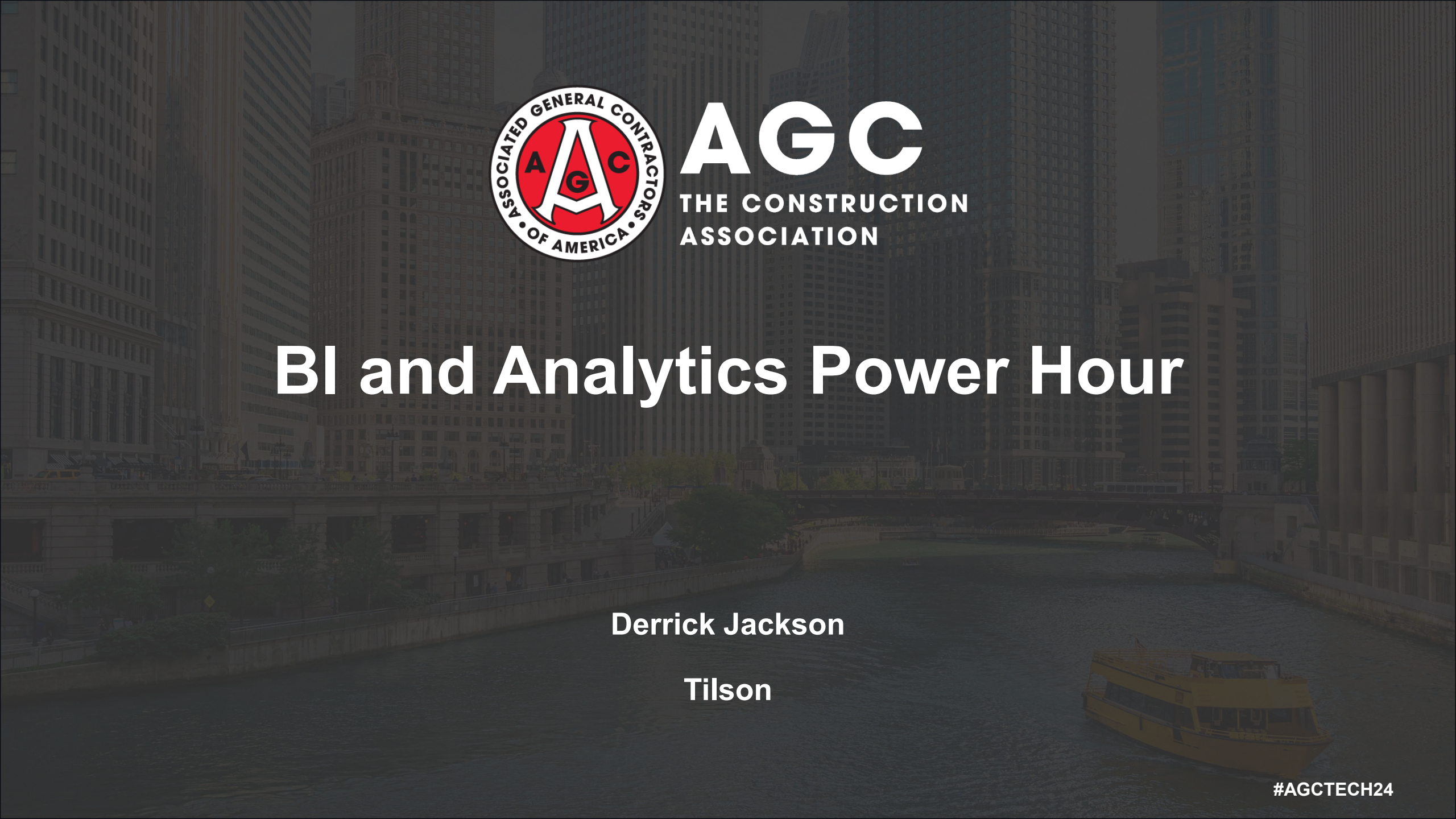

BI and Analytics Power Hour

Derrick Jackson

Tilson

#AGCTECH24

ABOUT TILSON

- Recognized 14 consecutive years on the Inc. 5000 list, one of the most prestigious rankings for the nation's fastest-growing private companies
- Organically grown construction consulting and telecommunications services firm designing, engineering, permitting and constructing fiber and wireless telecommunications network infrastructure
- 1,400+ employees in more than 20 locations, 60+ construction consultants with 30+ in contingent workforce
- Nationwide licensed professional engineer, nationwide licensed telecom contractor, and electrician in many states
- Average CIT professional has spent 15 years in construction and applications

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THE CONSTRUCTION ASSOCIATION

ABOUT ME

- 20+ Years Construction Industry Experience
  - BI & Analytics Lead and Senior Consultant
  - PPE Operations Management
  - M&A Analytics
  - IT Systems & Database Management
- Sports Fanatic

