PROTEA

# Capital Planning and Cost Modeling Software for Designers, Owners and Builders

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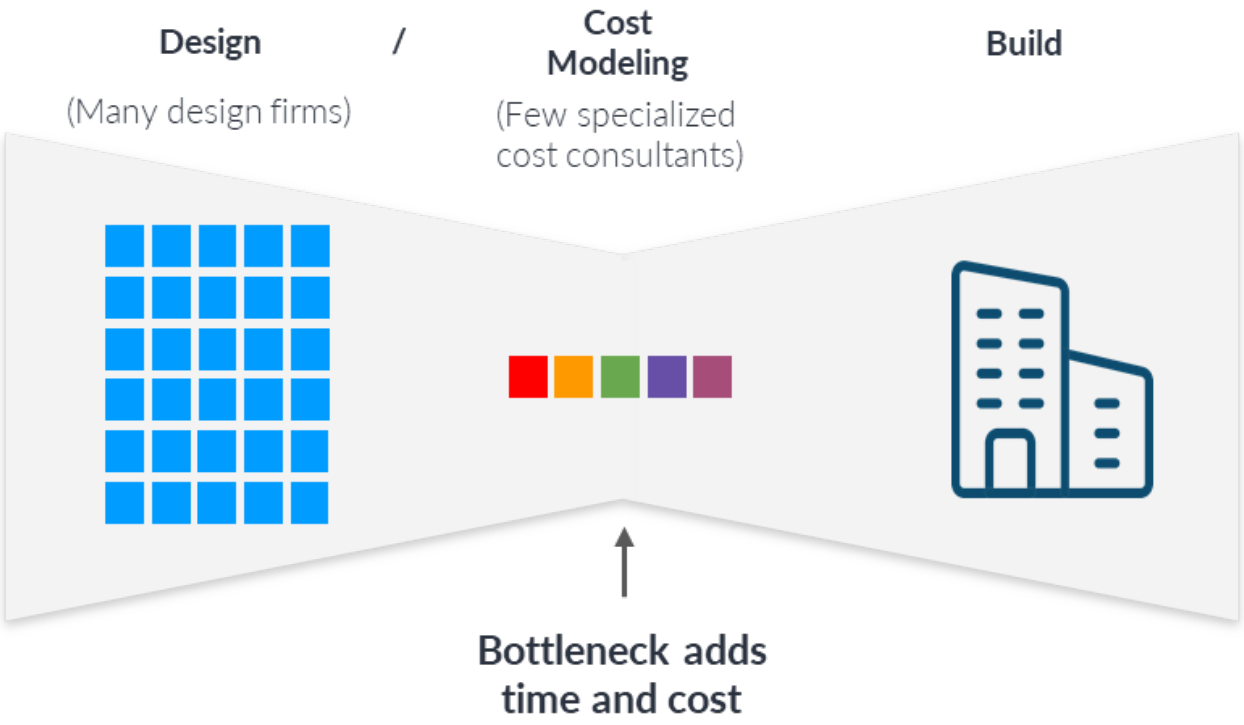
PROTEA provides innovative decision-making software to modernize cost-modeling for construction. Unlike existing cost estimating tools, PROTEA allows owners, designers, and builders to obtain building costs rapidly and easily for capital planning and design stage cost estimating.

Capital Planning and cost modeling is currently time-consuming and restricted to specialized consultants.




Demand for *capable* consultants typically outstrips supply. This creates bottlenecks in the process that results in cost and schedule overruns.

At the heart of every construction project is a **continuous cost modeling exercise** to **reconcile the designer's vision, and the owner's space need,** with the project budget.

Today, **cost modeling is inefficiently delivered by specialized consultants...**

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One of the biggest concerns is "***accurate estimating of anticipated costs prior to committing to the project***. Projects are moving so fast they have limited time to develop the scope and accurately estimate costs. This results in issues where the standard contingency used (10%) is not enough to cover the project risks."

