A quantum leap in the recovery of construction disruption costs
Three hurdles to entitlement

1. **Causation**: The method should establish the causal path linking disruptive events and the damages caused.

2. **Legal/Contractual Entitlement**: The method should be applicable to the whole project, and discount contractor-responsible events.

3. **Testability**: The accuracy of the method needs to be testable, as well as its consistency with project data and information.
Recovery rates are very low

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- **Jury Verdict / Quantum Merit**
- **Total Labour Cost Method**
- **Modified Total Labour Cost**
- **Comparable Project Studies**
- **Total Unit Cost Method**
- **Measuring Mile**
- **Earned Value**
- **Sampling Methods**
There is clearly room for **innovation**

Contemporaneous Project Documentation

- Jury Verdict / Quantum Merit
- Total Labour Cost Method
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- General Industry Studies (Corp of Engineers; MCAA; NECA, Estimating Guides)
- Specialty Industry Studies
- Measured Mile
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- Sampling Methods

System Dynamics
An innovative simulation-based technology

• The System Dynamics ("SD") computer simulation methodology was invented at M.I.T. in the early 1960s.

• It was first applied to estimate project disruption and delay back in the late 1970s, helping to settle a $900 million claim between a US defence contractor and the US Navy.

• Since then, SD models have been used as proactive project management tools on hundreds of projects in many industries (oil & gas, aerospace, engineering, shipbuilding, software...)

• SD models have also been the basis for over forty major disruption claims worldwide, totalling over $20bn in claim amounts.
System Dynamics satisfies all the requirements for entitlement:

System Dynamics satisfies all three requirements for entitlement, making it the optimal tool to support negotiations, arbitration and/or litigation proceedings:

- **Causation**: Its simulation models transparently (and step-by-step) show the causal chain between disruptive events and their ultimate impact on the project.

- **Resultant Damages**: The models capture the full non-linearity of disruption. The analysis allocates to each event the disruption that it (and it alone) caused, and it also explicitly accounts for the role of mitigating “managerial” actions and/or adverse decisions.

- **Testability**: The simulation models are constantly verified against all information known about the project. Statistical confidence ranges can be established for model inputs and for claim results.
‘Tuxedo Park’: 100% disruption recovery!

- Tuxedo Park was a design-bid-build development in the MENA region, budgeted at about $1bn, that:
  - Overran its budget by $500 million
  - Finished 2.5 years late
- The Contractor “knew” that the Employer had substantially impacted the project, but conventional analysis and the existing data trail did not (appear to) support this view.
- Yet, a forensic analysis using Dynamic Disruption Analysis proved that 60% of the overrun had been caused by the Employer.
- In international arbitration, the tribunal decided that the evidence produced by the analysis was credible and defensible, and awarded the Contractor full recovery of the Employer-risk disruption, as determined in the System Dynamics model (i.e., the entire 60% of the overrun.)
System Dynamics applied to Disruption

Any Questions?

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The simulation matches the data

- **Manpower**
  - Red: Data
  - Blue: "As Built" simulation

- **Hours expended**
  - Red: Data
  - Blue: "As Built" simulation

- **Progress**
  - Red: Data
  - Blue: "As Built" simulation

- **Expected completion date**
  - Red: Data
  - Blue: "As Built" simulation
… and it tells a more complete story!

Staff allocation

- Data
- Simulated
- First time
- Rework
- Other

Productivity

- Learning curve
- Out of sequence
- Inadequate planning (eg. missing equipment)
- Crowding
Early simulation results

Construction Labour (Headcount)

Construction Progress
System Dynamics applied to Disruption

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