



OPERATING SYSTEM 2.0 INDUSTRIAL AFFILIATES PROGRAM

REDEFINING THE CAPITAL PROJECTS BUSINESS MODEL



OPERATING
SYSTEM 2.0

Program Profile
2020 EDITION

The background of the slide is a photograph of an industrial facility, likely a refinery or chemical plant, featuring large pipes, valves, and structural steel. This image is partially covered by a large, semi-transparent orange triangle that points towards the right side of the slide. The text is overlaid on the white area of this triangle.

UNLOCKING VALUE CREATING SYSTEMS REDUCING WASTE

THE OPERATING SYSTEM 2.0 INDUSTRIAL AFFILIATES PROGRAM (OS2 IAP)

conducts research aimed at defining new ways of doing business in the capital projects industry. The goal is to unlock value blocked by today's engineering and construction practices.

While the systems and work processes that manage capital projects have improved steadily in recent decades, the underlying business model binding investors with construction industry product and service providers is still characterized by a lack of trust, excessive friction in transactions, and burdensome financial waste — preventing real progress.

WE ARE TAKING A DIFFERENT APPROACH.
YOU NEED TO BE INVOLVED.

OUR CHALLENGE

We will combat declining industry performance and poor project outcomes by creating a **new commercial model** for capital projects.

OUR GOAL is to create a healthy and robust engineering and construction industry that works for all stakeholders. The status quo is unacceptable.

98%
of mega-projects
>\$1 Billion
experience
cost overruns
Source: B. Bechtel

95%
of all projects
FAIL to meet
one or more of
their business
objectives
Source: CII

70%
of all projects
are not completed
within 10% of
budgeted cost
or schedule
Source: CII

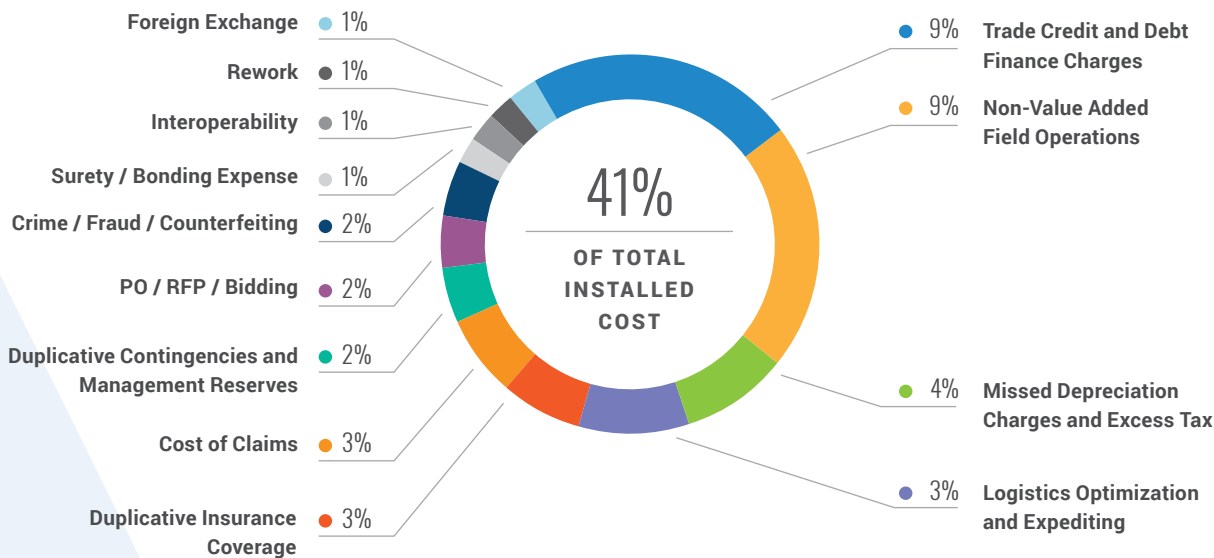
41%
of project capital
is WASTED ON
TRANSACTIONS
Source: CII/NTNU

OUR OPPORTUNITY

A healthy industry eliminates waste. Inefficient transactions are the largest source of waste on capital projects.

