

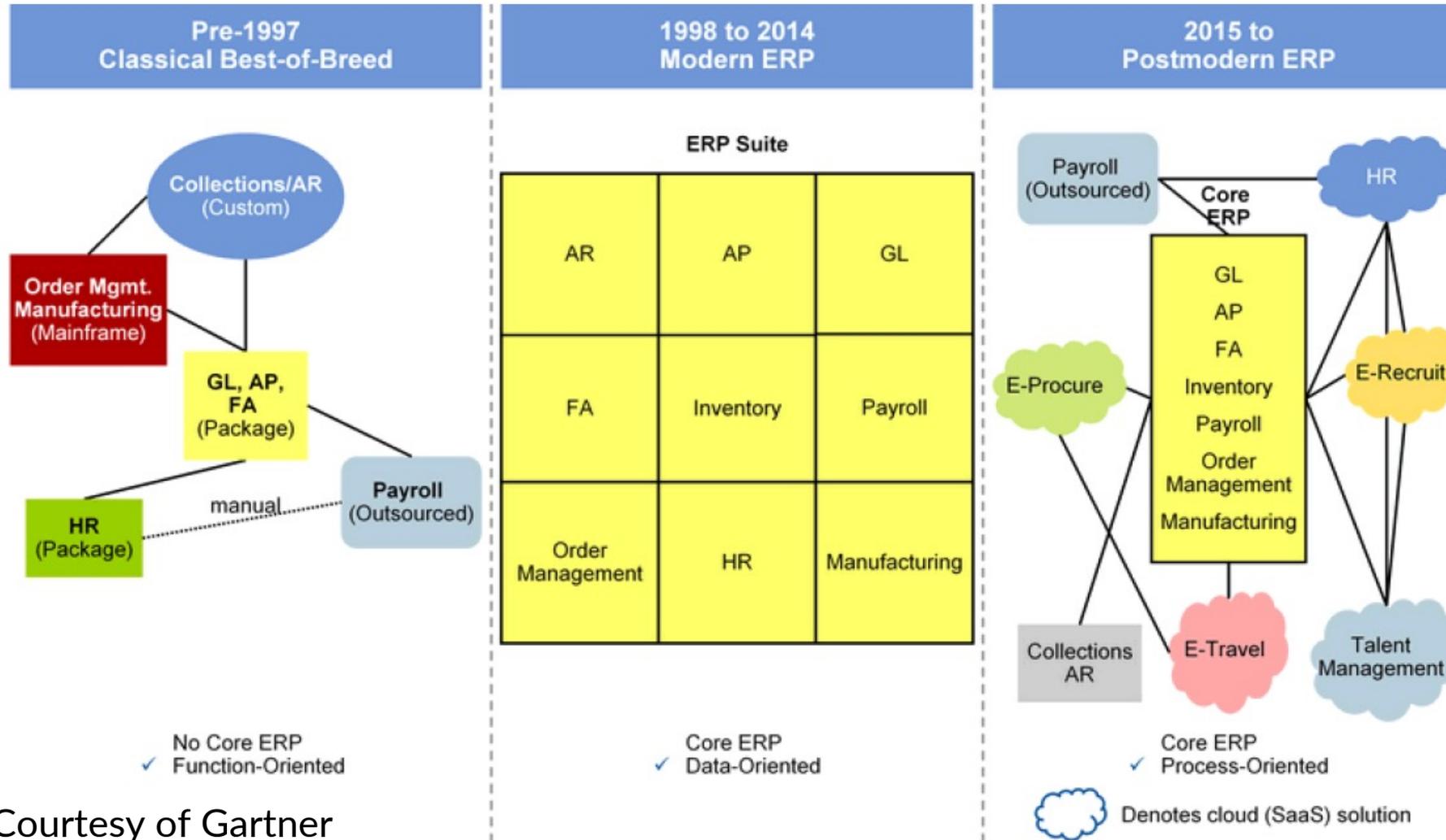
plante moran

Data driven decisions in Construction

Bob Tinglestad and Kim Pierce



Evolution of enterprise construction software

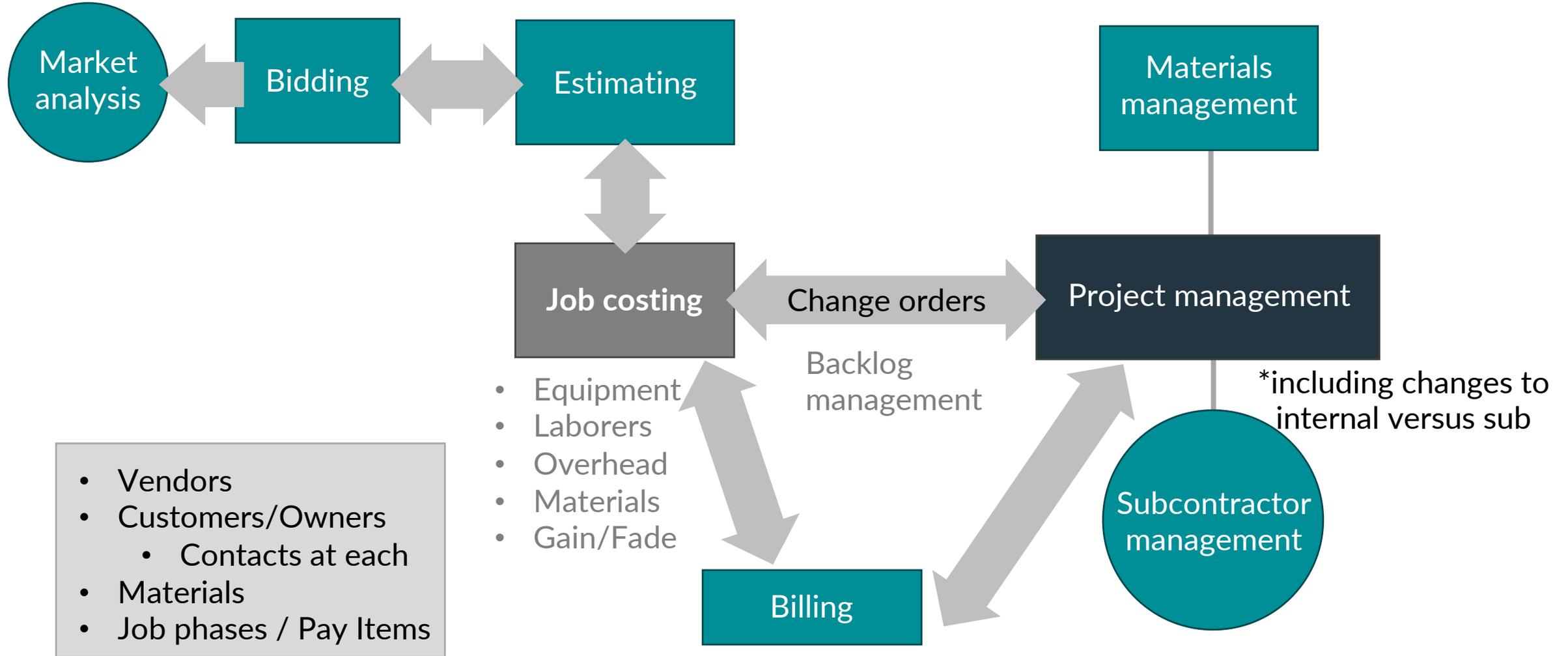


Analytics & Performance Management

Courtesy of Gartner



A construction business process example: Mastering bids through job costing with multiple solutions





Application Rationalization

- Primary systems

- Estimating & bidding
- Accounting systems
- Project management systems
- Project scheduling
- Fleet management

- Additional systems

- Invitation to bid
- Contact management/CRM
- Prequalification
- Telematics
- Safety/EHS
- Human Resources
- Payroll
- Plant ticketing
- Etc.





The power of business analytics

Business Analytics





Business intelligence and data integration



- **Information for every decision-maker**
 - Data discovery, reporting, analysis, scorecards, and dashboards
 - Delivered where, when, and how needed
 - View of all time horizons: past, present, & future
 - Up to date and performant
- **Free to answer critical business questions**
 - Answer “how am I doing,” “why,” and “what should I be doing?”
 - Ensure organizationwide insight and alignment



How you know there is a problem or need?

How many jobs am I winning per estimator? Are they improving?

Everywhere I look, people have different versions of the same accounting data. Which one do I believe?

