4-6 October, Nationals Park, Washington DC

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Use of New Technologies in Project Management and IPD Governance: An Approach to Blockchain and Smart Contracts

2022

Hello! My name is David Chigne…

- ✓ More than 17 years of experience in the development and/or management of Infrastructure Construction Projects for many industries (Energy, Oil & Gas, Mining & Public Administration).
  - ✓ Lead member (until completion - Dec 2019) for the Talara Refinery Modernization Project PMO (CAPEX of $ 5.4 Billion USD).
  - ✓ Subject Matter Expert Consultant for Project Management (Cost, Scheduling, Risk) and PMO implementations (CAPEX of $ 1.2 – 2 Billion USD)
- ✓ Master Degree in Business Administration (MBA) and Bachelor Degree in Electrical Engineering.
- ✓ Certified PMP®, PMI-RMP® and PMI-ACP® by the Project Management Institute PMI.
- ✓ Certified CCP® and CEP® by the Association for the Advancement of Cost Engineering International AACE.

Something you don't know about me…

- ✓ I was a volunteer firefighter for more than 12 years, reaching the rank of Fire Sergeant Major and being elected First commander of the Volunteer Fire Department (Venezuela) for the period 2008 – 2009.
- ✓ This is my first time that I'm presenting in English!

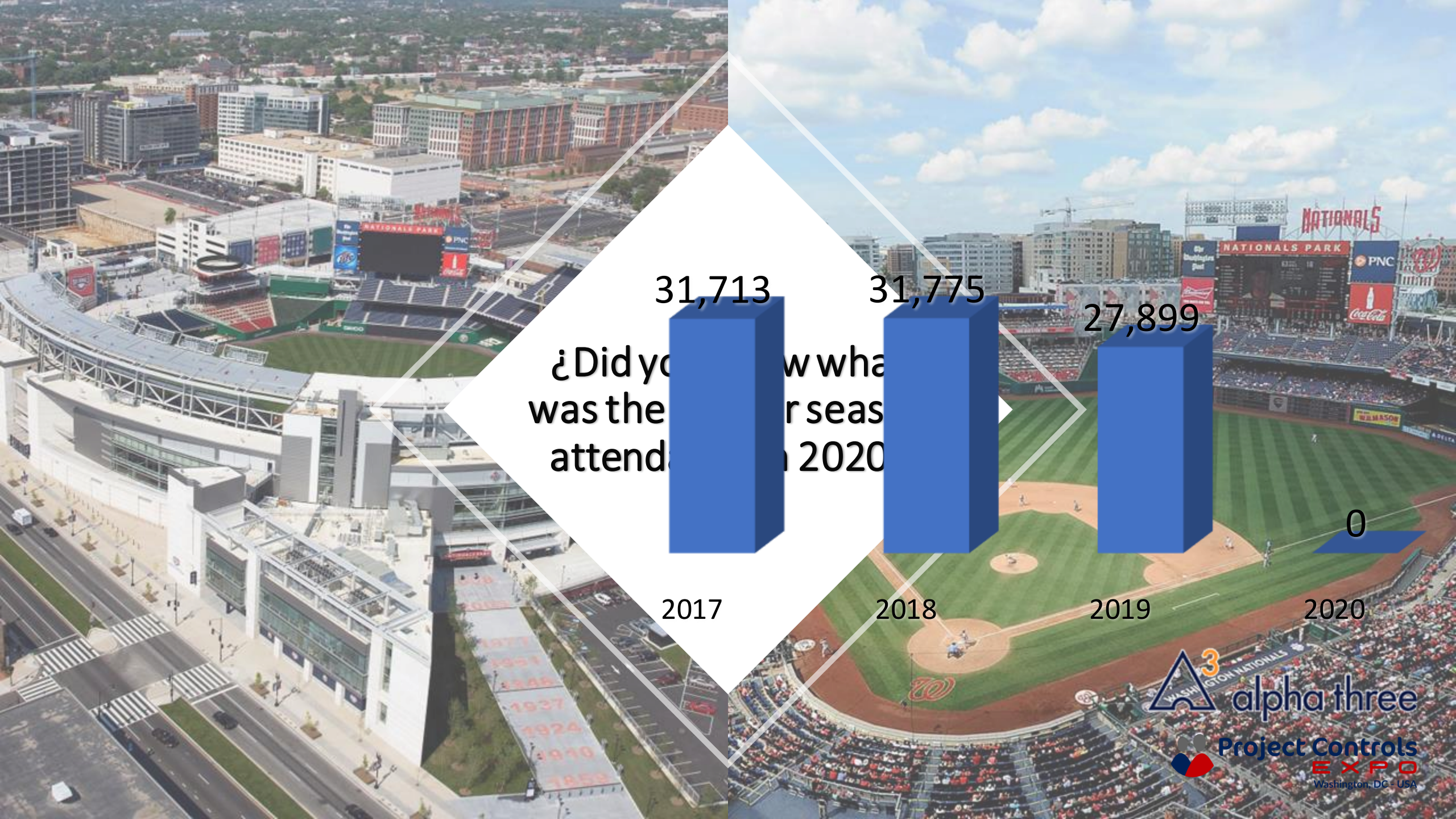
Hello! My name is Mark Sanders…

- ✓ More than 25 years of experience as an engineer, manager, and consultant on transportation, power, commercial, and government construction projects
- ✓ Director of Projects for Alpha 3 Consulting, LLC
