Lean Construction Institute

Provider Number H561

Lean Design Forum P2SL/AIA/LCI 2016-Day Two

P2SLDF20162

January 29, 2016

4 LU/HSW Credit(s) earned on completion of this course will be reported to AIA CES for AIA members. Certificates of Completion for both AIA members and non-AIA members are available upon request.

This course is registered with AIA CES for continuing professional education. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the AIA of any material of construction or any method or manner of handling, using, distributing, or dealing in any material or product.

Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.

Course Description

Kanban Method (the pull production system invented by Toyota) will be analyzed and shown to coordinate and improve design and knowledge-based work in the construction industry. Use of Kanban Method in a variety of design applications will be explained. Discussion will include how embracing reliable promising (linguistic action) and system design concepts drawn from Last Planner® are included in Lean practices. Findings of a survey on Integrated Project Delivery will be presented and analyzed.

Learning Objectives

1. At the end of this presentation, participants will be able to recognize the difference between push and pull planning
2. At the end of this presentation, participants will be able to define Kanban, its core practices, and terminology.
3. At the end of this presentation, participants will recognize how Kanban Method can be a powerful commitment-based approach to design and knowledge-based work in the construction industry.
4. At the end of this presentation, participants will have a better understanding of Integrated Project Delivery, and be able to discuss current trends and opinions regarding IPD.

IPD: Performance, Expectations and Future Use

Markku Allison, AIA, Scan Consulting
Renée Cheng, AIA, University of Minnesota

IPD Case Studies

AIA, AIA Minnesota, School of Architecture University of Minnesota

February, 2011

Interactive PDF

(Click any button on the left to begin)

	Overview					Legal and Commercial Strategies						Managment Strategies					Social Strategies		Workplace and Technological Strategies			
	Market Sector	Location (state)	Team Size (individuals)	Building Size (sf)	Project Cost ($ millions)	Multi-party contract	Liability Waivers	Integrated project insurance	Shared risk/reward	Financial Incentives tied to goals	Fiscal Transparency	Strong Leadership	Intensified planning/ team building	Mutually defined/aligned project goals	Inegrated team structure	Implementation Tools (i.e. Lean)	Early Involvement of key players	Collaborative decision making	Co-location	BIM	Networked sharing/ communication	Interactive artifacts (Smart board, visual mgmt. tools)
Cathedral Hill Hospital	Health	CA	123	858,000	1028.5	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
MERCY Master Plan Facility Remodel	Health	OH	60	94,439	19.4	●			●		●	●	●	●	●	●	●	○		●	●	●
Lawrence & Schiller Remodel	Office	SD	10	7,000	.5	●			●			○	○	○	○		●	○				
SpawGlass Austin Regional Office	Office	TX	16	15,370	2.8	●	●		○	○	●			○	○			○		○	●	
Edith Green Wendell Wyatt Federal Building	Office	OR	114	525,421	123.2				●	●	●	●	●	●	●		●	●	●	●	●	●
Autodesk Inc.	Office	MA	-	55,000	13.4	●	●		●	●	●	●		●	●		●	●	○	●		
Sutter Health Fairfield Medical Office Building	Health	CA	-	69,948	19.5	●			○		●	●	●	●	●	●	●	●		●	●	
Cardinal Glennon Children's Hospital Expansion	Health	MO	-	138,000	45.6	●			●		●	●			●	○	●	●				
St. Clare Health Center	Health	MO	-	430,000	157.2	●					●	●	●	●	●	●	●	●	○	●	●	
Encircle Health Ambulatory Care Center	Health	WI	-	157,000	38.6	●			●	●	●			●	●	○	●	●		○	●	
Walter Cronkite School of Journalism	Edu	AZ	-	230,000	72.1						●			●	○	○	●	●	●	●		○
UCSF Mission Bay Medical Center	Health	CA	-	878,000	1300.0					●	○	●	●	●	●	●	○	●	●	●	●	●

IPD profiles (markers or motivations)

CLICK HERE TO BEGIN

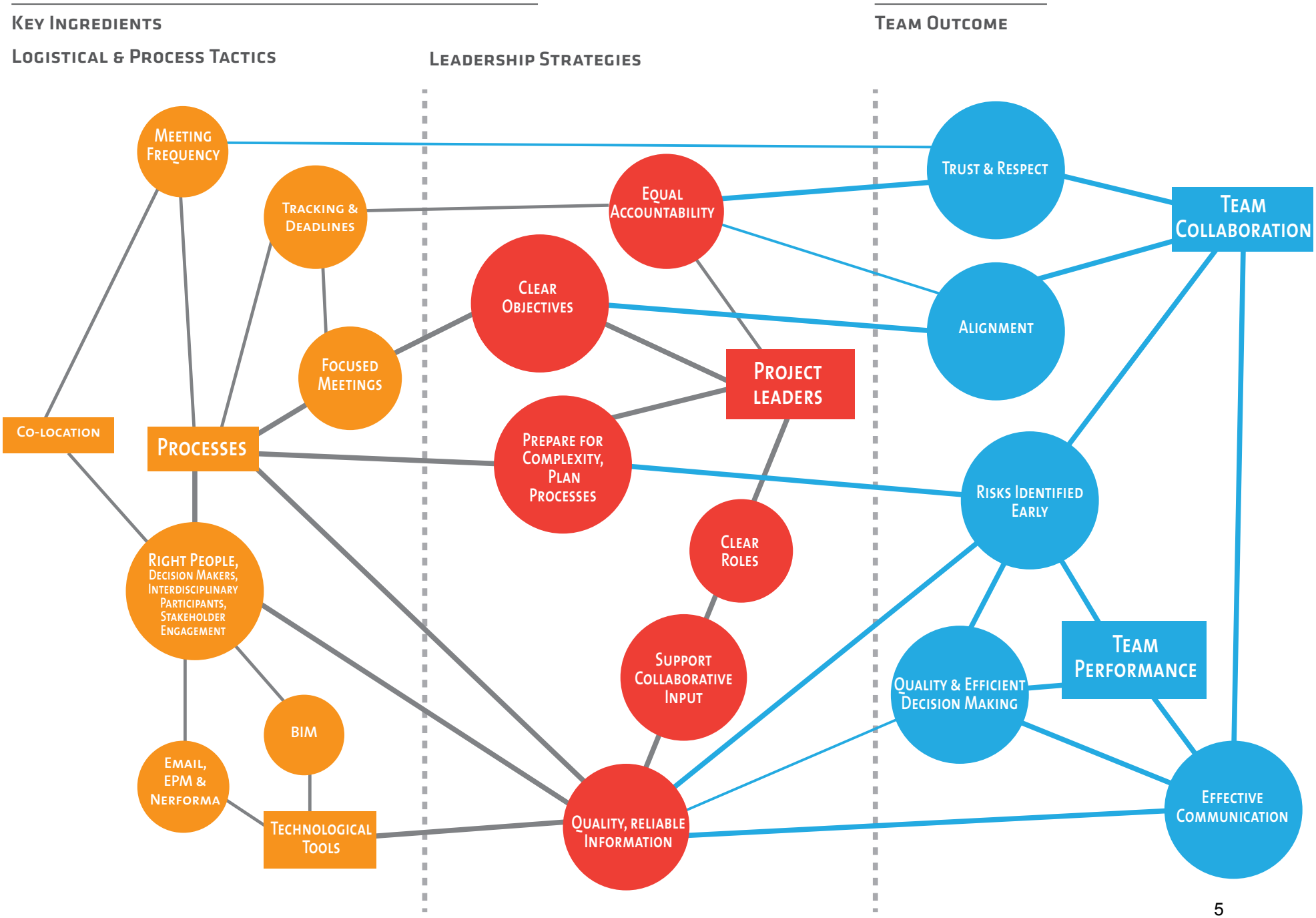
[redacted] Case Studies

Collaborative Practice

CLOSE TO FINAL REPORT FOR AUGUST 20, 2013 REVIEW MEETING

PUBLISHED AUGUST 12, 2013

KEY INGREDIENT RELATIONSHIP MAP



[redacted] Project Cumulative

[redacted]

[redacted]