THE OS2 IAP will slash significant transactional costs and their negative effects on schedule, predictability, productivity, and quality, to enable greater capital efficiency as well as increased profitability for supply chain members.

Typical Sources of Transactional Waste



OUR APPROACH

We have identified three ways to address our current industry challenges and to create a much more efficient and profitable business model for the construction industry.

1 Different Arrangement of Stakeholders

More companies than ever are involved in capital projects. Increased industry specialization and project complexity means more interfaces and greater exposure to risk (and potential opportunity). “Flattening” the capital project supply chain in a similar manner to industries such as shipbuilding and aerospace will enable different risk pooling and monetization solutions for the stakeholders. Key to this transition will be the concept of disaggregating contractual responsibilities and achieving a high degree of collaboration underpinned by risk transparency and trusting relationships.

2 Enabling Technologies

From design and “big data” applications to digitization and blockchain, improved transparency and collaboration is imperative.

Enabling technologies will drive positive change across the capital projects landscape. Streamlining data flow and business transactions eliminates significant waste in project execution processes. Transparent real-time project and portfolio status provides a rapid, shared, single source of truth for all stakeholders. These technologies will unlock full digital twin capability, increase the velocity of cash flow throughout the project, and reduce overhead costs and contract leakage.

3 Improved Commercial Environment

Reducing transactional waste improves the returns for investors, owners, contractors and other stakeholders involved in a project. This has multiple positive aspects. First, both the initial and operating expense of a facility may be substantially lower. Second, the margins for those who create the asset (for example, planning, design, and fabrication) may be substantially increased. Third, new and revitalized capital assets will drive value creation.

OUR RESEARCH

The Construction Industry Institute (CII) created the OS2 IAP at The University of Texas at Austin (UT) on July 5, 2019. An IAP is a relatively common, non-competitive academic forum that allows its affiliates to pool their contributions and fund research of mutual interest. **Four research projects are underway to examine different aspects of a new commercial model for the capital projects business:**

Goal Congruence & Alignment

This research effort overarches the other three topics. Its goal is to create a “neighborhood-like” structure that fosters long-term relationships among all stakeholders in a project or portfolio of capital projects. Unlike traditional contracting where the goal often is to reallocate risk, the “neighborhood” model should incentivize collaborative behavior and streamline the project process. Faculty involved in this research have backgrounds in cognitive psychology, anthropology, dispute resolution, organizational trust, innovation and entrepreneurship. Also involved are staff in the UT IC2 Institute and the Bureau of Business Research with backgrounds in econometrics and quantitative studies.

Supplier Engagement

Existing capital project supply chain engagement (that is, bidding) methods usually do not fully engage the expertise, knowledge, and innovation of engineers, contractors, and suppliers. Oftentimes suppliers are engaged late since they are in the lower tiers of the supply chain. The industry’s traditional bidding process burdens the supply chain with a high cost of capture and subjects it to dysfunctional buying practices that often focus solely on initial cost while ignoring the suppliers’ more compelling overall value propositions. Other industries utilize more successful approaches. This research topic will search for and apply leading practices that can improve the effectiveness of buyer-supplier relationships in capital projects. Faculty involved in this research come from the UT McCombs School of Business and its Supply Chain Management Center.



Dynamic Risk Modeling

The capital project industry lacks a common approach for defining, assessing and allocating risks. This lack of consistency contributes to negative financial, reputational and performance outcomes, impacting all stakeholders. An example includes characterizing risk dynamically over the life cycle of a capital project to enable implementation of steps that reduce, mitigate or assign risk to the most capable party for management. The objective of this research is to develop novel and dynamic methods to identify and price risks using a common, easy to understand basis to improve transparency and solution alignment. Faculty involved in this research work in UT’s Information, Risk, and Operations Management (IROM) Department in the McCombs School of Business and in the Operations Research and Industrial Engineering (ORIE) Department housed in Mechanical Engineering.

