

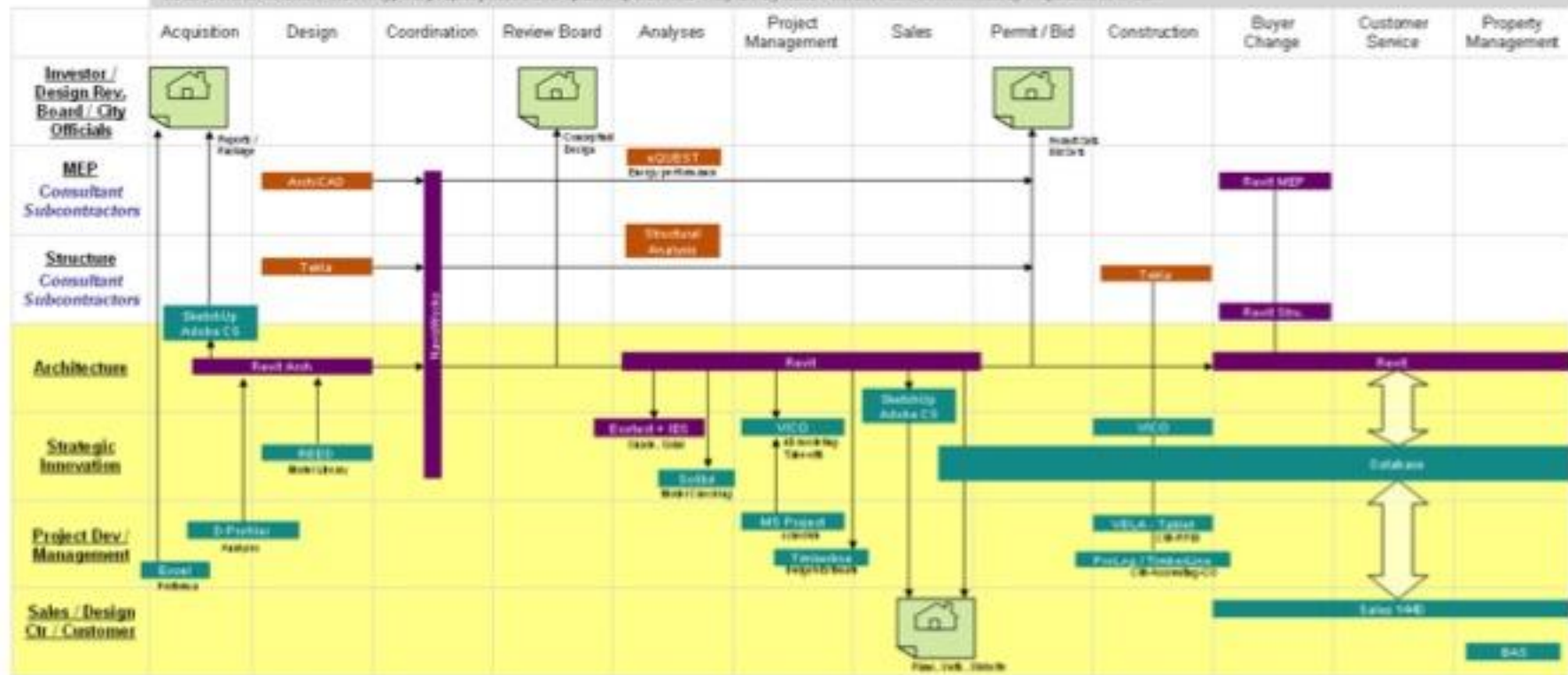
What is good BIM and VDC?



Optima Camelview, Arizona

David Hovey FAIA

Note: Vertical columns denote typical project phases and Optima operations. They are by nature iterative and not necessarily sequential in order.



Camelview Technology Roadmap

The industry sometimes claims that it's "90% sociology and 10% technology". With a highly vertically integrated team (same team who handles all the yellow rows in the roadmap), we'd submit the reverse—that interoperability issues between all the applications is 90% of our re-work, re-model. Even though discipline-specific BIM has offered a lot of value when compared to status-quo, but Camelview has to maintain the following models because of interoperability issues:

Models:

2 Revit models (one for architectural, another re-model for gbxml reasons), Tekla for Structure, IES for energy, Ecotect for solar, eQuest for energy, ArchiCAD for construction model, VICO estimator, VICO Control, Sales1440 for sales data, VICO 5D presenter, NavisWorks

Exchanges:

All native forms of the above applications, IFC, gbXML



How do we judge this project?

How do we learn from this project?

Optima Camelview, Arizona

David Hovey FAIA

optima[®]



Reasons for Failure

- Low bid 3D model - not following modeling guidelines
- Lack of management support for VDC champions
- Attention to marketing vs. sustaining personnel
- Unclear metrics for pilot - what do project team and company want to learn from pilot?
- Lack of strategy to go from pilot projects to widespread implementation
- Low transfer of knowledge from projects to corporate
- No career path for BIM engineers & champions
- Too much or too little level of detail

Calvin Kam

PhD, AIA, PE, LEED AP



Stanford University

CIFE Director of Industry Programs

Consulting Assistant Professor



bimSCORE

Founder & CEO



GSA National 3D-4D-BIM Program

Co-Founder

Senior Program Expert



American Institute of Architects - National

2010 & 2011 Chair, Technology in Architectural Practice

2011 & 2012 Co-Chair, Center for Integrated Practice

We provide a space with solutions




Senate
PROPERTIES

Assess state-of-the-art technologies and information standard:

- » Object-Oriented Product Modeling
- » 4D Modeling
- » Industry Foundation Classes
- » Virtual Reality—CAVE
- » Thermal Comfort and Energy Simulation
- » CFD Analysis
- » Lighting Simulation
- » Automated Cost Estimating and Scheduling
- » Life-Cycle Cost Analysis

PM4D Final Report

CIFE Technical Report Number 143
By Martin Fischer and Calvin Kam
October 2002



Senate Properties

Olof Granlund Oy

YIT Corporation

Finland

CIFE, Stanford University

United States of America

Different applications require specific “bridges” and interpretations of 3D geometry.

How should we construct and share a product model?

Cost Estimate & Value Engr.

COVE

*Layering and naming
comply with database*

3D+Time Visualization

4D

*Geometry break down
according to activities*

Life-Cycle Cost/Environmental Impact

LCC/LCA

*Distinction between
material types*

Architectural CAD

ArchiCAD

*Reduce 3D polygons
with texture map*

Computational Fluid Dynamics

CFX

*Boundary continuity
and “watertight”*

Lighting

Lightscape

*Interior surface
continuity*

Thermal Simulation

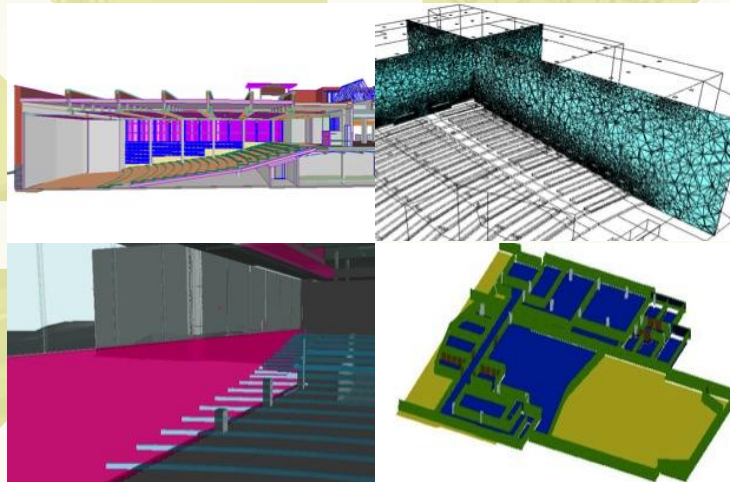
RIUSKA

*Wall breaks at
room slab*

Mechanical Design

MagiCAD

*Incorporation of
thermal data*

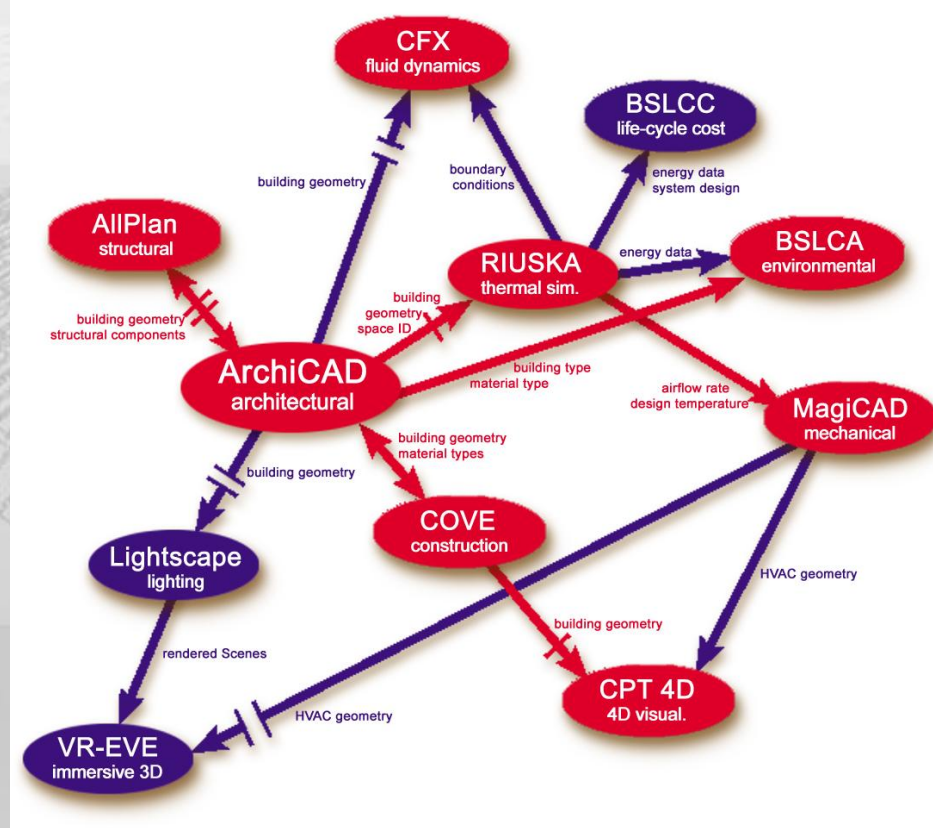


Research Needs

- *Partial data exchanges*
- *Model Server approach*
- *Schema extensibility*
- *More pilot applications*

Development Needs

- *More IFC import and export compatibilities*
- *Robustness of software applications*
- *Privilege and liability of the shared information*





- 8,700 buildings
- 350 million square feet
- 2,100 communities
- serves >1 million federal workers
- >200 major capital projects
- valued at \$12 Billion USD
- \$5 Billion USD Stimulus

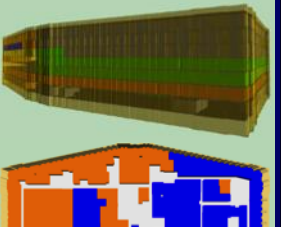
GSA's National 3D-4D-BIM Program

From introduction in 2003
to pilots and technology/guidance development,
to upper management policy and budget
to GSA national program deployment and
support
to US national standards
to international agreements

Mandated Requirement on all GSA Projects since 2006

100+ Projects To Date

16 National Contracts up to \$30 million each





IPE-BIM 2013 PANELS

Dr. John Keung
(Chairman)



Mr. Lee Chuan Seng
(Co-chairman)



Dr. Calvin Kam
(USA)



Prof. Stephen Lockley
(UK)



Prof. Kim Inhan
(Korea)



Dr. Marcus Schreyer
(Germany)



Mr. Øivind Røoth
(Norway)



Prof. Michael Ostwald
(Australia)

NEW!



