

Getting to Smart

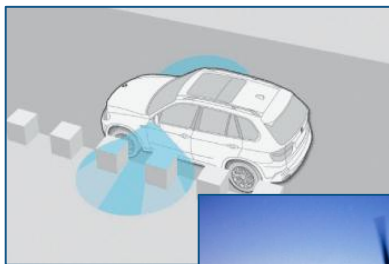
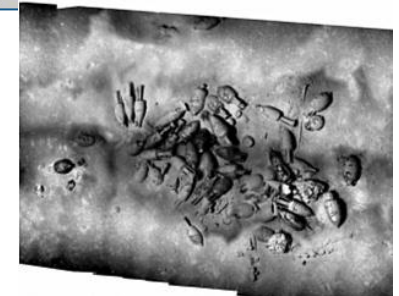
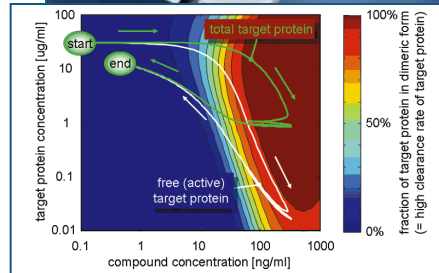
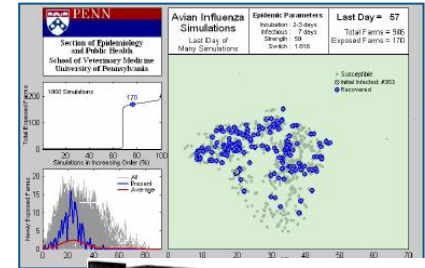
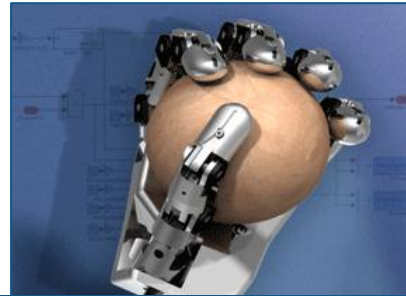
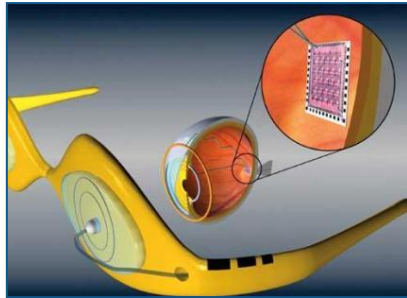
MATLAB® in Applied Mathematics

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Changing the world by accelerating the pace of discovery, innovation, development and learning in engineering and science



getting to smart

WHO

WHAT

HOW

WHY

getting to smart

...autonomous, responsive,
multifunction, adaptive,
transformable, and...

getting to smart

...and collaborative and....

University of Melbourne Supports New Engineering Curriculum with MathWorks Tools

Challenge

Enable students to solve complex problems across a wide range of disciplines and to support faculty research

Solution

Give undergraduate and graduate students and faculty campus-wide access to MathWorks tools

Results

- Course planning simplified
- Vital skills acquired
- Complex concepts visualized, enabling exploration and problem solving



Engineering students working in a design studio.

“Students pick up MATLAB much faster than a low-level language such as C. They can try things out in MATLAB and get immediate, visual feedback. When we couple MATLAB with hands-on activities, we have the full progression from theory to numerical computation to lab experiments.”