***KPMG*** |
*Global Construction Survey Participant*

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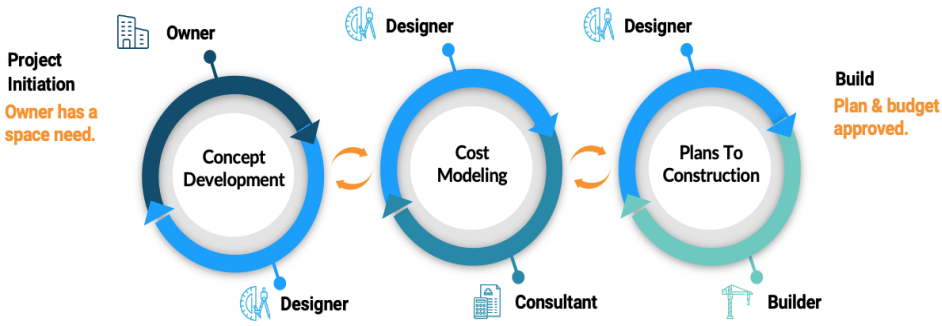
Current cost estimating consulting is slow and expensive because of a lack of reliable, accurate data. It is estimated that 52% of project rework ($31.3B in the US alone) is attributed to miscommunication and bad data. The four main reasons for this lack of data include:

- Construction is opaque and highly fragmented
- Poor project management and execution
- Inadequate design processes and workflows
- Under investment in digitization, technology, and innovation

The highly fragmented nature of the construction industry often means that cost consultants use different data assumptions, which are limited to, and biased by, previous work projects. A failure to operate at the correct level of granularity to appropriately inform decision-making at a capital planning level.

This problem manifests itself across all types of construction (commercial, residential, industrial, institutional and infrastructure). An inefficient institutional construction market (planning,

**Flaws in cost modeling means that owners and designers often spend a lot of time and money designing a project *on paper* — that they can't afford to build in the real world.**




**Current State: Iteration Purgatory**

design, and construction for universities, hospitals, government, etc.) leads to inferior project outcomes through poor decision-making, destroying billions of dollars of value annually. Large projects typically take 20% longer to finish and less than 1/3 (31%) come in on or under budget.

# PROTEA unlocks the black box of cost modeling empowering designers and owners to design and build the best buildings for their money.

PROTEA provides a revolutionary, interactive capital planning and cost-modeling platform based on proprietary algorithms derived from analyzing large data sets of past construction projects and identifying key variables and correlations which drive costs in building projects. PROTEA delivers results in real-time, resulting in potentially compelling financial and strategic advantages.

Current planning processes and software solutions do not address the problem in this manner because they only drive *incremental* and not *order of magnitude* efficiency gains, at best improving the way in which industry professionals perform their tasks rather than leveraging the data at hand along with rapidly evolving computational capability.

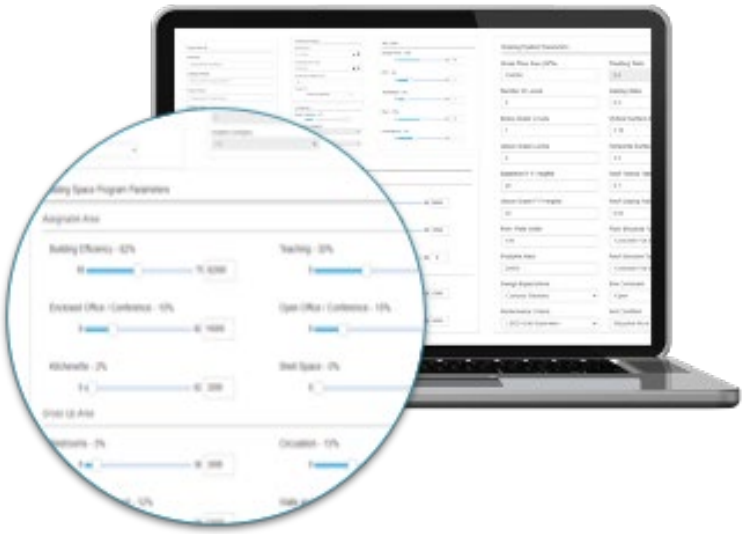
PROTEA believes that *continuously improving data will drive transparency and efficiency through the value chain.*