- ✓ Registered Professional Engineer in Delaware, Maryland, Pennsylvania, and Wisconsin; License to Practice Law in California
- ✓ AACE International—Certified Cost Professional (CCP), Certified Planning and Scheduling Professional (PSP), Certified Forensic Claims Consultant (CFCC)
- ✓ Project Management Institute—Certified Project Management Professional (PMP); Certified Portfolio Management Professional (PfMP)
- ✓ Education—Bachelor/Master of Civil Engineering, J.D.

Something you don't know about me…

- ✓ I have been spending a lot of time at hockey rinks and soccer fields this year.

¿Did yo w wha
was the r seas
attend 2020



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Why do we need the use of new technologies in Project Management and Governance?

Accelerated digital disruption has compressed the long digital transformation roadmap from years into weeks.

The digital transformation that ***was expected to take 6 years progressed in 60 days!***

https://www.twilio.com/covid-19-digital-engagement-report

We have the obligation to…

… Optimization efforts may be applied to project resources, supply chain, cash flow, and project controls.

[AACE International]

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Blockchain and Smart Contracts

…the interest in possible implementations of blockchain in the construction sector ***is on the rise.***

[Tezel]

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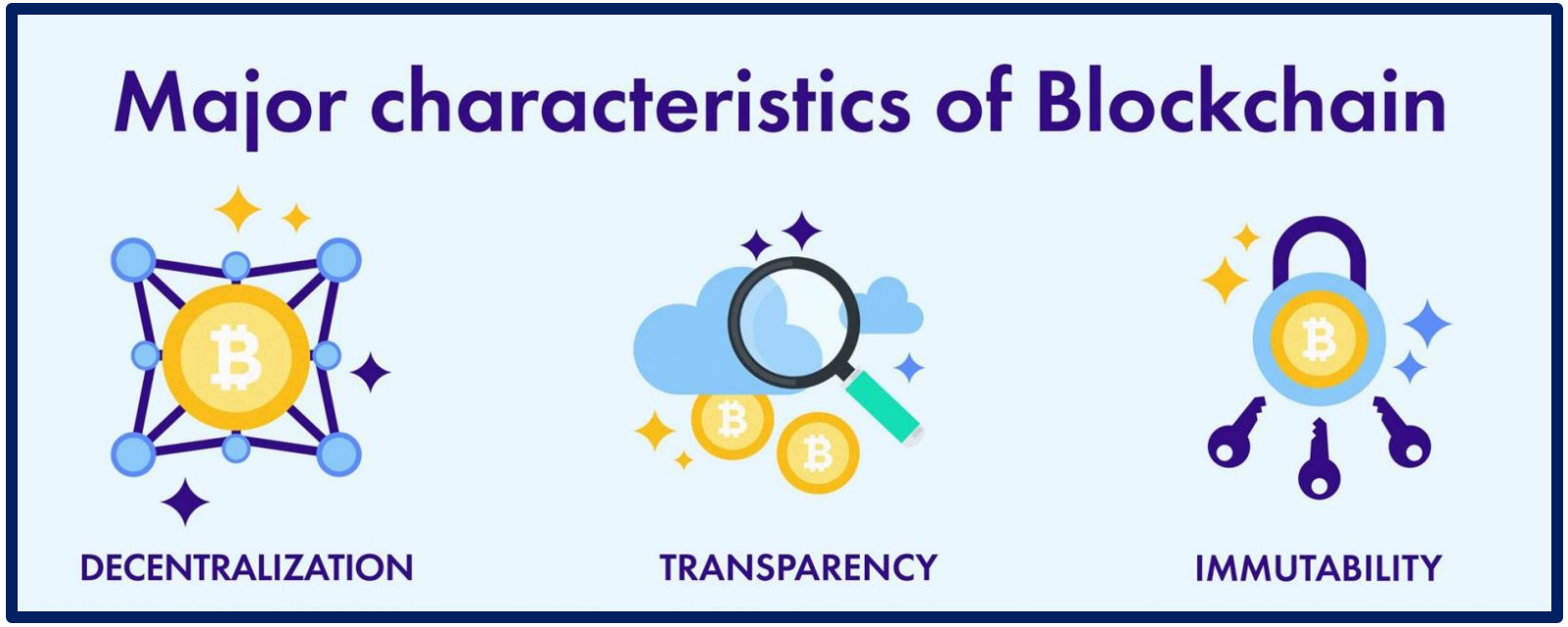
Blockchain… how can we understand it?

