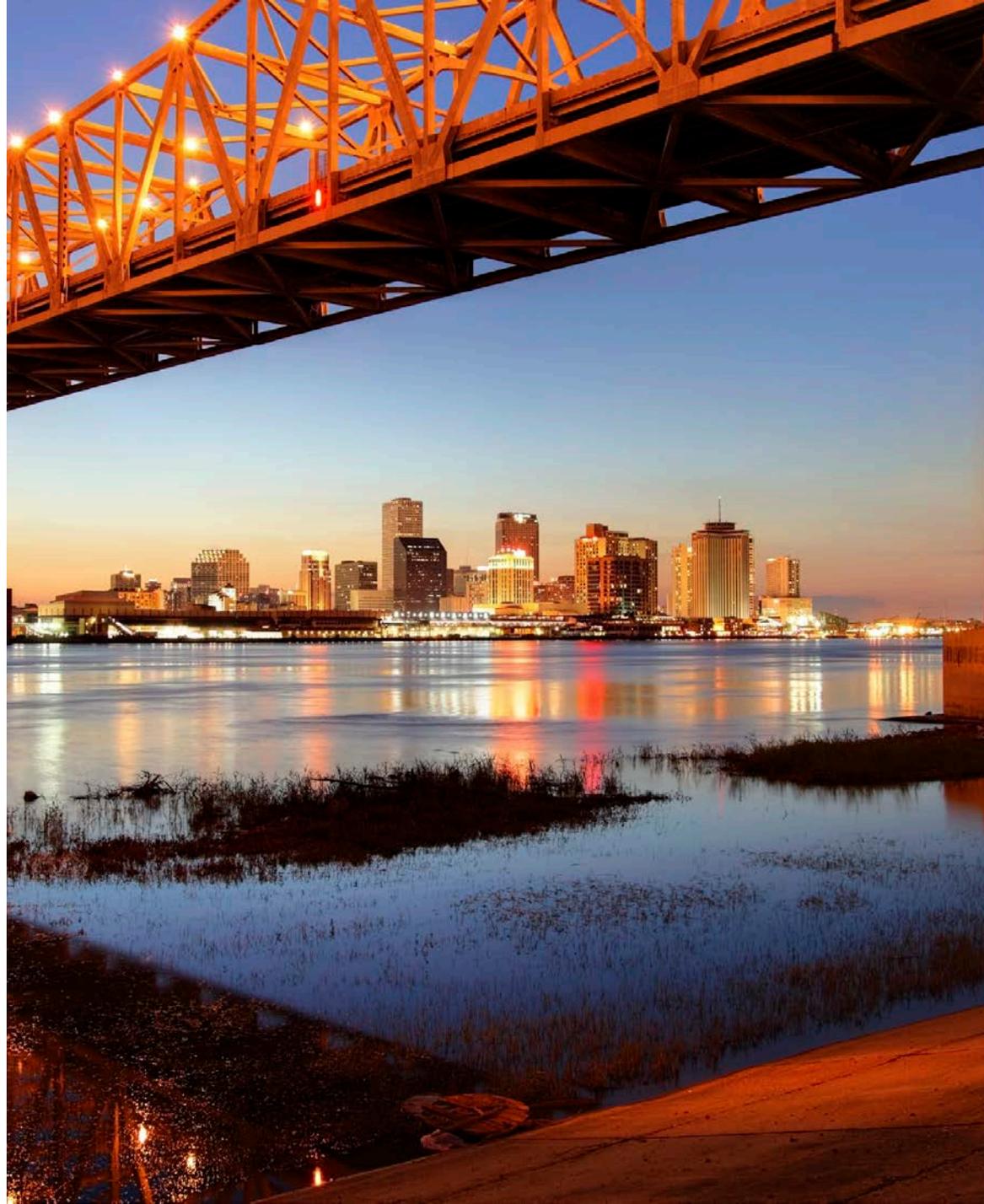# Deloitte.

2015 Engineering & Construction Conference

Managing Project Risk Using Predictive Project Analytics

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Why Analytics?

