Integrated Project Delivery

Integrated 09
PROJECT DELIVERY SEMINAR SERIES

Lessons Learned

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April 28, 2009

Produced by:

HansonBridgett

McGraw Hill CONSTRUCTION

AIA California Council

AGC CALIFORNIA

DBIA Western Pacific Region Design-Build

Integrated Project Delivery

AIA Architectural Billing Index
Reports IPD Deployment

- About one in eight members-Work-on-the-Boards panel worked on projects organized around IPD.
- One in five firms have considered working on a project using an IPD approach.
- Over half of these firms are larger firms-annual billings > $5 million a year.

Integrated Project Delivery

AIACC Definitions Document

Definition

IPD is a project delivery approach that integrates people, systems, business structures and practices into a process that collaboratively harnesses the talents and insights of all participants to optimize project results, increase value to the owner, reduce waste and maximize efficiency through all phases of design, fabrication and construction.

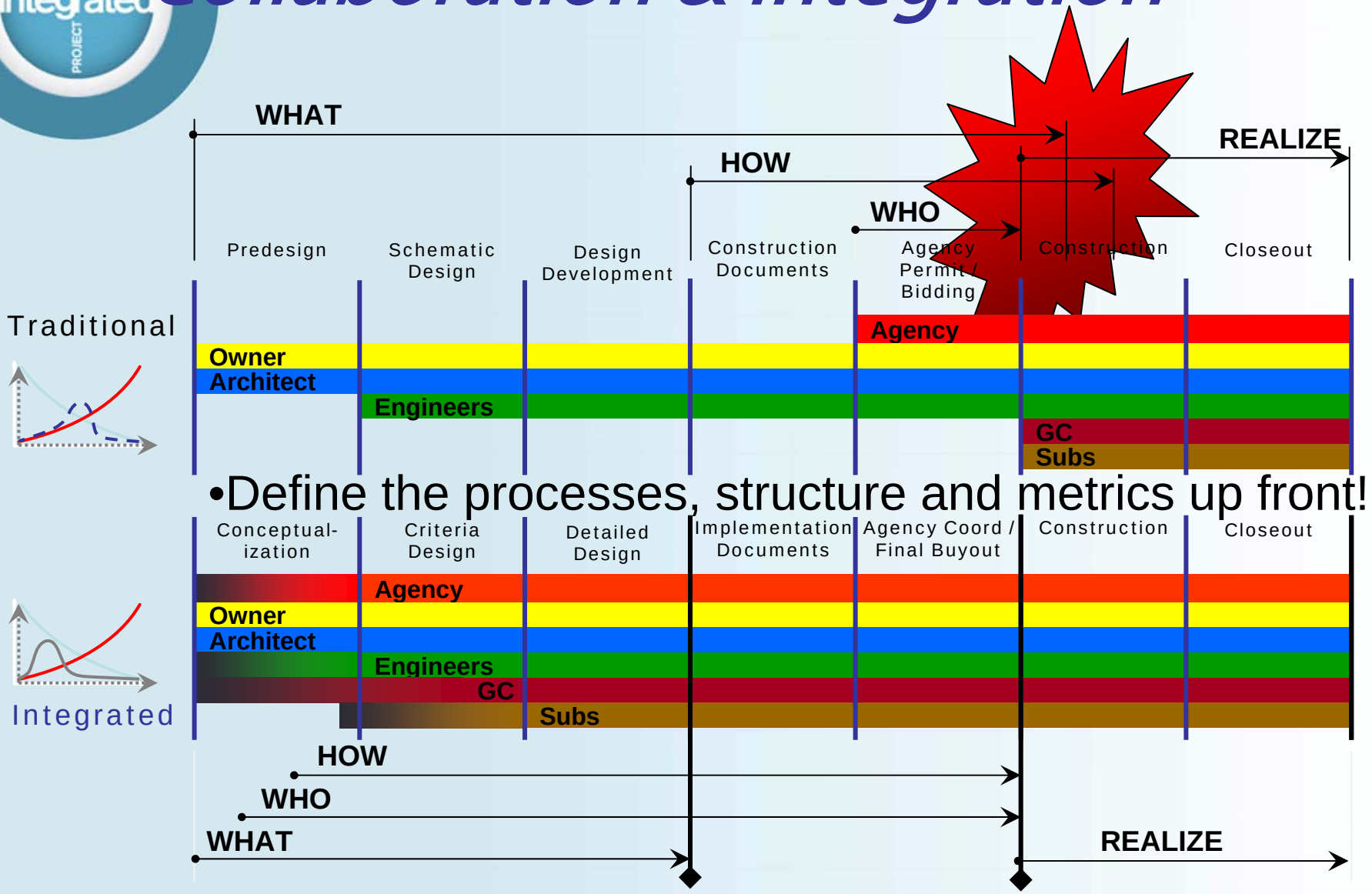
Integrated Project Delivery

AIACC Definitions Document

Definition

IPD principles can be applied to a variety of contractual arrangements and IPD teams will usually include members well beyond the basic triad of owner, architect, and contractor. At a minimum, though, an integrated project includes highly effective collaboration between the owner, the architect, and the general contractor ultimately responsible for construction of the project, from early design through project handover.

Collaboration & Integration



- Define the processes, structure and metrics up front!

Lessons Learned Symposium AIACC

Purpose: IPD - Sample results - what's working - what is not - what would they do differently.

Attendees:

- Owners-2
- Architects-5
- Engineers-1
- General Contractors-8
- Sub Contractors-2

Lessons Learned Agenda

- Describe the Lessons Learned by Owners, Designers and Builders for 5 key IPD topics:
  - The Value Proposition
  - Assembling the Project Team
  - Determining and Managing the Project Budget
  - The Reality of Group Decision making

Value Proposition Collaboration Integration

1

Value Proposition
Collaboration

From the Construction Industry Institute – UT Austin

Total Project Cost – 10% Reduction

- Construction Administration – 24% Reduction
- Engineering - $10/hr Reduction
- Value Engineering – 337% increase
- Profitability – 25% increase

- Number of claims – 83% Reduction
- Projects with claims – 68% Reduction

Value Proposition

*"When you look at other industries where an **entity** has control of the design, the fabrication, the financing, the marketing of a product like the airline industry or like Apple-look what they've done as a computer company, versus other PC type companies"*