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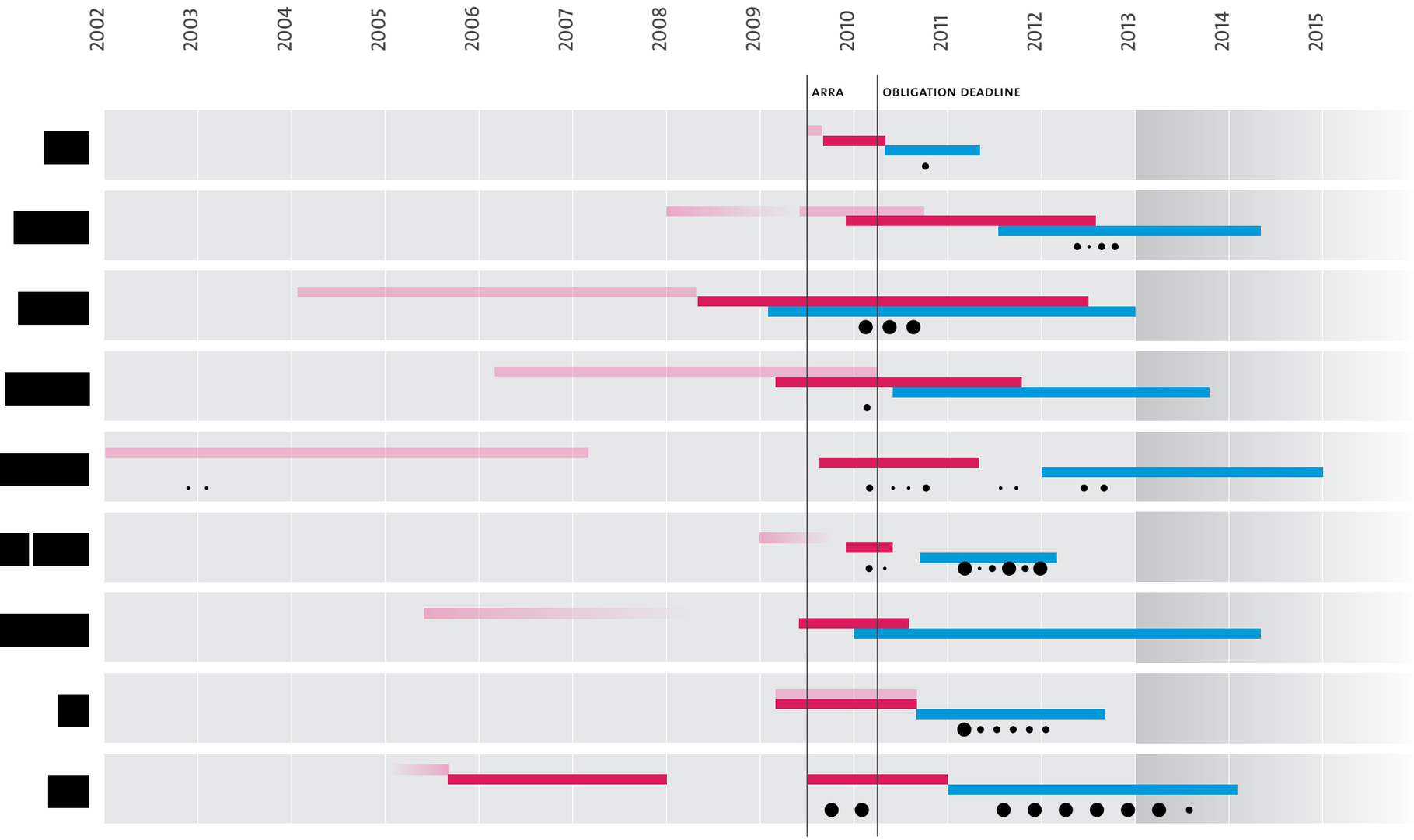
Timelines



Planning
Design
Construction

Turnover (large impact)
Turnover (medium impact)
Turnover (small impact)

Truth Table

Context							Key Ingredients															Outcomes											
							Commercial			Leadership												Logictical & Process Tactics			Team Outcomes							Building Outcomes					
Project Size	Complexity and Risk	Logistical Complexity	Level of scope development at ARRA award	Frquency of scope refinement after ARRA award	Experience Level (Years in Career)	Experience Level (Familiarity)	Presence of shared savings (1=n, 2=y)	Impact of savings and funding process	Impact of GSA funding decisions	Impact of ARRA visionary goals	GSA PM Leadership Capability	GSA Leadership Impact on goal achievment	GSA Regional Leadership Involvement	Accountability	Effective and healthy relationships	Continuity	Core team supported planing for complexity	Early process planning	Processes supported joint planning and decisior	Timely Involvement of partners & stakeholders	Meeting Quality	Extend and Breath of BIM usage	Degree of Co-location	Trust and Respect	ALigned Goals	Effective Communication	Decisions Quality	Collaboration	Team Capability	BIM Impact	Design includes Innovative Technology	Conribution to advancing sustainable technol-	Impact of scope refinement	Cumulative ARRA Outlay Performance	Monthly ARRA Outlay Deadline Performance	Overall Project Success
1.00	3.88	2.2	1.38	2.88	4.00	1.67	2.00	3.45	3.82	3.91	4.30	3.83	3.48	2	4.11	1.00	4.14	3.00	2.86	2.63	4.19	3.50	2.00	2.88	3.71	2.86	4.08	4.25	4.00	3.86	4.00	2.00	3.38	3.00	3.60	4.34
5.00	4.19	3.00	1.15	3.63	4.00	2.37	2.00	3.02	3.87	4.18	4.30	3.84	3.16	1.95	3.93	2.80	4.06	2.88	2.82	2.72	3.96	3.96	5.00	2.8	3.49	2.69	3.84	4.58	4.31	3.88	5.00	1.94	3.94	5.00	4.20	4.24
2.00	3.90	2.60	3.60	3.50	2.00	1.94	1.00	–	3.69	3.68	4.34	3.85	2.50	1.94	4.29	4.00	4.29	2.86	2.86	2.49	4.13	3.2	3.00	2.71	3.70	3.00	4.05	3.92	4.43	2.42	–	2.00	3.17	2.00	3.10	4.71
1.00	3.76	2.60	2.50	2.89	4.00	2.55	1.86	3.42	3.33	3.58	4.24	3.70	2.89	1.89	4.17	1.00	4.13	2.89	2.89	2.66	4.24	2.57	2.00	2.78	3.67	2.67	4.11	4.17	4.28	2.40	2.00	2.00	3.89	1.00	2.80	4.27
5.00	3.87	3.00	1.57	2.67	4.00	2.34	1.17	4.40	3.50	3.47	4.01	3.79	3.26	1.89	3.86	3.50	4.22	2.67	3.00	2.70	3.61	2.10	4.00	2.78	3.56	2.67	3.99	3.98	4.00	1.87	4.00	2.00	3.44	2.00	2.70	4.34
1.00	3.54	1.00	1.40	3.21	3.00	2.31	1.00	–	3.32	3.58	3.81	3.71	3.11	1.87	3.86	2.90	3.90	2.65	2.78	2.61	3.74	3.25	3.00	2.64	3.30	2.71	3.46	3.64	3.96	2.88	1.00	1.75	2.95	3.00	3.10	3.96
3.00	3.92	–	3.80	2.75	5.00	2.17	1.00	–	3.47	3.94	3.76	3.60	2.67	2.00	3.95	–	3.75	2.50	2.40	2.26	3.60	–	4.00	2.46	3.00	2.50	3.29	3.85	4.20	–	2.00	2.00	3.50	3.00	2.80	4.01
1.00	4.45	–	1.00	2.88	1.00	2.02	1.67	3.00	3.01	3.53	3.96	3.76	3.26	1.88	3.50	–	3.33	2.43	2.29	2.29	3.79	3.00	3.00	2.55	3.07	2.00	3.66	3.81	3.14	1.92	1.00	1.71	2.00	4.00	3.50	3.42
2.00	4.13	–	2.11	3.45	3.00	2.23	1.89	3.21	2.93	3.32	3.34	3.24	3.32	2.00	3.47	–	3.18	2.73	2.33	2.33	3.25	2.81	4.00	2.35	3.10	2.36	2.86	3.23	3.33	3.22	1.00	1.82	2.33	3.00	2.40	3.88
4.00	4.38	3.80	2.48	3.59	3.00	2.17	1.08	3.00	2.94	3.31	3.36	3.51	3.15	1.87	3.40	4.20	3.27	2.30	2.27	2.28	3.48	2.75	5.00	2.24	2.89	2.30	2.98	3.16	3.10	2.46	1.0	1.93	2.40	2.00	2.90	3.61
2.00	4.16	4.00	3.31	3.78	2.00	1.82	1.50	2.81	2.23	2.76	2.38	2.58	3.04	1.80	2.67	5.80	2.38	1.69	1.67	1.72	2.92	–	2.00	1.76	2.20	1.67	2.33	2.40	1.79	–	1.00	1.43	1.39	1.00	2.80	2.39