Someone used to push a button to get it. Now they're gone, and we think they took the button with them.

How do we compare to industry?

I don't want to spend every weekend dumping job cost data & scheduling data into Excel.

What are realistic utilization targets and associated equipment rental rates?

There's no consistency to how we measure project managers. 30/60/90% gain/fade would be great!

I need to know when and where we're spending too much on overtime.

We've outgrown our processes, and they are too complicated to maintain.

We don't know how to get what we need.



What are some types of decisions and outcomes?

WHY?

Drive Growth

Increase Profit

Reduce Risk

HOW?

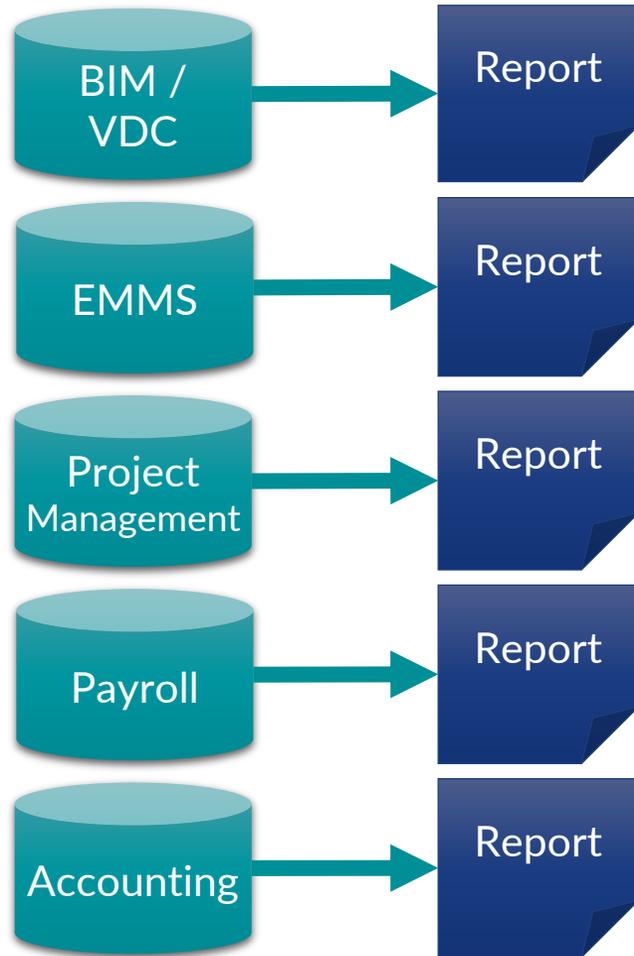
- Data Driven Strategic Planning
- Financial Planning & Management
- Sales Forecasting, Analysis and Opportunity Management
- New Market Entry / Plant Locations
- Increase access and insight to owner/customer data

- Job fade reductions
- Aggregate Inventory Mgmt
- Bid spread optimization
- Procurement
- Labor & Resource Mgmt
- Equipment Mgmt
- Maintenance & Warranty Mgmt
- Trucking Mgmt & Optimization

- Quality Assurance
- Compliance
- Safety
- Customer & Supplier Concentration
- Employee satisfaction and retention
- Employee performance
- Environmental impact
- Root-Cause Analysis
- Data Quality

