

# IPD Develops and Deploys Real Estate Cash-Flow Models with MathWorks Tools

Sophisticated real estate investors are constantly striving to balance the risk return profiles of complex investment portfolios that often contain both indirect and direct real estate. Established in 1985, Investment Property Databank (IPD) is the global standard for the provision of performance measurement and benchmarking services to the real estate investment industry.

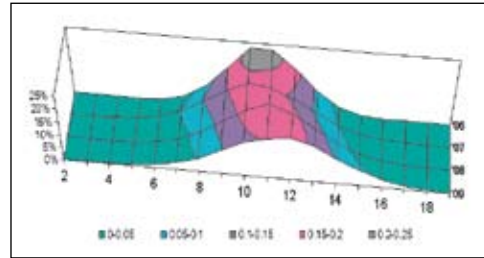
While IPD principally focuses on analyzing current and past performance, the company has started an initiative to leverage the expertise of its specialist and comprehensive property databases to project future performance and risk measures for its clients. In its effort to achieve this, IPD has used MathWorks tools to develop and deploy cash-flow models of real estate investment portfolios.

“Our core business is providing clients with metrics that help them understand the key drivers of portfolio performance,” says Peter McAnena, software development manager at IPD. “Using MATLAB, we have developed and deployed a tool that projects current information into the future to predict the values of those same metrics. Fund managers use this information to help them formulate and implement their investment strategies.”

## THE CHALLENGE

One of the main objectives when developing the simulation model was to create a solution that financial analysts in the research department could maintain—freeing up IT resources to work on other projects.

After initial attempts to develop a model in Microsoft® Excel® failed, the team sought a more complete development environment.



MATLAB graph generated to indicate how total returns from industrial property are likely to behave given a set of market assumptions.

“We needed a sophisticated model, and Excel was nowhere near powerful enough to handle our data volumes—hundreds of simulations involving thousands of complex lease structures and their associated probability distributions,” says Simon Durkin, director of service design at IPD.

In addition, IPD needed an efficient and cost-effective way to distribute the cash-flow model to its clients.

## THE SOLUTION

To develop algorithms and the cash-flow model, run Monte Carlo simulations, and optimize various investment metrics, IPD used MATLAB® and Optimization Toolbox™. To enable rapid deployment, the team used MATLAB Builder™ NE for Microsoft® .NET framework to translate the model into a Common Object Model (COM) object that IPD clients access using an Excel spreadsheet.

With no prior experience using MATLAB, the team worked with MathWorks Consulting to develop a basic simulation model.

Working from this early prototype, McAnena and his colleagues created a full-featured version of the model in MATLAB. Based on a wide range of inputs such as the loca-

### THE CHALLENGE

To create cash-flow models of real estate investment portfolios and project returns using Monte Carlo simulations

### THE SOLUTION

Use MATLAB and MATLAB Builder NE to develop optimization algorithms, build financial models, and deploy solutions

### THE RESULTS

- Development time cut by 16 weeks
- Updates completed in hours
- Deployment simplified

tion and value of properties and current tenants and their parent companies, the model produces a set of measures, including total return, risk, yield, and growth, projected into the future.

Using Optimization Toolbox, the team developed optimization algorithms that enable analysts to find the precise value of a specific measure to minimize or maximize the value of a second measure. The team also used Optimization Toolbox to calculate equivalent yield—defined as the ratio of income to the capital value of an investment—by solving a series of exponential ratios that sum to a particular value.

To exchange data between Microsoft Excel and MATLAB during early model development, the team used Spreadsheet Link™ EX. Using Excel as the main user interface, the team would execute Excel macros to pass large blocks of data to MATLAB with Spreadsheet Link EX. MATLAB completed the simulations and the results were returned to Excel, again using Spreadsheet Link EX.

Once the model had been debugged and tested using MATLAB, IPD used MATLAB Builder NE to generate a COM object from the model. IPD clients can access the COM object through an Excel spreadsheet—without installing MATLAB.

MathWorks consultants provided support at this stage as well. “We were under a tight deadline, and the consultants enabled us to start our project quickly. With their support, we applied MATLAB Builder NE to solve our problem immediately,” says McAnena.

In the next phase of development, IPD plans to replace the Excel interface with a Web interface, using MATLAB Builder NE to create a COM object or .NET assembly that will serve as the computational core of the system.

[www.mathworks.com](http://www.mathworks.com)

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“The real estate investment industry is driven by highly specialized knowledge. It is difficult to find people with both industry-specific knowledge and software development skills or to coordinate these skills between people on a project. MATLAB solves this problem by providing an environment that enables our industry specialists to develop software themselves.”

**Simon Durkin, IPD**

## THE RESULTS

### ■ Development time cut by 16 weeks.

“The only other approach we seriously considered involved developing a class library in .NET and C#. Development, debugging, and testing would have taken us 37 weeks,”

McAnena says. “Using MATLAB, we completed the project in 21 weeks.”

### ■ Updates completed in hours.

“Now, our researchers can make changes themselves, without using IT resources,” notes McAnena. “Researchers can complete a minor change in a few hours with MATLAB, rather than wait the two days that IT would need. Bigger changes that would have taken a week can usually be done in a day using MATLAB.”

### ■ Deployment simplified.

“From the start, we wanted to distribute a solution to our clients that they could access from a spreadsheet, without requiring them to have MATLAB installed,” McAnena explains. “With MATLAB Builder NE, we compiled and distributed a COM object that simplified deployment and maintenance while minimizing costs.”

**To learn more about IPD, visit**

[www.ipdglobal.com](http://www.ipdglobal.com)



## APPLICATION AREAS

- Financial modeling and analysis
- Algorithm development
- Application deployment

## PRODUCTS USED

- MATLAB®
- Optimization Toolbox™
- MATLAB Builder™ NE
- Spreadsheet Link™ EX
- Microsoft® Excel®