OFFICIAL APOLOGY

- Reasons that I blew the Prediction
  - Too focused on Big Data
  - Overly Healthy Skepticism

SESSION OBJECTIVES

Current Trends

- Broader Market
- Construction Industry Specific

Technologies Driving BI & Analytics

- Big Data, IoT, AI, ML
- Tool Overviews

Strategies and Best Practices

- Data Strategy & Governance
- Driving Data-Driven Decision Making

Future Directions and Predictions

CURRENT TRENDS AND CASE STUDIES

Latest Trends in BI & Analytics

- **Augmented Analytics (AI, ML & NLP)**
- **Advanced Data Visualization**
- Data Democratization

Industry-Specific Trends

- Performance Dashboards
- Predictive Maintenance & Equipment Management
- **Data Integration (BIM & Digital Twin)**

AUGMENTED ANALYTICS

The Challenge

- GC hired to develop a new technology park in Silicon Valley.
- Oracle's Primavera P6 is the traditional CPM scheduling tool. However, P6 doesn't let users explore the impact of alternative scenarios on the time and cost of a construction project easily.
- GC deployed an AI model to investigate schedule alternatives.

The Solution

- AI removed the constraints that were hard coded within the P6 schedule and let the model generate the most efficient scenarios.
- Attractive execution options are surfaced that the contractor wouldn't have had time to surface on their own given how long it takes to create schedules with traditional methods.

The Result

- With AI, this GC was able to accelerate its schedule for the project by 45 days (8%) while reducing crew sizes by 10%. The crew savings alone was worth millions.