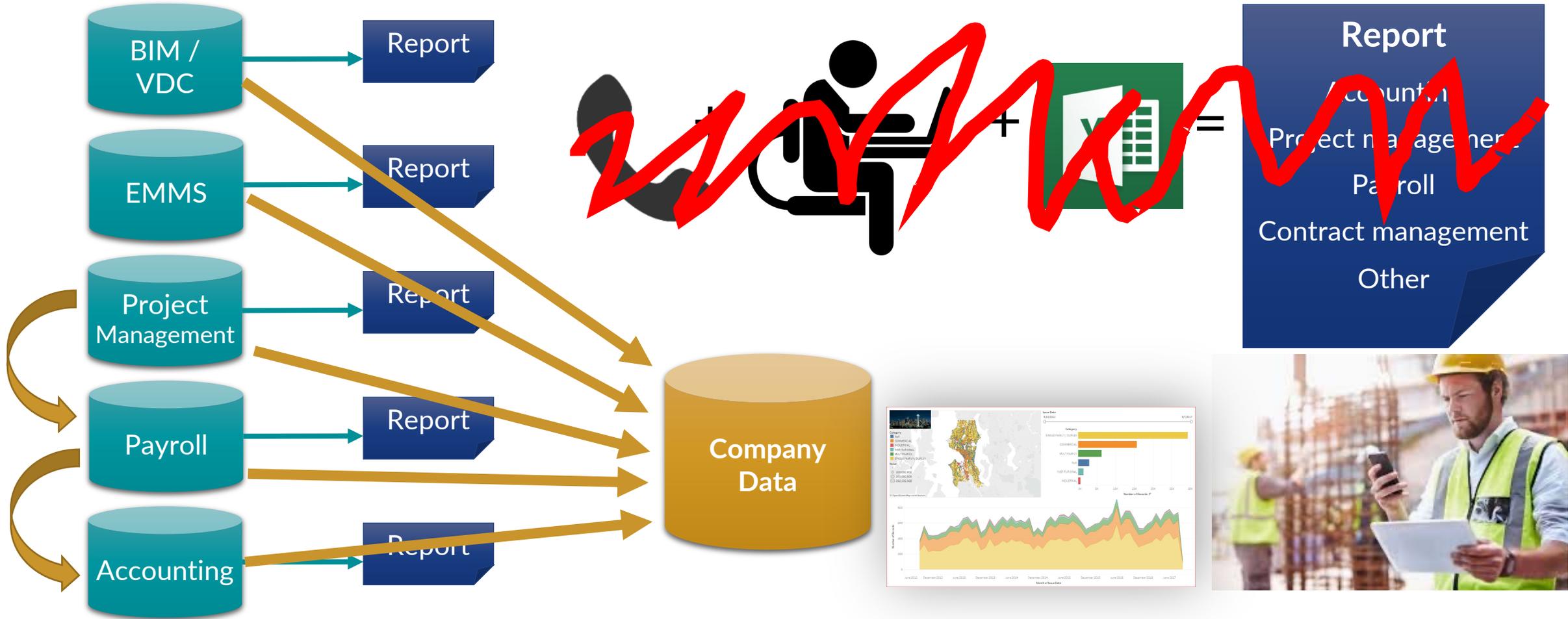


Before it all comes together





After business analytics solution is implemented





Margin Analysis Blueprint



Gross Margin Analysis: 12/2017 to 12/2018
YoY GM Increase | YOY GM Decrease

Contract Value	Gross Margin	Jobs	Change	<input checked="" type="radio"/> (All) <input type="radio"/> 2017 <input type="radio"/> 2018	Estimator (All)
\$2,671M	\$86M	159	-6.84%		Project Manager (All)

SAMPLE CONSTRUCTION Co



DIVISION1			DIVISION2			DIVISION3		
Gross Margin			Gross Margin			Gross Margin		
2017	2018	Change	2017	2018	Change	2017	2018	Change
37,871,536	34,150,426	-9.83%	2,853,020	2,907,720	1.92%	\$53,762	\$62,868	16.94%

Job Name	2017				2018			
	Contract Value	Estimated Cost	Gross Margin	GM %	Contract Value	Estimated Cost	Gross Margin	GM %
Grand Total	1,279,531,886	1,235,097,738	44,434,148	5.8%	1,391,744,331	1,350,348,316	41,396,015	6.0%
111 Diego Dr.	45,151,628	44,751,628	400,000	0.9%	46,709,054	48,806,326	-2,097,272	-4.5%
CC River	32,799,138	32,179,256	619,882	1.9%	33,186,530	33,325,356	-138,826	-0.4%
Park Library Parking Lot	237,203	237,203	0	0.0%	0	72,719	-72,719	0.0%
Cotton Wood Visitor Center Roof	143,000	143,000	0	0.0%	161,674	181,999	-20,325	-12.6%
Master Main Lobby	1,178,068	1,139,793	38,275	3.2%	1,173,171	1,184,984	-11,813	-1.0%
TR5 Veranda Reno	262,942	312,942	-50,000	-19.0%	227,256	238,669	-11,414	-5.0%
Succession Art Gallery	504,021	504,021	0	0.0%	532,524	533,622	-1,099	-0.2%
Widedot - Box T*R	1,691	1,495	196	11.6%	0	163	-163	
P90 USCG Carpet Install	2,547	2,316	232	9.1%	1,631	1,763	-132	-8.1%
Widedot - U3, Y65, Duo	4,893	4,355	538	11.0%	4,448	4,467	-20	-0.4%
Widedot Fill Holes	9,200	8,464	736	8.0%	4,980	4,998	-18	-0.4%
Widedot - Flooring	5,300	4,876	424	8.0%	4,941	4,958	-18	-0.4%
Widedot - Flooring part 2	5,300	4,876	424	8.0%	4,972	4,986	-14	-0.3%
Widedot - Basement Blowout	1,100	979	121	11.0%	1,047	1,050	-4	-0.3%
Welton Crop Redesign	1,125	1,077	48	4.3%	0	1	-1	



