DELIVERING CRITICAL PROJECTS & PROGRAMS

2018 System Dynamics Conference
Most development projects experience substantial cost and schedule overruns, for example:

Development Cost Performance and Average Launch Delay for Major NASA Projects from 2009 to 2018

Source: GAO analysis of National Aeronautics and Space Administration (NASA) data. | GAO-18-576T
The Project Rework Cycle portrays the real-world phenomenon that work is often executed at varying, but usually less than perfect quality.

It also captures how it often takes time and effort to discover that rework.

This structure is the core of a simulation model developed for and applied to hundreds of complex design and construction projects (e.g., power plants, aerospace developments, electronics, software systems, shipbuilding, etc.)
And of course many things impact work productivity and quality.

There are a number of papers and open courseware material online about the rework cycle if you want to learn more.
Construction productivity and quality vary with program conditions and resulting work accomplishment drives subsequent program conditions.

- Design changes
- Workforce morale
- Schedule pressure
- Out-of-sequence work
- Prior construction work availability and quality
- Material availability
- Material funding timing
- Material funding timing
- Design and planning maturity/quality
- Workforce experience
- Hiring
- Attrition
- Staffing requested
- Hours expended to date
- Expected hours at completion
- Work To BeDone
- Work Really Done
- Progress
- Known Rework
- Undiscovered Rework
- Rework Discovery
- Perceived progress
- Expected completion time
- Schedule pressure
- Hours expended to date
- Work Really Done
- Work To BeDone
- Progress
- Known Rework
- Undiscovered Rework
- Rework Discovery
- Perceived progress
- Expected completion time
- Schedule pressure
Program simulation model structure represents design, material procurement and delivery, direct construction effort, and support activities.
We have worked across the entire lifecycle from early analysis to total lifecycle improvement on hundreds of major programs.

<table>
<thead>
<tr>
<th>Pre-Program Launch</th>
<th>Change &amp; Risk Management</th>
<th>Program Recovery</th>
<th>Enterprise and Program Portfolio</th>
<th>Lifecycle Cost &amp; Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Shaping</td>
<td>Change Impact Analysis</td>
<td>Assess Outlook &amp; Scenarios</td>
<td>Portfolio-Wide Optimization</td>
<td>Lifecycle Cost Analysis / Reduction</td>
</tr>
<tr>
<td>Rigorous Tradespace Analysis</td>
<td>Prioritize Mitigation Options</td>
<td>Prioritize Options to Improve</td>
<td>Prioritize Use of Scarce Resources</td>
<td>Life-Extension of Mature Platforms</td>
</tr>
<tr>
<td>Strategic Risk Review and Reduction</td>
<td>Negotiate w/ Industry &amp; Government Stakeholders</td>
<td>High-Value Improvements &amp; Cost Reduction</td>
<td>Enterprise-Wide and Supply Chain Improvement</td>
<td>Improve Infrastructure and Gov't / Industry Mix</td>
</tr>
</tbody>
</table>

The approach has been applied to a number of different types of programs: software, aircraft, shipbuilding, missiles, automobiles, civil construction, satellite systems, air defense, oil platforms, power plants, airport development, etc.
Case 1: Quantifying the Impacts of Change and Improving Performance on a Large Software Development Program
WAAS began under difficult conditions

- The prior contractor had just been terminated for their lack of performance, testifying to the challenges, and ensuring even-greater FAA scrutiny of our client

- Our client was given an aggressive schedule -- without much time to accomplish crucial up-front systems engineering

- Our client had little prior experience in the WAAS technology domain

- Several recent program wins meant resources were scarce

We were hired to develop a risk management tool for the program office
The WAAS program team attacked the challenges and made good early progress . . .

Assumptions required to simulate the planned staffing, schedules, and progress were generally very reasonable based on “ancestor” programs.
One year into the program major customer-initiated changes made WAAS much more difficult than planned ...

Traditional, bottom-up project planning analyses takes weeks to evaluate a change like this.
We Diagnosed How The Changes Hurt Productivity to Determine a Mitigation Strategy

1 – Customer-initiated changes add work and divert staff
2 - Impacts ripple downstream to coding and integration
3 - New people are brought on to the program, with less experience
4 -- Sustained pressures and overtime hurt morale and productivity
The Mitigation Works by Preventing the “Delay and Disruption” from the Changes

Mitigation Plan

- Accelerate SRS Rework & Prototyping
- Hire Top-Notch Technical Leaders
- Schedule Allowance
Working with Program Managers and the FAA, an effective mitigation strategy was developed and implemented

Our client was applauded by the FAA for using this approach to rapidly evaluate the impact of the change and potential mitigation ideas.

Helped them reach amicable agreement with customer on pricing of change *in advance* – rather than fight over the full impact after the fact.

Allowed for a proactive schedule slip rather than working to unrealistic original deadlines that would exacerbate the issues.
PA Aerospace & Defense – Overview

We Make The Difference

PA has helped clients for over 70 years through consulting, technology, and innovation

Our people work with businesses and governments worldwide to create ground-breaking solutions that really work – in practice, not just on paper. We bring the experience and insight to challenge conventional wisdom and create solutions for our clients that best meet their needs and their priorities.

In everything we do, we don’t settle for just making a difference. We work to make the difference.

We Are Independent and Global

Owned by The Carlyle Group & our employees

We Address Clients’ Needs

- Sector insight and competitive strategy
- Business intelligence and strategic analytics
- Technology and business model innovation
- Delivering sustained growth
- Performance improvement
- Enterprise-wide transformation

We Drive Success For Clients

Clients choose us because we bring the right expertise, fresh insights and thinking, and because we work hard to deliver exceptional results that have lasting impact.

- The right team
- Unconstrained thinking
- Exceptional results
- Lasting impact