Dr. Jamie Evans
University of Melbourne

Roche Evaluates Drug Safety and Efficacy Using MathWorks Tools

Challenge

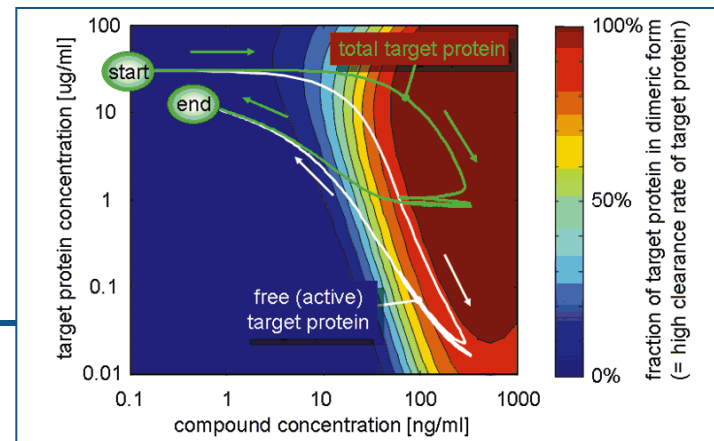
Increase the efficacy and safety of clinical drug trials and accelerate drug discovery

Solution

Use MathWorks tools to model drug interaction with human tissues and organs, optimize dosing regimes

Results

- Months of effort saved
- Therapeutic profile redefined
- Clinical trial approval process streamlined



MATLAB visualization used to predict the clearance rate of the target protein.

“Using MathWorks tools to solve difficult ODE and ODE-PDE models, visualize results, and perform parameter optimization enables us to quickly isolate issues in the development of candidate drugs and to design the best experiments to tackle those issues.”

Cristiano Migliorini
Roche

Research Engineers Advance Design of the International Linear Collider with MathWorks Tools

Challenge

Design a control system for ensuring the precise alignment of particle beams in the International Linear Collider

Solution

Use MATLAB, Simulink, Parallel Computing Toolbox, and Instrument Control Toolbox software to design, model, and simulate the accelerator and alignment control system

Results

- Simulation time reduced by an order of magnitude
- Development integrated
- Existing work leveraged



Queen Mary high-throughput cluster.

“Using Parallel Computing Toolbox, we simply deployed our simulation on a large group cluster. We saw a linear improvement in speed, and we could run 100 simulations at once. MathWorks tools have enabled us to accomplish work that was once impossible.”

Dr. Glen White
Queen Mary, University of London

Earthquake modeling

Geoscience Australia

Challenge

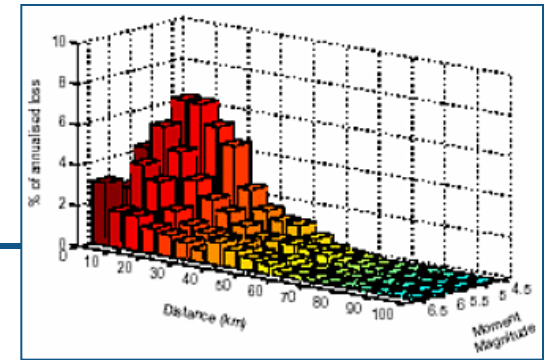
- Better understand earthquakes and their potential impact on populated areas

Solution

- Perform data processing and simulations in MATLAB technical computing software to estimate earthquake hazards and their associated risks

Results

- Development time cut by 12 months
- Earthquake hazard test results generated in one day
- Up to 75% less code to write



Earthquake hazard model developed in MATLAB.

“MATLAB enabled us to perform all our modelling and produce diagnostic plots simultaneously. This would have been much more difficult in traditional programming languages.”

David Robinson
Geoscience Australia

The Sound of Innovation

Cochlear

Challenge

- Develop a compact but feature-rich cochlear implant

Solution

- Use MathWorks tools for Model-Based Design to prototype and test design ideas

Results

- Development of implant processing methods accelerated
- Development and testing of product improvements
- Validity of tests improved and testing time reduced



“With Simulink and xPC Target everything is running live, so we can interact with the recipient. We can talk to them, they can hear us, and more importantly, they can hear how their own voice sounds.”

