The Value of Digitalization in Capital Projects

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7° Congreso AACE International de Ingeniería de Costos

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Astor Luft

Astor Luft is the Regional Director for IPA Latin America. In this role he leads a team of analysts, researchers, and support staff based in Curitiba, Brazil. He is responsible for maintaining IPA's relationships with its global and local clients in the region and forging new partnerships with owner companies in the mining, oil and gas, chemicals, consumer goods, power, and infrastructure industries.

Prior to assuming the Regional Director role, Astor was a client engagement leader for two major oil and gas companies and conducted project evaluations for numerous IPA clients in the Americas, Asia, Europe, and the Middle East. He also conducted several megaproject evaluations and led consulting engagements and research studies.

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Outline

- About IPA

- Defining Digitalization

- Understanding the Value of Digitalization

- Implementing Digitalization

- Conclusion

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IPA

IPA Is a Data-Driven Research Consultancy

IPA—Independent Project Analysis—is the world's leading advisory firm on capital projects

A benchmarking, research, and consulting organization devoted to the empirical research of capital project systems

Over 20,000+ projects collected directly from owner organizations

Proprietary & Granular Databases	**Research**	**Clients**	**Validation**
We maintain a steady flow of high quality proprietary non-public domain capital project data	Our database enables the research that flows into our products and services	We have unparalleled access to a global network of capital-intensive organizations and their leaderships	Our recommendations are continuously verified to yield business value

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IPA Our Experience in the South America Region

IPA has been working in South America since **1995**

70+ companies **served**

1200+ capital projects **evaluated**

$400+B capital investment **assessed**

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Some Definitions...

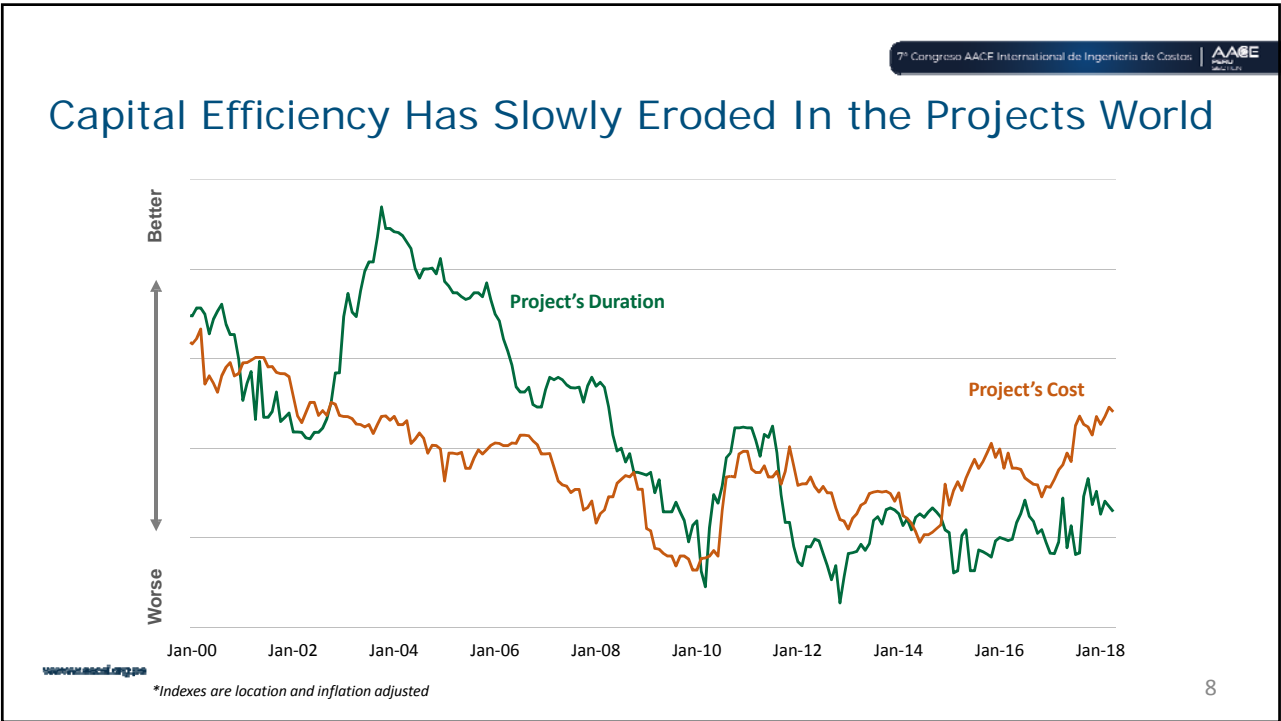|	
"Project Data"	Refers to cost, schedule, engineering, and team data, as well as project documentation
"Digitization"	Conversion of information into digital form (photos, music, paper, old CAD drawings, etc.)
"Digitalization"	Process of getting separate collections of digitized information to communicate; can also be referred to as "data integration"

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Capital Efficiency Has Slowly Eroded In the Projects World

*Indexes are location and inflation adjusted

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Is Digitalization the Cure to Our Capital Deficiency?