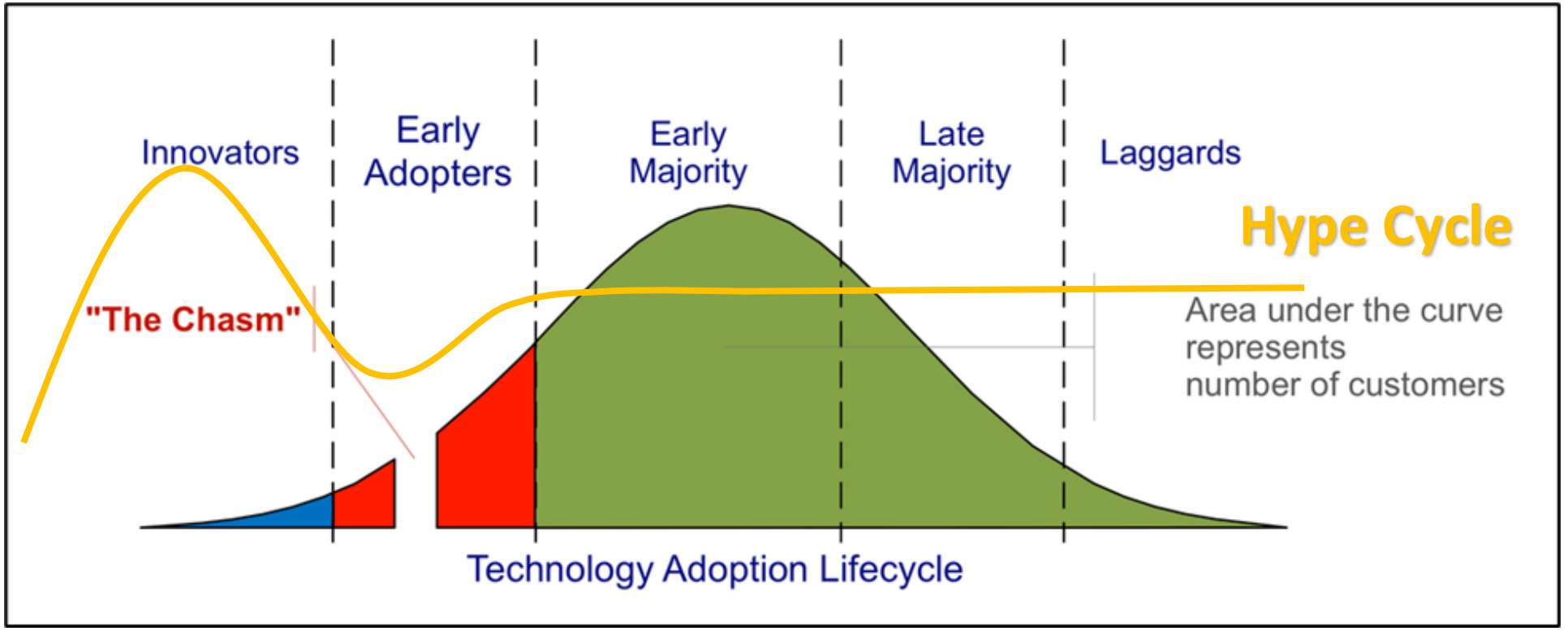
A blockchain is a decentralized, distributed and public digital ledger that is used to record transactions across many computers so that the record cannot be altered retroactively without the alteration of all subsequent blocks and the consensus of the network."