Mr. Chng Chee Beow
(CEL)



Prof. Heng Chye Kiang
(NUS)



Er Lai Huen Poh
(RSP)



Mr. Pek Lian Guan
(Tiong Seng)



Mr. William Lau
(BuildingSMART S'pore)



Ms Helen Chen
(CP2M)

NEW!



Mr Norman Wu
(MOHH)

NEW!

Ms Helen Chen and Mr Norman Wu just confirmed joining. We shall update their photo and CV in the next update.

BIM

INNOVATE. INTEGRATE. TRANSFORM WITH BIM.
30 JULY 2013 – 1 AUGUST 2013

This is meant for update to IPE-BIM members ONLY. Do not distribute the contents and information of this slides without acknowledgement/consent of BCA.

Building and Construction Authority

We shape a safe, high quality, sustainable and friendly built environment.

Singapore Building & Construction Authority

2010

- **Centre for Construction IT** facilitates BIM adoption

2011

- Work with key agencies on **pilot projects**

2012

- Prepare Public Projects' Consultants & Contractors to be **BIM ready**

2013

- Mandatory **Architecture** BIM e-Submissions for all new building projects **> 20,000 m²**
-

2014

- Mandatory **Engineering** BIM e-Submissions for all new building projects **> 20,000 m²**

2015

- Mandatory **A & E** BIM e-Submissions for all new building projects **> 5,000 m²**

Source: Singapore BCA

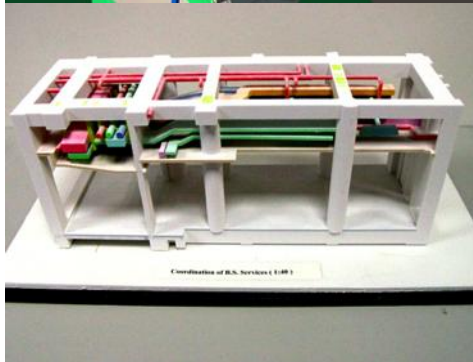
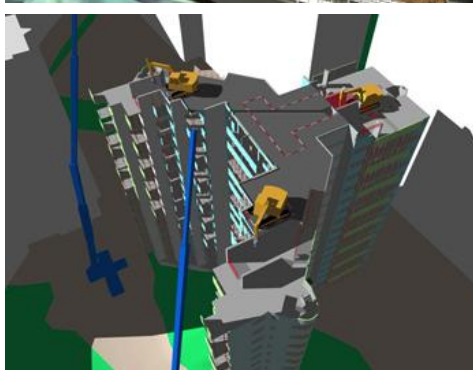
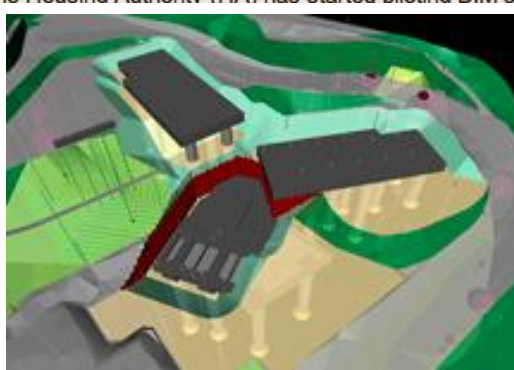


Building Information Modelling



Building Information Modelling (BIM) is the process of creating a three-dimensional, digital representation of building data throughout its life cycle. BIM is an innovative technology for bridging communications between the architecture, engineering and construction industries. Also, with the data packed BIM, various sustainability design and environmental studies can be carried out, such as lighting, ventilation, energy, carbon and green design, etc.

The Housing Authority (HA) has started piloting BIM since



Source: Hong Kong Housing Authority

China BIM Movement



Objectively Evaluating BIM Performance: the VDC Scorecard



Industry Performance of the Time



Benchmarking & Improvements



Expectation _ Outcome

Planning _ Performance

Executive _ Junior

“Hollywood” _ Optimization

108 cases and counting

14 countries

3 years

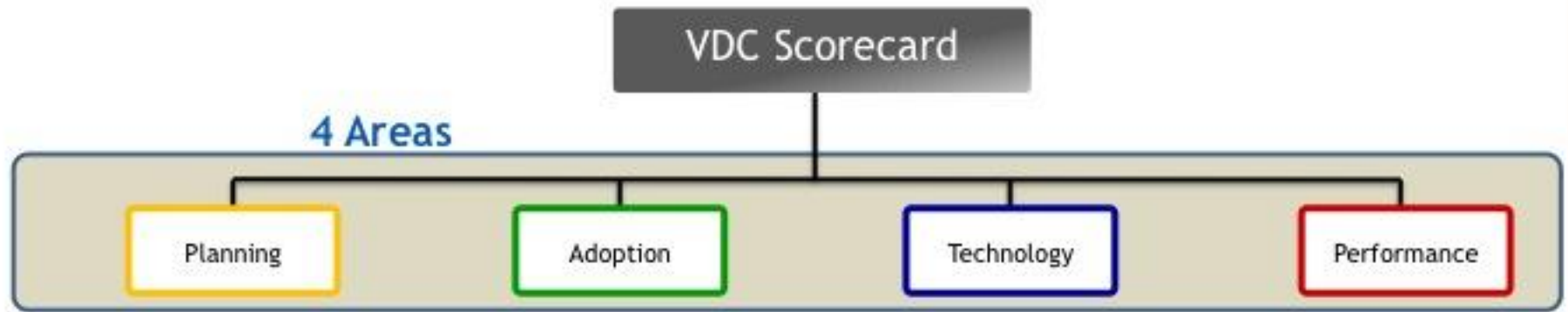


Holistic

Quantifiable

Relevant

Scalable





National Institute of
BUILDING SCIENCES
Facilities Information Council
National BIM Standard



McGraw Hill
CONSTRUCTION

BIM_e



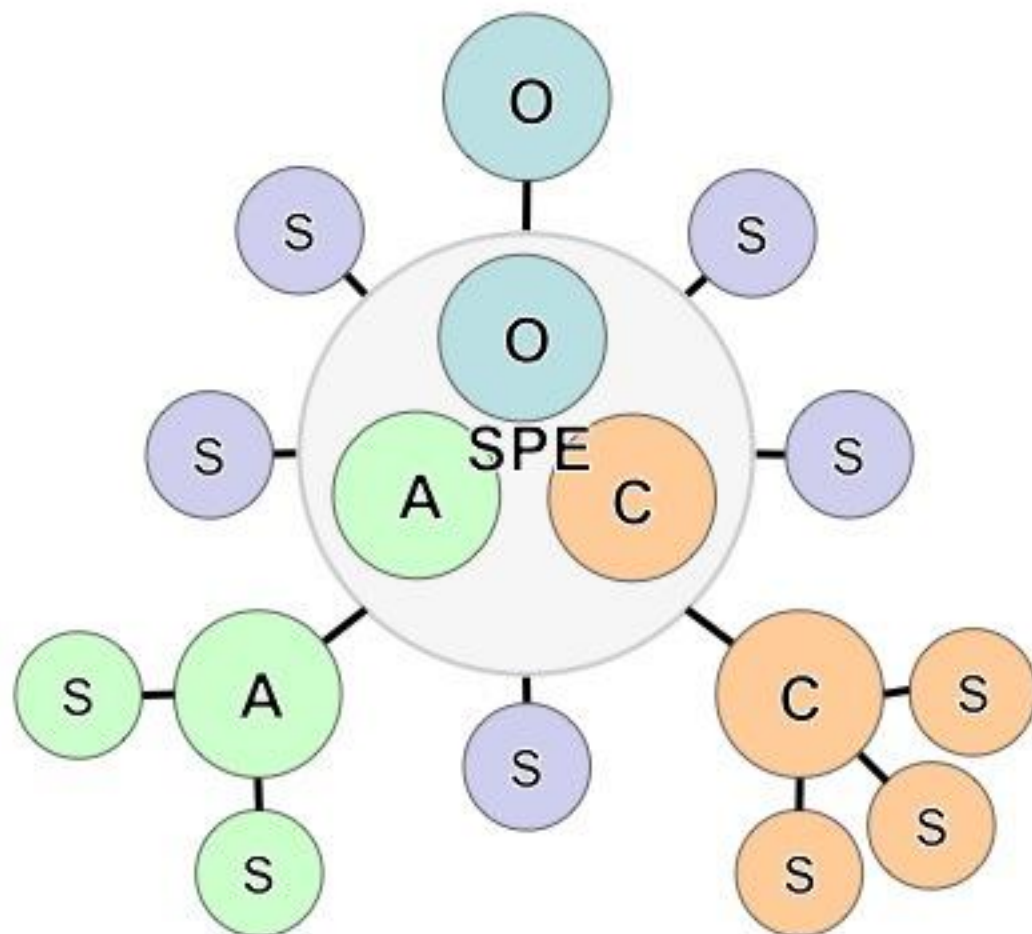
Autodesk®

vico SOFTWARE
Integrating Construction



CIFE
Center for Integrated Facility Engineering

AIA National | AIA-CC (2007)



building an integrated team
early in the process

collaborative, open, intensified
planning

participants share risk and
apply common values, goals

appropriate technology

such as a single-purpose entity



Good design

AIA Documents Committee, National Convention 2008



Metric	Unit of measurement	Value
Latency of Critical Issues	Time to reach resolution	Avoid snowball effect
Commitment Overrun	Days past due date	Address reasons for delays early on
Impact of Issues by Trade, by Schedule, by Cost	% of issues that incurred impact	Fine tuning future BIM efforts by trade accordingly
Detailed Cost Conformance	bid-to-actual cost variance at all phases of estimating	Interpret variances & perfect estimation methodologies
Just-In-Time Delivery	% of material delivered within 24 hrs of use	Streamline procurement and cash flow



Structure & Weight

The VDC Scorecard

1 Score

VDC Scorecard

4 Areas

Planning

Adoption

Technology

Performance



Structure & Weight

The VDC Scorecard

1 Score

VDC Scorecard

4 Areas

Planning

Adoption

Technology

Performance

10 Divisions

Objective

Standard

Preparation

Process

Organization

Maturity

Coverage

Integration

Quantity

Quality



Structure & Weight

1 Score

VDC Scorecard

4 Areas

Planning

Adoption

Technology

Performance

10 Divisions

Objective

Standard

Preparation

Process

Organization

Maturity

Coverage

Integration

Quantity

Quality

Documentation

Guideline

Budget

Project

Stakeholders

Depth

Level of Detail

Communication

Stakeholder Survey

Reduced Design Errors

Metric

Benchmark

Tool

Broader Context

Training

Breadth

Model Use Life Cycle

Interoperability

Post Occupancy S.

Reduced Labor

Etc.

Etc.