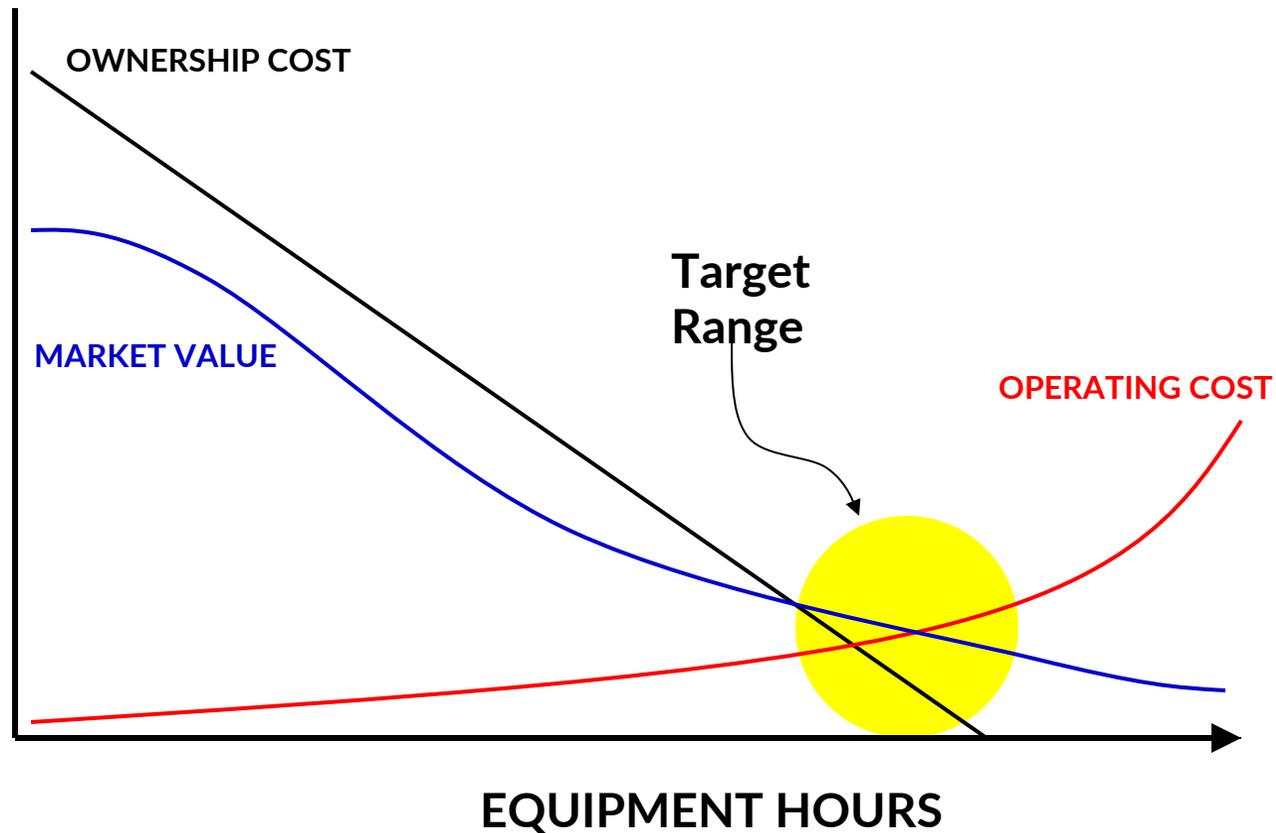
Equipment Cost Modeling Blueprint

- Full life-cycle costing/rental rates
- Model the key drivers of ownership costs and operating costs
- What-if scenarios with utilization, maintenance intervals, shop costs, etc.
- Run versus stand-by rates
- Shop budget based on operating hours projections and key cost model drivers
- Support key fleet management decisions regarding utilization, rent vs. lease vs. own, hold/sell and maintenance practices



Managing the Age of Your Fleet

Operating cost curve...





Hot Mix Tonnage

Ticket Month

June

Ticket Year

2020

Plant 1
6/30/20 7:15 PM

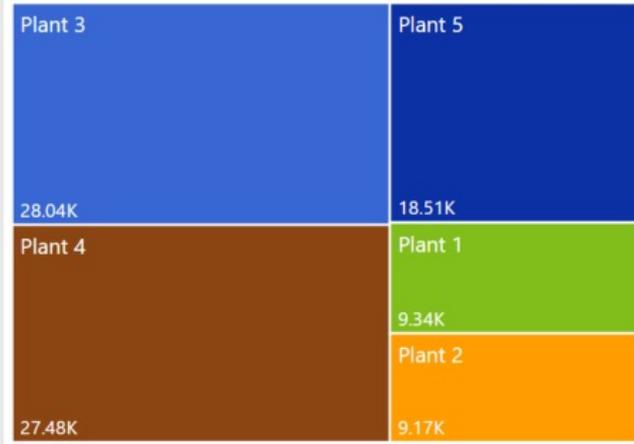
Plant 2
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Plant 3
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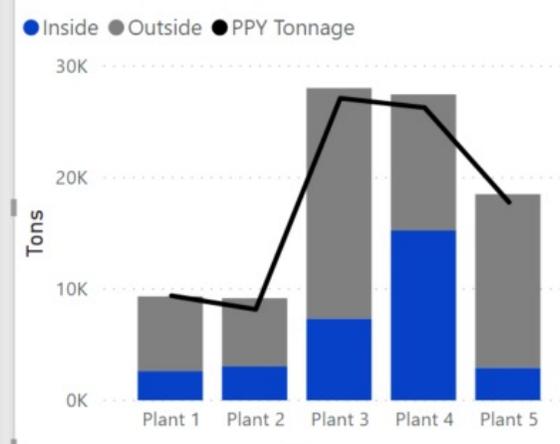
Plant 4
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Plant 5
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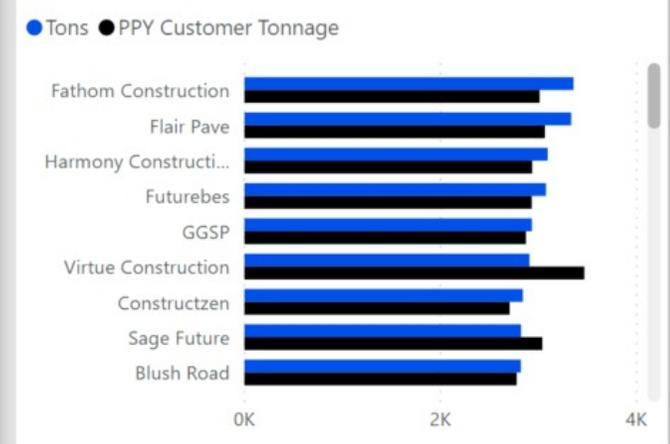
Tons by Plant