## PROTEA empowers designers and owners to deliver better buildings faster and more economically.

### Data-driven transparency and accountability.

- PROTEA's collaborative SaaS platform drives transparency and accountability, streamlining the design process.
- Transparency into the project's cost drivers delivers confidence in decision making early in design, saving time and money through the overall design process.
- Interactive, real-time cost modeling allows designers and owners to understand which elements of the project are driving cost, enabling strategic changes that don't compromise the project's objectives.

# PROTEA is designed for designers, owners and builders and is easy to use



1. Designers simply input building parameters for their projects.
2. PROTEA applies unit costs to appropriate combinations of building parameters to deliver correct cost guidance.
3. PROTEA updates construction and project parametric changes in real time.
4. PROTEA continuously improves with additional use, additional data, and artificial intelligence.

# Protea instantly produces industry-standard cost estimate reports

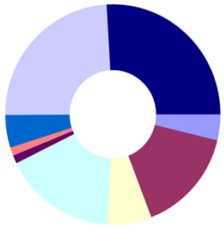
Project Title : 1
Institution : 1

Date : 7/12/2020

**Overall Component Summary**

| | Building | | | | | | Site | | | | | | Building + Site | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Core and Shell 100,000 SF | | Fitout 100,000 SF | | Subtotal 100,000 SF | | Site Development 70,000 SF | | Site Utilities 70,000 SF | | Subtotal 70,000 SF | | Total 100,000 SF | |
| | $/SF | Total ($'s) | $/SF | Total ($'s) | $/SF | Total ($'s) | $/SF | Total ($'s) | $/SF | Total ($'s) | $/SF | Total ($'s) | $/SF | Total ($'s) |
| A SUBSTRUCTURE | 33.24 | 3,324,000 | - | - | 33.24 | 3,324,000 | - | - | - | - | - | - | 33.24 | 3,324,000 |
| B SHELL | 134.82 | 13,482,000 | - | - | 134.82 | 13,482,000 | - | - | - | - | - | - | 134.82 | 13,482,000 |
| C INTERIORS | 7.96 | 796,000 | 50.06 | 5,006,000 | 58.02 | 5,802,000 | - | - | - | - | - | - | 58.02 | 5,802,000 |
| D SERVICES | 65.35 | 6,535,000 | 82.55 | 8,255,000 | 147.90 | 14,790,000 | - | - | - | - | - | - | 147.90 | 14,790,000 |
| E EQUIPMENT | 1.10 | 110,000 | 9.51 | 951,000 | 10.61 | 1,061,000 | - | - | - | - | - | - | 10.61 | 1,061,000 |
| F SPECIAL CONSTRUCTION & DEMOLITION | 10.67 | 1,067,000 | - | - | 10.67 | 1,067,000 | - | - | - | - | - | - | 10.67 | 1,067,000 |
| G SITEWORK | - | - | - | - | - | - | 34.87 | 2,441,000 | 25.24 | 1,767,000 | 60.11 | 4,208,000 | 42.08 | 4,208,000 |
| SUBTOTAL DIRECT CONSTRUCTION COSTS | 253.14 | 25,314,000 | 142.12 | 14,212,000 | 395.26 | 39,526,000 | 34.87 | 2,441,000 | 25.24 | 1,767,000 | 60.11 | 4,208,000 | 437.34 | 43,734,000 |
| **INDIRECT CONSTRUCTION COSTS** | | | | | | | | | | | | | | |
| General Requirements, Ins., Bonds, Etc. 12.00% | 39.65 | 3,965,000 | 22.26 | 2,226,000 | 61.91 | 6,191,000 | 5.46 | 382,000 | 3.95 | 276,000 | 9.41 | 659,000 | 68.50 | 6,850,000 |
| Contingencies 26.30% | 71.89 | 7,189,000 | 40.35 | 4,035,000 | 112.24 | 11,224,000 | 9.89 | 692,000 | 7.16 | 501,000 | 17.05 | 1,194,000 | 124.18 | 12,418,000 |
| Contractor Fees 3.00% | 10.94 | 1,094,000 | 6.14 | 614,000 | 17.08 | 1,708,000 | 1.51 | 106,000 | 1.09 | 76,000 | 2.60 | 182,000 | 18.90 | 1,890,000 |
| SUBTOTAL INDIRECT CONSTRUCTION COSTS | 122.48 | 12,248,000 | 68.75 | 6,875,000 | 191.23 | 19,123,000 | 16.86 | 1,180,000 | 12.20 | 854,000 | 29.06 | 2,034,000 | 211.57 | 21,157,000 |
| TOTAL CONSTRUCTION COSTS | 375.62 | 37,562,000 | 210.87 | 21,087,000 | 586.49 | 58,649,000 | 51.73 | 3,621,000 | 37.44 | 2,621,000 | 89.17 | 6,242,000 | 648.91 | 64,891,000 |
| SOFT COSTS | 131.47 | 13,147,000 | 73.80 | 7,380,000 | 205.27 | 20,527,000 | 18.11 | 1,267,000 | 13.10 | 917,000 | 31.21 | 2,185,000 | 227.12 | 22,712,000 |
| TOTAL PROJECT COST | 507.09 | 50,709,000 | 284.67 | 28,467,000 | 791.76 | 79,176,000 | 69.84 | 4,888,000 | 50.54 | 3,538,000 | 120.38 | 8,427,000 | 876.03 | 87,603,000 |