Major Characteristics of Blockchain

But… what is the "State of the Art" of Blockchain in Construction Projects?

State of the Art of Blockchain in Construction



Depiction of the technology adoption lifecycle [Moore, Chelius] with hype cycle [Gartner]

…the interest in possible implementations of blockchain in the construction sector ***is on the rise.***

[Tezel]

Our goal is to provide a pragmatic evaluation of whether blockchain is a fit-for-purpose solution to the problems presented in each

Use case

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Use Case 1

Scheduling and Progress Reporting: Monitoring the Procurement of Long-Lead Items and Compliance Certificates for Milestones and Factory Inspections

(Using blockchain)

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The environment: PMRT

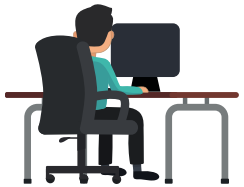
PETROPERU

"Capital Project Oil & Gas sector, a 5,000 MM USD public investment where the Owner decides to implement a Project Management Office (PMO)"

Blockchain Smart Contracts for Supply Chain and Construction

1 SMART CONTRACTS

Owner's team generates a Smart Contract, which will contain the conditions of the Project, applicable legislation, organization, approval hierarchies for each modification, milestones and payment conditions.

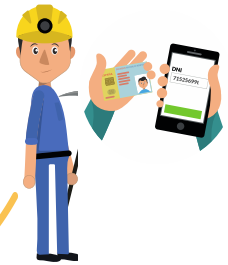


2 BLOCKCHAIN EVIDENCE

- DB Creation of **contractual evidence in BlockChain**. The equipment entry, materials and personnel can be controlled.
- Connected equipment allows **monitoring the entire daily work process**, total hours worked, effective hours, real consumption, ...

3 CONTRACT MONITORING

- Monitoring of work area or permit release dates
- Automatic justifications for compliance or non-compliance with contractual milestones.
- Permissions management for change authorization (digital signature of approvers)
- Productivity clauses incorporated in the Smart Contract (measured automatically)



4 DISPUTE MANAGEMENT

- During the contract monitoring process, variations can be registered with respect to the contractual conditions, initiating a process of contract change order.
- Through a roboticized system, the evidence is registered in the DB in BlockChain, and the communications and documents generated by the parties will be mapped, generating adequate support for claims.

5 PRODUCT GENERATION

- Report generation of support, change opportunities, and claims in an automated way through RPA from pre-established models.
- Claims support Validation through evidence in Blockchain, recognized by the parties.

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Use Case 2

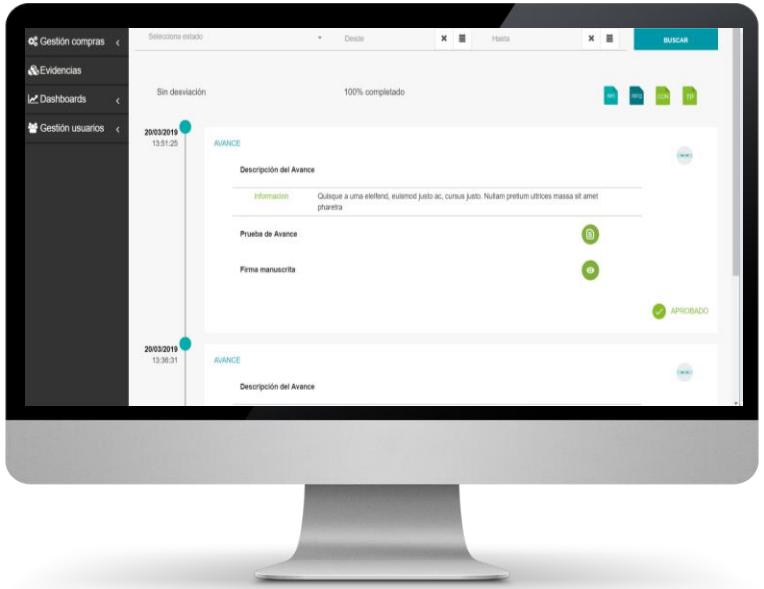
Blockchain Smart Contracts for Supply Chain and Construction