Extraordinary results from Collaboration AND Integration

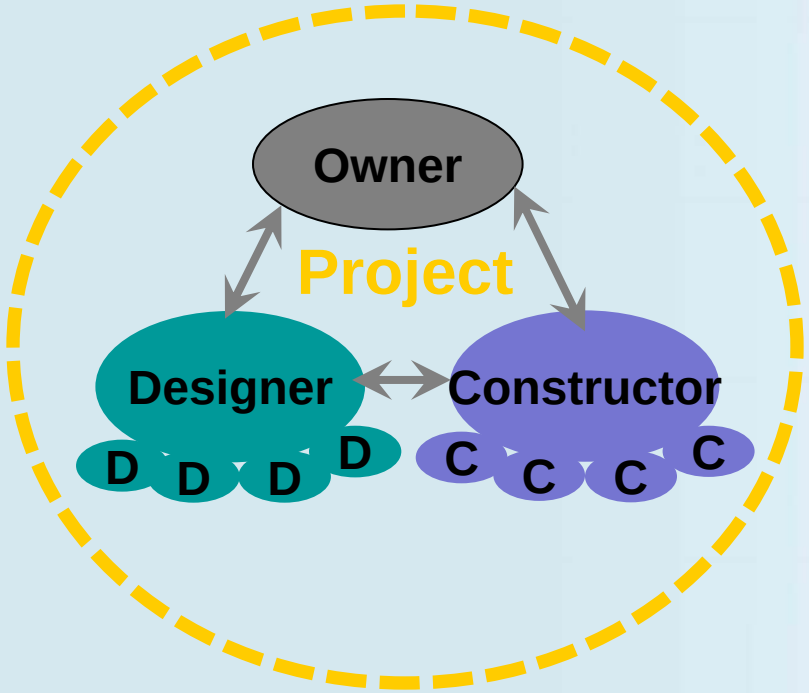
Value Proposition
Collaboration

Best for the Project-Best for the Firms

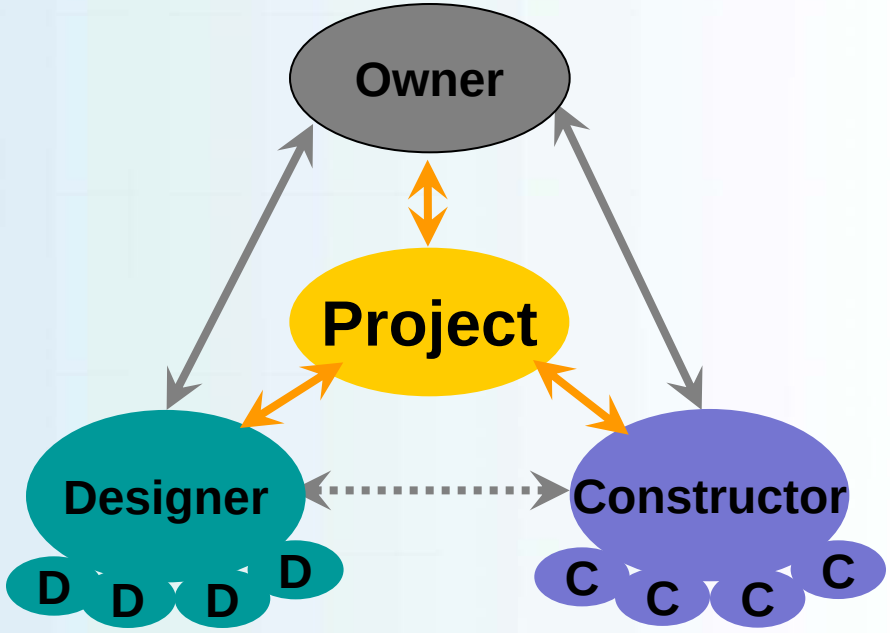
"…… do what you know ….even if it costs more because it protects you…why on earth did you do that….because we've been sued five years ago for not doing it…so now we do it on every project whether it makes sense or not…"

Value Proposition
Integration

Different – Disciplines Vs. Business Models



Project Entity



Virtual Organization

Value Proposition
Integration

Project Responsibility Matrix

Design/Documentation Item		Phase 1 Precon			OSHPD Submittal	Phase 2 Construction		
		Primary	Secondary	Review		Primary	Secondary	Review
Design Coordination								
Design/Assist Team Meetings								
Building Official /Permitting Agency								
Costing during design								
	perform construction cost analysis of proposed cost alternative	C		E				
	maintenance + life cycle cost analysis	E		C				
	make decision on cost alternative to pursue	ECO						
Construction Documents								
Mechanical Systems; General Items								
	Symbols, notes and schedules	E		C				
	Establish CAD standards, layering, symbols, title block & sheet numbering requirements, etc	E	C					
	Produce Specifications to match owners requirement and budget	E	C					
HVAC Equipment Schedules								
Criteria, sizing and initial vendor selection								
	AC Units	E	C					
	Boilers	E	C					
	Exhaust Fans	E	C					
	Air Outlets	E	C					
	Pumps	E	C					
	Other HVAC Equipment	E	C					
	Terminal Box Schedules	E	C					
	Reheat Coil Schedules	E	C					
Vendor procurement, submittal prep and costing								
	AC Units	C		E				
	Boilers	C		E				
	Exhaust Fans	C		E				
	Air Outlets	C		E				
	Pumps	C		E				
	Other HVAC Equipment	C		E				
	Terminal boxes	C		E				
	Reheat Coils	C		E				

Value Proposition
Integration

- Efficiency - Shop drawings, pre-fabrication opportunities tested and decided in CD phase.
- Market Forces - Team process quicker to react-respond to changes in commodities, labor availability.
- Innovation - Bigger opportunity to introduce/evaluate new technologies
- Control – To project versus individual firm

Assembling the Project Team

2

Assembling the Project Team

Creating Effective Teams

- Alignment-3 Levels
  - Ownership
  - Management
  - Those Doing the work
- Experience
  - Estimator - Continuous process over milestones
  - Team – Experience - Excited re risk vs. Opportunity
- Co-location – Essential
- BIM-System compatibility – getting to fabrication
- Whose behind the contract?