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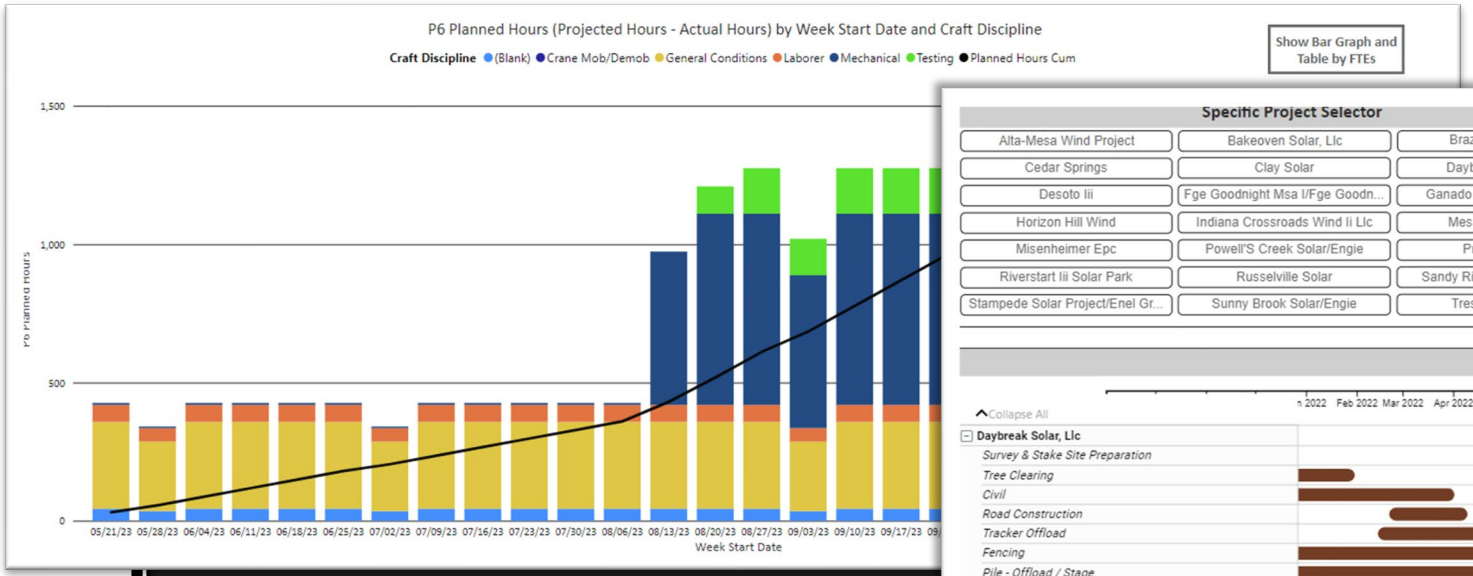
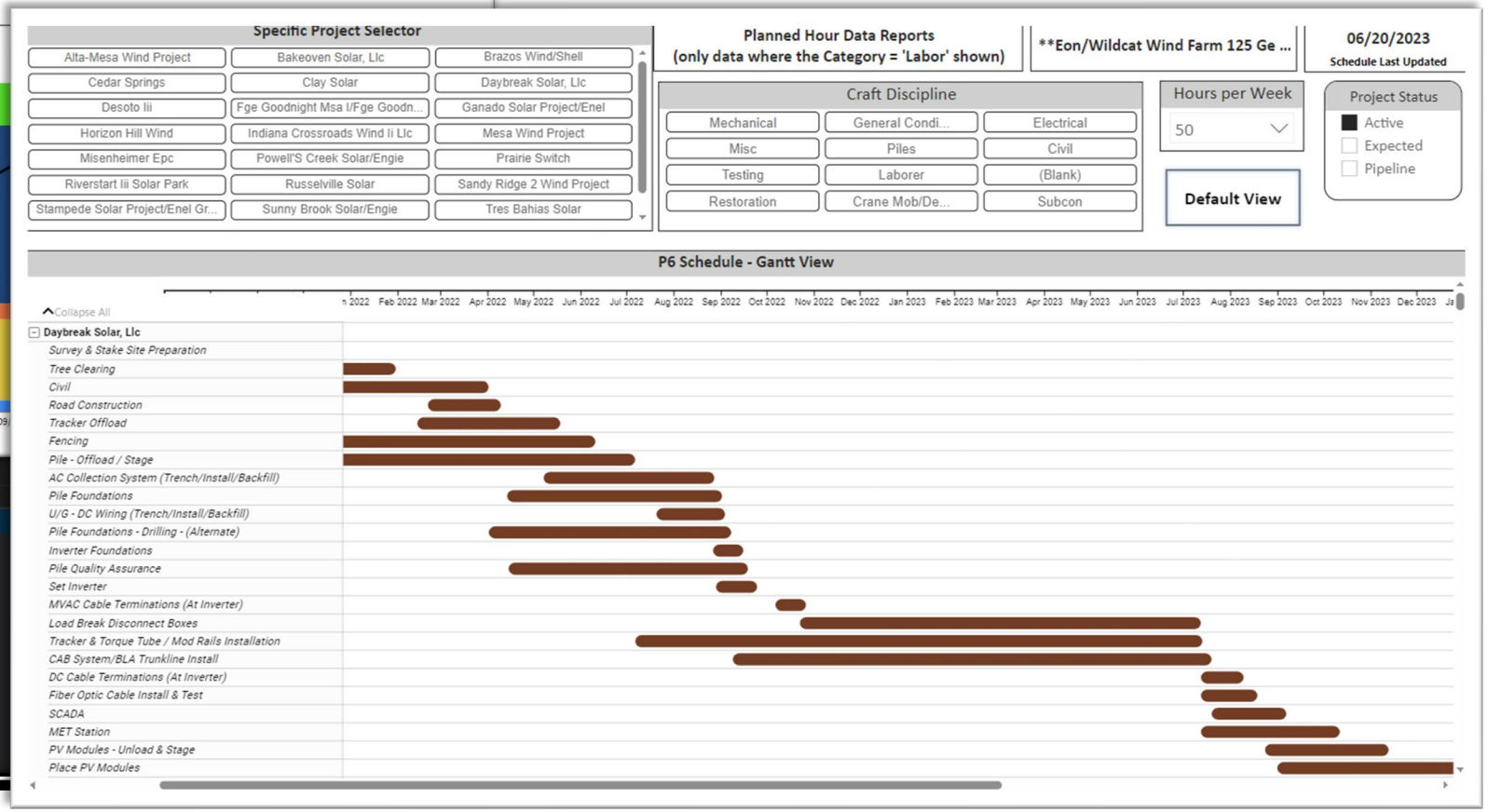



```
56      # check for best solution
57      best_idx = np.
58      if f_eps[best_
59          self._best
60          self._best
61                      
62      f_eps = (f_eps
63                      
64  eps = (f_eps - n
65  _eps = np.mean(f
66  sert (md_eps.sha
67                      
68  lf._x1 = self._x
```

clip
asarray
arange
insert
argsort
append
min
abs
absolute_import
add_docstring
add_newdoc



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ADVANCED DATA VISUALIZATION

The Challenge

- GC brought in a new CFO and additional PE funding to grow through acquisition.
- Existing analytical tools did not provide the high-level indicators needed to correlate actuals back to the corporate strategy or intuitive explanations of what story the data was telling.
- GC had already partially deployed the Microsoft Power Platform throughout the business.

The Solution

- The financial analytics platform was revamped through fresh KPI discoveries and redefined data models.
- The new models were used to create dynamic visuals within Power BI that not only support the drill-through to actuals but provide the storytelling required to tie back to the corporate strategy.