Current vs Prior Year Tonnage



Tons by Customer



Tons by Month and Year

Year	January	February	March	April	May	June	July	August	September	October	November	December	Total
2020	531.55	559.05	733.28	20,231.82	73,823.36	92,545.32							188,424.38
2019	486.52	513.29	675.84	19,705.73	71,426.38	88,751.03	96,610.56	102,646.13	86,241.07	93,305.51	65,950.51	6,277.96	632,590.53
2018	389.00	499.38	712.24	19,440.81	69,356.68	86,605.42	93,365.03	99,590.10	83,518.43	90,195.06	64,466.67	6,040.20	614,179.02
2017	403.80	503.48	660.87	18,388.66	67,619.49	83,632.11	91,115.28	96,031.90	80,969.17	88,324.46	62,062.68	5,714.38	595,426.28
2016	440.72	485.80	606.07	18,137.54	65,398.61	81,118.79	88,216.49	93,494.30	78,312.44	85,263.05	60,380.83	5,877.37	577,732.01
Total	2,251.59	2,561.00	3,388.30	95,904.56	347,624.52	432,652.67	369,307.36	391,762.43	329,041.11	357,088.08	252,860.69	23,909.91	2,608,352.22

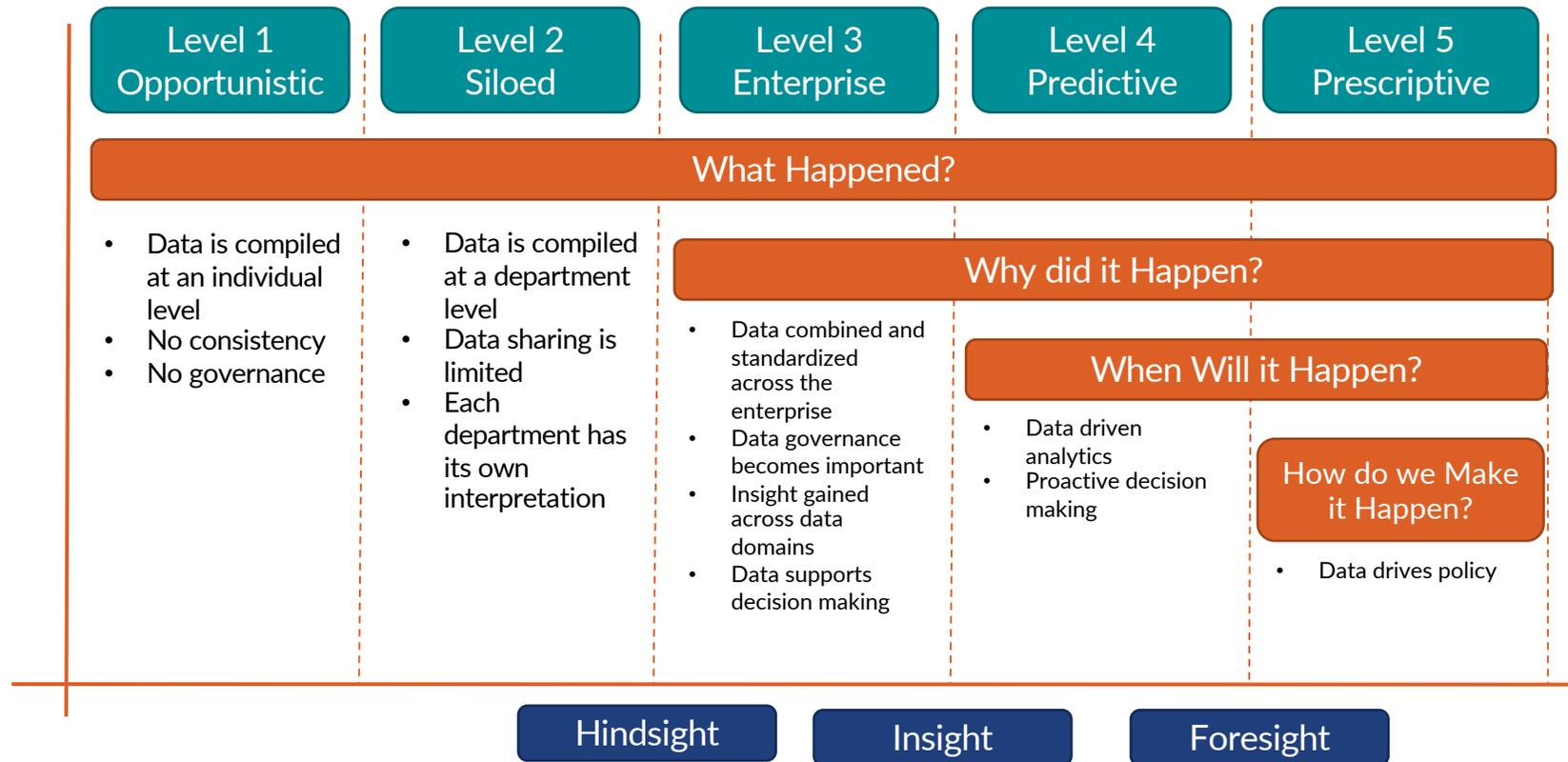


Cash Gap Blueprint





Analytics stages of maturity





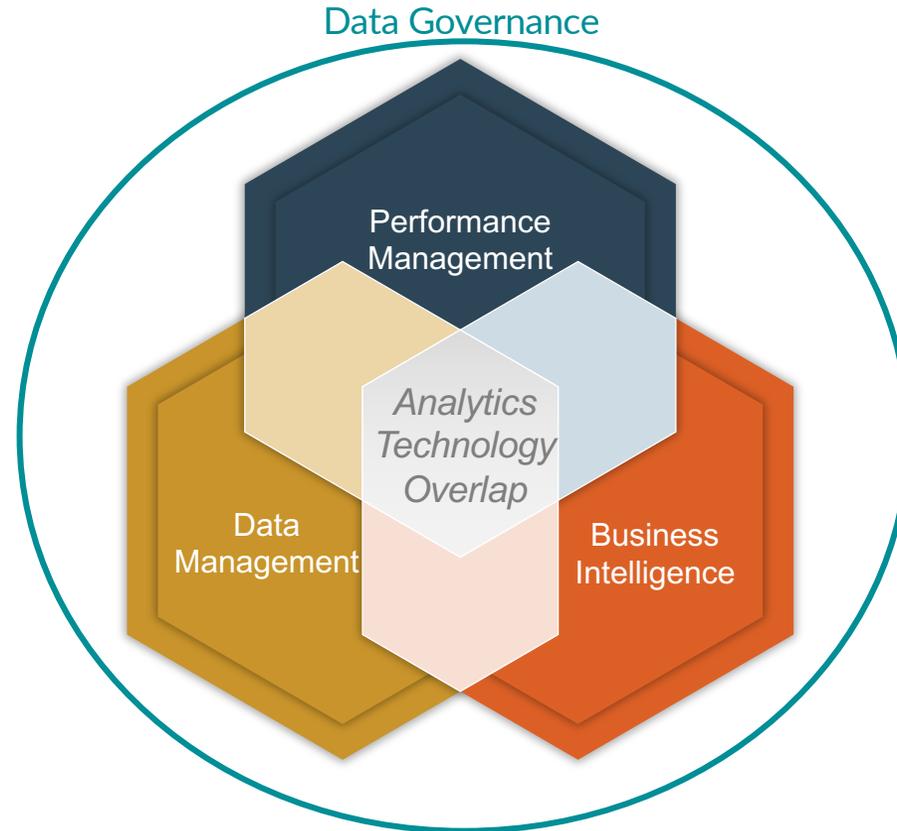
Enterprise Analytics Technology

Data Governance Technology