Building System Costs ($/SF)



4 % A SUBSTRUCTURE 33.24
15 % B SHELL 134.82
7 % C INTERIORS 58.02
17 % D SERVICES 147.90
1 % E EQUIPMENT & FURNISHINGS 10.61
1 % F SPECIAL CONSTRUCTION & DEMOLITION 10.67
5 % G SITEWORK 42.08
24 % INDIRECT CONSTRUCTION COSTS 211.57
26 % SOFT COSTS 227.12

Building Program - % By Space Type

30 % Teaching
15 % Enclosed Office / Conference
15 % Open Office / Conference
2 % Kitchenette
0 % Shell Space
3 % Restrooms
13 % Circulation
12 % MEP/Building Support
10 % Walls and Shafts

Building Program - % By Space Cost

34 % Teaching ($19.8M, $661.52/SF)
18 % Enclosed Office / Conference ($10.6M, $709.49/SF)
15 % Open Office / Conference ($8.6M, $575.67/SF)
3 % Kitchenette ($1.9M, $969.86/SF)
0 % Shell Space ($0.0M, $339.73/SF)
5 % Restrooms ($3.2M, $1051.88/SF)
11 % Circulation ($6.3M, $482.14/SF)
9 % MEP/Building Support ($5.0M, $416.39/SF)
5 % Walls and Shafts ($3.2M, $316.51/SF)