Etc.

Etc.

50+ Measures



Holistic

Quantifiable

Relevant

Scalable



Scorecard Scale

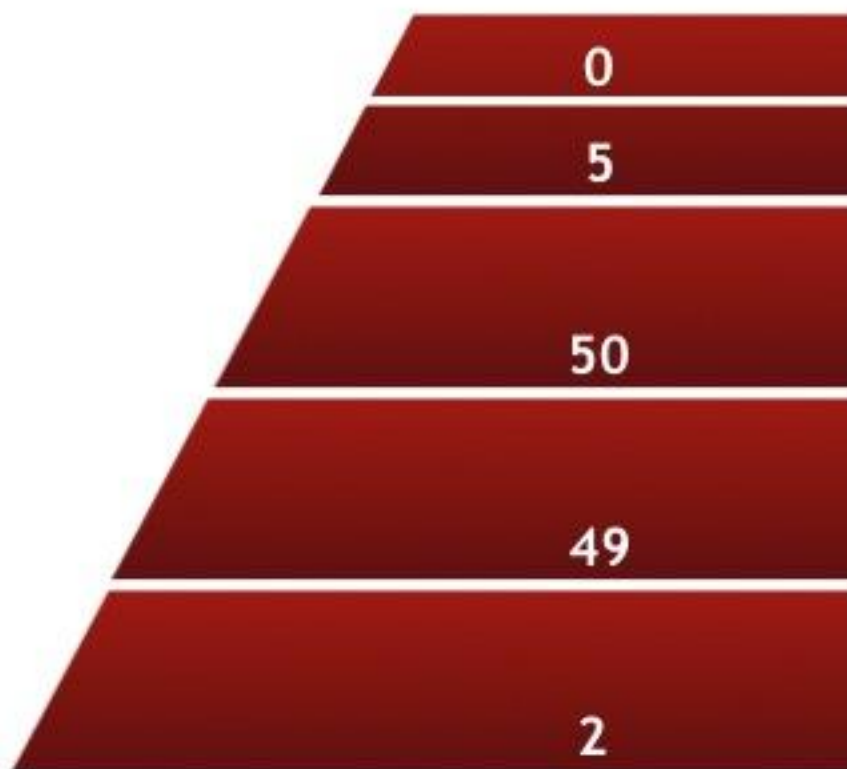
The VDC Scorecard





106 cases from 8 countries

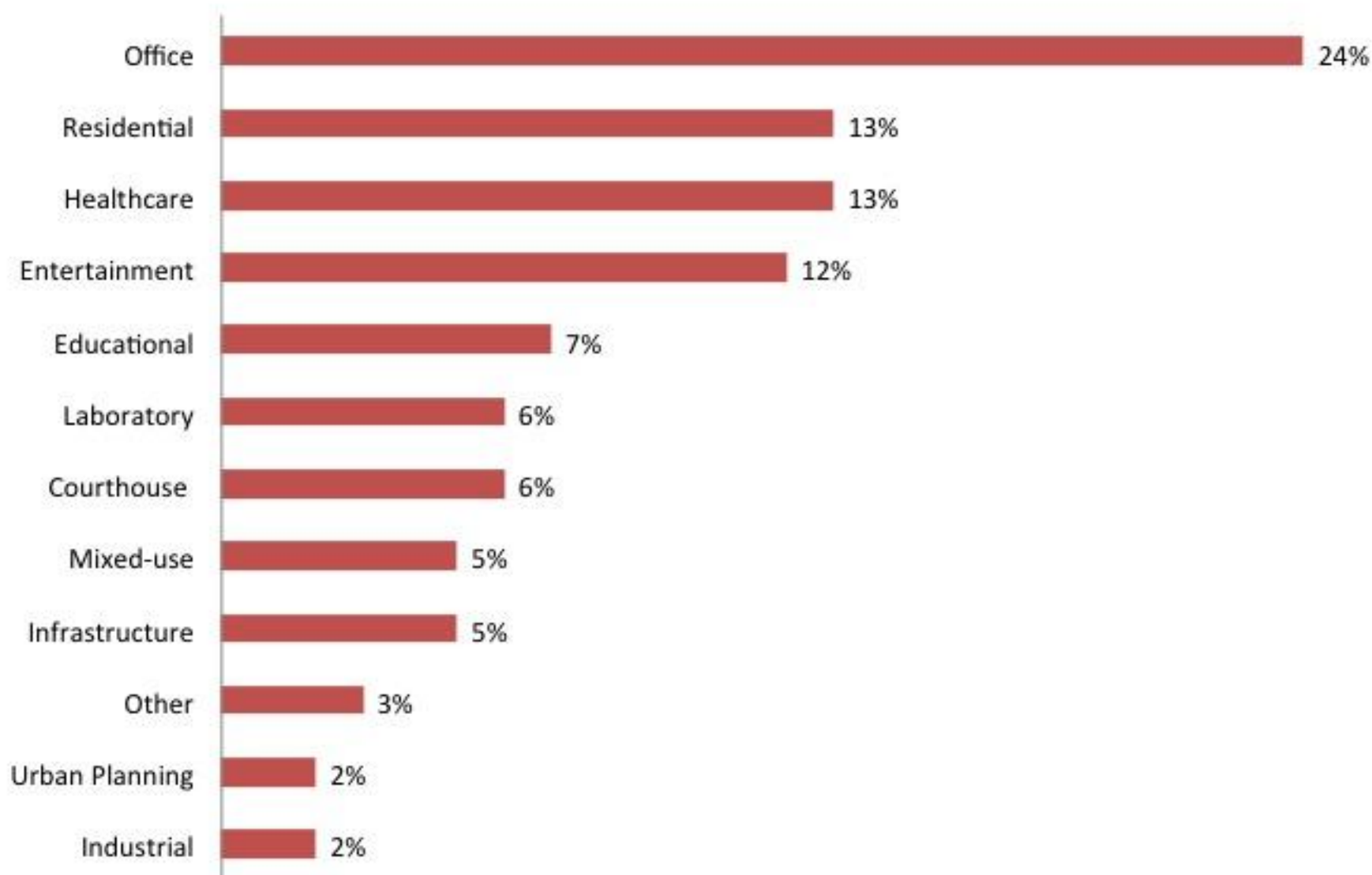
The VDC Scorecard



Average confidence level : 39%



Facility Types





Structure & Weight

The VDC Scorecard

1 Score

VDC Scorecard

4 Areas

Planning

20%

Adoption

20%

Technology

25%

Performance

35%

10 Divisions

Objective

40%

Standard

30%

Preparation

30%

Process

50%

Organization

50%

Maturity

40%

Coverage

20%

Integration

40%

Quantity

70%

Quality

30%

Documentation

Guideline

Budget

Project

Stakeholders

Depth

Level of Detail

Communication

Stakeholder Survey

Reduced Design Errors

Metric

Benchmark

Tool

Broader Context

Training

Breadth

Model Use Life Cycle

Interoperability

Post Occupancy S.

Reduced Labor

Etc.

Etc.

Etc.

Etc.

50+ Measures



Maturity Level - Percentile

- Example: Number of stakeholders that benefit from objectives





Statistical Correlation

The VDC Scorecard

1 Score

VDC Scorecard

4 Areas

Planning

Adoption

Technology

Performance

10 Divisions

Objective

Standard

Preparation

Process

Organization

Maturity

Coverage

Integration

Quantity

Quality



Statistical Correlation

The VDC Scorecard

1 Score

VDC Scorecard

4 Areas

Planning

50%

Adoption

56%

Technology

48%

Performance

47%

Innovative

0%

Best

6%

Advanced

44%

Typical

46%

Conventional

4%

Innovative

6%

Best

8%

Advanced

55%

Typical

29%

Conventional

3%

Innovative

1%

Best

5%

Advanced

42%

Typical

41%

Conventional

11%

Innovative

0%

Best

9%

Advanced

33%

Typical

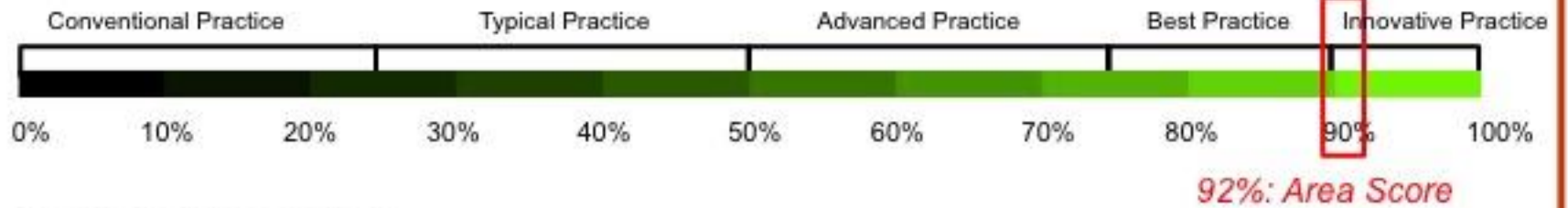
44%

Conventional

13%



Adoption Area - Innovative Case



Process Dimension

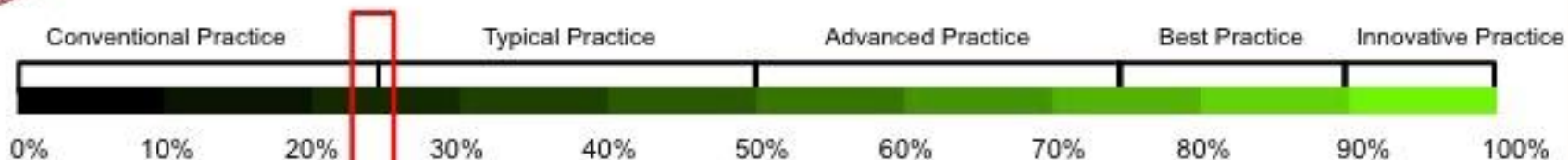


- IPD enabled team collaboration early
- IPD expanded the ability to leverage VDC application throughout the project.