- Master data management
- Data Dictionary
- Managing Business Rules & Meta-Data Layer

Data Management Technology

- Data Integration
- Data Staging and Warehousing
- Speed & Performance aligned with user needs.



Performance Management Technology

- Financial planning & budgeting
- Variance reporting
- Financial forecasting
- Revenue, Sales, Labor, Capex forecasting
- Scenario modeling
- What-if analysis

Business Intelligence Technology

- End user reporting ("Managed")
- Dimensional reporting and filtering ("Adhoc")
- Visualizations
- Drill-downs



The real world problem of data issues

Customer name	Number of orders	Total paid
Chris Froome	11	11,000
Mark Cavendish	7	7,000
Bradley M Wiggins	6	6,000
M.S. Cavendish	6	6,000
Bradley Marc Wiggins	5	5,000
BM Wiggins	4	4,000
Taylor Hamilton	3	3,000
Tyler Hamilton	2	2,000
Brad Wiggins	2	2,000
Bradley Wiggins	2	2,000
Tyler Hamilton	1	1,000
B.M. Wiggins	1	1,000

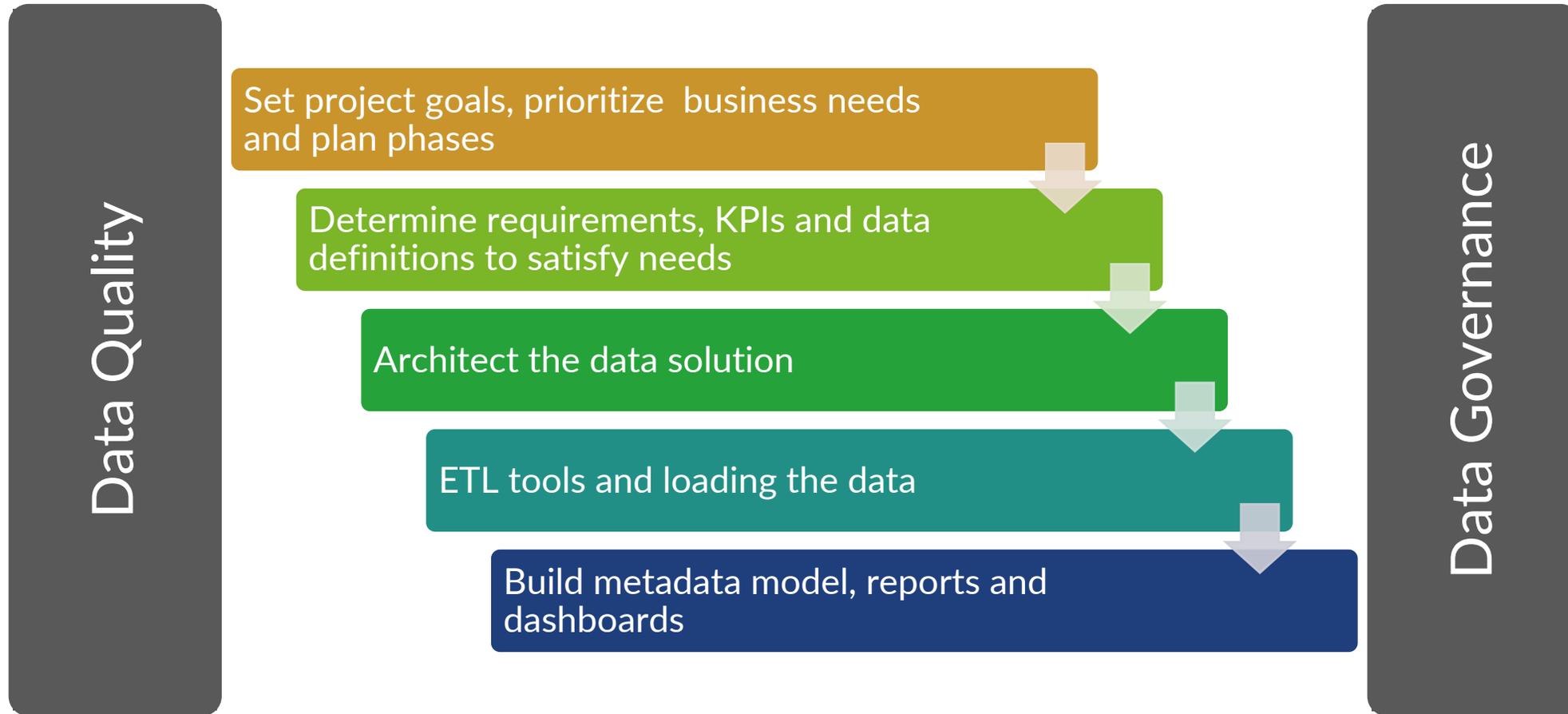


Customer name	Number of orders	Total paid
Bradley Wiggins	20	20,000
Mark Cavendish	13	13,000
Chris Froome	11	11,000
Tyler Hamilton	6	6,000