PROTEA Intelligence

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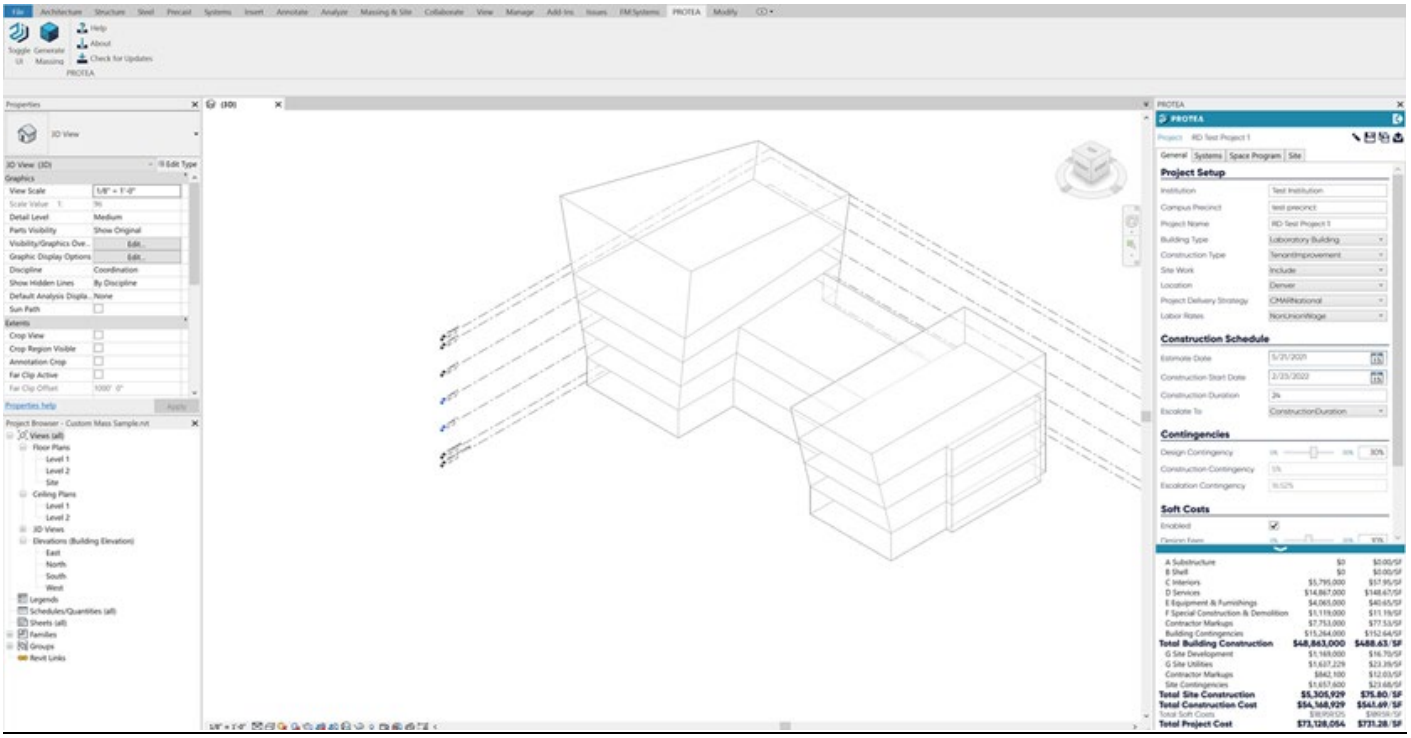
Each report can save owners, designers and builders thousands of dollars and weeks of time. Protea's software supports unlimited iterations.

Reports can be generated within Revit or Protea's web application and saved in the cloud.

Reports can be exported as PDF or Excel files.

Users can share projects and reports with their colleagues.

## PROTEA integrates with Autodesk's Revit via a downloadable plug-in.




AUTODESK® REVIT®

Users can obtain cost estimates in real time while designing buildings in Revit.

Users can seamlessly transition between Revit and Protea's web application while working on their projects.