The Result

- GC can prepare business unit review meetings in half of the previous timeframe. The alignment of all stakeholders to a shared vision of the financial health of the company allows them to pursue additional acquisition targets much more aggressively.

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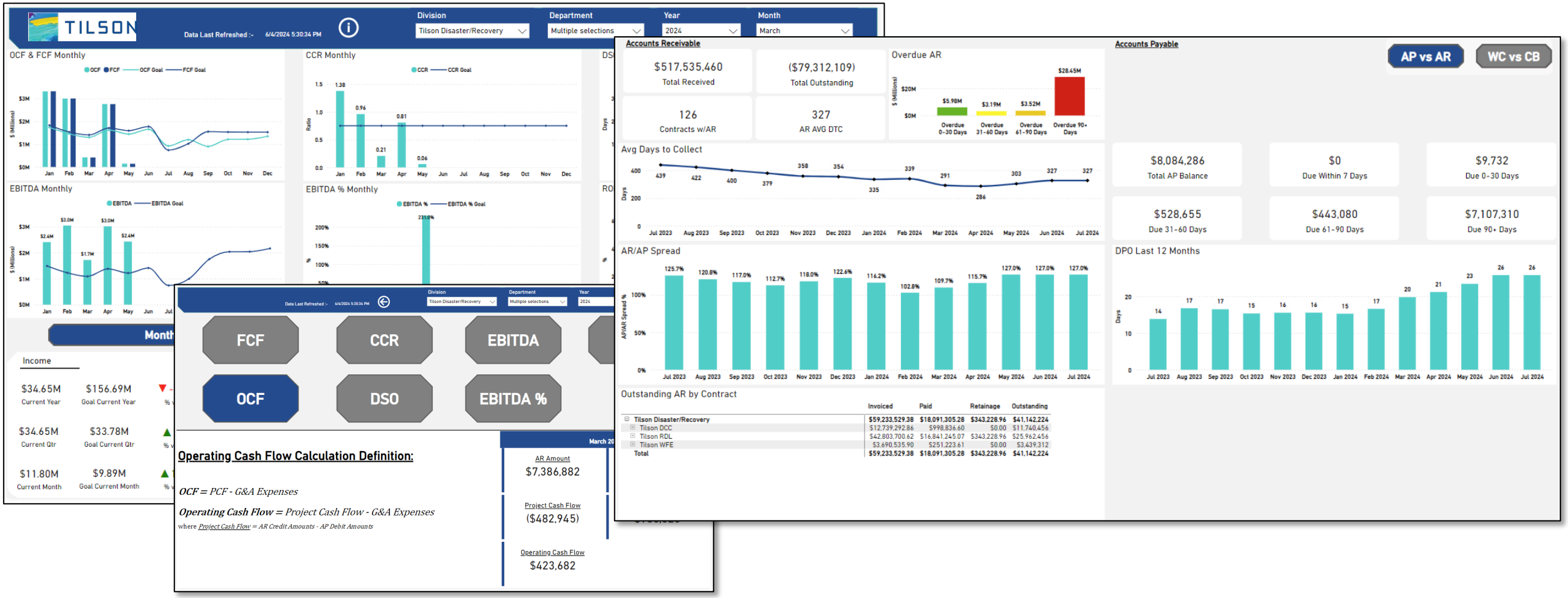


DIGITAL TWIN

The Best Targets

- Quality Control
- Safety
- Productivity and Performance

Minimum Digital Capabilities

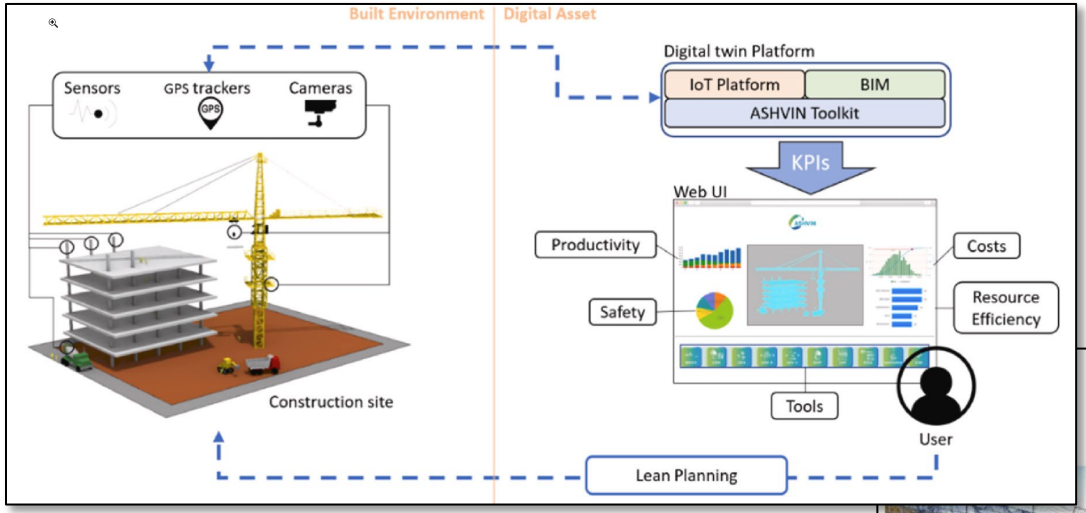
- IoT Sensors & Devices
- BIM
- Data Integration Platform
- Cloud Computing
- Data Analytics/Visualization
- Network Infrastructure
- Cybersecurity
- API/Interoperability