Why risk analytics:

Analysis

- smart people gathering some data

- using excel spreadsheets

- calculating some options

- making recommendations

Challenges

- data gathering is difficult and time consuming

- often considers decisions in isolation of other planned changes

- leads to a focus on a few key datasets

- can often show that different views are 'right

- often retrospective and fails the 'so what' test

Analytics

- identify patterns and correlations in existing data

- use inputs to project future trends

- statistical modelling to develop scenarios

- assess confidence in models/courses of action

- use of specific analytic tools

Why risk analytics (con't):

Area	Typical Analysis	Target Analytics
Datasets	Considers a few key datasets	Considers a broader picture of data
Focus	Key indicators	Relationships between different indicators
Projects forward	On the basis of all other things being equal	On the basis of relationships between indicators
Tools	Excel	SPSS / SAS
Repeat use	None/limited	Strategic picture enhances over time
Data quality	Informally considers "error margin"	Formally considers confidence factors in conclusions
Robustness	As good as people doing the work	Statistical techniques embedded with the system
Assessment	Good for simple decision making	Good for complex systems

Is the E&C Industry Ready for Data Analytics?
Competitive advantages may be the incentive

- Many companies in other industries are using predictive data analytics to boost their competitive advantage

  - Retailers, airlines, banks for example all use data to grow their business

- Engineering firms are ahead of constructors in the use of data

  - BIM for increased efficiency in the design process

  - Previous project design components and metrics used on current projects

  - Data driven design for operational efficiencies

- Many contractors are still not applying data analytics

  - Contractors are data consumers, not necessarily data generators

  - Thin margins – not much appetite for investment

  - Every project is different and data is not stored consistently

Is the E&C Industry Ready for Data Analytics?
Competitive advantages may be the incentive

- However a growing number of contractors are finding ways to use their own data

  - Comparisons of profitability (by industry, customer, region, etc.)

  - Estimating quantities and costs based on past history

  - Putting technology in the field (iPads for PMs and Superintendents)

  - Codifying processes in software

- Other methods could be used to improve performance, compliance and win rate

  - Monitoring unstructured data (e.g. e-mails) for key words/phrases

  - Linking payroll data, including subcontractors, to schedule performance, labor rate compliance and future estimating

- We will explore the concept of predictive analytics – using previous project data to predict risks and shift management focus to deliver successful projects

Predictive Project Analytics

New generational project management

What if there was a way to predict and avoid performance strains?

Predictive Project Analytics (PPA): an analytical project risk management capability that examines a project'(s) characteristics and assesses the appropriate level of oversight and governance:

- Identifies project performance execution shortfalls
- Avoids/mitigates execution performance strains and risks
- Decreases likelihood of schedule overruns
- Minimizes financial and reputation losses
- Provides quantitative and defendable data to drive management decisions

Ensures appropriate project controls are in place to improve project performance and probability of success.

PPA Overview

A project risk management methodology based on a quantitative analytical engine.

Navigator Project Database

Database contains over 2,000 successfully completed projects from various industries, sizes, complexities and magnitude ranging up to US$5B

Complexity Assessment

28 complexity factors, within 5 areas, are based on research that has identified the key characteristics that drive complexity on all projects

Risk Assessment/Health Check
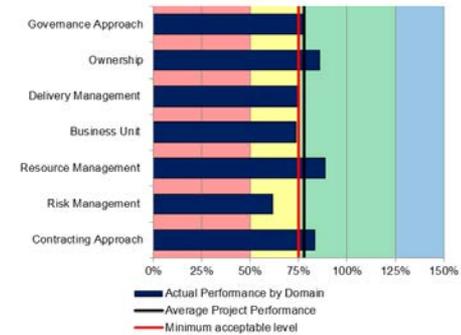
Comprehensive assessment of project performance and use analytics to highlight priority areas for improvement based on the project's unique complexity

Analytical tool with "Big Data" capabilities

PPA provides insights derived from systemic, scientific, and statistically-significant methodologies allowing for evidence based decision making.
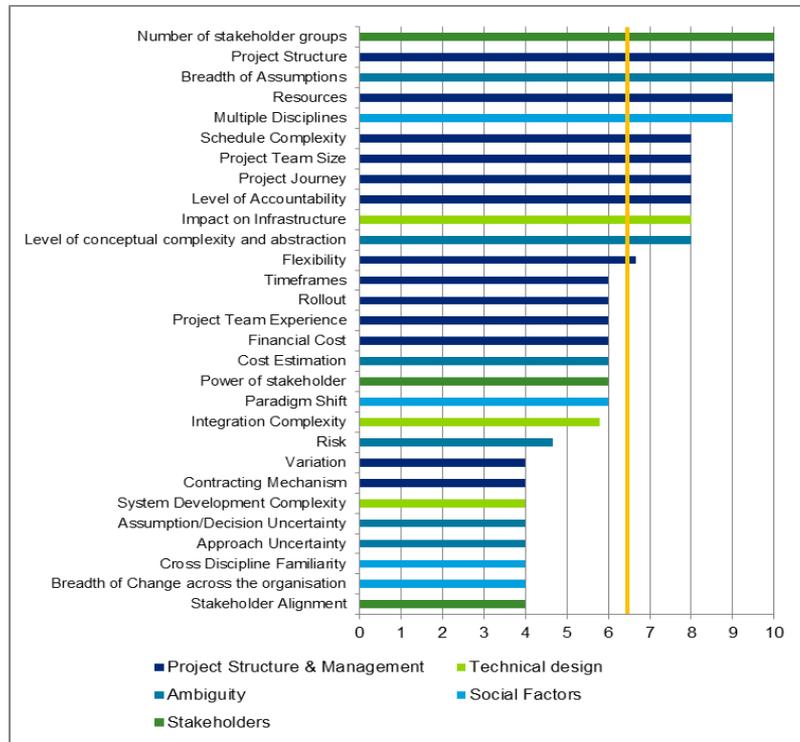
Reporting Results & Visualization