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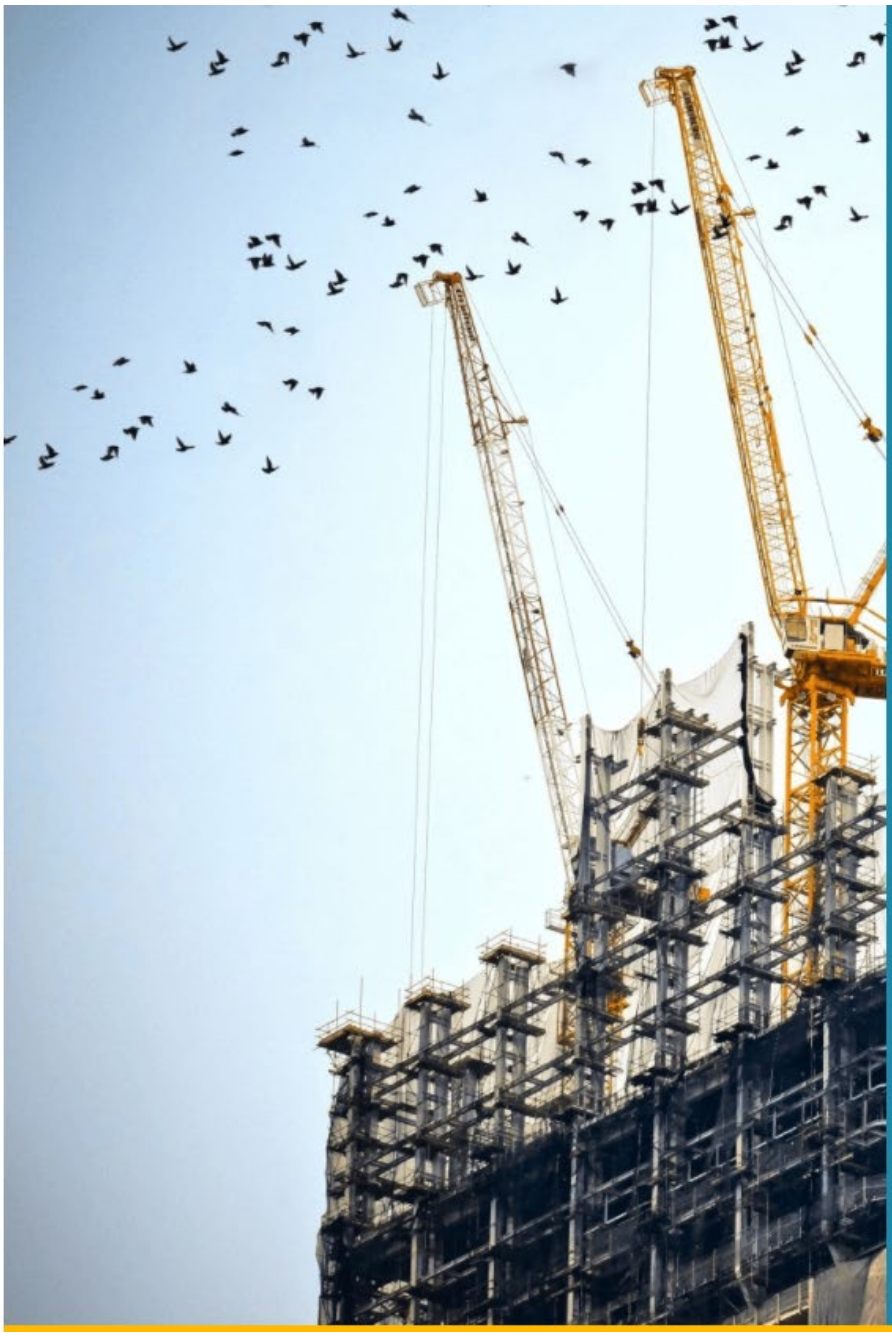

# Use Cases

Protea represents the inevitable evolution of capital planning and cost estimating.

At the heart of every construction project is a continuous cost modeling exercise to reconcile the designer's vision, and the owner's space need, with the project budget.

Until now, cost modeling has been delivered by specialized consultants, and while the evidence is overwhelming that cost modeling in general delivers optimal outcomes, it has been a type of service that is difficult to find, is expensive, and can be time consuming.

PROTEA puts the cost modeling capabilities that were only available to specialists in the hands of designers and owners, so that they can more efficiently and effectively design and build the best building for their money – in real time.

### PROJECT PURSUIT

A design firm uses PROTEA to avoid pursuing suboptimal projects and wins the bid of a better fitting project.

### DESIGN-BUILD

A builder pursuing a design-build delivery method avoids redesign feedback loops.

### UNIVERSITY PLANNING

A design team generates multiple planning scenarios in response to rapidly changing requirements.