Determining and Managing the Project Budget

3

Cost Management Design to an Estimate

- Estimate first - Design second.
- Creation of cost targets by system/component based on program
- Continuous cost management – weekly rather than 100% SD, DD phase
- Escalation and Market forces

"The Next Architect understands that money is a design tool"
James P. Cramer & Scott Simpson - The Next Architect

Estimate First, Design Second

Overall Cost Target Summary

OVERALL PROJECT TOTALS

Cost Target	$650,060,463.00
Current Cost	$575,645,988.00
Over/(Under) Target	($74,414,475.00)

An Overall Cost Target Summary is shown above.

Groups 1 & 4 (of 6) are shown to the right.

Overall Cost Target Summary

GROUP 4: *HVAC, Plumbing & Fire Protection*
Overall Project

Owner Lead:
Estimating Lead:
Architect Lead:

HVAC, Plumbing & Fire Protection Totals

HVAC

Cost Target	$104,015,114.00
Current Cost	$116,331,699.00
Over/(Under) Target	$12,316,585.00

Plumbing

Cost Target	$46,223,148.00
Current Cost	$51,587,062.00
Over/(Under) Target	$5,363,914.00

Fire Protection

Cost Target	$10,077,859.00
Current Cost	$13,376,329.00
Over/(Under) Target	$3,298,470.00

Overall Cost Target Summary

GROUP 1: *Foundations & Superstructures*
Overall Project

Owner Lead:
Estimating Lead:
Architect Lead:

Foundations & Superstructures Totals

Foundation

Cost Target	$15,285,881.00
Current Cost	$17,434,284.00
Over/(Under) Target	$2,148,403.00

Superstructure

Cost Target	$60,026,026.00
Current Cost	$75,428,021.00
Over/(Under) Target	$15,401,995.00