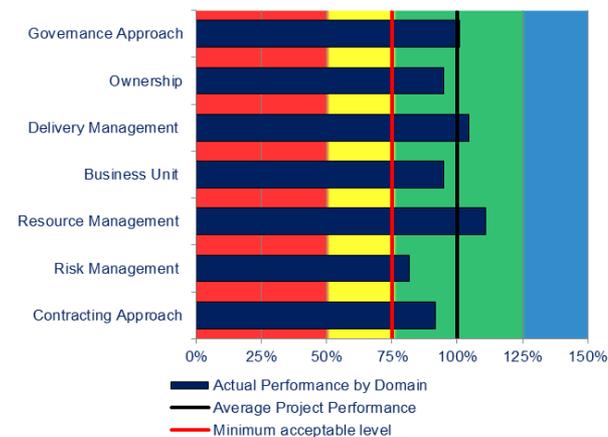## SAMPLE REPORTING DASHBOARDS

Complexity Summary

- Average project complexity is **6.5**
- Multi disciplinary team
- Requires board attention

Complexity Details

Project Performance Summary

- Actual Performance by Domain
- Average Project Performance
- Minimum acceptable level

Project Controls Summary

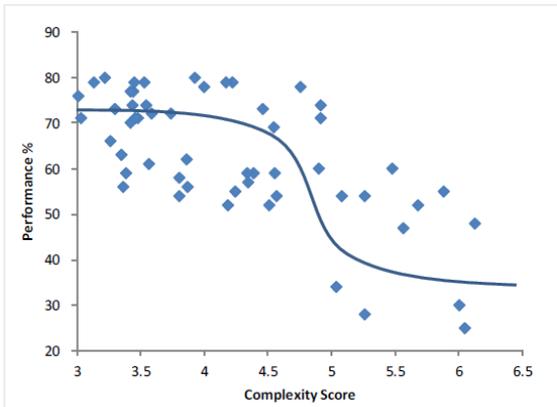| % of factors outside of expected results			
	Below		*Above*
Governance	23%		21%
Ownership	7%		0%
Delivery Management	13%		26%
Business Unit	25%		25%
Resource Management	0%		14%
Risk Management	50%		0%
Contracting Approach	21%		21%

Summary Analysis

Actual vs. expected project practices for the project is 100% which is within the range of expected success, however there were key areas that showed controls/performance below what is expected.
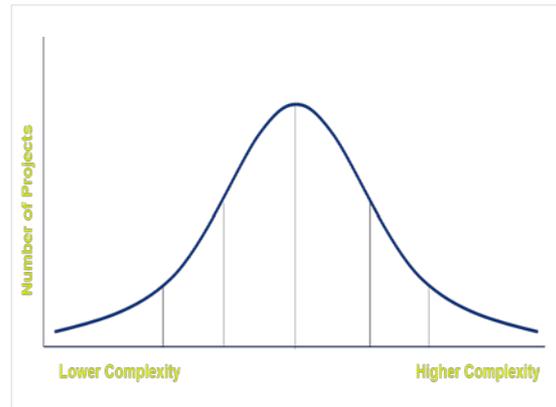
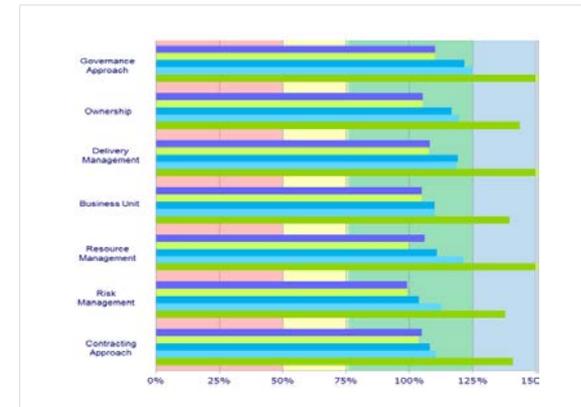# Reporting Results & Visualization – Program Level

Performance Cliff Analysis

- Understand at what level of complexity projects begin to decrease in effective execution within an organization.