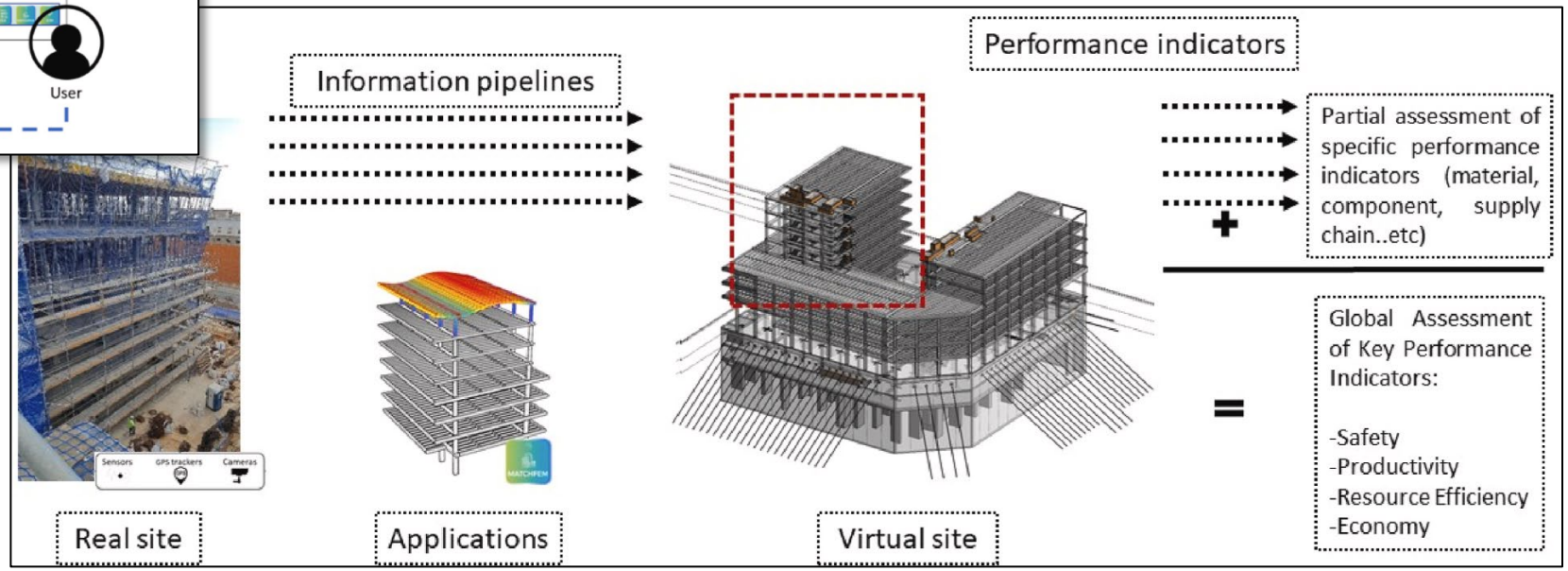
Where Efforts Should be Focused

- Information Pipelines (from Site to Dashboard)
- Data Transformation Points
- Information Life Cycle
- External Factors (i.e. Weather, Material Economics)
- Deviation Capture and Incorporation

The Top 5 Challenges

- Technical Readiness of Crew
- Remote Locations
- Priority
- Privacy Concerns
- Time Constraints


Built Environment
Digital Asset
Sensors
GPS trackers
Cameras
Digital twin Platform
IoT Platform
BIM
ASHVIN Toolkit
KPIs
Web UI
Productivity
Costs
Safety
Resource Efficiency
Tools
User
Construction site
Lean Planning


Performance indicators
Information pipelines
Partial assessment of specific performance indicators (material, component, supply chain..etc)
Global Assessment of Key Performance Indicators:
-Safety
-Productivity
-Resource Efficiency
-Economy
Real site
Applications
Virtual site

KEY TECHNOLOGIES DRIVING BI AND ANALYTICS

KEY TECH FOR 2024

Where Investment $$ are Going

- Big Data and BI
- Internet of Things (IoT)
- Artificial Intelligence (AI) and Machine Learning (ML)
- Cloud Computing