- Companies across the capital projects industry have turned to digitalization as the solution to improving capital efficiency

  - i.e., produce more, in less time, at lower cost

- The excitement is born out of advances in technology and data analytics from which many solutions are available

- Many advances are remarkable, and have the potential to revolutionize the way we do projects

- But, understanding how to identify high value solutions, and rolling out said solutions is difficult with a high potential for failure

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What Value Do We Get From Project Data?

- Data have the potential to improve project controls and decision making

- In projects, there is a vast amount of data that could be valuable to owner project organizations

- But that value depends on projects organizations ability to collect and use the information

- Therefore, we asked the question, "What does data value look like for you for your capital projects?"

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We Surveyed and Talked With Representatives from Organizations to Understand Digitalization Efforts

Digital Representatives

Multiple participants from
25 companies around the globe

Typically with 10+ years of experience

Most in senior roles in company-wide digitalization initiatives

Surveys & Telephone Interviews

Structured surveys and phone interviews focused on the following concepts:
- Perceived value
- Current organization practices
- Tools and software
- Lessons learned
- Ongoing initiatives
- Insights for adoption

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The Bigger Initiatives

- Several organizations we interviewed are working on implementing systems to unify project cost, schedule, and engineering data into one database:
  - Records the development of the cost estimate, schedule, and conceptual to basic engineering
  - Then, combined with planned continuous digital updates from the contractors, it is used through execution to control the project
  - Concludes with a perfect data record for the project from concept to completion, including all modifications/change orders for the project
- This is one of the dreams of digitalization for the project world

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Some Gains Have Already Been Made With Digitalization

Progress reporting was always a month late and involved a team of people re-entering data into our system; now it is instantaneous

We were able to cut down the burden of transferring detailed cost data from SAP into our cost database from two people working over a month to about three minutes

Savings of a couple million on a recent large project

Data standards

30 percent reduction in project control man-hours

20 million savings across our portfolio

We have standardized our code of accounts

Doubled tool time on a recent project

Project cost and schedule data management per project reduced from six people down to one

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What Is the Reality?

- For project data digitalization to work, companies need a better way of receiving and managing data
  - Most project systems do not have data infrastructure (e.g., databases or data management)
  - Data collection is manual (spreadsheets) and inconsistent
  - Contractors resist providing detailed information
- The effort to remedy these issues is perceived as significant
  - Automation tools are not comprehensive and can be expensive
  - Data functions add to your already scrutinized head count
  - You can get more detail from contractors, but it takes discipline

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Establishing the Value of Investing in Data

What data bring the most value?	How and when will the data be captured?	Who needs to be involved?	What are we doing with it?
Step 1	Step 2	Step 3	Step 4

These considerations should be clarified early

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Establishing the Value of Investing in Data

What data bring the most value?	How and when will the data be captured?	Who needs to be involved?	What are we doing with it?
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Data That Reduce Project Costs Should Be the First Priority

- The most valuable project data for business are data that reduce the project costs

- What do cost-saving data look like?

Cost Data Drive competitive targets	**Control Data** Cost & schedule data for execution control	**Design Data** Promote standardization	**Team Data** For team optimization

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Establishing the Value of Investing in Data

What data bring the most value? Step 1	**How and when will the data be captured?** Step 2	**Who needs to be involved?** Step 3	**What are we doing with it?** Step 4

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Needs Infrastructure to Collect and Manage The Data

Data Sources

- Cost Management
- Schedule
- Team
- Contractor
- General Project Data

Collection Instruments

Database

Analysis

Insights

Data collection requires a process

Intake from data sources must be as automated as possible

Relational databases needed to fully capture useful data

Efficiency of analysis is greatly improved from organized data

Data requirements and format need to be predefined

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Establishing the Value of Investing in Data