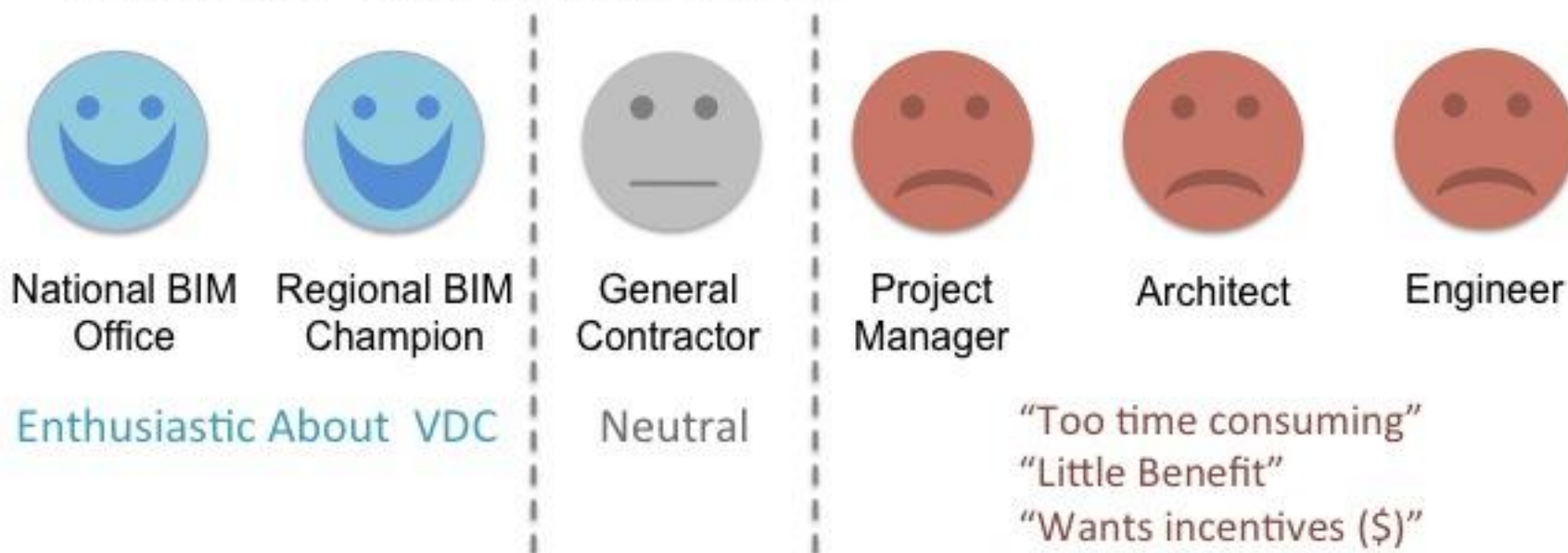
Alignment / Integration / Collaboration through IFOA
(Courtesy of DPR Construction, Inc.)



Adoption Area - Conventional Case



Stakeholders' attitudes towards VDC:



"For me as a project manager... it's hard for me to say I'd be willing to go down this path when I know I'm not funded to do this."

– Project Manager

"I don't see having to pay another group for their learning curve."

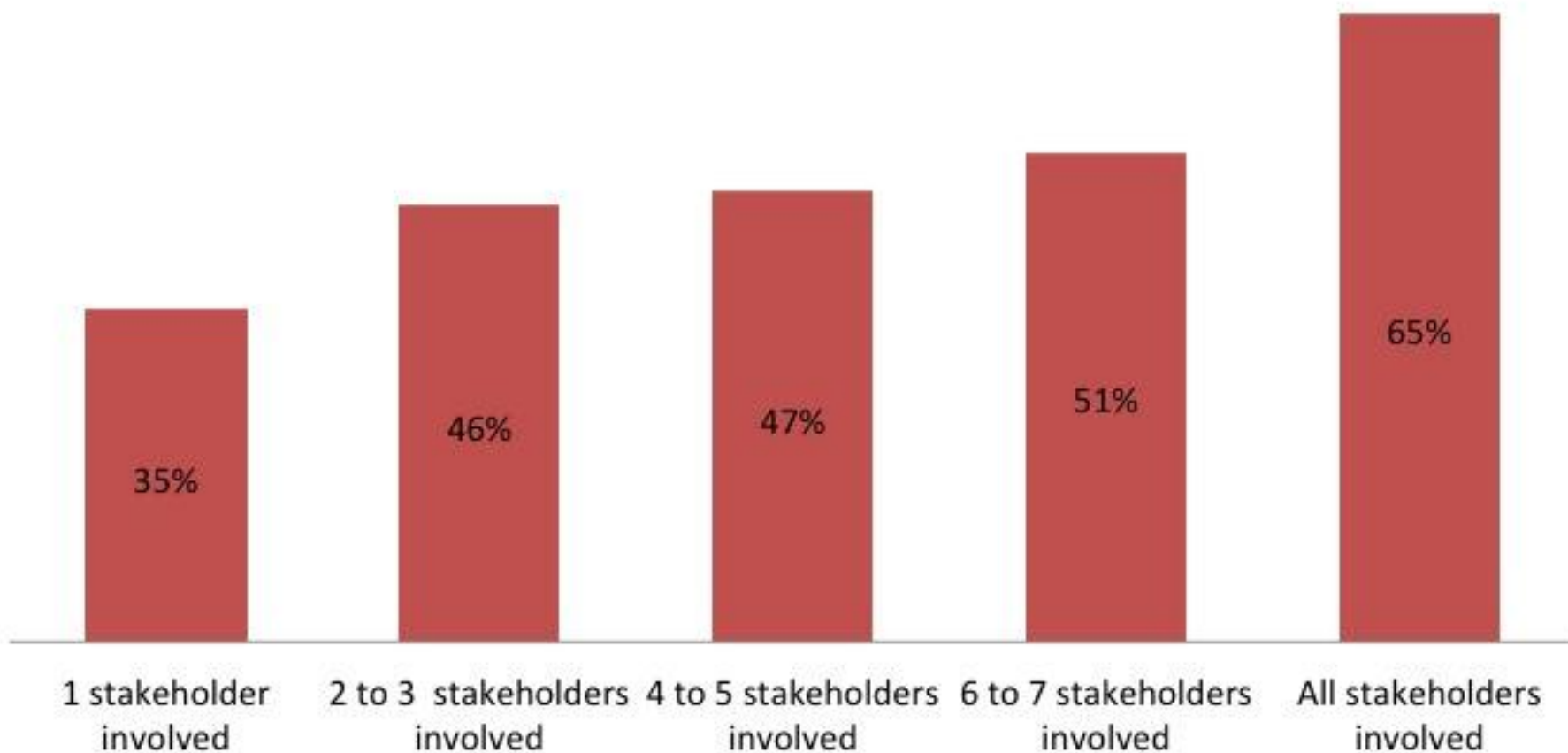
– Project Stakeholder



	Top 25%	Bottom 25%
Quantifiable Objectives	83%	5%
Documented Objectives	79%	39%
Stakeholders Involvement	84%	35%
Positive Attitude	100%	54%
Phases Covered	5.1	2.7
IPD characteristics	3.5	1.4
Process Benefits	3.8	1.9
Qualitative Satisfaction	88%	66%
Quantitative Satisfaction	86%	25%

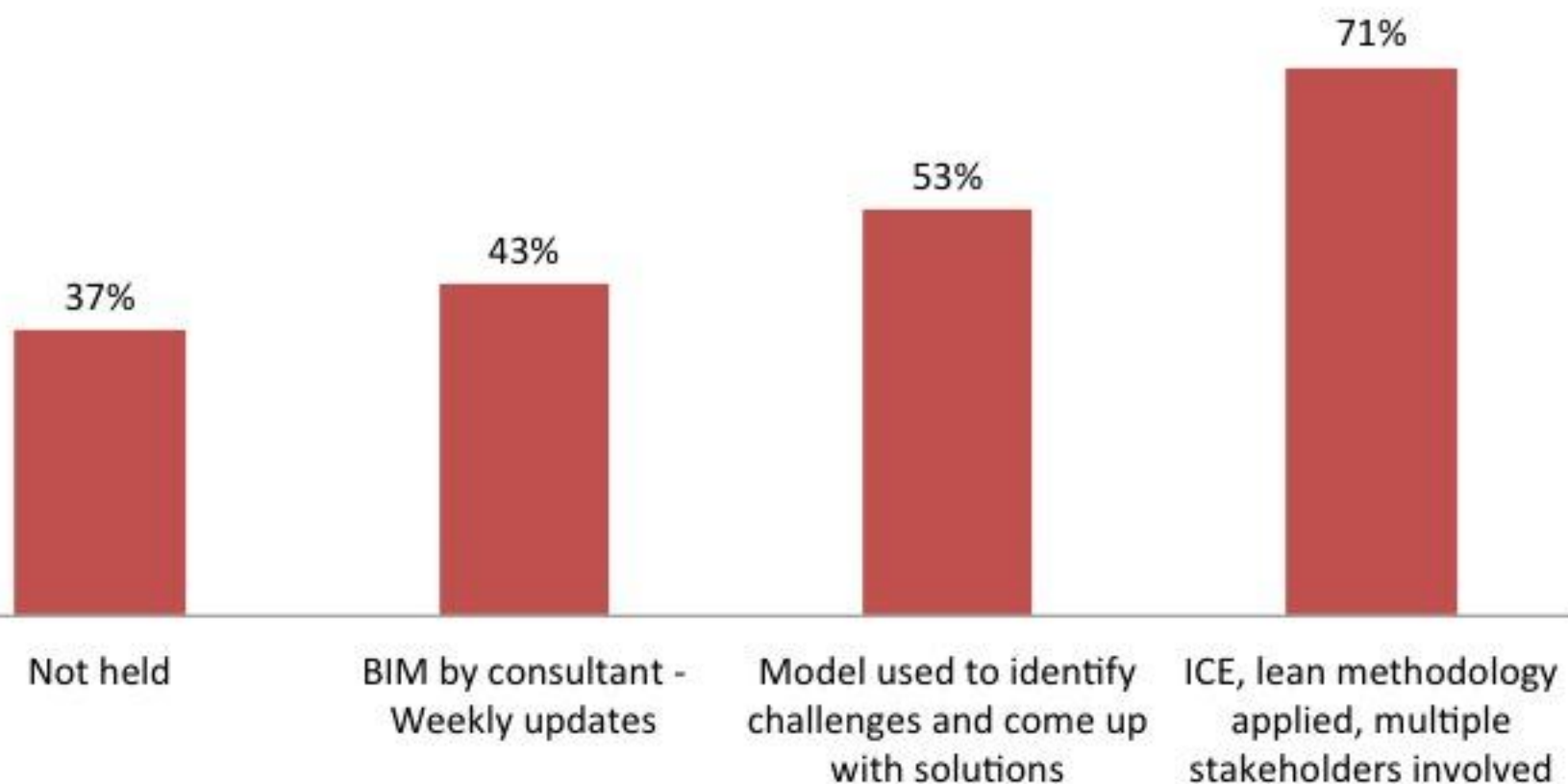


Stakeholder Involvements & Performance Area Scores





BIM-enabled Meetings & Performance Area Scores





- Proven with over 108 cases from 14 countries
- 20-minute or ongoing evaluation
- Independent scoring based on targeting vs. evidence
- Dynamic scoring; Raising the bar
- Retire measures, new measures, custom weights

I KORTHET

Fler P303-
bostäder i Örebro

• NCC ska snart börja bygga 20 bostadsrätter i Rynningeåsen i Örebro med utgångspunkt från byggsystemet P303. Ordern från Svenska hyreshus är värd 23 miljoner kronor.

P303 är ett byggsystem med kort byggtid som baseras på flerbostadshus i två våningar, parhus eller radhus. Energlänsvändningen är 59 kWh per kvadratmeter och år. Husen levereras nyckelfärdiga till fast pris.

Storleken på de 20 lägenheterna kommer vara 67 eller 83 kvadratmeter. Husen byggs i två våningar, med balkong och terrass respektive uteplats. Byggstart sker i september och inflyttning är beräknad till sommaren 2013.

20

BOSTADSRÄTTER.
Ska NCC bygga enligt
P303 i Örebro.

"Bim och VDC är mer tro än vetenskap"



Calvin Kam på Stanford-universitetet har utvecklat ett särskilt verktyg för att mäta vad det virtuella byggandet egentligen ger.