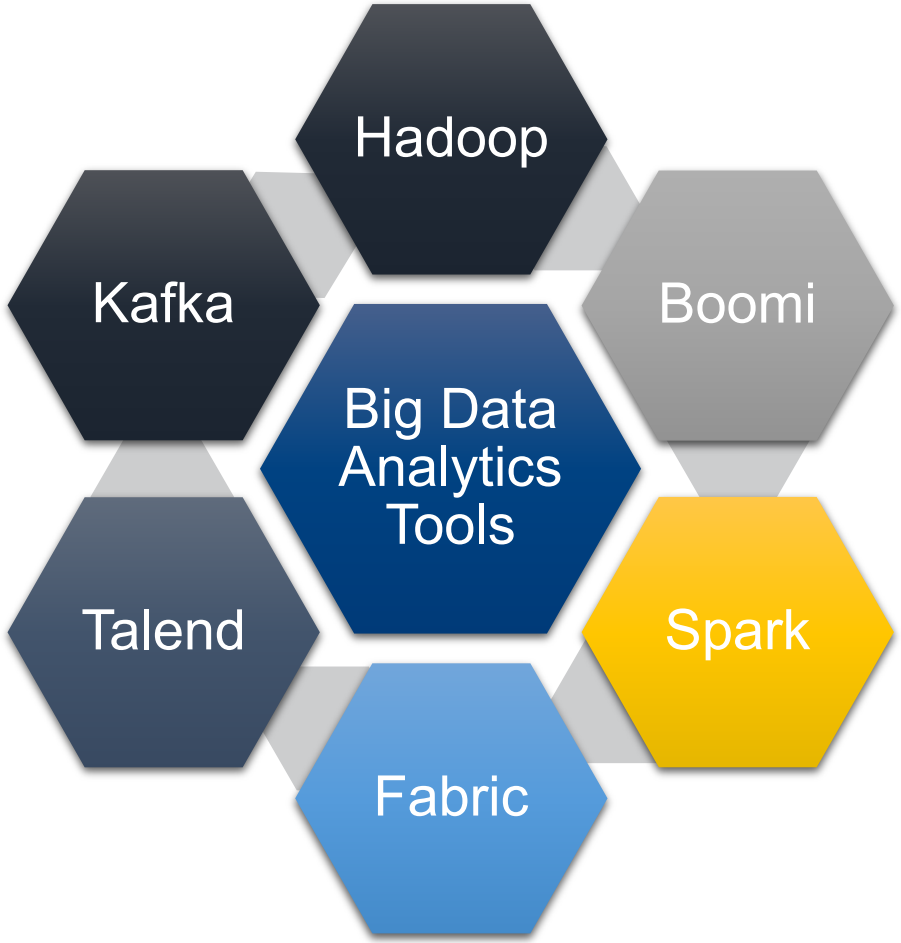
MQ at a glance

- Shift towards conversational / Gen AI
- No change in vendor mix
- Biggest advance is Pyramid (again)
- Biggest decline is Sisense (again)
- Oracle joins leaders!
- AWS, SAP close to leaders