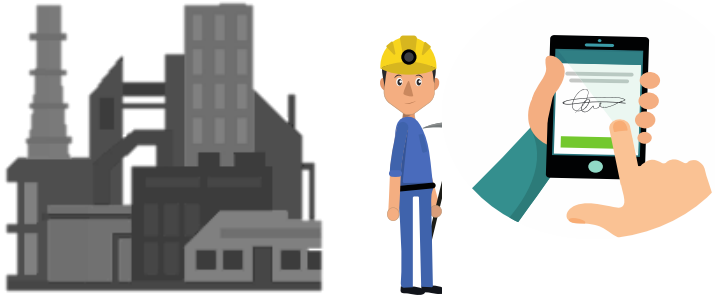
Scheduling and Progress Reporting: Monitoring the Procurement of Long-Lead Items and Compliance Certificates for Milestones and Factory Inspections

Turbine Inspection

Cellphone Application

Dashboard Visualization





- The Smarthphone APP, developed by the PMO, allows the geolocation of photography and is stored in Blockchain databases.
- Use of mobile devices connected to the platform in real time.

- Monitoring the progress of procurement milestones in real time allows us to improve control over delivery dates on the LLI site and to ensure the project's deadline.

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Use Case 3

Auditing Design Changes for Integrated Project Delivery

A typical proposed blockchain implementation in IPD describes an automated system with:

- A sufficiently detailed BIM design
- Field verification with scanning technology
- Approval of work in place (sometimes)
- Automatic payment for work in place

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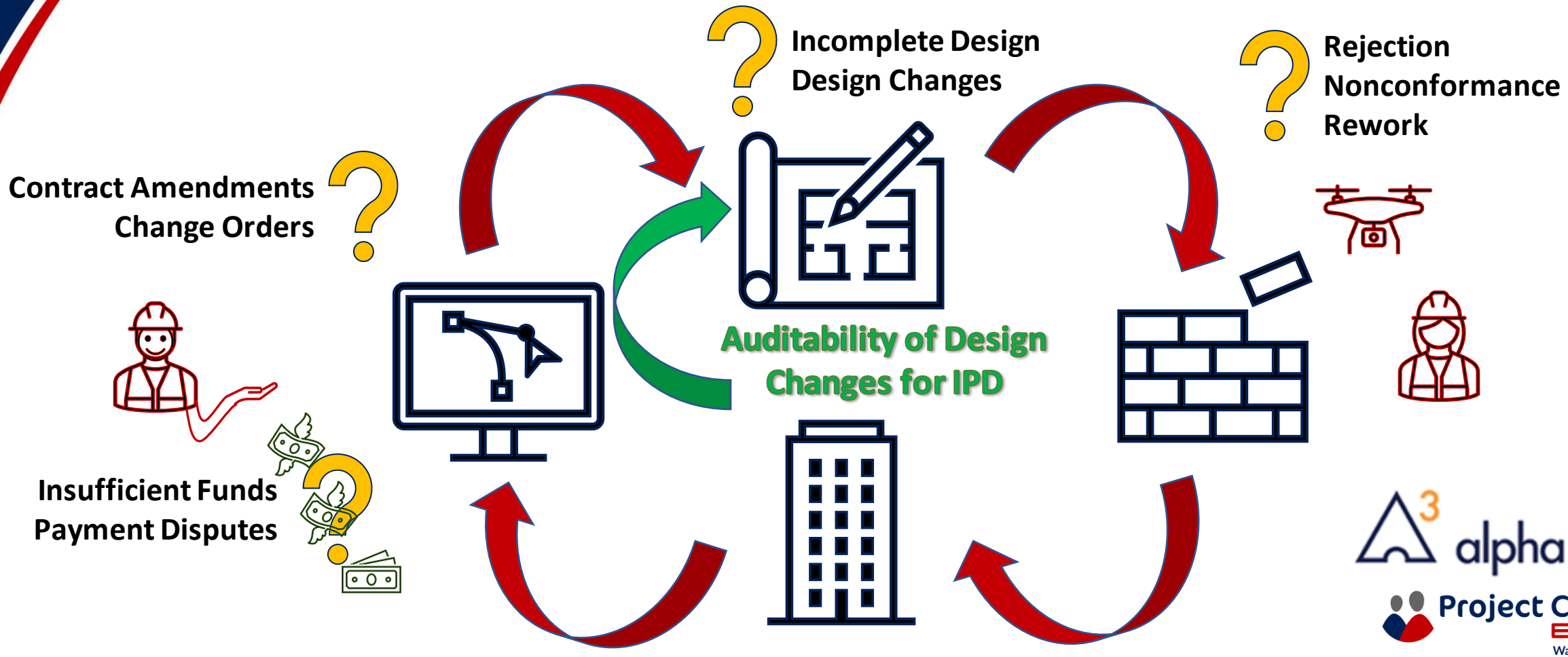
Questions on Costs and Benefits