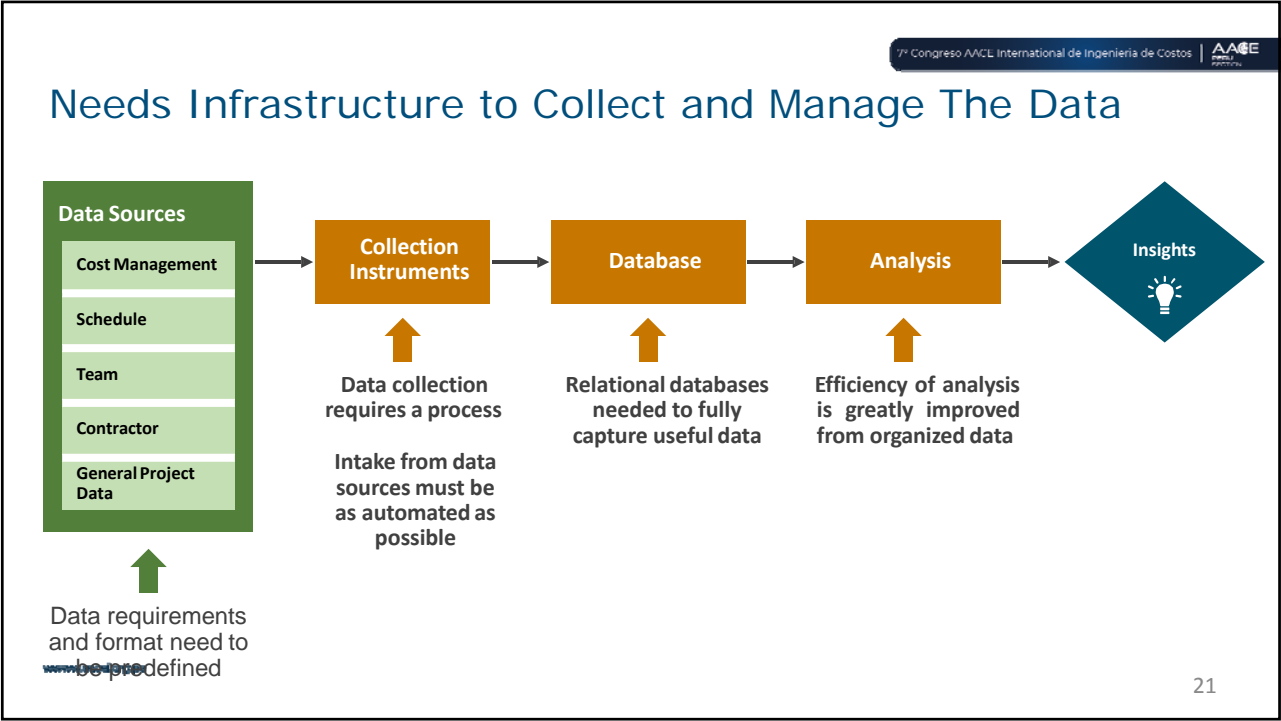| What data bring the most value?	How and when will the data be captured?	Who needs to be involved?	What are we doing with it?
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Like Engineering, Data Analytics Requires Specialization

Database Administrator

- Knowledge of database design and theory
- Knowledge of database software, SQL Server, MySQL, PostgreSQL, etc.
- Capable of database server installation
- Capable of ensuring security and generating backups

Data Scientist

- Typically masters or PhD in computer science, math, or statistics
- Skilled with statistical computer languages
- Experience creating data structures
- Knowledge of statistics and machine learning
- Experience with data visualization techniques

Statistician

- Masters or PhD in statistics
- Skilled in the theory and application of statistics
- Designs research plans and experiments
- Skilled in statistical computer languages

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Establishing the Value of Investing in Data

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The Challenge is to Convert Data into Knowledge

- Projects produce tones of valuable data that should be used to control its execution, manage changes, and document its life-cycle

- However, the value of data is much more than that; companies should use data to understand how to do projects better

- Project knowledge supports better planning of future projects (cost, durations, staffing, contracting, etc.)

- Improving predictability, competitiveness, and portfolio management

- This is the core of IPA's research: study completed projects data to understand how the Industry can do projects better!

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Perceived Roadblocks to Digitalization

66% "We have tried IT solutions in the past that work, but not very well. Management is disappointed."

50% "Legacy systems are perceived as very expensive to change."

33% "We cannot get the kind of data we want from EPC contractors."

50% "We don't have data people."

25% "No standard breakdown structure for cost and schedule."

8% "What would we do with the data?"

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The Power of Data Is NOT From the Sheer Volume
The Power Is From the Insights You Get

"Data is like garbage.

You'd better know what you are going to do
with it before you collect it."

– Mark Twain
(1835-1910)

- Tangible business benefits must be laid out clearly so that buy-in can happen from both upper management and the employees

- Digitalization projects, like all other capital projects, need to establish clear business objectives and targeted outcome performance metrics

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Conclusions

- Digitalization provides benefits to capital projects by improving project controls and supporting planning of future projects

- Capturing and managing data is difficult but can be done by:
  - Having the right people and infrastructure in place
  - Establishing specific requirements for contractors

- Data acquisition and management cost money, hence, cost reduction measures should be the first priority to make its implementation viable

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Questions comments?

(Please use microphone)

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