Federal Center South Bldg 1202

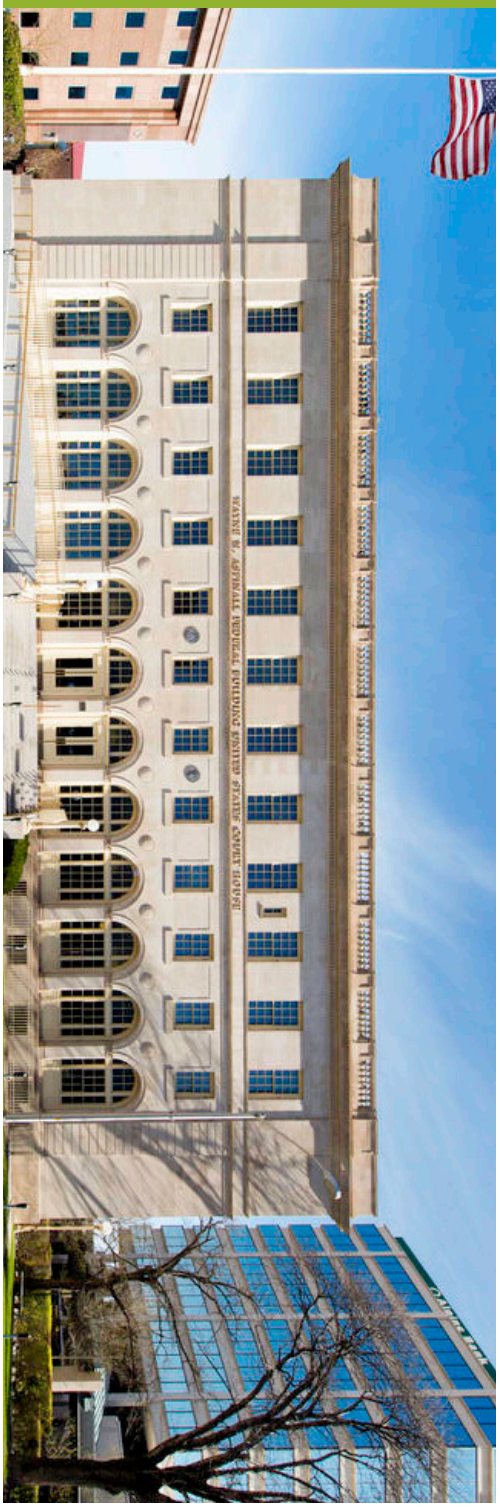
New Construction

Edith Green Wendell Wyatt

Renovation

Wayne N. Aspinall Federal Building

Historic Renovation



	Energy Metrics			Daylight & IAQ Metrics			Water Cycle & Materials Metrics		
Wayne N. Aspinall Federal Building	0	14	78 %	50 %	92 %	0 %	40 %	N	?? %
	Total Net EUI 0 kBtu/sf/year	**Total EUI** 14 kBtu/sf/year	**Reduction** 78% reduction from national median building type EUI	**Fully Daylit** 50% of occupied areas have daylighting at levels that allow lights to be turned off	**Views to Outdoors** 92% of occupied spaces have views to the outdoors	**Operable Windows** 0% of occupied areas are within 15 feet of an operable window	**Water Reduction** 40% reduction of regulated potable water	**Potable Irrigation** No permanent landscape irrigation system	**Stormwater Cntrl** ??% of rainwater from 2-year storm event can be managed onsite
Edith Green Wendell Wyatt	29	30	55 %	51 %	96 %	0 %	61 %	Y	90 %
	Total Net EUI 0 kBtu/sf/year	**Total EUI** 14 kBtu/sf/year	**Reduction** 78% reduction from national median building type EUI	**Fully Daylit** 50% of occupied areas have daylighting at levels that allow lights to be turned off	**Views to Outdoors** 92% of occupied spaces have views to the outdoors	**Operable Windows** 0% of occupied areas are within 15 feet of an operable window	**Water Reduction** 40% reduction of regulated potable water	**Potable Irrigation** No permanent landscape irrigation system	**Stormwater Cntrl** ??% of rainwater from 2-year storm event can be managed onsite
Federal Center South Bldg 1202	21	21	74 %	61 %	90 %	0 %	79 %	Y	100 %
	Total Net EUI 0 kBtu/sf/year	**Total EUI** 14 kBtu/sf/year	**Reduction** 78% reduction from national median building type EUI	**Fully Daylit** 50% of occupied areas have daylighting at levels that allow lights to be turned off	**Views to Outdoors** 92% of occupied spaces have views to the outdoors	**Operable Windows** 0% of occupied areas are within 15 feet of an operable window	**Water Reduction** 40% reduction of regulated potable water	**Potable Irrigation** No permanent landscape irrigation system	**Stormwater Cntrl** ??% of rainwater from 2-year storm event can be managed onsite

IPD: Performance, Expectations, and Future Use

A Report On Outcomes of a University of Minnesota Survey

September 25th, 2015

Contents

Overview

Effective project delivery meets or exceeds owner's expectations for schedule, cost and quality. There is an emerging body of research that shows more collaborative/integrated delivery is more likely to lead to successful outcomes and high-level team performance. Within that context, this survey takes a snapshot of current perceptions of effectiveness on projects using multiparty agreements, the most formal and contractually binding of the integrated delivery methods.

Conducted by the University of Minnesota and sponsored by Canada's Integrated Project Delivery Alliance, the goal of this survey was to understand the current state of Integrated Project Delivery (IPD).

This goal was pursued through use of a broad-based comparative survey. Each survey response collected data for one IPD project from one respondent's experience. If the respondent had multiple IPD project experience, they could take the survey multiple times, entering data for one project each time. Individual stakeholders on the same project could be matched by project name during the data analysis. For the purpose of this survey, IPD was defined as a multi-party agreement.

The survey was short and required no preparation. With one specific IPD project in mind, respondents began the survey by verifying the use of a multiparty agreement (those with other types of agreement were thanked and survey ended). For those who confirmed multiparty, survey gathered basic demographic data about the respondent and their project, followed by three questions:

- Comparison of this IPD experience with non-IPD project experience
- The meeting of expectations on this project
- Likelihood of future use of IPD

Key Findings

Significantly Positive

- Responses are significantly positive, strongly supportive of IPD as a superior delivery method.
- Distribution of responses is weighted heavily toward the most positive possible answers, not clustered around the neutral point.
- The overwhelmingly positive response is consistent across all demographics: stakeholder type, project type, project progress, project averages, and past respondent experience.

Owner Expectations

- Owners' expectations were met or exceeded more than architects, contractors, or others. When owners compare their expectations of IPD at the start of the project to the project outcomes, they overwhelmingly say their expectations were met, exceeded, or significantly exceeded.

Choosing IPD

- Reasons for choosing IPD are varied but seem to be most important where there is a desire for more team integration, a challenging budget, and/or where the owner requires the use of IPD.

Diverse Data Set

- The 108 response / 59 project data set represents a broad cross-section of building type, project location, project scope, project progress, and stakeholder background. BIM and Lean tools were used to varying degrees on almost all projects.

For Consideration

- Positive survey outcomes may reflect interest, engagement, and approval of early adopter owners and AEC professionals, and may additionally be influenced by project teams constructed of skilled and motivated practitioners.