Contracting via Smart Contracts and Blockchain

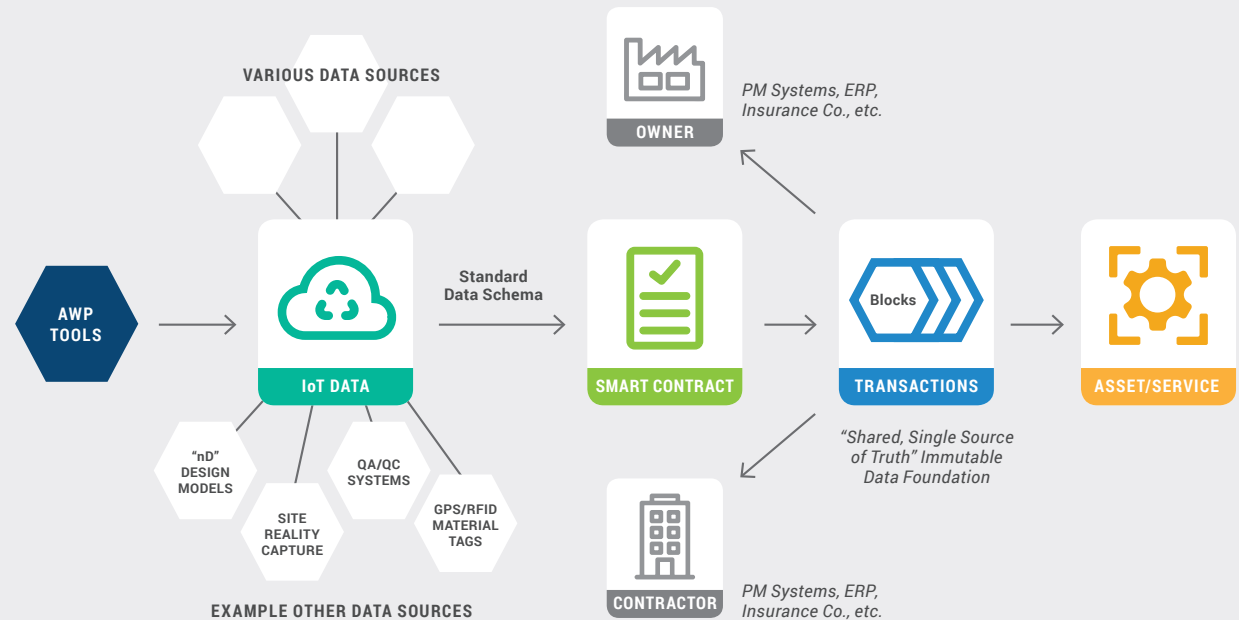
Blockchain technology allows smart contracts to improve access to information, is immutable and readily auditable, can automate functions such as “micro” payments, and can be connected to enterprise resource planning (ERP) and project management information systems (PMIS) for real-time visibility of transparent data to all project participants. These capabilities support multiple project parties in developing, demonstrating, and verifying reliability so that predictability is enhanced. Smart contracts also can eliminate cumbersome administrative processes and greatly reduce back-office overhead costs. This research team will apply state-of-the-art thinking and technology to explore how this technology can facilitate trust, enhance security, speed up the velocity of cash flow, and improve performance of capital projects. Faculty involved in this project come from the UT Blockchain Initiative and include researchers from UT’s Department of Electrical and Computer Engineering as well as the McCombs School of Business.