Development methodology





Identifying & Managing: *Implementation Risks*

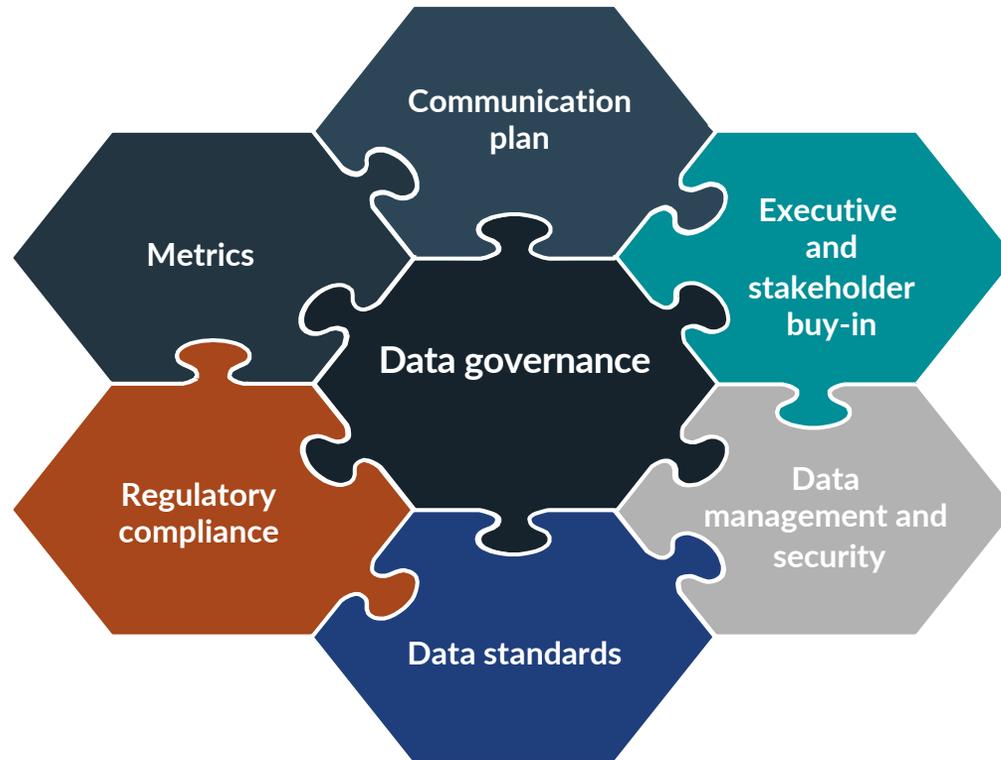


The jigsaw of data governance

Best practice components are variable for each organization; some translate into higher success rates than others.

Start with a manageable set of data. Look at the size of the organization, the number of data sets to be governed, and required data security compliance

Establish which best practices will generate the highest results for your organization's data governance initiative and implement them first.





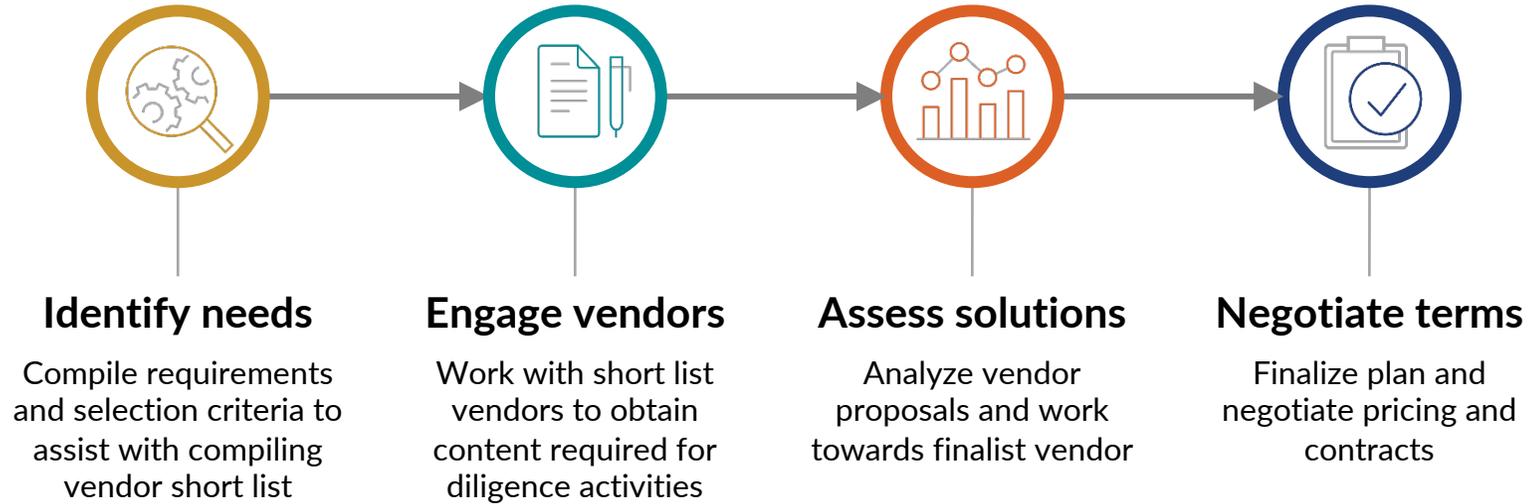
Analytics end user adoption

- Solve a business need
- Understandability
- Performance
- Accuracy
- Executive sponsorship