Groups are further broken down by Sections and Cost Drivers

Cost Target Driven Summary

Cost Target Driven Summary

GROUP 4: *HVAC, Plumbing & Fire Protection*
SECTION 1: DRIVERS
GFA :632, 738 SF

Date of Summary

	50% DD					100% SD					
				COST					COST		
	Quantity	Unit	$/Unit	$/GSF	$,000	Quantity	Unit	$/Unit	$/GSF	$,000	Reason for Variance
PLUMBING											
Fixtures	1,558	EA	3,551.65	8.75	$5,533,463.00	1,405	EA	3,551.65	8.75	$5,533,463.00	Increased quantity but decreased installed rates
Waste Drainage System	43,560	LF	104.16	7.17	$4,537,413.00	48,637	LF	104.16	7.17	$4,537,413.00	Decreased quantity, increased labor & material rates
Condensate Drainage System	8,600	LF	42.28	0.57	$363,567.00	8,600	LF	42.28	0.57	$363,567.00	Increased labor & material rates
Storm Drainage System	19,700	LF	152.21	4.74	$2,998,442.00	21,168	LF	152.21	4.74	$2,998,442.00	Decreased quantity, increased labor & material rates
Domestic Hot & Cold Water	139,780	LF	42.11	9.30	$5,885,851.00	127,780	LF	42.11	9.30	$5,885,851.00	Increased quantity for 1st floor piping, increased labor & material rates
Industrial Hot & Cold Water	34,606	LF	71.84	3.93	$2,486,257.00	34,606	LF	71.84	3.93	$2,486,257.00	Increased labor & material rates
Medical Service Piping	95,194	LF	132.94	20.00	$12,655,550.00	90,406	LF	132.94	20.00	$12,655,550.00	Increased quantity for 1st floor piping, increased labor & material rates
Natural Gas Piping	1,123	LF	91.01	0.16	$102,203.00	1,123	LF	91.01	0.16	$102,203.00	Increased labor & material rates
Food Services	632,738	GFA	1.19	1.19	$749,800.00	640,841	GFA	1.19	1.19	$749,800.00	Increased labor & material rates
Other Items	632,738	GFA	8.23	8.23	$5,207,433.00	640,841	GFA	8.23	8.23	$5,207,433.00	Increased labor & material rates
Sub-total - Plumbing				**64.04**	**$40,519,977.00**				**64.04**	**$40,519,977.00**	
HVAC											
Chilled Water Piping - Main runs	14,760	LF	261.64	6.10	$3,861,749.00	10,680	LF	250.25	4.22	$2,672,638.00	Quantity and rate increase
Low Temperature Chilled Water Piping - ...	32,765	LF	10.23	0.53	$335,073.00	XXX	XX	XXX	XXX	XXX	Not included in 100% SD
Heating Hot Water Piping - Main runs	32,765	LF	94.59	4.90	$3,099,244.00	30,940	LF	93.66	4.58	$2,897,842.00	Quantity & rate increase, pipe size & length changes
Steam & Condensate Piping - Main runs	14,590	LF	99.22	2.29	$1,447,549.00	10,590	LF	99.37	1.66	$1,052,333.00	Quantity increase
Piping Connections	897	EA	4,079.28	5.78	$3,659,116.00	697	EA	4,286.67	4.72	$2,987,810.00	Quantity & rate decrease, Updated FCU/CRAC/Re-heat
Valves - Controls	632,738	GSF	2.42	2.42	$1,530,203.00	640,841	GFA	2.36	2.39	$1,509,974.00	No significant change
AHU's	805,000	CFM	12.27	15.62	$9,881,244.00	751,056	CFM	9.77	11.60	$7,339,077.00	Quantity increase and rate increase
Air Distribution - Standard	1,464,500	LB	21.92	50.73	$32,101,336.00	1,474,000	LB	20.16	46.96	$29,713,491.00	Adjusted to updated FCU/CRAC, provided sizes & rate increase
Air Distribution - Stainless Steel, Aluminum,	97,500	LB	33.13	5.11	$3,230,317.00	97,500	LB	31.51	4.51	$2,851,448.00	Quantity increase & rate increase
Phoenix Boxes	775	EA	5,802.11	7.11	$4,496,633.00	850	EA	4,954.02	6.66	$4,210,920.00	Rate increase
Controls	632,738	GFA	13.50	13.50	$8,539,020.00	640,841	GFA	18.87	19.12	$12,095,050.00	Scope Change
Testing & Balancing	632,738	GFA	2.71	2.71	$1,714,438.00	640,841	GFA	2.58	2.61	$1,651,633.00	Rate increase
Other Items	632,738	GFA	11.23	11.23	$7,104,501.00	640,841	GFA	8.85	8.97	$5,674,792.00	Rate increase
Sub-total - Mechanical				**128.02**	**$81,000,421.00**				**117.99**	**$74,656,508.00**	
FIRE PROTECTION											
Ordinary Hazard System	632,738	GFA	15.00	15.00	$9,491,063.00	640,841	GFA	10.86	11.00	$6,960,113.00	Rate increase
Other Systems	3,810	GFA	72.46	0.44	$276,086.00	640,841	GFA	0.37	0.37	$235,421.00	Rate increase
Sub-total - Fire Protection				**15.44**	**$9,767,149.00**				**11.37**	**$7,195,533.00**	

Lessons Learned on Budget

Determining

1. Historical data, coupled with trends, informs a project budget but should not set it.
2. The need to invite project stakeholders (the designer and constructor) is most valuable when the budget is least defined.

