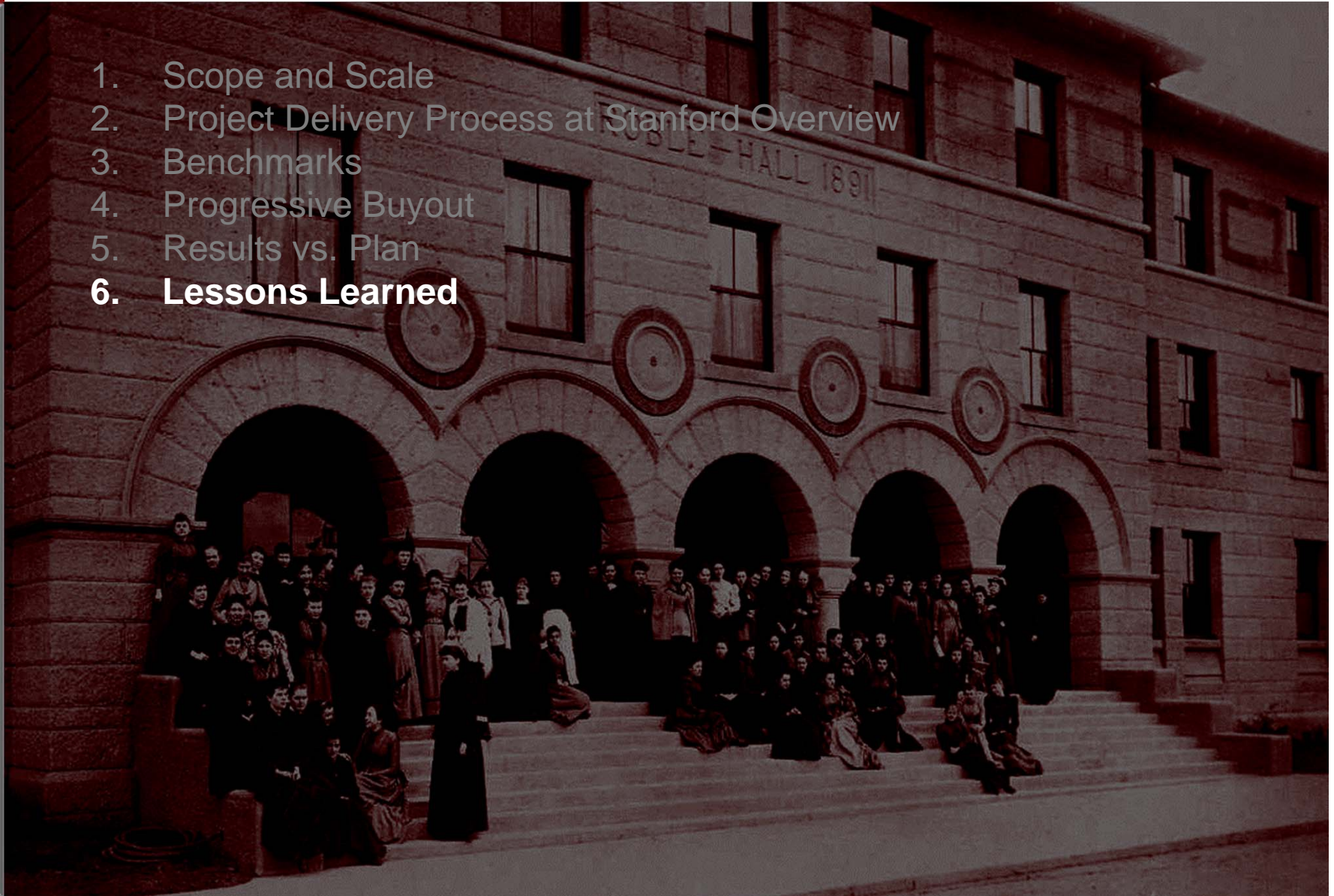
Avoided Costs on Recent Major Projects

Stanford Capital Projects 2005 - 2013																	
Estimated Project Cost Savings / Cost Avoidance Tracking Sheet																	
Project	"High Water" Project Cost	BOT Design Approval (Project Approval for Renovs)	Current Total Likely Project Cost	Negotiation / Design				Negotiation / Bidding / Risk Exposure					Policy		Total Savings / Cost Avoidance to date	% change	
				Negotiate/Arch change requests (post RFP)	Negotiate consultant fees and change requests (post RFP)	Negotiate GC's/Fee (post RFP)	Simplify design/program refinements	Bid savings/negotiation (shell)	Bid savings/negotiation (mep)	Bid savings (finish trades)	Soft cost reductions	Reduce allowances /design contingency	Reduce risk escalation /contingency	Code/permit negotiation			Letter of Credits vs. Bond Savings
KMC	415.90	377.29	337.50	0.75	0.43	10.43	26.60	6.65	3.64	14.84	3.15	3.88	4.54	0.50	3.00	78.40	19%
Lokey Stem Cell	233.00	204.61	187.00	1.20	0.50	1.63	20.20	0.50	3.25	0.25	1.80	3.07	7.30	5.00	1.30	46.00	20%
HEC/Nano/CE	225.00	183.59	175.31	0.83	0.11	0.34	32.48	5.00	5.80	1.00	0.61	0.00	2.39	0.00	1.13	49.69	22%
Bing Concert Hall	186.00	133.00	112.76	4.00	0.00	5.00	23.25	1.00	10.00	10.00	5.00	10.50	4.50	0.00	0.85	74.10	40%
LKSC & CE	175.00	143.20	132.20	2.20	0.00	2.09	30.37	2.36	0.38	0.00	0.00	0.00	4.20	0.30	0.90	42.80	24%
Bio E/ Chem E/CE	197.30	196.57	196.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0%
Newkom	80.00	71.30	62.90	0.70	0.00	0.20	6.15	1.15	0.60	4.00	2.50	0.50	0.90	0.00	0.40	17.10	21%
Gunn Building	36.00	32.00	32.70	0.00	0.00	0.00	3.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	3.30	9%
Stanford Ave Housing	35.00	33.40	28.00	0.00	0.00	0.00	6.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	7.00	20%
Nano Fit-up	28.14	20.00	15.84	0.00	0.00	0.00	10.30	0.00	0.00	0.00	0.00	0.00	1.86	0.00	0.14	12.30	44%
Olmstead Housing	26.80	16.00	17.20	0.00	0.00	0.00	6.80	0.00	0.00	0.00	0.00	1.00	1.66	0.00	0.14	9.60	36%
Crothers Dining	25.00	23.00	20.30	0.00	0.00	0.00	2.56	0.00	0.00	0.00	0.00	1.10	0.90	0.00	0.14	4.70	19%
Crothers Renovation	24.00	22.00	19.00	0.00	0.00	0.00	4.06	0.20	0.30	0.30	0.00	0.00	0.00	0.00	0.14	5.00	21%
Peterson	22.00	18.60	16.52	0.10	0.00	0.07	2.60	0.10	0.07	0.06	1.50	0.00	0.85	0.00	0.13	5.48	25%