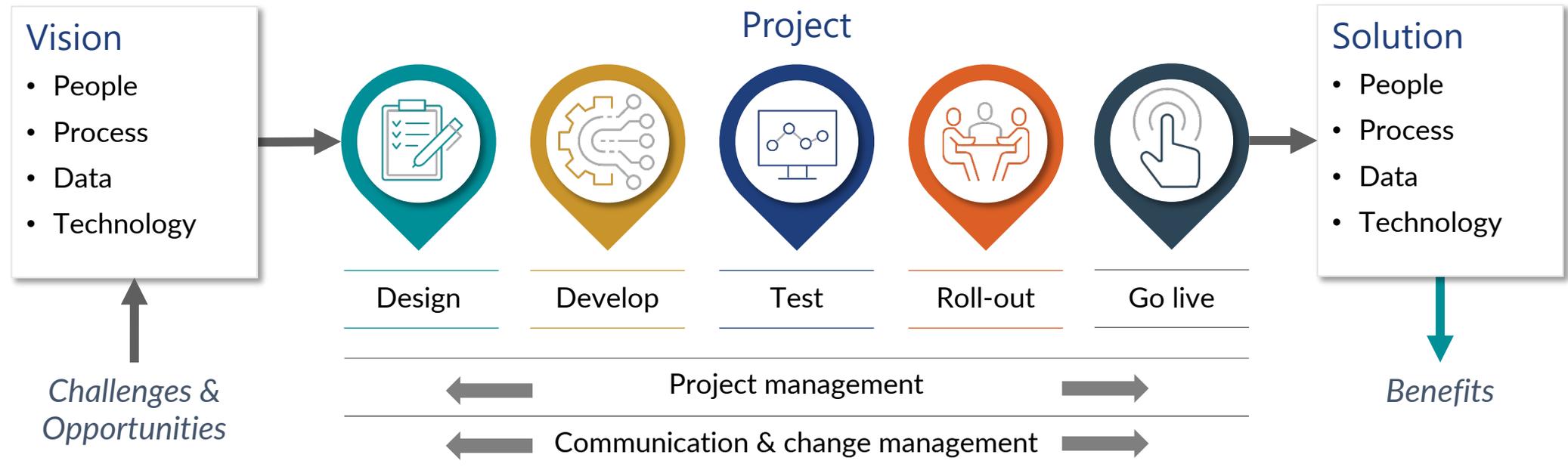
Software selection approach





Software Implementation Process

- Software initiatives are inherently complex because they are multidimensional. Turning a vision into delivering a tangible solution requires discipline, a diverse skill set, and adept decision making.





Holistic View of Implementation Management

Project operations

- PMO advisory
- Change management advisory
- Project administration
- Project governance

Project realization

- Process re-engineering
- Solution design advisory
- Data management
- Test scenarios

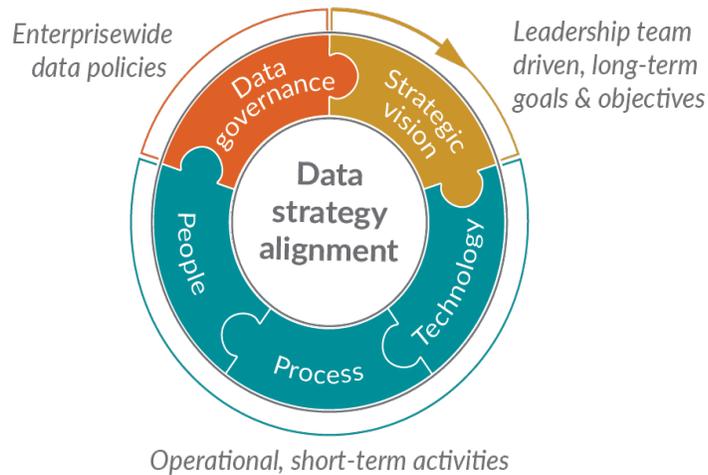


Project adoption

- Customized training
- End user documentation
- Change management execution assistance
- Stakeholder communications



Technology Optimization and Analytics - Considerations



Strategic Vision

Explore, define and communicate the vision and strategy for analytics (by stakeholder group and on whole) and identify and evaluate specific gaps to achieving digital strategy objectives and outcomes.



People

Understand, evaluate and benchmark capacity, capabilities and organization necessary to meet analytics goals and provide you with actionable insight; identify resource needs and opportunities to reduce non-value added efforts.



Process

Review and define KPIs, metrics and reporting priorities; discuss and propose analytics and IT best practices including foundations for data management, mining, exploration, visualization, science; propose project execution approach.



Technology

Educate and evaluate on current and probable fit technologies that would enable desired future state. Identify software, infrastructure and end-user device gaps; discuss compatibility, integration, stability and scale.



Data Governance

Synthesize, benchmark and guide participants regarding effective data governance policies, procedures, standards and cultural change necessary to gain confidence in quality of your data.

Strategic Vision	People	Process	Technology	Data Governance
Analytics Vision	Capacity	Data Sharing Practices	Data Applications	Data Ownership
Data Utilization	Organization	Internal Operations	Data Warehousing	Data Quality
Programmatic Needs	Knowledge & Skill	Project Prioritization	Descriptive Analysis	Data Risks
Stakeholder Interests			Data Access Points	
			Data Visualization	



Closing thought...

Celebrate Successes!!

- These projects are long and hard, recognize successes whenever possible
- Project activities are always focused on issues and defects – take a break and celebrate the positive



- Kim Pierce
- kimberly.pierce@plantemoran.com
- 248.223.3260



- Bob Tinglestad
- bob.tinglestad@plantemoran.com
- 303.846.3341



Articles

- [Growing into business analytics](#)
- [Business Analytics for Data Driven Decisions \(CFMA\)](#)
- [Improve Fleet Management with the right KPIs](#)
- [How construction companies can use business analytics to boost margins](#)
- [Case study: Large construction company upgrades critical ERP software](#)
- [Supercharge your industry peer group to drive innovation](#)