The world of government-led aerospace projects is wrought with cost overruns, schedule overruns, and canceled projects. One simple and often overlooked reason for this is the fact that standard requirements-based contracts incentivize this behavior. By analyzing contracting through the lens of Principal-Agent Theory, we aim to develop the Value-Based Acquisition theory and method, in which contracts are written in terms of optimization objective functions rather than requirements. This aligns the interests of the government and contractor (or any other applicable principal and agent) by encoding the appropriate incentives into the contract itself.

The bridge has four design variables: \( h_2 \) (deck thickness), \( L_4 \) (width of first support), \( L_5 \) (width of second support), and \( t \) (total design time expended). The benefit to the government of the bridge is based on the maximum load that the bridge can carry, which is in turn based on its physical properties and design effort expended (assumed to be proportional to design time). The manufacturing cost varies with the volume of the bridge and the area underneath the supports. The engineering cost is assumed to vary linearly with design time.

The value to the government is calculated based on the simplest scenario in which they do not hire a contractor, but do all the work themselves. In this case, pure value is benefit minus costs, adjusted for time based on the government’s discount rate. An affine transformation is used to develop a contract expression that is aligned with the government’s pure value function, and the value to the contractor is calculated based on discounted payment minus costs.

While there is still much work to be done, these findings strongly suggest that Value-Based Acquisition could greatly benefit not only the aerospace industry, but many others as well. Widespread implementation of these concepts has the potential to reduce cost and schedule overruns, reduce the number of canceled projects, raise contractor profits, and improve the value of the project as perceived by all parties involved.