Challenges and Needs

Respondents had an opportunity to comment on their experience. Some comments reflect challenges and needs:

Challenges IPD teams face

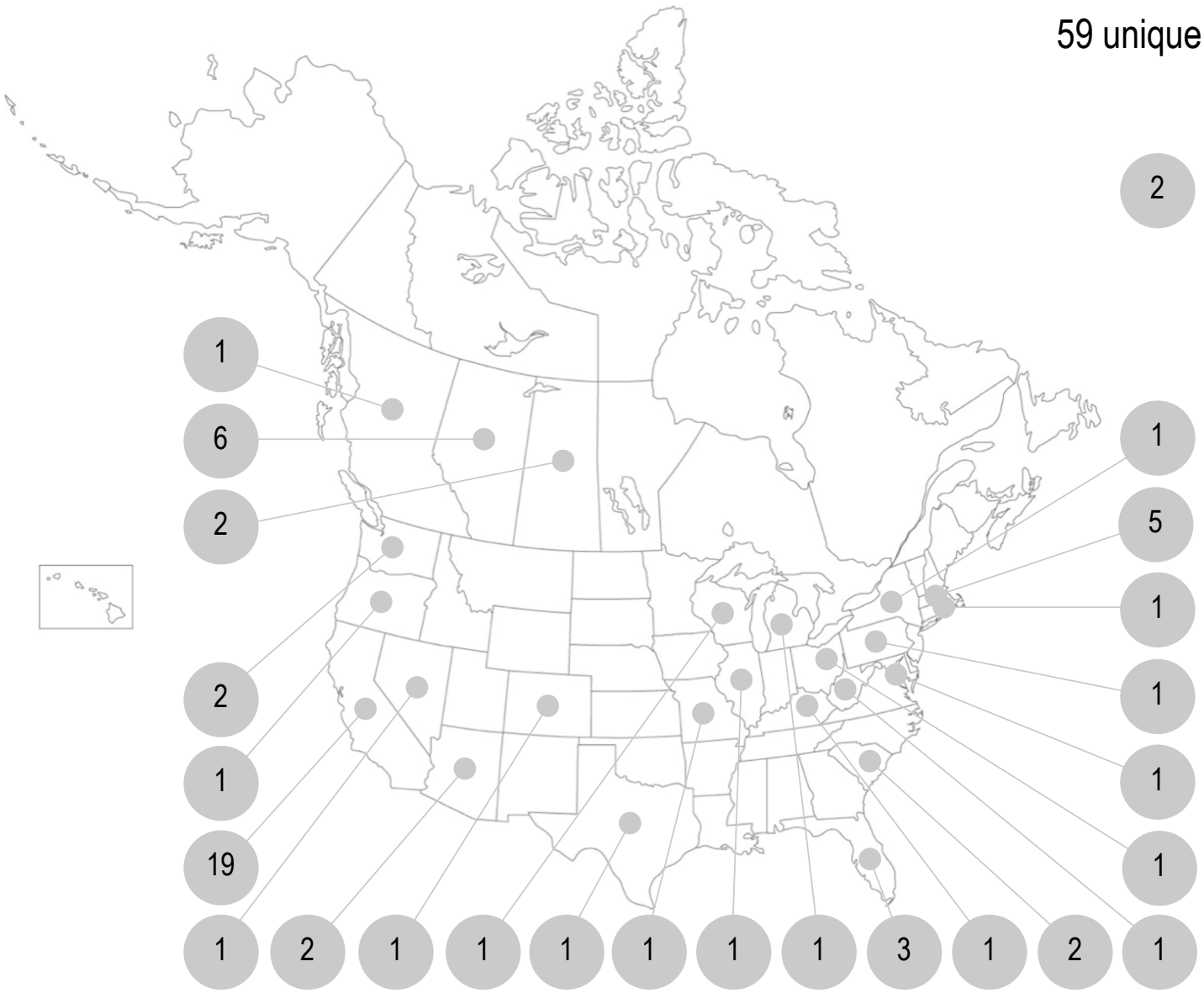
- Unwillingness to fully embrace IPD, its hard to let go of traditional roles
- Understanding of what is IPD (and what it takes to succeed) is uneven in the industry
- Negative performance by any single stakeholder can disrupt the whole team
- Changes in personnel can have a large negative impact

IPD Teams have particular need for:

- Alignment and commitment across the team
- Strong owner involvement
- Strong leadership
- Having the right people involved at the right time
- Increased and earlier planning
- Careful attention to fees/time
- Maintaining focus on key project goals
- Accountability among team members.

Projects | Distribution

59 unique projects



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Projects | Breakdown

		Location	Type	Scope	Progress	Year
1		Arizona	Health Care	$10-$25 million	Completed	2014
2			Industrial	over $50 million	Completed	2014
3		California	Government/Civic	under $10 million	Completed	2015
4			Health Care	under $10 million	Completed	2010
5					Completed	2014
6					Completed	2012
7					Completed	2014
8					Completed	2015
9				$10-$25 million	Completed	2015
10					Completed	2010
11					Completed	2008
12					Completed	2014
13				over $50 million	Construction	
14					Construction	
15				over $50 million	Completed	2014
16					Completed	2013
17					Completed	2014
18					Completed	2013
19			Industrial	$10-$25 million	Completed	2015
20				$25-$50 million	Design	
21			Other	under $10 million	Construction	
22		Colorado	Education (college/university)	over $50 million	Completed	2008
23		District of Columbia	Cultural	over $50 million	Design	
24		Florida	Health Care	under $10 million	Completed	2015
25			Other	over $50 million	Construction	
26			Recreational	over $50 million	Design	
27		Illinois	Education (college/university)	$25-$50 million	Completed	2014
28		Kentucky	Health Care	$25-$50 million	Design	
29		Massachusetts	Mixed Use	$10-$25 million	Construction	
30					Design	
31			Office	$10-$25 million	Construction	
32					Design	
33				$25-$50 million	Design	
34		Michigan	Education (college/university)	$10-$25 million	Completed	2014
35		Missouri	Health Care	$10-$25 million	Completed	2008
36		Nevada	Health Care	$25-$50 million	Construction	
37		New York	Other	over $50 million	Completed	2015
38		Ohio	Health Care	over $50 million	Completed	2015
39		Oregon	Other	over $50 million	Design	
40		Pennsylvania	Utilizes/Power/Water/Sewer	$10-$25 million	Completed	2013
41		Rhode Island	Education (college/university)	$10-$25 million	Completed	2013
42		South Carolina	Health Care	under $10 million	Completed	2012
43				over $50 million	Design	
44		Texas	Office	$25-$50 million	Completed	2013
45		Washington	Health Care	$10-$25 million	Completed	2014
46				over $50 million	Completed	2010
47		West Virginia	Utilizes/Power/Water/Sewer	$10-$25 million	Completed	2012
48		Wisconsin	Education (college/university)	over $50 million	Completed	2011
49		Alberta	Education (K-12)	over $50 million	Completed	2017
50			Government/Civic	under $10 million	Construction	2015
51					Completed	
52			Mixed Use	$25-$50 million	Design	
53			Multi-family Residential	under $10 million	Design	
54			Office	under $10 million	Completed	
55		British Columbia	Office	under $10 million	Completed	2010
56		Saskatchewan	Health Care	over $50 million	Completed	2015
57				over $50 million	Design	
58		New South Wales	Single-family Residential	under $10 million	Completed	2015
59		Jordan	Health Care	over $50 million	Construction	

59 unique projects

- 48 in U.S.
- 9 in Canada
- 2 outside of North America

Project Types

• Education (K-12)	1
• Education (college/university)	5
• Health Care	28
• Cultural	1
• Recreational	1
• Office	5
• Industrial	3
• Mixed Use	3
• Government/Civic	3
• Single Family Residential	1
• Multi-Family Residential	1
• Utilities Power/Water/Sewer	2
• Other	5