En bra process måste utvärderas för att i framtiden kunna blir ännu bättre. Det är utgångspunkten för ett examensarbete där två chalmersstudenter arbetar med att mäta och kartlägga virtuellt byggande på NCC Housing. Doktor Calvin Kam från Stanforduniversitetet i Kalifornien bidrar till examensarbetet med ett värdefullt verktyg, VDC Scorecard.

– Hittills har bim och VDC varit mer tro än vetenskap, sa Calvin Kam, som är en internationell auktoritet på området, när han nyligen besökte Stockholm.

Bakom examensarbetet står Martin Andersson och Oscar Månsson från Chalmers.

– Målet är att nå ökad produktivitet och varaktiga förbättringar genom att synliggöra vad som ska förbättras, säger Martin Andersson.

Martin Andersson och Oscar Månsson arbetar nu med att kartlägga och jämföra arbetet med virtuellt byggande i tre olika NCC-projekt i Stockholm, Helsingfors och Berlin.

Det handlar om tre typiska projekt, inte några pilotprojekt som väljs ut för att de är särskilt lyckade.

– Vi gör en uppskattning av hur långt NCC har kommit, säger Martin Andersson.

Under arbetets gång har Martin Andersson och Oscar Månsson kommit i kontakt med doktor Calvin Kam från Stanforduniversitetet. Hans forskarteam har utvecklat verktyget VDC Scorecard där VDC står för virtual design and construction.

– Det ger en bra bild av hur framgångsrik man är i ett VDC-projekt. Hittills har de flesta fokuserat på



Holistic

Quantifiable

Relevant

Scalable

Stanford
CIFE

Collaborative
Feedback Loop



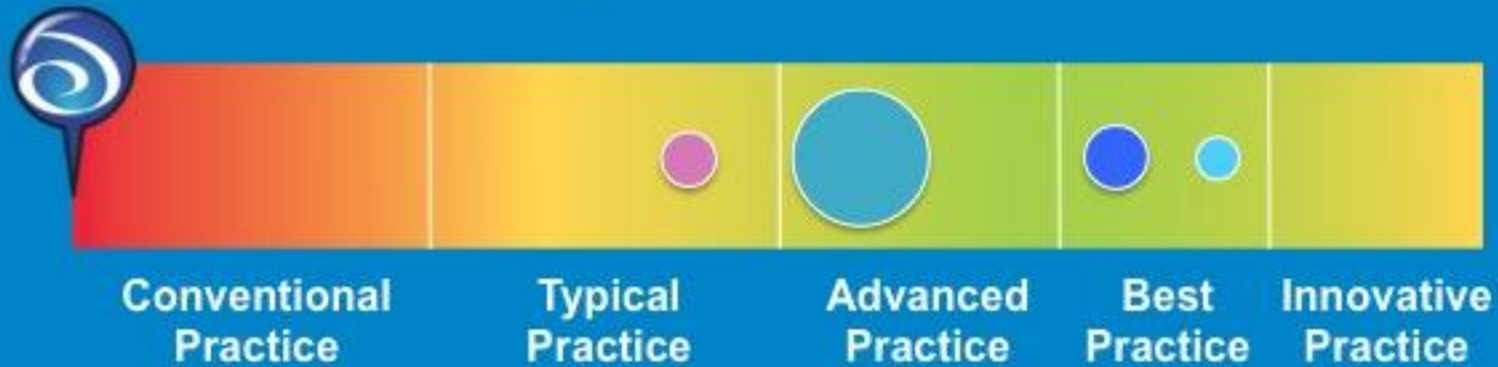
Research

- Academic Exploration & Validation
- Sets Standards for Evaluations
- Research, Collaboration with CIFE members
- Dozens of Cases per Year

Development

- Professional Advice & Implementation
- Worldwide Score & Solution Database
- Industry Partnerships, Delivery Methods
- Hundreds/Thousands of Cases per Year

Objective Evaluation



Benchmark with Others



Global Knowledgebase



CONSULT
EXPERT 024
LIVE 024
NOW 010

PROJECT

PORTFOLIO



Please answer the following series of measures:



Planning

BIM/VDC Objectives and Expectations for Implementation

5) How have BIM and VDC objectives been formalized among project stakeholders?