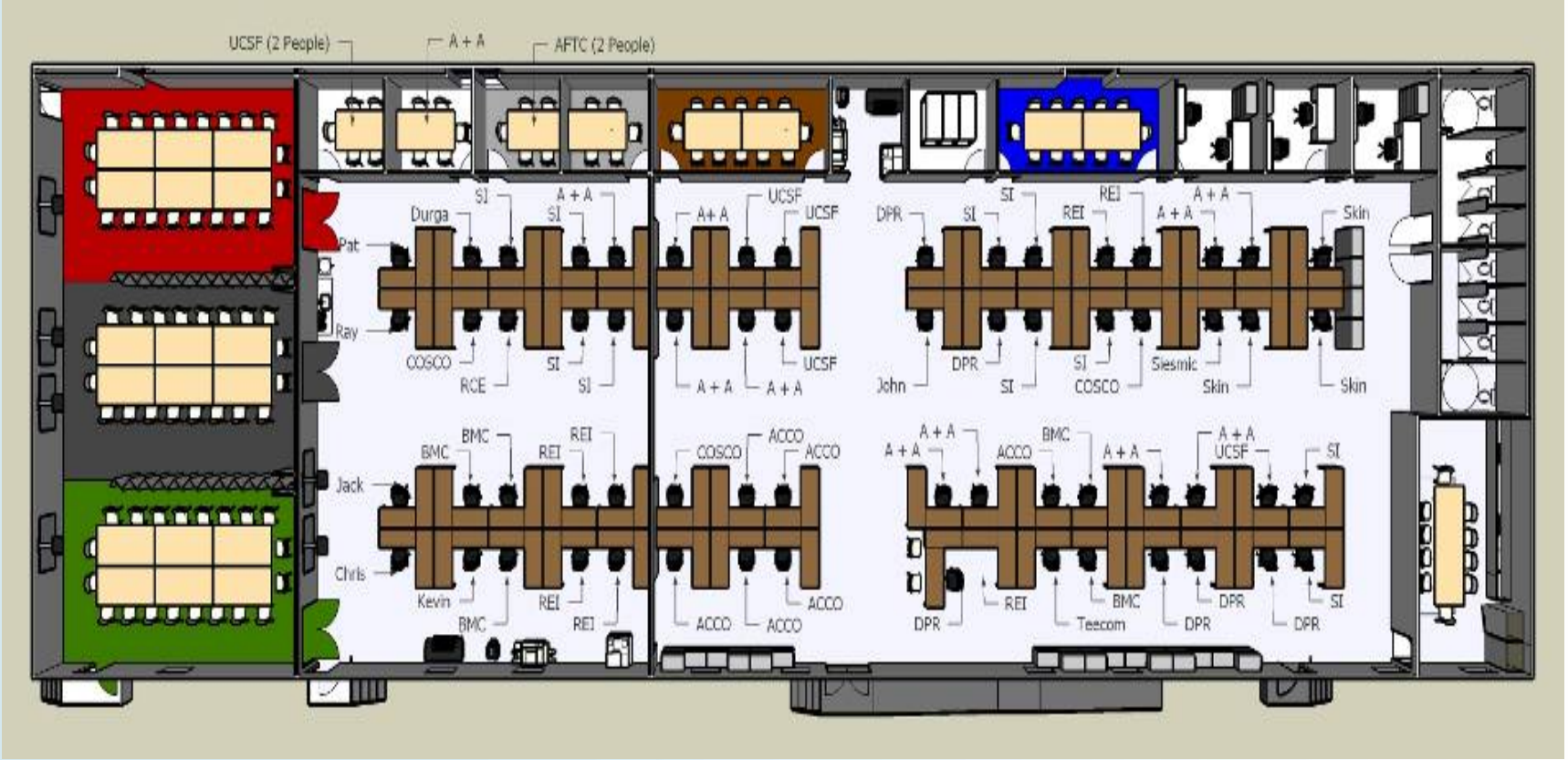
Managing

3. An open book or transparent process allows for all the stakeholders to have input and confirming the project direction.
4. A budget is a target whose sub - targets will fluctuate to respond to the development of the project and realities of the market.