OUR DEPLOYMENT

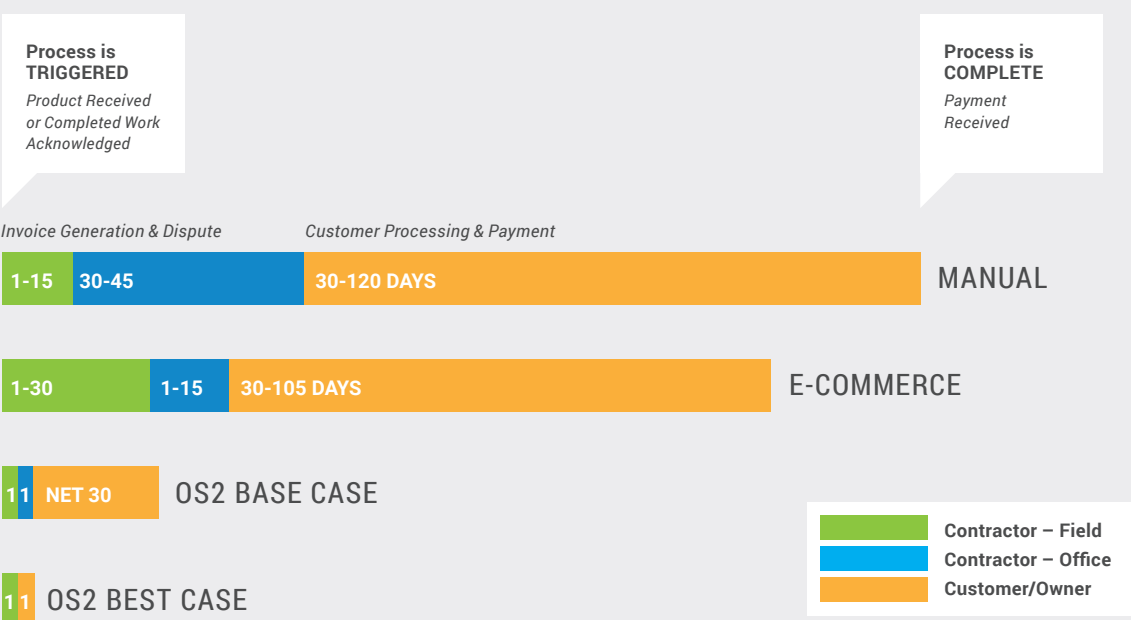
Transparency and real-time data reinforce trust and support collaborative decision making that makes the project “neighborhood” work. Beginning with smart contracts and blockchain and continuing with supporting supplier engagement, dynamic risk modeling and beyond, **data analytics is the foundation for the OS2 IAP research and its subsequent deployment.**

Financing is the single largest category of waste on construction projects. Financing costs remain buried in the rate structures at each level of the supply chain but accumulate to the owner’s total installed cost. The OS2 IAP research will explore new methods that enable more rapid payments and reduce the cost of capital while improving the verifiability of the associated transactions, thus eliminating a major source of waste and lowering total installed cost.

Enabling Technologies: IoT + Smart Contracts + Blockchain



Payment Cycle Time



Get Involved

The OS2 IAP was created to leverage the legacy of our industry's best practices – to incorporate and transcend them. Better opportunities for our industry's companies and talented people are coming. Your participation is needed as we implement and validate the OS2 IAP innovations on projects that are underway. *For more information, please contact our team.*

As of Fall 2020, OS2 IAP Affiliates include:



Our Team & Partners

Dr. Stephen Mulva, Director of CII and
Co-Principal Investigator, Univ. of Texas
Dr. Carlos Caldas, Professor of Civil Engineering
and Co-Principal Investigator, Univ. of Texas

Continuum Advisory Group, Program Manager
ePM, Program Advisor
PrairieDog Venture Partners, Technology Partner
Construction Users Roundtable, Association Partner



The University of Texas at Austin
3925 W. Braker Lane (R4500)
Austin, Texas 78759-5316
(512) 232-3000

OPERATING
SYSTEM 2.0

os2.construction-institute.org
os2@utexas.edu