Adoption

Technology

Performance

INPUT FIELD*

Reset Fields

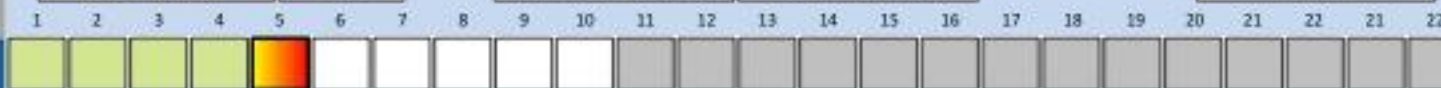
Save

Previous Question

Next Question

Submit

Completion Level



Client Name Project Name



CONSULT
EXPERT 024
LIVE 024
NOW 010



☒ bimSCORE

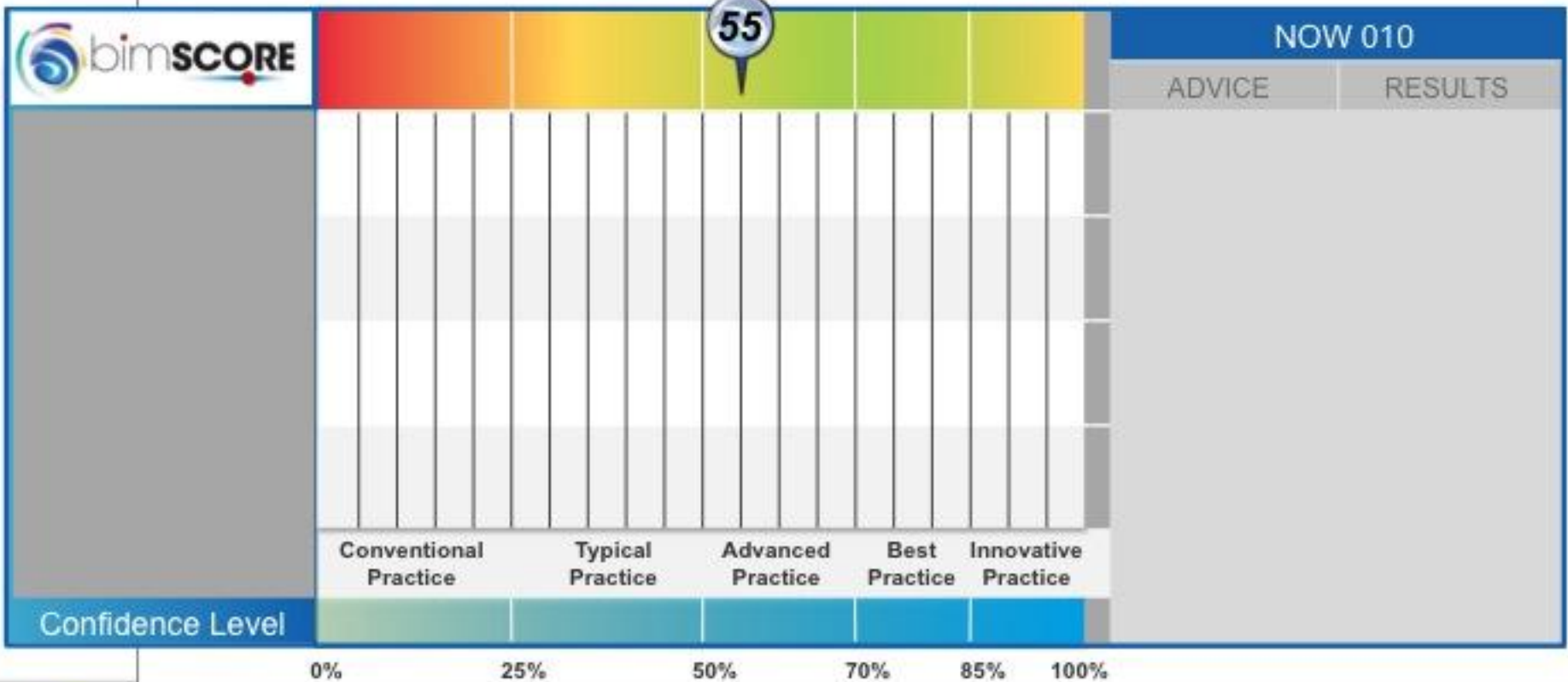
☐ Area Scores

☐ Division Scores

☐ Timeline

PROJECT

PORTFOLIO



Client Name Project Name



CONSULT
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LIVE 024
NOW 010

☒ bimSCORE

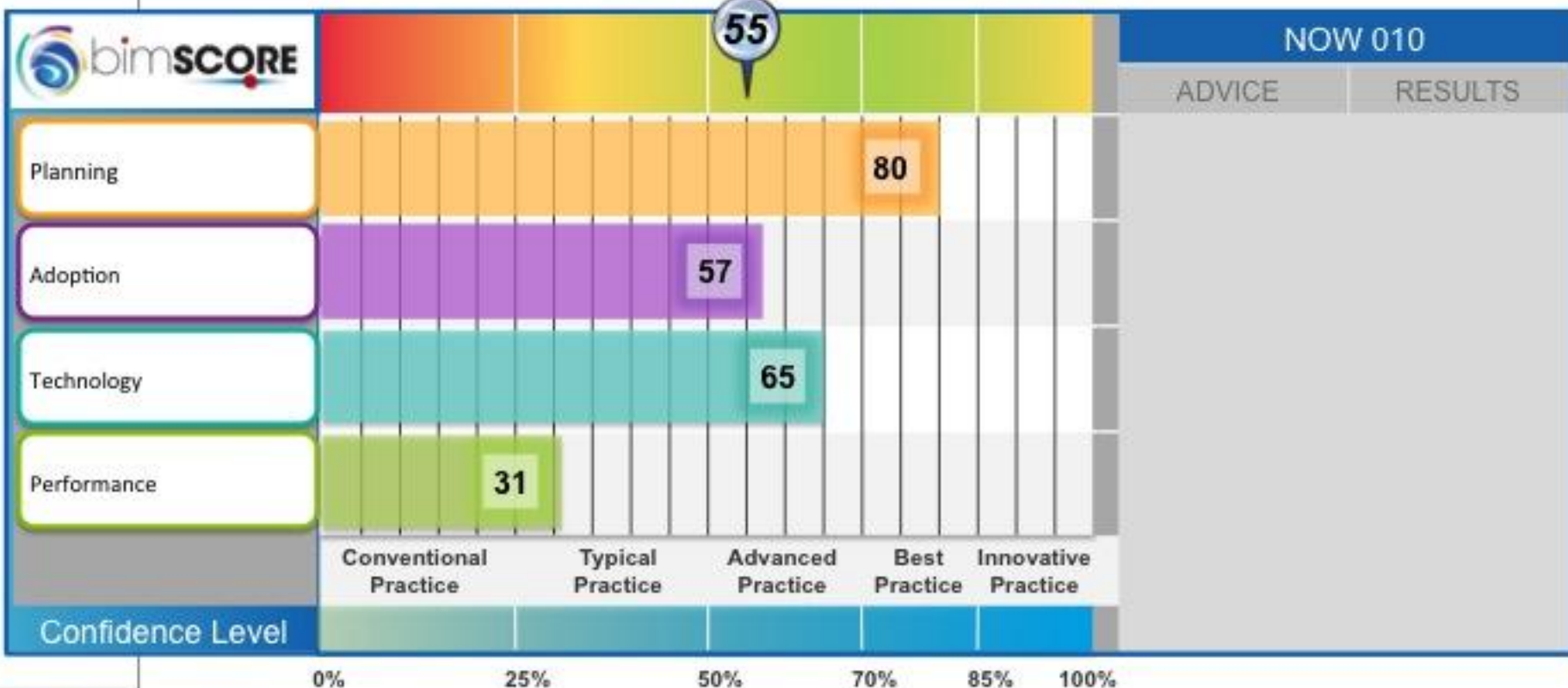
☒ Area Scores

☐ Division Scores

☐ Timeline

PROJECT

PORTFOLIO



Client Name Project Name



CONSULT
EXPERT 024
LIVE 024
NOW 010

☒ bimSCORE

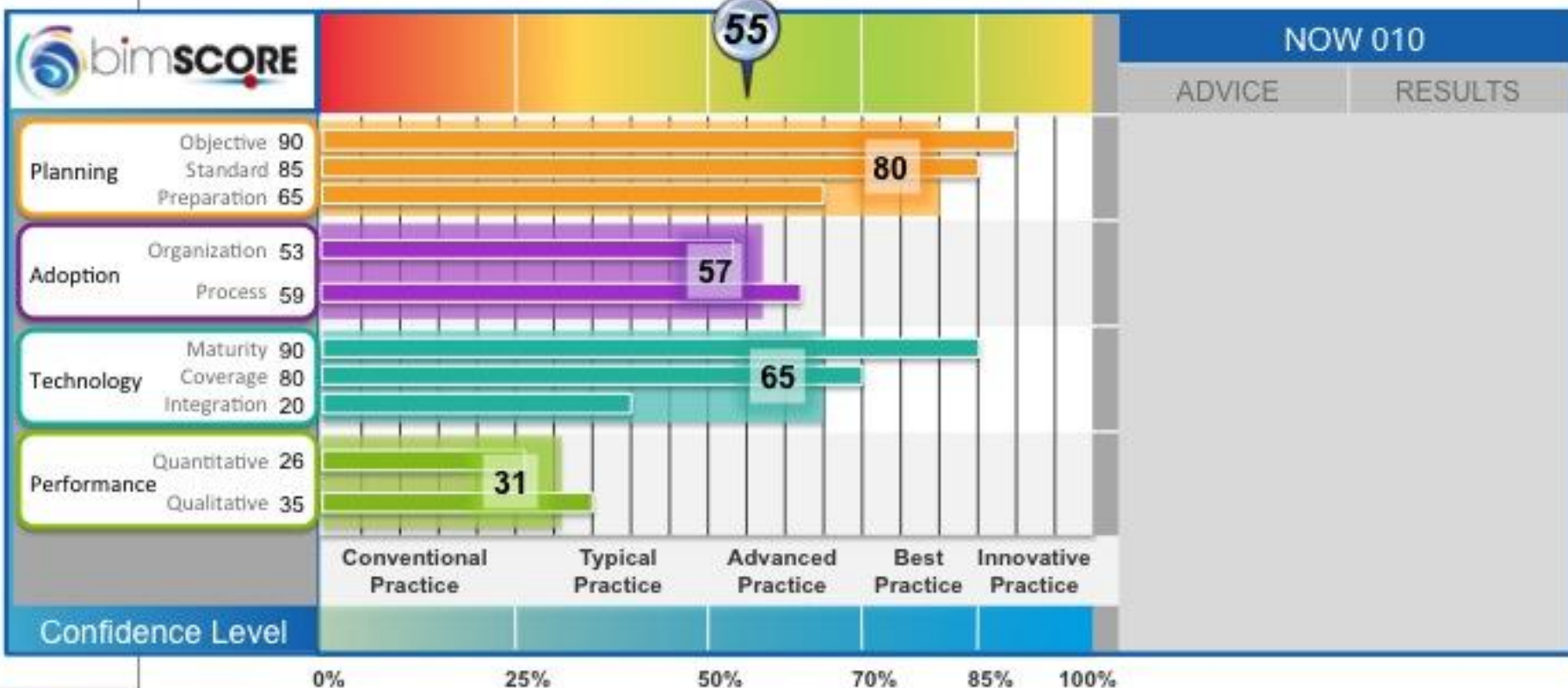
☒ Area Scores

☒ Division Scores

☐ Timeline

PROJECT

PORTFOLIO





Client Name
Project Name



CONSULT
EXPERT 024
LIVE 024
NOW 010

☒ bimSCORE

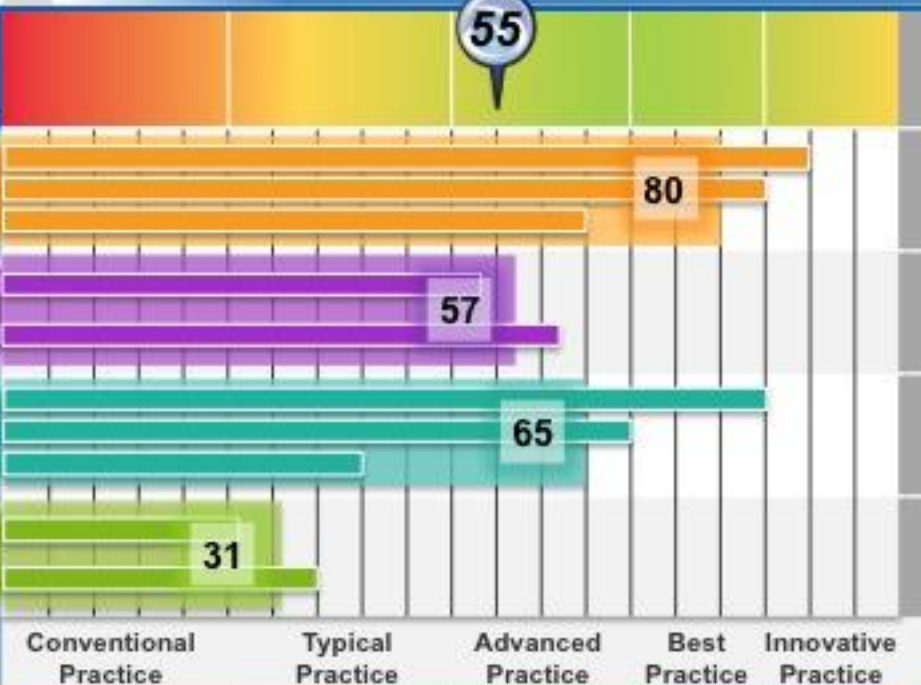
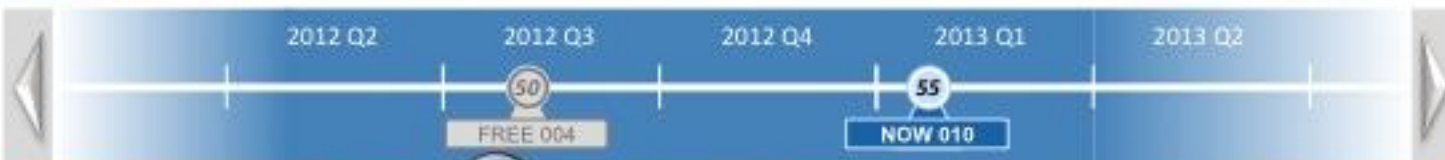
☒ Area Scores

☒ Division Scores

☒ Timeline

PROJECT

PORTFOLIO



NOW 010

ADVICE

RESULTS

Confidence Level

0% 25% 50% 70% 85% 100%



Planning
Objective
Standard
Preparation

72%

Management
Objectives

67%

Planning Advice

Seven categories for classifying objectives for BIM/ VDC intent

Establish benchmarks and track metrics through the project lifecycle
to fuel continuous improvements

Communication

Cost

Schedule

Facility

Safety

Project
Delivery

Management

Confidence Level

Adoption

Organization
Process

Incentives

Responsibilities

Decision Making

Attitude

Actions

56%

40%

73%

80%

80%

60%

Conventional
PracticeTypical
PracticeAdvanced
PracticeBest
PracticeInnovative
Practice

Confidence Level

Organization Dimension

- Project teams have a **general understanding of BIM/VDC** terms & benefits
- **Most** team members are **supportive** of BIM
- BEP has established **explicit responsibilities** and roles for each stakeholder
- Some **variations in End User involvement** in VDC process

Technology
Maturity
Coverage
Integration

44%

Model Uses

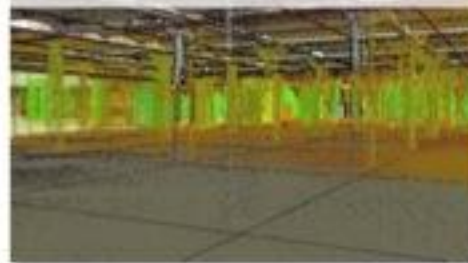
44%

Confidence Level

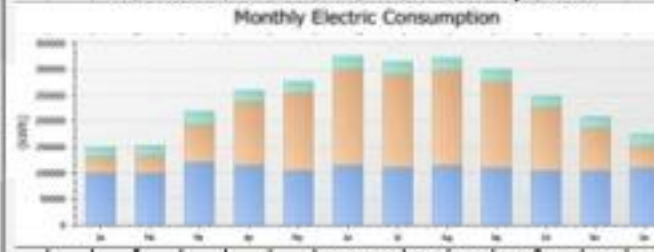
1. Visualization



2. Documentation

Source: GSA and Ghafari Associates, www.sparlic.com

3. Model Based Analyses



bimSCORE Collaborator Beck

Technology Results

Technology

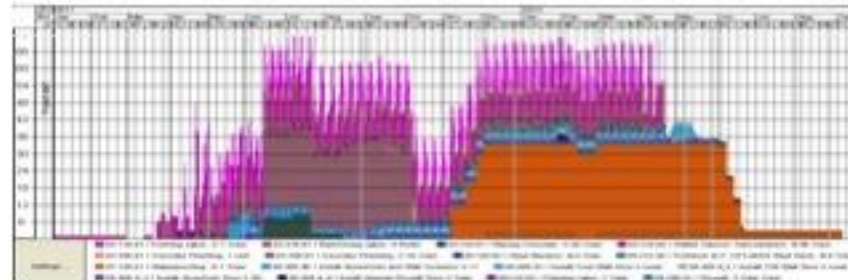
Maturity
Coverage
Integration

95%

Model Uses

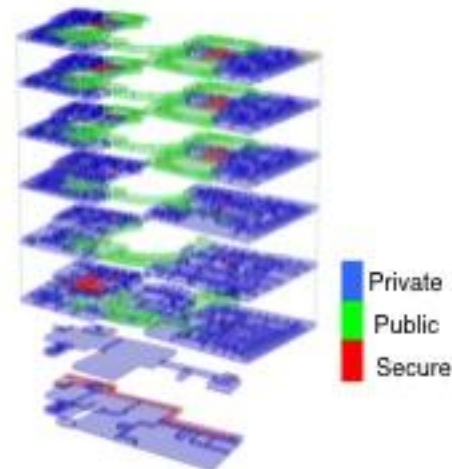
95%

4. Integrated Analyses

Technology Results

Source: bimSCORE Client Optima

5. Automation and Optimization



Source: GSA, Stanford-CIFE and Georgia Institute of Technology

Confidence Level

Performance Quantitative
Qualitative

62%

Meeting
Effectiveness

41%

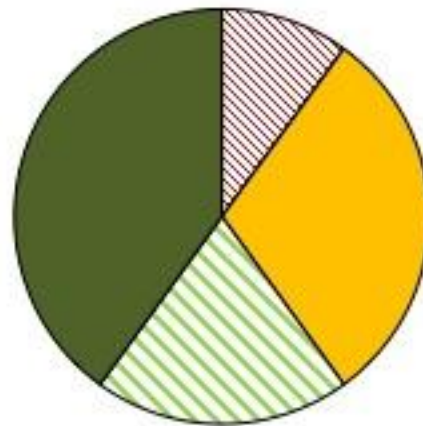
User Emotion

72%

Results from pre-workshop survey

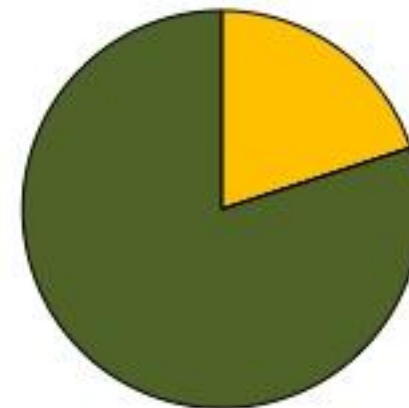
bimSCORE Project Performance Results

Weekly meetings satisfaction



- 1. Very dissatisfied
- 2. Not satisfied
- 3. Neutral
- 4. Somewhat satisfied
- 5. Very satisfied