**Michael Goorevich
Cochlear**

Donor Matching

Skåne University Hospital

Challenge

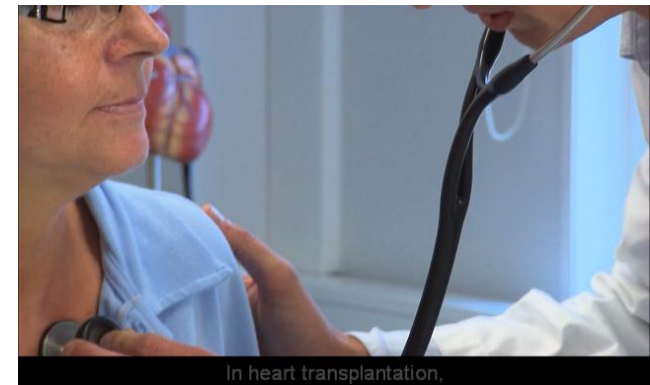
- Improve long-term survival rates for heart transplant recipients by identifying optimal recipient and donor matches

Solution

- Use MathWorks tools to develop a predictive artificial neural network model and simulate thousands of risk-profile combinations on a 56-processor computing cluster

Results

- Prospective five-year survival rate raised by up to 10%
- Network training time reduced by more than two-thirds
- Simulation time cut from weeks to days



“I spend a lot of time in the clinic, and don’t have the time or the technical expertise to learn, configure, and maintain software. MATLAB makes it easy for physicians like me to get work done and produce meaningful results.”

Dr. Johan Nilsson
Skåne University Hospital
Lund University

Capgemini Helps Clients Achieve Basel II Compliance and Deliver Economic Capital, Risk, and Valuation Models with MATLAB

Challenge

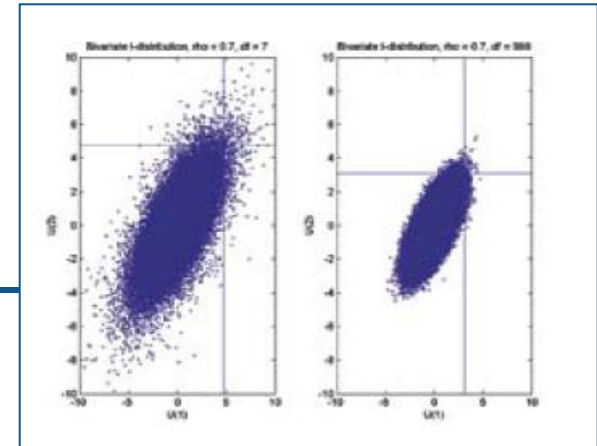
Enable banking clients to meet Basel II regulatory guidelines and perform other risk management tasks

Solution

Use MATLAB to develop risk management models and to perform valuations of complex products

Results

- Strong competitive advantage established
- Scalable solution delivered
- Customer portfolio revalued



Scatterplots showing 500,000 simulations drawn from bivariate t-copulas with the same correlation coefficient but differing degrees of freedom.

“With its computational power, matrix infrastructure, and ability to perform Monte Carlo simulations, MATLAB gives us a competitive advantage in performing complex risk analyses.”

Dr. Marco Folpmers
Capgemini

getting to smart



Why MATLAB?

- Simple
 - Robust
 - Transparent
 - Multi-disciplinary
 - Cost effective
- Parallel Computing
 - Math, Statistics, and Optimization
 - Signal Processing and Communications
 - Image Processing and Computer Vision
 - Test and Measurement
 - Computational Finance
 - Computational Biology
 - Code Generation and Verification
 - Application Deployment
 - Database Connectivity and Reporting

MATLAB R2012b

New:

- ToolStrip
- Apps Gallery
- Production Server

Updates:

- Neural Network
- Financial and Financial Instruments Toolbox
- Communications System Toolbox
- Computer Vision Toolbox
- Phased Array System Toolbox
- DSP System Toolbox
- MATLAB Coder
- HDL
- XPC

What if you could...

- ... have a strong foundation of algorithms and components to build “smart” systems?
- ... use models to share ideas and verify implementations?
- ... coordinate your research and product development teams?
- ... put decision-making tools in the hands of the right people?
- ... educate students with theory, modeling, hands-on practice, and a systems perspective?
- ... hire for those skills and build them in your teams?

...Accelerate the pace of engineering and Science...

Questions?

**Thank
You**