HEC Fit-up	18.00	14.00	11.62	0.00	0.00	0.00	6.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	6.38	35%
AIF	4.25	4.00	4.00	0.00	0.00	0.00	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.25	6%
Roble Hall Renovation	18.00	15.10	14.20	0.00	0.00	0.00	3.00	0.00	0.00	0.00	0.00	0.00	0.70	0.00	0.10	3.80	21%
Stanford Daily	4.00	3.75	3.55	0.00	0.00	0.00	0.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.45	11%
3145 Porter Drive	22.00	19.89	16.20	0.00	0.00	0.20	5.10	0.00	0.00	0.30	0.10	0.00	0.00	0.00	0.10	5.80	26%
Madera Grove Childr	4.50	4.00	3.87	0.00	0.00	0.00	0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.63	14%
SCRF	42.30	41.20	41.05	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	1.25	3%
SRAF	27.50	26.50	23.33	0.00	0.00	0.00	2.51	1.00	0.50	0.00	0.00	0.00	0.00	0.00	0.16	4.17	15%
3165 Porter Drive	23.85	23.85	23.45	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.40	2%
3155 Porter Drive	19.53	18.59	18.19	0.00	0.00	0.00	1.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	1.34	7%
SAL3	14.80	14.80	14.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.10	1%
Comstock Housing	120.00	110.00	110.00	0.00	0.00	0.00	9.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	9.30	8%
SESI	599.00	485.00	485.00	1.00	2.00	8.00	24.50	10.00	40.00	5.00	0.00	0.00	10.00	10.00	3.50	114.00	19%
Freidenrich TRC	24.00	21.30	20.80	0.00	0.00	0.00	3.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	3.20	13%
Small/Non-BOT Projects (2000-2013)	332.74	332.74	322.75	0.40	0.30	1.50	3.09	0.50	1.20	0.50	0.00	0.00	0.00	0.00	2.50	9.99	3%
Total by Category	\$2,983.61	\$2,609.28	\$2,466.52	\$1.18	\$3.34	\$29.45	\$235.70	\$28.46	\$65.73	\$36.25	\$14.66	\$20.05	\$39.80	\$15.80	\$16.10	\$516.52	17%
Subtotal				\$279.67				\$204.95					\$31.90				
Total Avoided Cost Savings				\$516.52													

High:	\$2.98B	} \$517M 21% Savings in Avoided Costs from "High Water" Point to Closeout
Budget:	\$2.61B	
Closeout:	\$2.47B	

Agenda

1. Scope and Scale
2. Project Delivery Process at Stanford Overview
3. Benchmarks
4. Progressive Buyout
5. Results vs. Plan
6. **Lessons Learned**



Lessons Learned

- **Know and understand the environment that we manage**
- **Provide process to establish order**
- **Establish management authority and demonstrate accountability**
- **Discipline and transparency are vital**
- **The power of choice in a system of limits is the key to our success**



Discussion