Weekly meetings importance



- 1. Wasted time
- 2. Not important
- 3. Neutral
- 4. Somewhat important
- 5. Very important

Confidence Level

Performance Area Advice



A4 - PERFORMANCE AREA ADVICE

A4 PERFORMANCE AREA

- A4.01 Formally assess qualitative objectives, and expand their scope beyond model uses
- A4.02 Track, trend, and publish satisfaction with BIM/VDC processes and tools
- A4.03 Establish quantitative VDC metrics and track achievement on a regular basis.

PROJECT	ENTERPRISE	IMMEDIATE	TECHNICAL	EXECUTIVE
x		x	x	x
x	x	x	x	x
x	x	x	x	x

Executive Summary

Commitment to BIM in North America Surges

from 2007 to 2012 despite the Challenging Economy

Overall BIM adoption and implementation levels have increased significantly, with the more deeply engaged users enjoying greater benefits and stepping up their plans for future investments.

BIM Adoption

BIM USERS

Industry-wide adoption of BIM surged from 28% in 2007 to 71% in 2012. Contractors (74%) have surpassed architects (70%) and engineers (67%) are close to parity with the two other groups.

Regional differences also narrowed, and though the Western U.S. still leads at 77%, the formerly lagging Northeastern U.S. jumped from 38% in 2009 to 66% in 2012. Other U.S. regions and Canada remain close to the growing national average.

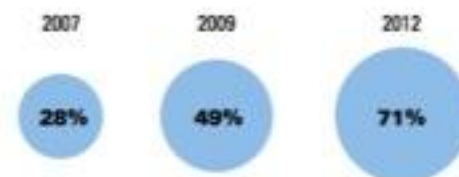
Size matters in BIM adoption: About 90% of large and medium-to-large organizations are engaged with BIM, compared to less than half (49%) of small ones.

BIM NON-USERS

Although there are fewer non-users, more of them are hardening their resistance, especially among non-using architects where 38% say they will not use BIM.

Levels of BIM Adoption in North America

Source: McGraw-Hill Construction, 2012



driver of sustainable business benefits:

- Increased profits increased more than any other BIM benefit.
- Maintaining repeat business with past clients, which requires completed projects, outpaced marketing new business to new clients, a benefit that can be done right after adopting.
- The most engaged users enjoyed far larger increases in BIM benefits.

NORTH AMERICA: MULTI-YEAR TREND ANALYSIS AND USER RATINGS (2007-2012)

bimSCORE Featured in 2012 North America Report

Sidebar: Mortenson Construction

believed it would be positive for our business, but we had to prove it." Since 2007, Curtz says the company has refined its efforts, benchmarking similar projects, expanding the range of metrics it measures and targeting more specific uses of BIM.

"All of the low-hanging fruit that we justified in the past is now all standard operating procedure," he says. "Things like modeling, clash detection, planning enclosure mock-ups are all a given [on projects]. Now we can use metrics to guide decisions about specific BIM uses on certain projects. So, on a project with a complex steel frame, we could look at how much we would save if we did a BIM-to-fabrication scenario and decide that it would be worth it."

While Mortenson Construction can measure effectively against itself, Curtz says he looks forward to expanded and open sharing of metrics among other companies in the coming years, so it can gauge its performance on an industry level.

Industry Effort

To help add more industry perspective, researchers with the Center for Integrated Facility Engineering at Stanford University developed a metrics system called bimSCORE. The system benchmarks innovative practices and scores projects by rating their practices against those benchmarks.

Each project's Virtual Design and Construction (VDC) Scorecard is broken into four main areas: planning, adoption, technology and performance. Each of those areas is subdivided into two or three additional "dimensions" such as quality or objectives. Another 20 measures feed into those dimensions.

Through its benchmarking, the team can score different practice areas based on a sophistication scale that starts at conventional (not leveraging VDC) and moves up to typical (standard BIM use), then advanced (leveraging use) and finally best practice (not being done) and topping it all at innovative (one of a kind).

Calvin Kam, CEO and founder of bimSCORE, says that by breaking the scoring into multiple pieces, a team gets a more complete picture of a project and can show projects where their BIM use may have excelled or been lacking.

"It's a great tool for showing an owner that maybe they had the right technology on a project but the wrong team," he says. "Or maybe the planning was great, but then you didn't follow through with performance. We provide the vocabulary to discuss this."

Kam notes that one of the benefits of the system is that scores are dynamic, so they are not simply snapshots in time. As new innovations are introduced, benchmarks are adjusted. In theory, scored projects will see their scores drop over time as BIM use advances.

As of October 2012, the team had scored 57 projects in roughly two years. Over time, Kam predicts that the system could create an ample database of projects for comparing scores at multiple levels.

"This is something that can scale from individual projects to companies to regions to industries and even to countries," he says.



Banner Medical Center Castro Valley (see page 34) earned an overall bimSCORE of 79, registering high marks (83%) in the planning area for the innovative 3D party 2D method, while showing room for improvement in the technology area (63%).

Calvin Kam, CEO and founder of bimSCORE, says that by breaking the scoring into multiple pieces, a team gets a more complete picture of a project and can show projects where their BIM use may have excelled or been lacking.

"It's a great tool for showing an owner that maybe they had the right technology on a project but the wrong team," he says. "Or maybe the planning was great, but then you didn't follow through with performance. We provide the vocabulary to discuss this."

Maintaining a healthy body is a life-long mission



Health Planning



Diagnosis



Continuous monitoring



Surgery & Treatment



Living Well

Maximizing BIM value is a life-cycle process

Targeting,
Best practices

Evaluation, Benchmark, Advice and
Continuous Improvements

ROI
Satisfaction

Performance Indicators

Performance

Quantitative

Qualitative

59%

Tracking

43%

Performance

66%

bimSCORE Project Performance Results

Objective Categories

Qualitative?

Quantitative?

Metric?

Benchmark?

Tracking?

Linked to Model use?

Mature?

Example

Communication

x

x

Use model for illustrations and presentations

Cost

x

x

Use model for estimation

Schedule

x

x

x

x

x

x

x

Schedule variance

Project Delivery

x

x

x

x

x

x

Submittal latency, commitment reliability

Safety

x

x

x

x

x

Recorded incidents and injuries

Facility Performance

x

x

Use model for building operations and FM

Confidence Level

Management

Performance
Quantitative
Qualitative

Tracking

Performance

59%

43%

66%

Performance Advice

Critical Success Factors

bimSCORE Performance
Indicators

Metrics

Communication

Prefabrication

% Components
prefab

Cost

Off-site labor hours
v. on-site labor
hours

Schedule

Off-site time per
component/unit of
manufacture

Project Delivery

Off-site cost per
component/unit of
manufacture

Safety

Off-site schedule
variance

Facility Performance

Off-site labor cost

Management

On-site laydown use

Confidence Level



Client Name
Project Name



TARGETING

EXPRESS

IN-DEPTH

PORTFOLIO

PROJECT



bimSCORE Performance Indicator

1. Select bPI

2. Enter Project Data

View input

View output

- ☒ Cost \$
- ☐ Communication
- ☐ Schedule
- ☒ Prefabrication Indicator
- ☐ Safety
- ☐ Facility
- ☐ Delivery

<< Select bimSCORE Performance Indicator

Confidence Level





Client Name
Project Name



TARGETING

EXPRESS

IN-DEPTH

PORTFOLIO

PROJECT



bimSCORE Performance Indicator

1. Select bPI

Schedule

Prefabrication Indicator

% Components prefab

Off-site labor hours v. on-site labor hours

Time per component/unit of manufacture

Cost per component/unit of manufacture

Off-site labor cost

On-site laydown use

2. Enter Project Data

View input

View output

Metric 2 Off-site labor hours v. on-site labor hours

Frequency of Input:

Weekly

Date of Input:

Select date of input

Choose Stakeholder:

Select Stakeholder

Metric Target:

Enter Target

% total labor hours off-site

Enter Metric Inputs:

Total off-site labor hours

Enter Input

\$ (US)

Total on-site labor hours

Enter Input

\$ (US)

Confidence Level



Modify Fields

Submit





Client Name
Project Name



TARGETING

EXPRESS

IN-DEPTH

PROJECT

PORTFOLIO



bimSCORE Performance Indicator

1. Select bPI

2. View Output

Select Stakeholder

View input

View output

Schedule

Prefabrication Indicator

% Components prefab

Off-site labor hours v. on-site labor hours

Time per component/unit of manufacture

Cost per component/unit of manufacture

Off-site labor cost

On-site laydown use



Prefabrication Indicator Score

Commentary

Advice

The Prefabrication Indicator is a normalized average of prefabrication performance metrics on a construction project. It is a set of indexes used to measure the success of prefabrication efforts for any given construction project.

Confidence Level



Performance
Quantitative
Qualitative

59%

Tracking

43%

Performance

66%

Performance Advice

Critical Success Factors

bimSCORE Performance Indicators

Metrics

Communication

Safety

Off-site recordable incidents

Cost

On-site recordable incidents

Schedule

Safety hazards modeled

Project Delivery

Safety equipment modeled

Safety

Hazardous material location

Facility Performance

Safety hazards modeled by phase

Management

Equipment operating zone conflicts

Model checking rule conformance rate



Client Name
Project Name



TARGETING

EXPRESS

IN-DEPTH

PROJECT

PORTFOLIO



bimSCORE Performance Indicator

1. Select bPI

2. View Output

View input

View output

Safety



Safety Indicator

Off-site recordable incidents

Model checking rule
conformance rate

On-site recordable incidents

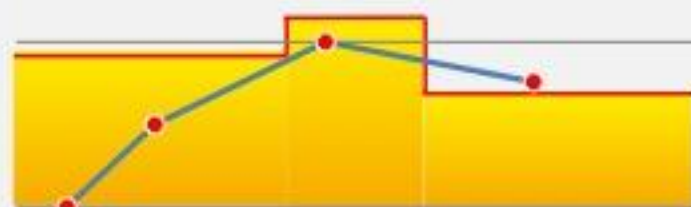
Safety hazards modeled

Safety equipment modeled

Equipment operating zone
conflicts

Model Checking Rule Conformance

Exceeding
Target
Below



2011 Q4

2012 Q1

2012 Q2

Commentary

Advice

The Safety Indicator is a normalized average of key safety metrics on the project. It's set of measures consider both on and off-site incidents, as well as efforts to mitigate safety hazards through the leveraging of BIM and VDC.