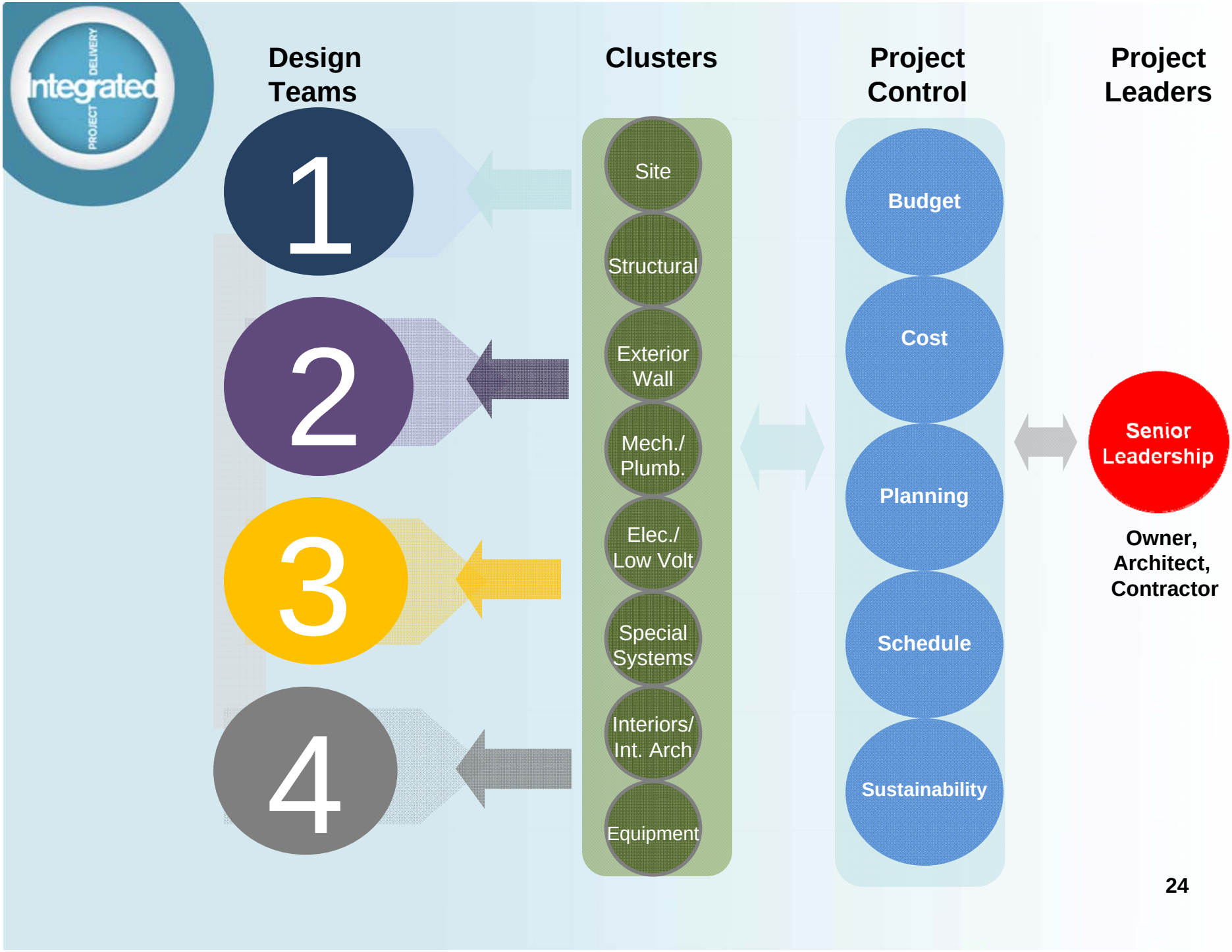
The Reality of Group Decision Making

4

Integrated Center for Design and Construction (ICDC)



…opening mid-May 2009


Integrated
PROJECT DELIVERY
Design Teams
Clusters
Project Control
Project Leaders
1
2
3
4
Site
Structural
Exterior Wall
Mech./ Plumb.
Elec./ Low Volt
Special Systems
Interiors/ Int. Arch
Equipment
Budget
Cost
Planning
Schedule
Sustainability
Senior Leadership
Owner, Architect, Contractor

Remember that:

Integrated Project Delivery *is optimized by:*

- Knowing what your Team Selection Criteria is.
- Work out the details - Alignment
  - Metrics
  - Decision process – Who - Where
  - Cost Targeting/budget management process
  - Systems

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