Project Scopes

• Under $10M	15
• $10M to $25M	16
• $25M to $50M	7
• Over $50M	21

Project Status

• Design	12
• Construction	9
• Complete	38

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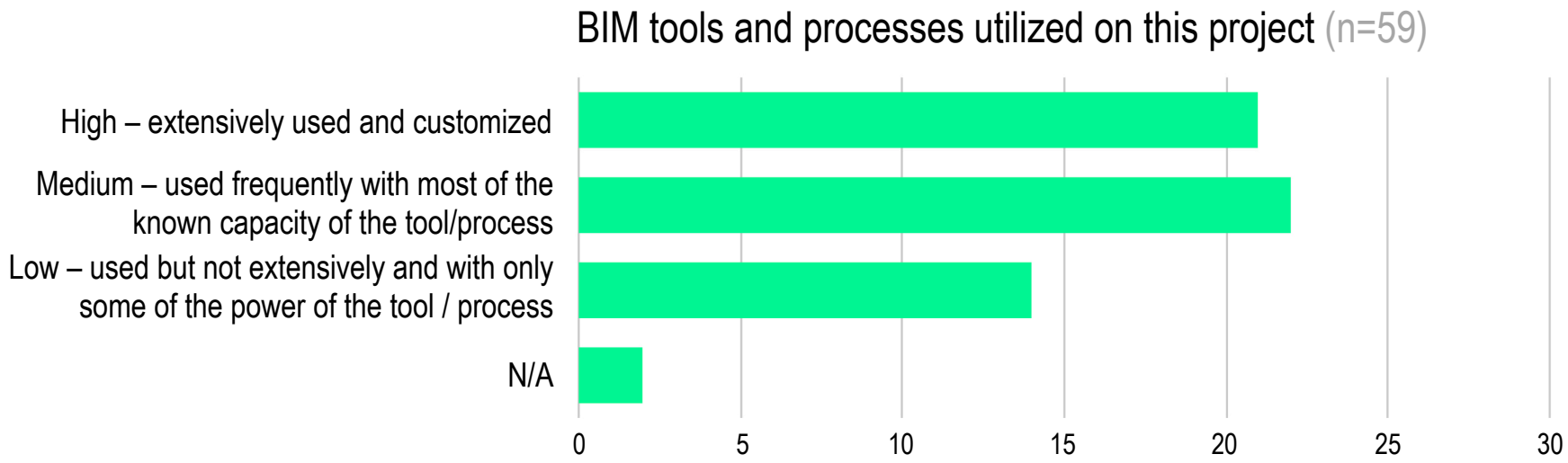
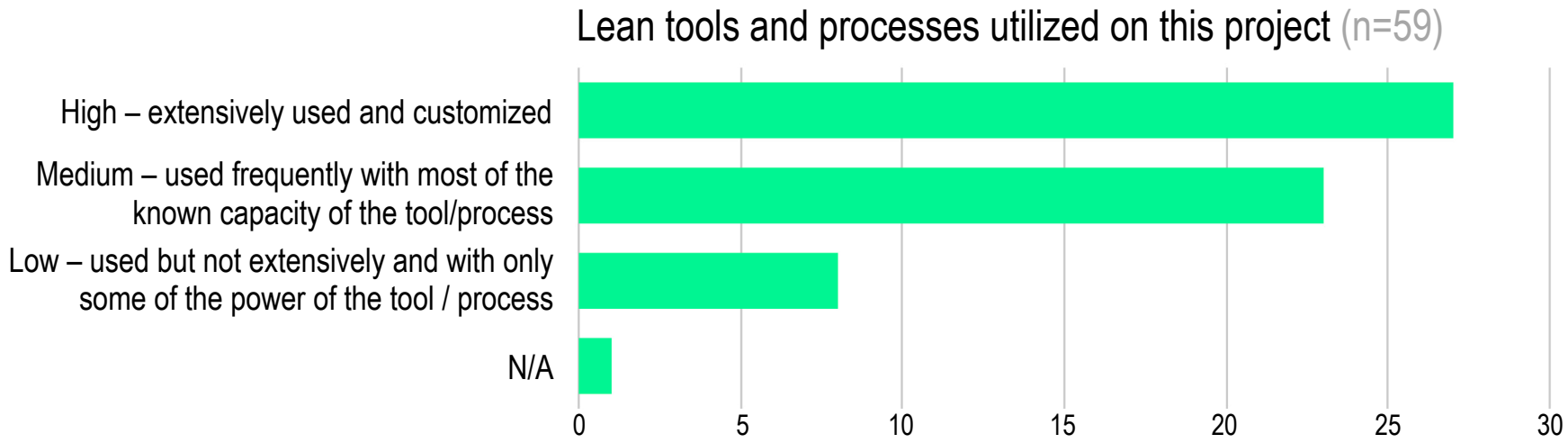
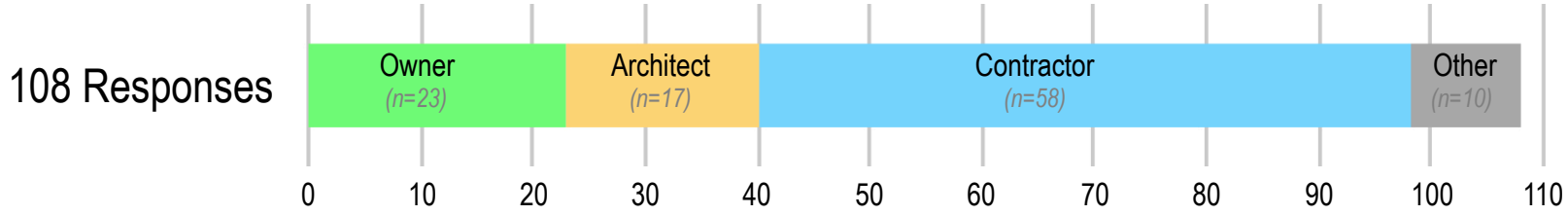
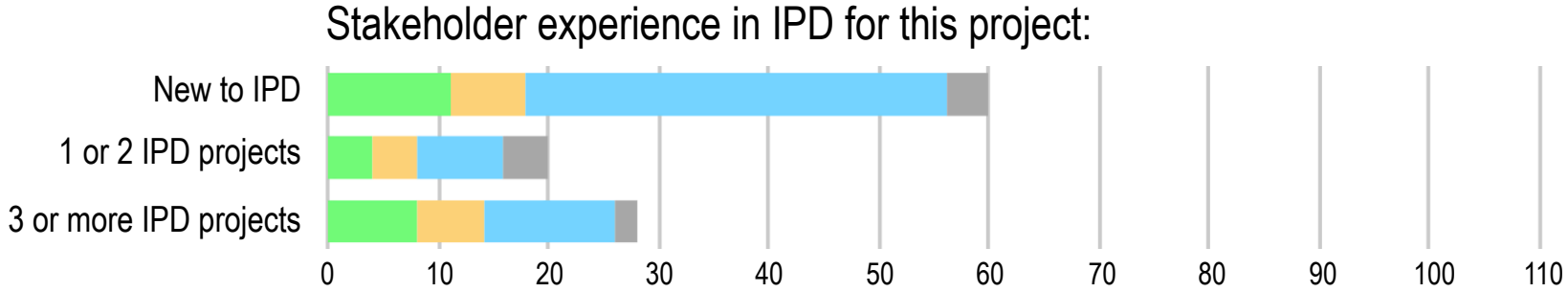
Projects | Use of BIM and Lean