Confidence Level



Portfolio of Projects



Portfolio Comparison



CONSULT
EXPERT 024
LIVE 024
NOW 010

☒ bimSCORE

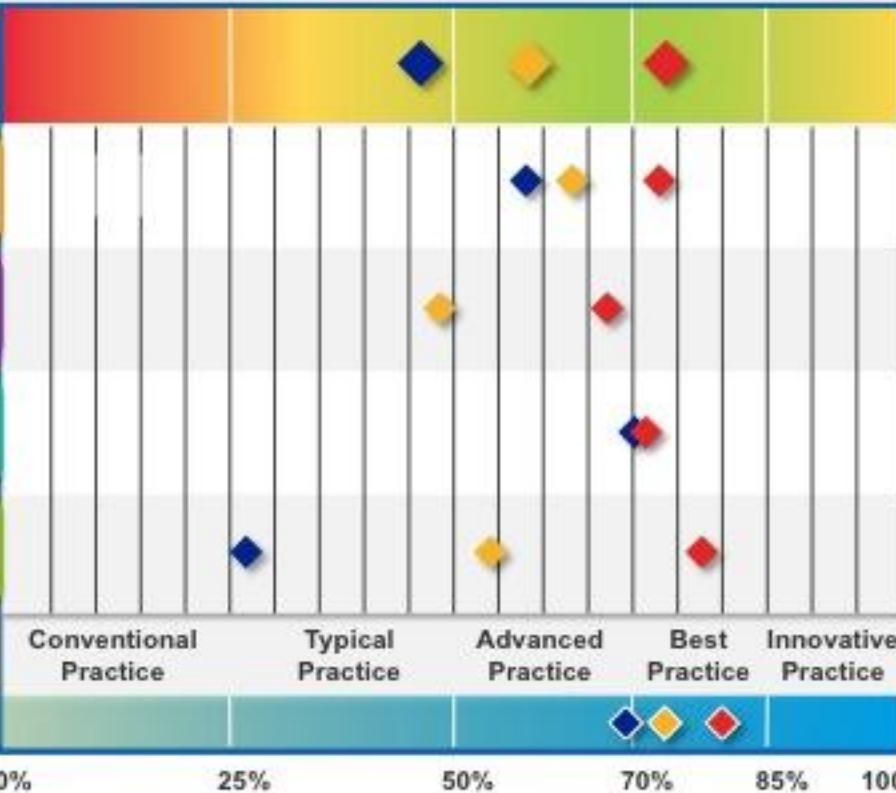
☒ Area Scores

☒ Division Scores

☐ Timeline

PROJECT

PORTFOLIO



NOW 010

bimSCORE Overview >> Portfolio



Project Score Compare?

Project 1	72	■	<input checked="" type="checkbox"/>
Project 2	46	■	<input checked="" type="checkbox"/>
Project 3	58	■	<input checked="" type="checkbox"/>

[ADD PROJECT](#)

INPUT

VIEW REPORTS



What can your company learn from other experienced enterprises?



Industry Benchmark

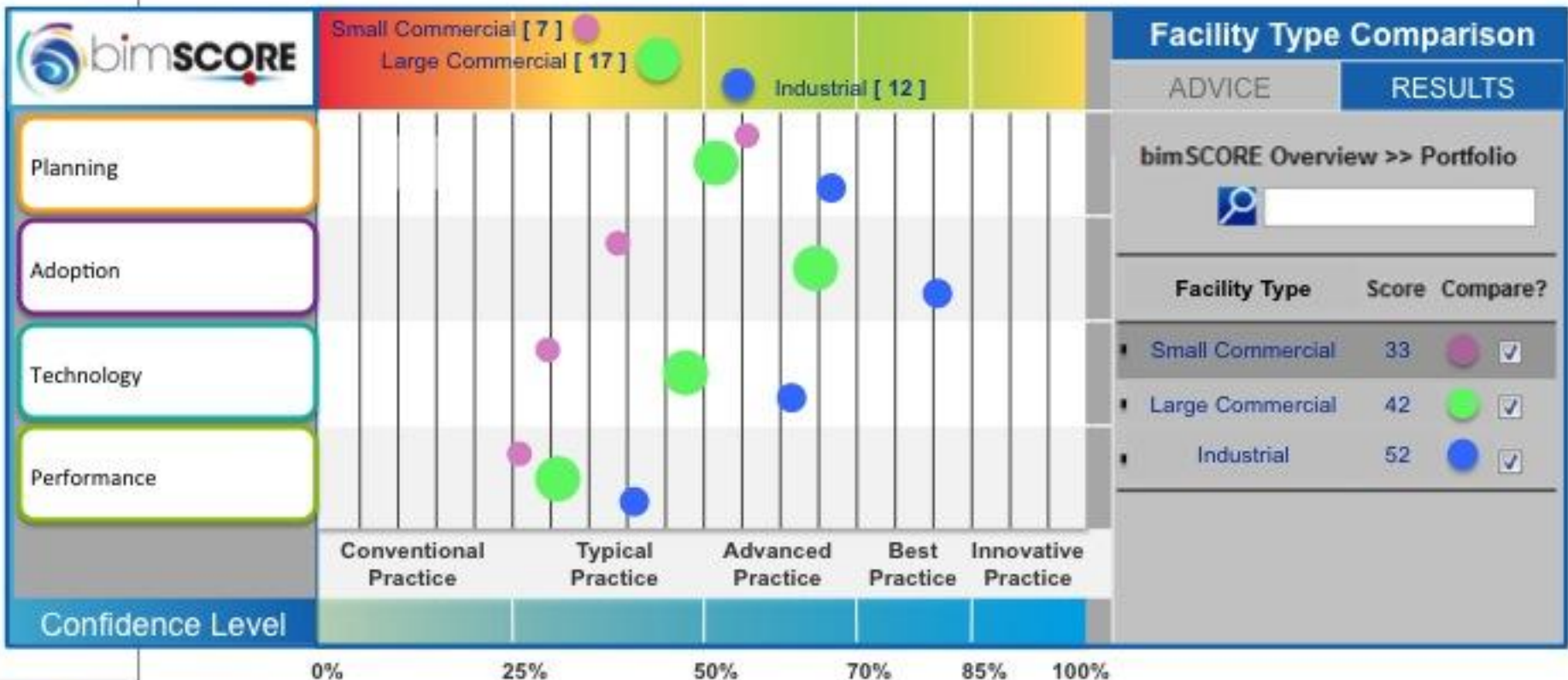


CONSULT
EXPERT 024
LIVE 024
NOW 010

Small Commercial Large Commercial Industrial

PROJECT

PORTFOLIO



Where is Sweden in the Global BIM Movement?



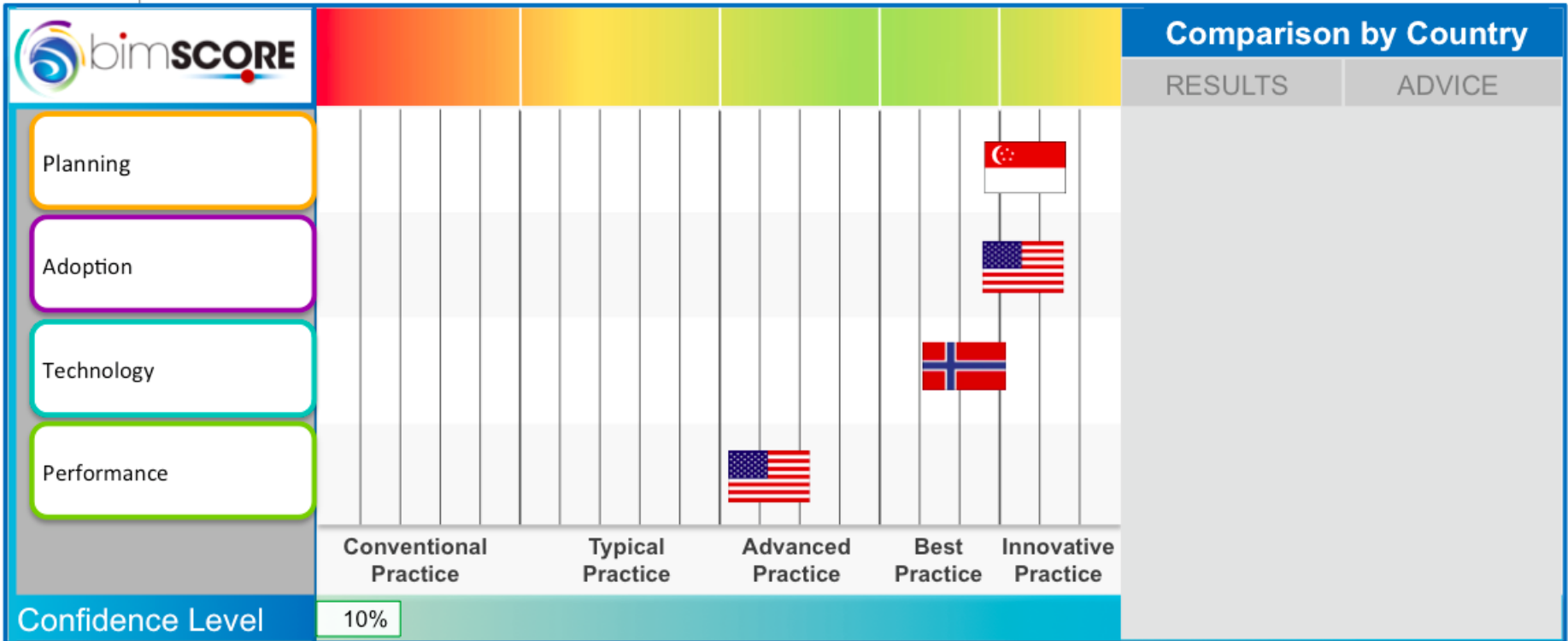
Country to Country



CONSULT
EXPERT 024
LIVE 024
NOW 010

PROJECT

PORTFOLIO



Know the Landscape
Identify Objectives

Pinpoint your Position
Take the Best Pathways

Roadmap



GPS



Tracking Improvement of BIM

Quantifying Return of Investment



Calvin Kam

PhD, AIA, PE, LEED AP



Stanford University

CIFE Director of Industry Programs

Consulting Assistant Professor



bimSCORE

Founder & CEO



GSA National 3D-4D-BIM Program

Co-Founder

Senior Program Expert



American Institute of Architects - National

2010 & 2011 Chair, Technology in Architectural Practice

2011 & 2012 Co-Chair, Center for Integrated Practice