### DESIGN CHARETTE

An owner and design team evalutes numerous combinations of parameters and makes tradeoffs in real time to rapidly reach consensus.

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## Project Pursuit

An architect was pursuing a complex project with an imminent deadline and the design firm wanted to avoid spending significant amounts of their time and money designing for a pursuit, only to discover at the end of the process that the cost of their design might exceed the advertised budget.

PROTEA enabled the design firm to rapidly model building parameters to confirm that their designs would fall within the advertised budget before spending any time or money on developing 3D models. This delivered a significant amount of savings and helped the design firm win the project.

## DESIGN-BUILD: PLANNING AND DESIGN

A builder using a design-build delivery method was moving from developing a tabular space program into design without pre-determining the likely costs for their designs or testing options along the way. The design team was concerned about spending a significant amount of time and money during early design phases only for the designer and owner to discover at the conclusion that the cost of their design exceeds budget, and they wanted to avoid a time-consuming and expensive redesign feedback loop.

Using PROTEA, the design-build team and owner rapidly modeled building parameters in a real-time environment – evaluating different combinations, permutations, and options in order to arrive at an optimized parametric building model that fell within the owner's budget, thereby avoiding spending extra time and money developing design models.

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## UNIVERSITY PLANNING

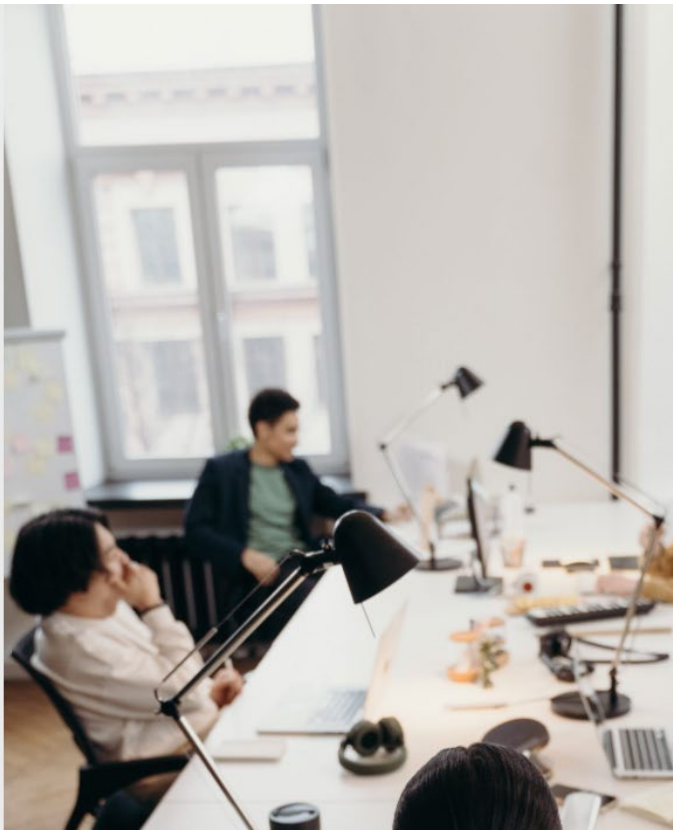
Routinely, architects spend significant amounts of their time and money designing for a pursuit, only to discover at the end of the process that the cost of their design exceeds the advertised budget.

PROTEA enabled a design team to rapidly model building parameters to confirm that their designs will fall within the advertised budget before spending any time or money on developing 3D models. This delivered a significant amount of savings to the design firm and lowers barriers to entry for pursuing new work.

## DESIGN CHARETTE

A design firm was working with the project owner on the programming and conceptual design of a new laboratory facility. The design team and owner engaged in a design charette to decide upon the facility location, space program, building systems, building geometry, aesthetics, sustainability goals and whether the choices they were making would fall within budget.

Using PROTEA's cost modeling software, the designer and owner rapidly evaluated numerous combinations of these parameters, considered options, made tradeoffs among parameters, in real time, and left the charette with a common understanding of the choices that were made and the cost profile of the building they were designing.



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