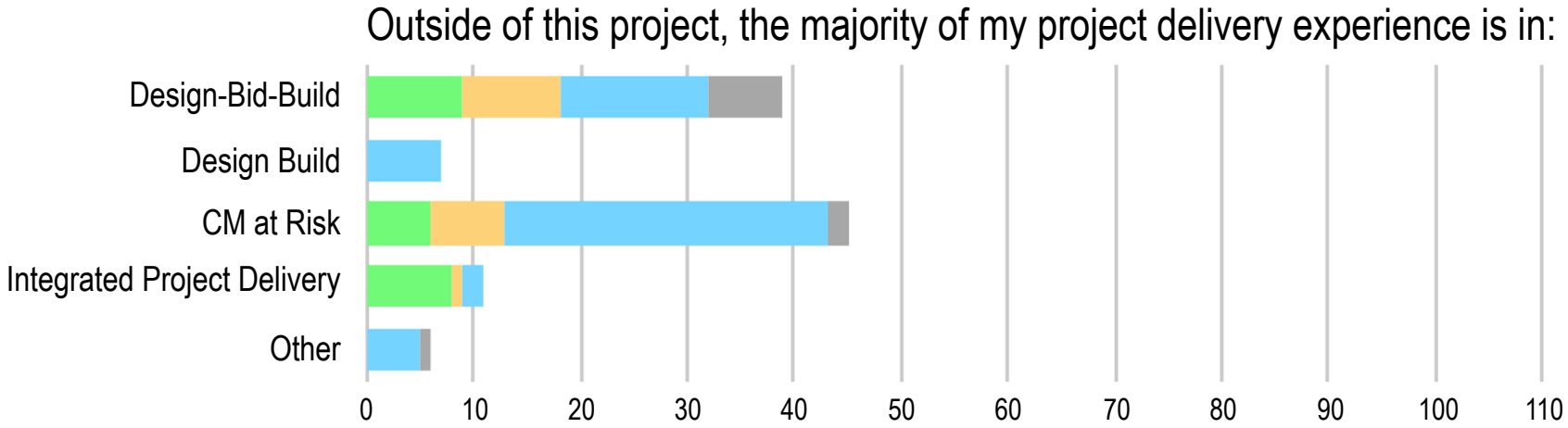




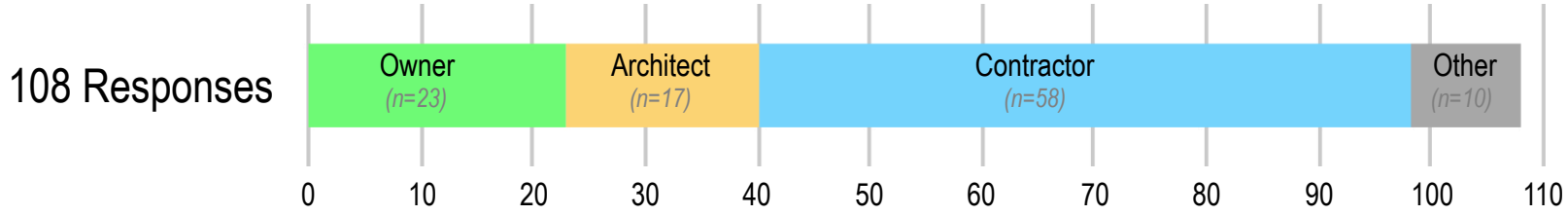
Respondents | Past Experience



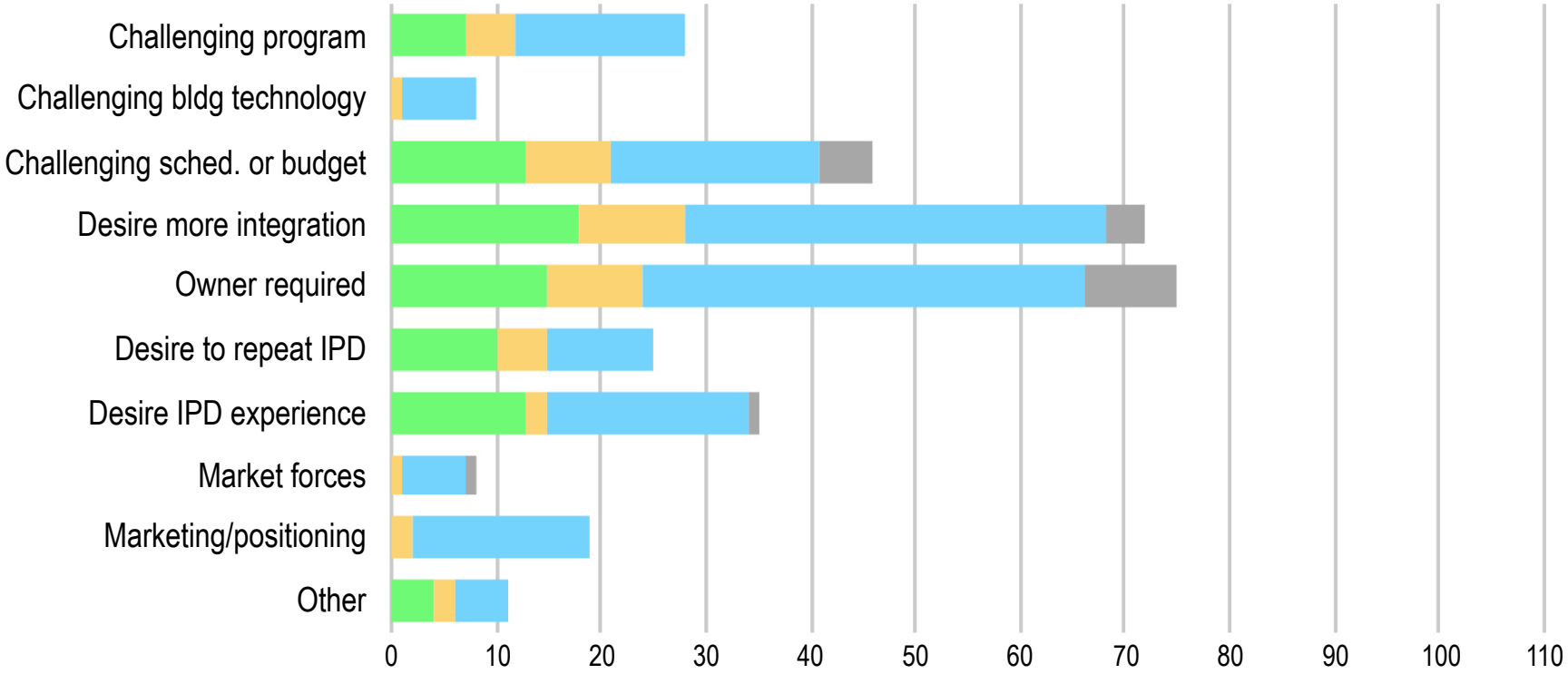




Respondents | Why IPD?