KEY TECH FOR 2024

Big Data Toolsets

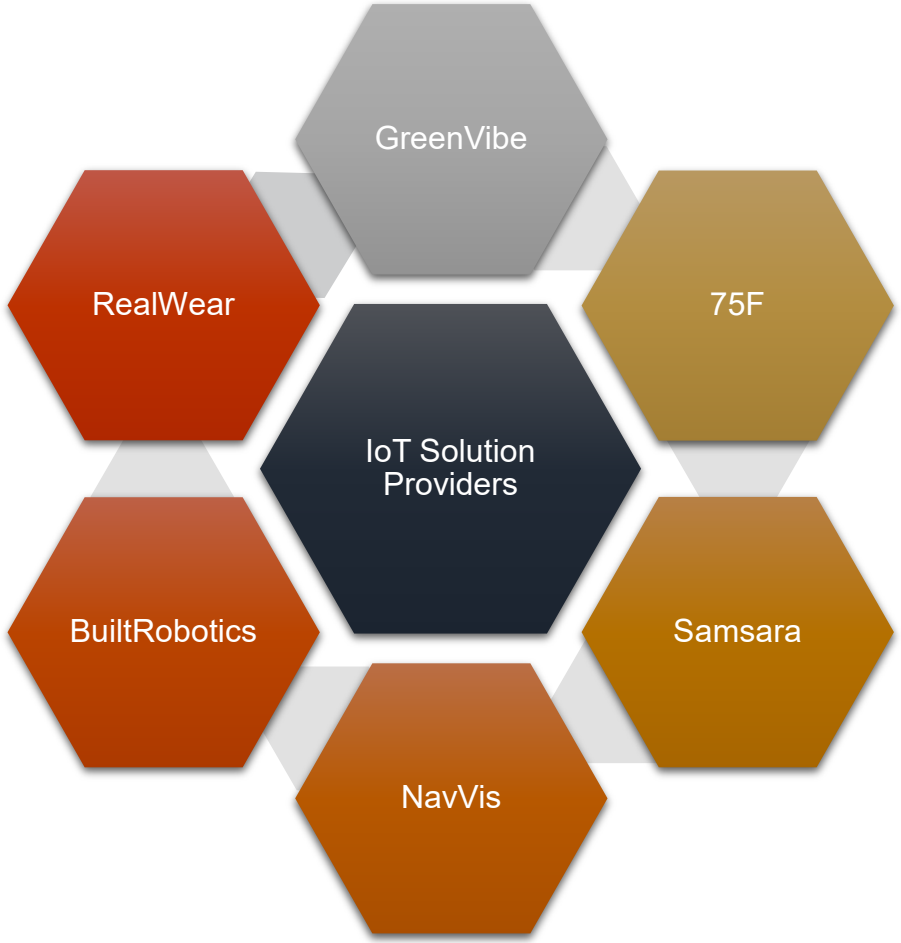
- **Talend**: Software Integration Platform
- **Kafka**: Distributed event store and stream-processing platform
- **Hadoop**: Framework that is used to store/process large datasets
- **Boomi**: Integration Platform as a Service
- **Spark**: Unified Analytics Engine
- **Fabric**: Unified SaaS Analytics Platform



KEY TECH FOR 2024

IoT Vendors

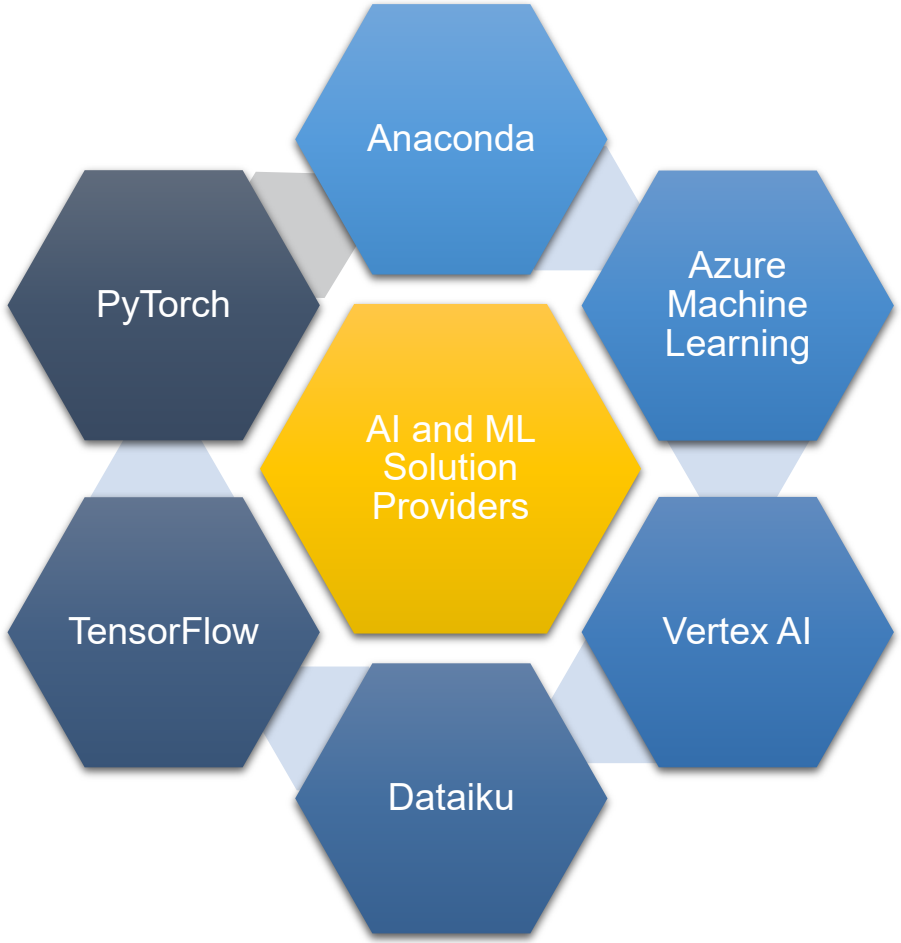
- **GreenVibe**: Concrete Condition Sensing
- **75F**: IoT-based automation for building systems like HVAC and lighting
- **Samsara**: Video-Based Safety, Telematics, Equipment Monitoring
- **NavVis**: Laser Scanning and Reality Capture
- **BuiltRobotics**: AI-Powered Tools for Utility-Scale Solar Construction
- **RealWear**: AI-voice-powered Smart Glasses