- Leverage existing data to uncover organizational project management capability strengths and weaknesses.

Complexity Distribution of Project Portfolio

- Provide additional insight in project prioritization and fiscal planning.

- Better manage risk levels related to complexity across portfolio projects.

Project Performance Comparison

- Identify systemic issues within project execution and management.

- Identify areas that are consistently over controlled .

- Enable risk balanced adjustments to maximize capital efficiency.

Explore the data you have • Reveal better Insight • Ask new questions

Discussion Topics

What metrics do E&C Firms measure?
Examples of key performance indicators

- Profitability by:
  - Project, region, type of project, owner, etc.

- Estimate or cost at completion vs. initial estimate

- Change orders and claims, by cause, as a percent of original contract value

- Profit/margin fade over time

- Productivity/efficiency by subcontractor

You can't improve what you don't measure

How to utilize analytics in Compliance and ERM programs

- **Drive insight from dashboards**:
    - statistical correlations between input and output indicators
    - identify leading and trailing indicators of performance
    - understand the value and indicators
    - link to business planning processes and plans
    - use all of the above to create a better dashboard

- **Challenge plans and proposals**
    - review and enhance evidence behind current proposals
    - provide clarity on ambiguity
    - scenario model future events to stress test existing plans and approaches

- **Check 'pressure' across activities**
    - compare and contrast plans across differing domains
    - understand pressures impact these domains and where they will first manifest
    - considering areas of overlaps and gaps between existing plans

- **Data driven searches for new efficiency opportunities**
    - comparative analysis across departments and services
    - comparative analysis across comparator organisations
    - analysis to focus resources in areas most significantly impacting outcomes

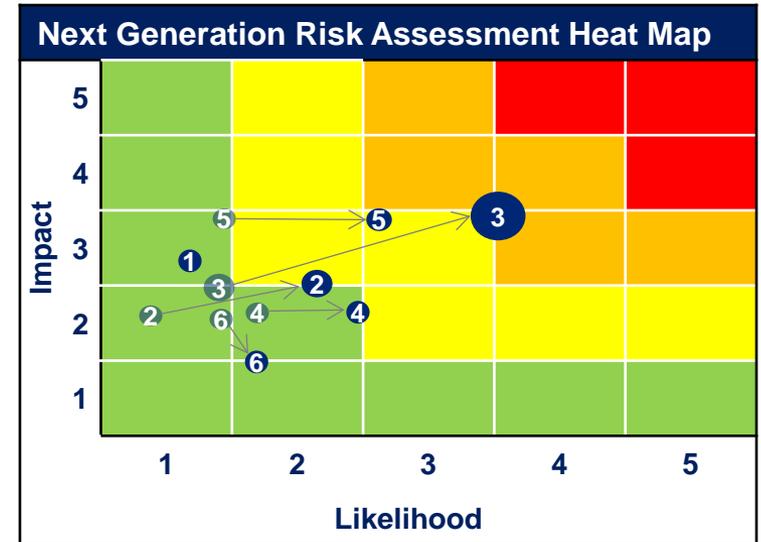- **Build trusts in analytics capabilities**
    - review/improve existing information
    - enhance technology tools and techniques

Other Risk Management Techniques

- Lessons learned database

- Cost estimating data updated frequently with as-built costs

- Subcontractor pre-qualification

- Contractual protections

- Insurance, including subcontractor default, CCIP, etc.

- Alignment of skill set and culture with customer, region, industry and project type

- Close scrutiny of design/engineering documents during bid phase

- Monitoring quality, safety and productivity during construction

Next Generation Risk Assessment Heat Map

Risk Factor

Low 1-5	Medium 6-10	High 11-16	Very High 17-25

Movement of risk classification

Shift between Date 1 & Date 2 | Minimal/No Change

Velocity (risk manifestation):

Slow | Medium | Fast

Risk Category:

1. Governance and Ownership
2. Risk Management
3. Delivery Management
4. Resource Management
5. Vendor Contract & Relationship Management
6. Change Management / Business Unit Impact

Project Predictive Analytics

Conference Resources

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