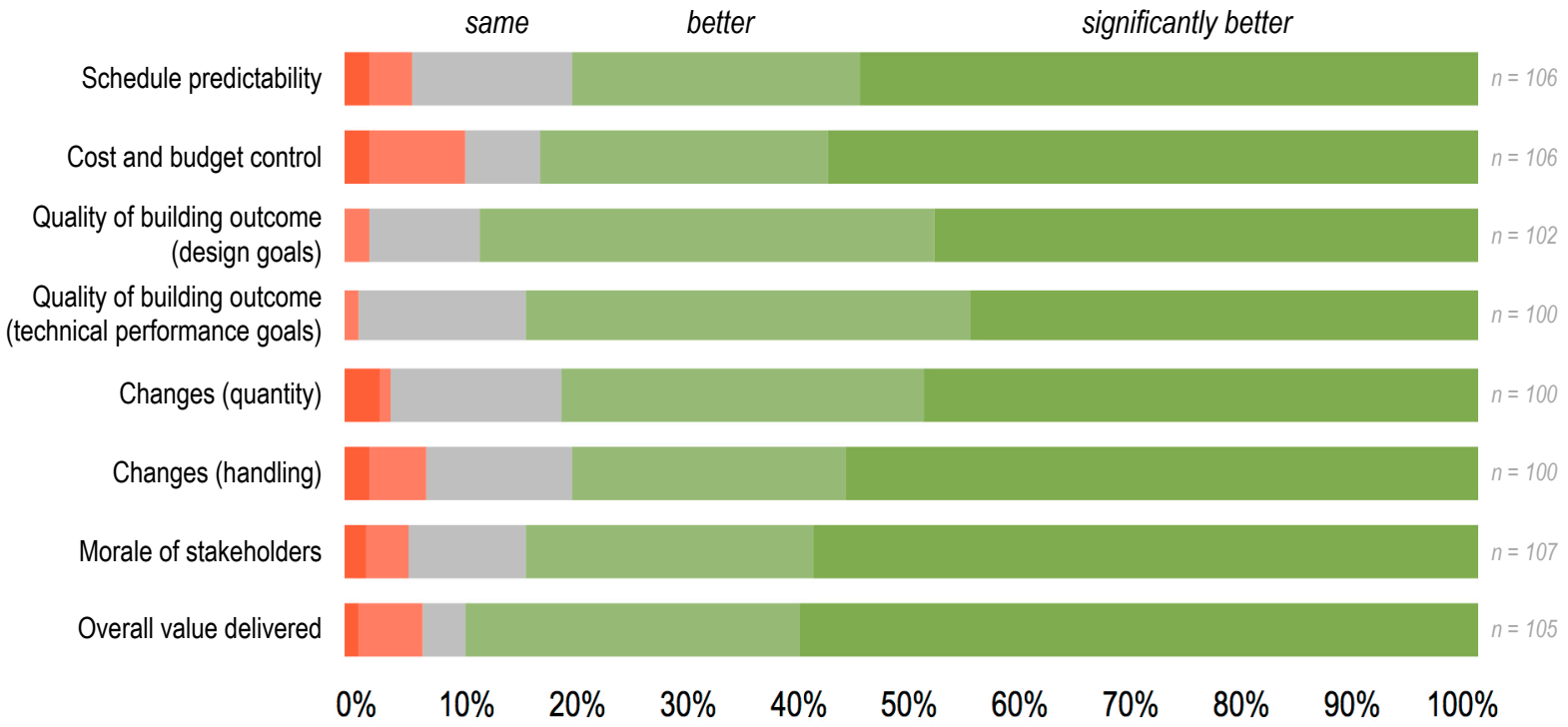


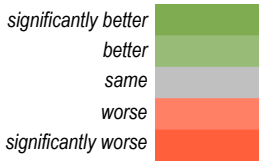
The reason(s) we chose IPD were:



Performance | All Responses

Compared to your experience on non-IPD projects, rate your impression of the performance of this project in each of the categories below.





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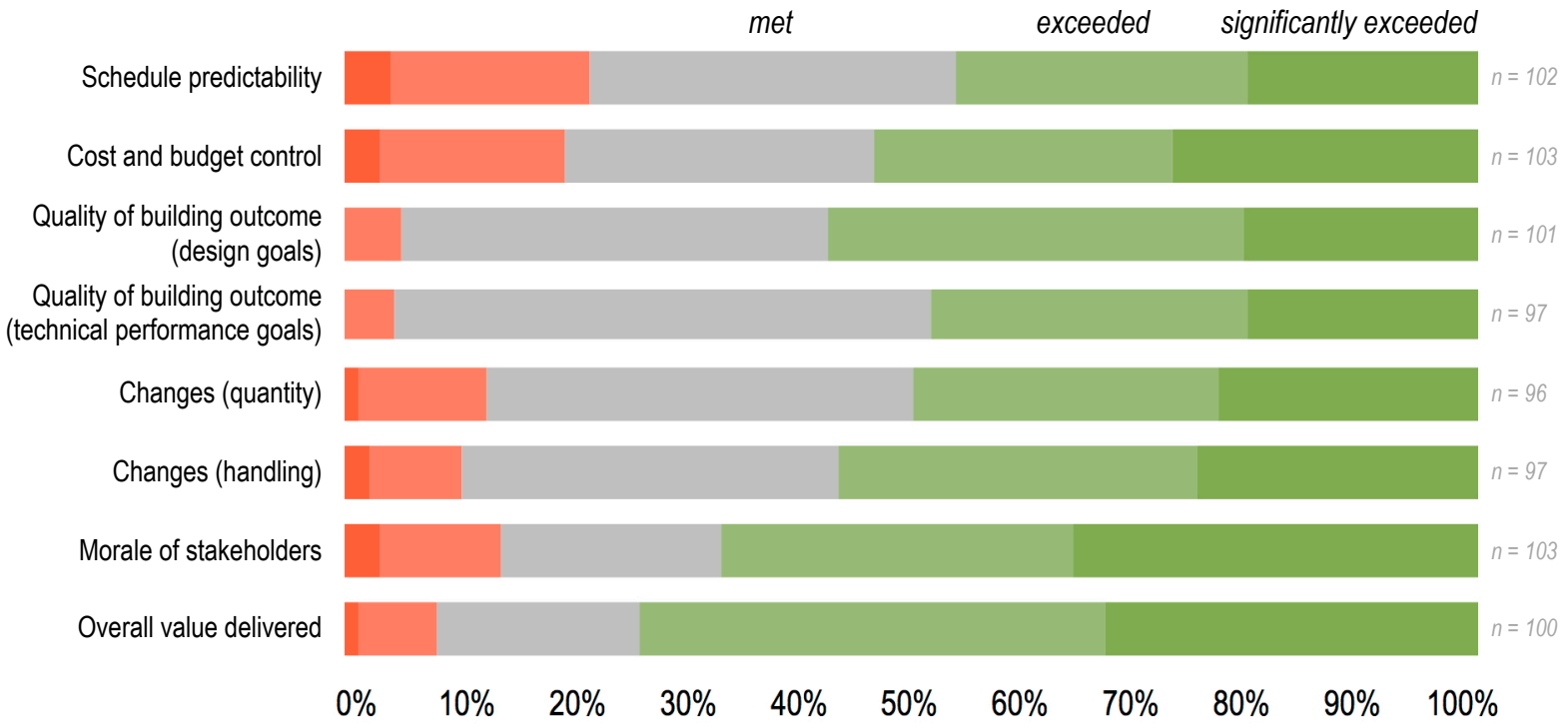
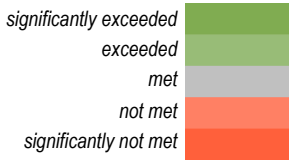
Expectations | All Responses

Considering your expectations at the start of this project, rate the outcomes of this project in each of the categories below.





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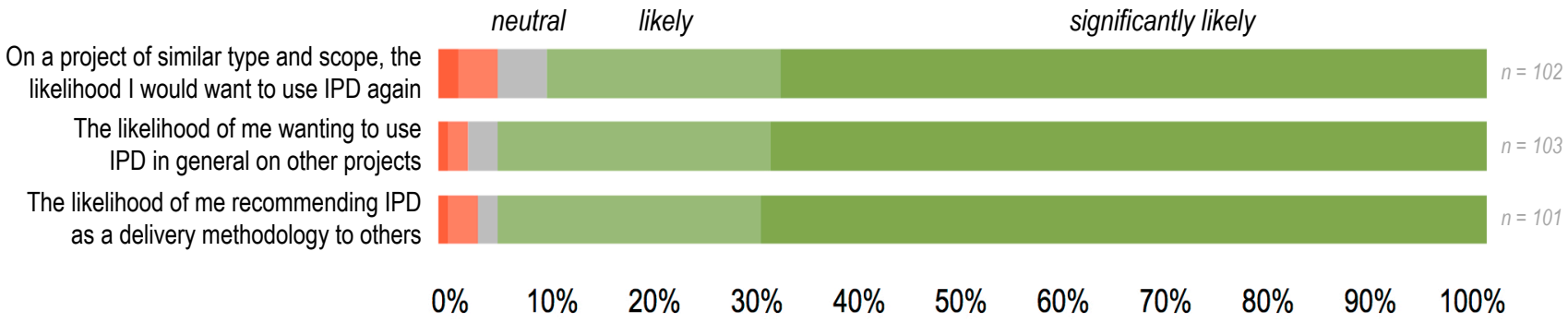
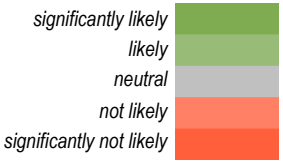
Likelihood | All Responses