KEY TECH FOR 2024

AI and ML Solutions

- **Anaconda Enterprise:** Build, deploy, secure Python AI and Data Science solutions
- **Azure Machine Learning:** Cloud service to build/deploy ML. Can also ingest opensource models (like TensorFlow and PyTorch)
- **Vertex AI:** Google's unified AI development platform for building and using generative AI
- **Dataiku:** Tailored offerings for AI & ML, Data Analytics and Enterprise AI. Partners with AWS, Google, Microsoft and Snowflake
- **TensorFlow:** End-to-end opensource machine learning platform
- **PyTorch**: Framework for building learning models



STRATEGIES AND BEST PRACTICES

DATA STRATEGY

START
- The data you already have

EMBED
- Core principles of compliant data governance

MAXIMIZE
- Data usability through standardization

COMMUNICATE
- Early and often with stakeholders

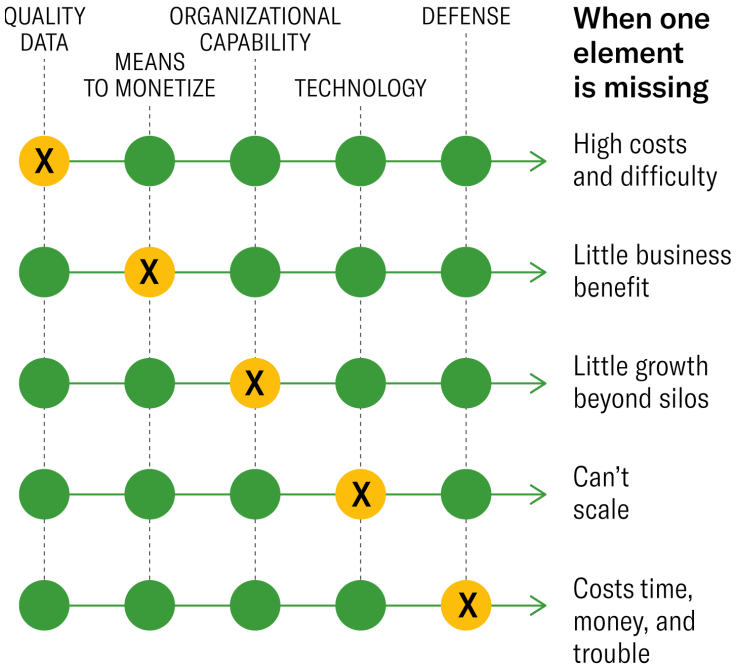
PARTITION
- The effort by the business domain rather than the governance stack

Balance Offense and Defense

- Offense (Flexibility)
  - Identify, compile and inventory data supporting business objectives
  - Generate insights around customer and/or market data
  - Identify and compile data utilization metrics
- Defense (Control)
  - Ensure regulatory compliance
  - Limit fraud and theft
  - Enforce data quality
  - Drive to a “single source of truth” that can be presented as multiple versions

5 Essential Elements for Succeeding with Data

And what happens when one element is missing.



Source: Thomas C. Redman

HBR

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DRIVING DECISION-MAKING

SHIFT MINDSET

- Executive Sponsors
- Quick Wins
- Experimentation

STRENGTHEN SKILLSET

- Data Literacy
- Data Storytelling
- Analyst Resources

SHARPEN TOOLSET

- SVOT
- Automation
- Process Integration

SOLIDIFY DATASET

- Data Governance
- Strategy Alignment
- Data Privacy

FUTURE DIRECTIONS AND PREDICTIONS

PROJECTIONS

Digitization and AI ($2.5B & 20% CAGR)

- Safety Monitoring
- Cost Prediction
- Generative Construction

https://www.gminsights.com/industry-analysis/artificial-intelligence-in-construction-market

Construction Robotics ($1.4B & 19.1% CAGR)

- 3D Printing, Concrete Placement, Rebar Installation
- Welding, Cutting and Surface Finishing
- Earthmoving, Excavation and Grading

https://market.us/report/construction-robot-market/?trk=article-ssr-frontend-pulse_little-text-block

PREDICTIONS

Adoption of Tier 1 (Basic) Analytics (via KPMG)

- 45% of Companies already implemented
- 45% of Companies are in the process of adoption
- 68% of Companies are planning Tier 2

2026

~15% Adoption Growth in Tier 1
~ 6% Tier 2 Growth

Will Kansas City Do it Again?

- Over/Under of 11.5 wins
- Odds to advance to postseason are -500
- Odds to win Superbowl are +600

NO

~ Because I'm a Saints fan

QUESTIONS