Do we need 128-bit encryption on these transactions?

Have real-world challenges been adequately addressed?



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Use Case 4

Project Documentation: Registration of Evidence in the Field to Avoid Potential Controversies

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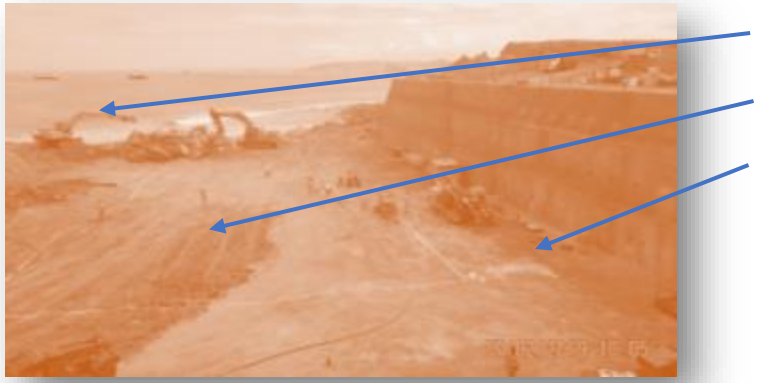
Project Documentation: Registration of Evidence in the Field to Avoid Potential Controversies

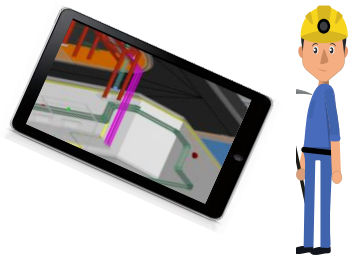
Potential Sources of Controversy in an EPC Contract

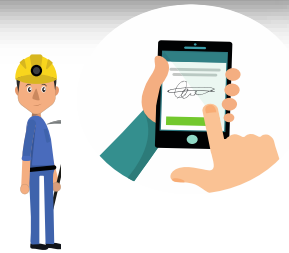
- ✓ Release for construction areas
- ✓ Obtaining licenses and permits
- ✓ Material quality issues
- ✓ Third party interfaces or activities in operation (brownfield)
- ✓ Divergence in understanding of scope and specifications
- ✓ Engineering errors and omissions
- ✓ …

Impact Generating Events



- ✖ Third Party Work Interferences
- ✖ Different terrain elevation
- ✖ Engineering Issues





Report Presentation

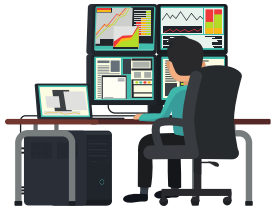
- Data collection
- Pre-established format

Claim Formulation

RPA for reading communications and contracts

Impact Assessment

Blockchain data validation



Blockchain registration support

- Georeferenced photographs
- Topographic tests
- List of equipment and personnel
- Documentation and permits
- Digital signature

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How it impacts

Project Management?

"It is important for project managers to prioritize tasks correctly and get work done as efficiently as possible ..."

THANK YOU

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