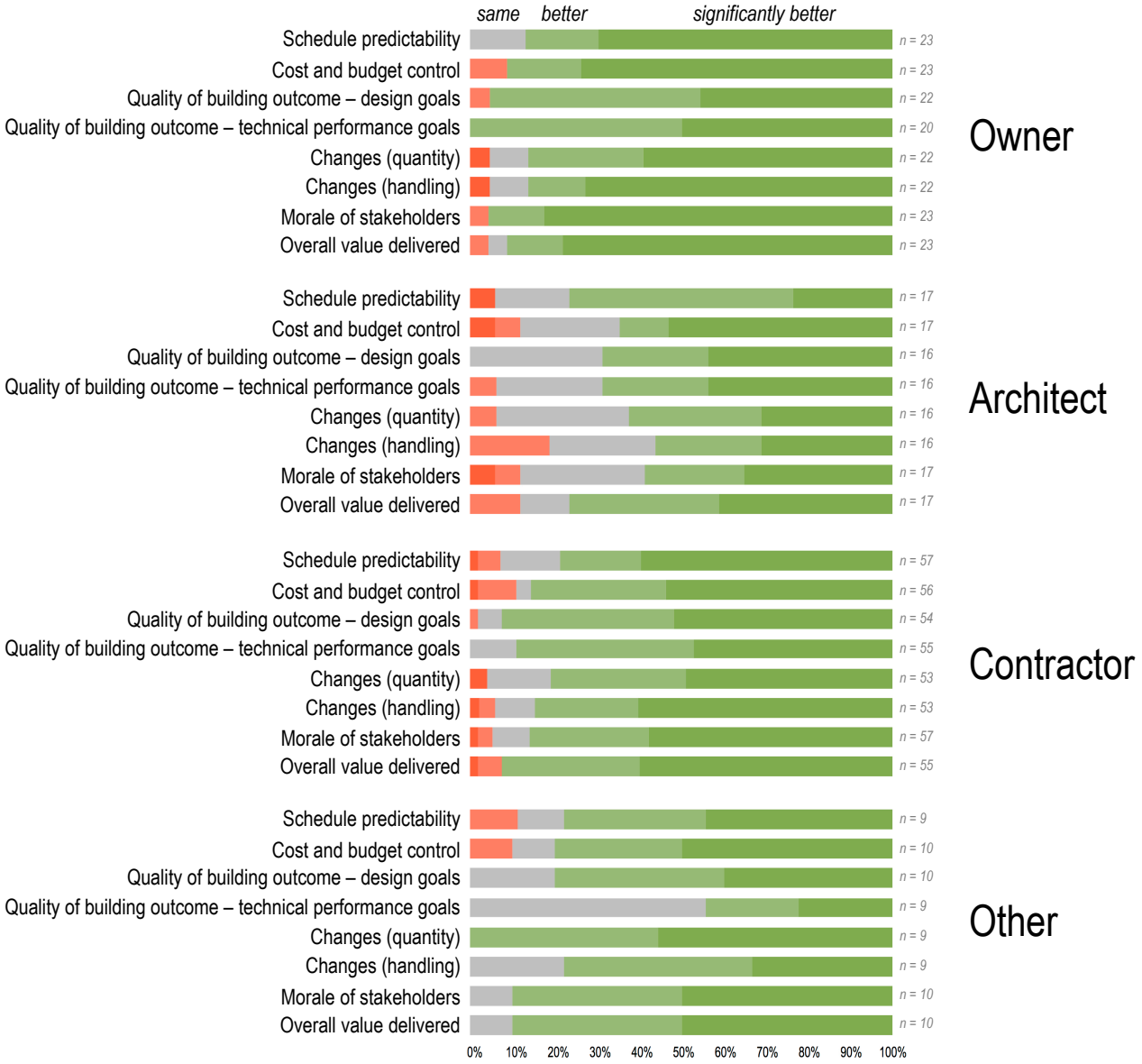
Identify the likelihood for each of the following statements:





Performance | Stakeholder

Compared to your experience on non-IPD projects, rate your impression of the performance of this project in each of the categories below.



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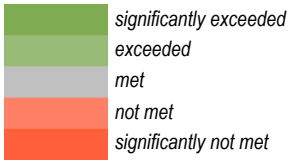
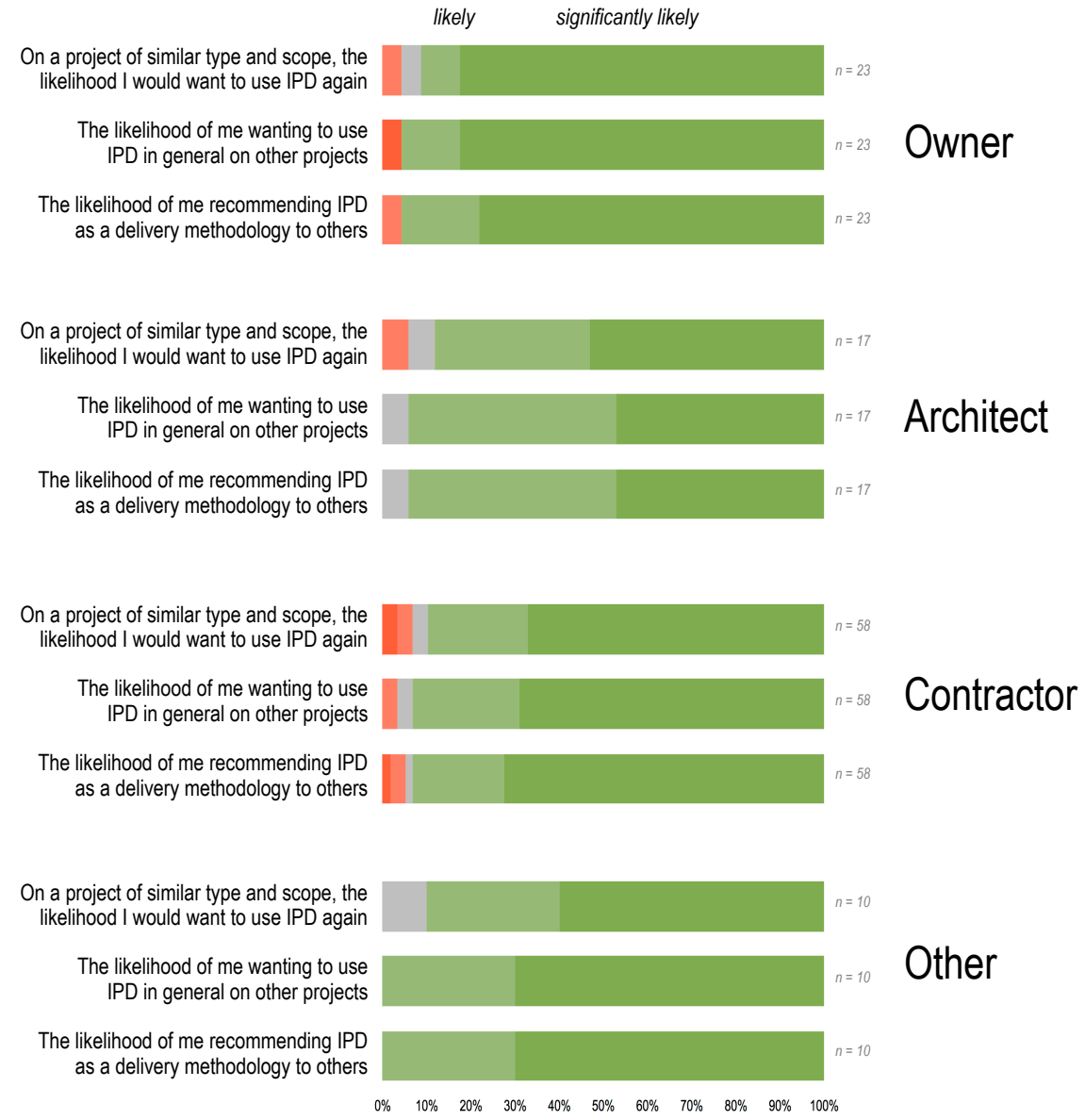
Expectations | Stakeholder

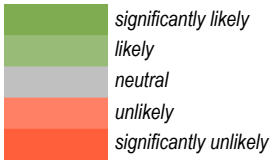
Considering your expectations at the start of this project, rate the outcomes of this project in each of the categories below.



Likelihood | Stakeholder

Identify the likelihood for each of the following statements:





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Survey Open Through September 2016!

The data in this report was collected between July 9th and September 15th 2015. We recognize that many stakeholders on past or current projects did not have the chance to participate and as such their experiences are not represented in this data set.

To increase the robustness of the report, the survey will remain open until September 15th 2016, followed by a revised report.

If you are have worked on or are currently working on an IPD project, please take the survey here:
http://survey.az1.qualtrics.com/jfe/form/SV_5uPcumvO8xJu9CZ

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The Integrated Project Delivery Alliance (IPDA) is a group of organizations that seek to advance integrated project delivery (IPD) as a delivery method in Canada. The mission of the IPDA is to promote best practices that enhance IPD.
www.ipda.ca

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This concludes The American Institute of Architects
Continuing Education Systems Course

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