AUGUST 2005

Innovation

Invetech
BRINGING IDEAS TO LIFE

## IN THIS ISSUE



## Editorial

As another financial year closes, it is fitting to look back on what we have achieved over the past year.

I am extremely proud of all of our efforts that have resulted in an increase of over 50% in project revenue from our external customers.

This has also been a year in which the proportion of our international revenue has grown by 100%, to a position where international projects now represent 75% of our business.

We have done this at a time when capital investment in R&D and outsourcing in particular has been sluggish.

I believe that a major factor in this improvement has been due to Invetech's continued striving for excellence in client service, innovation, development process and technical delivery.

It also illustrates our ability to help our clients achieve their principal objective which is to deliver a return on their product development investment.

In this edition we showcase another successful new product, which was launched recently in the US and in Australia, and we describe some of the tools that Invetech uses to optimise the development process.

We are very excited about the many new projects that we will be working on over the coming year. In particular, some recent positive results have begun to flow from our increased investment in the North American market as we pursue our objective of being the world's leading bioautomation development service.

Over the last month, Invetech has secured four new instrument development contracts, representing a potential $20m in design and development fees. At least two of these projects are expected to yield downstream manufacturing contracts for Vision BioSystems. Invetech is now involved in major development programs that span the healthcare industry serving clients in diagnostics, point of care, drug discovery, research, therapeutics and microbiology.

In future editions, I look forward to telling you more about some of these groundbreaking projects as well as others from our growing international portfolio.

*Paul Wright*
*Chief Executive Officer*

## *We snare top award for building a 'better' mouse trap*

***Given that there are more than 5,000 patents registered worldwide for rodent catching products, it would seem a difficult task to actually build a better mouse trap.***

But that's precisely the task put before Invetech by Reckitt Benckiser, a world leader in fast moving consumer goods, including pest control products.

The final Invetech-designed product, which has been available for many months in stores in the USA as d-Con and in Australia as the Mortein "No See No Touch"™, was awarded a top prize in the 2005 Australian Design Awards Consumer category announced in Melbourne in late April.


Richard Stephens, Invetech Director, said this particular assignment with Reckitt Benckiser epitomised the power of combining our client's depth of knowledge in the market and core science with Invetech's very broad experience and strong ideation and development processes.

Richard said one of the keys to this particular project was the strong market knowledge that Reckitt Benckiser brought to the table. "Their comprehensive consumer knowledge and research told them that people were looking for a new device in which they did not have to see or touch the dead mouse.

"They also had in-depth understanding of rodent behaviour. They knew that mice are inquisitive creatures that like squeezing into tight openings."

Armed with this market information and insightful rodent psychology, Invetech assembled a team that

*continued page 4*

*from page 1*

*L to R: Brendyn Rodgers, Consultant Designer, Invetech; The Hon. Lynne Kosky MP, Victorian Minister for Education and Training; Dr Duncan Watson, Senior Scientist, Reckitt Benckiser; Arbie Artinian, Brand Manager, Reckitt Benckiser; and Paul Wright, CEO, Invetech, receiving the consumer award for the "No See No Touch"™ mousetrap at the Australian Design Awards 2005 ceremony in Melbourne.*

included industrial designers, mechanical engineers, materials technology specialists and manufacturing technologists to start brainstorming various concepts that could turn this market need into a successful commercial product.

These initial brainstorming sessions uncovered 30-40 ideas designed to catch, kill and conceal a mouse. From this number, a short list was developed, incorporating at all times product functionality, flexibility, attractive design and – perhaps most importantly – low cost.

The entire idea-to-market life cycle of this project took 12 months from first meeting through to final product, including the need for several testing phases, both through focus groups and efficacy tests in the US.

From a manufacturing point of view, this innovative design involves only four parts and can be mass produced via the use of injection moulding methods and simple tools. The Mortein "No See No Touch"™ met all of Reckitt Benckiser's design, manufacturing and cost criteria and has been warmly received by homeowners worldwide since its release.

To bait the trap, the user simply peels back a label on the underside of the trap and places some "peanut butter" into a small cavity.

To set the trap, the user simply twists the top cover clockwise until it locks. A red indicator shows that the trap is 'Set', and an entryway large enough only for a mouse is now operable.

The inquisitive mouse, attracted by the smell of the bait, enters the trap and moves along the circular corridor. It tries to access the bait by pushing its nose under the trigger bar ... the mouse is killed and trapped.

"This mouse trap improves on all other models available on the world market – a simple-to-use trap that is easy to bait, even easier to set and keeps the mouse totally concealed after it's caught," Richard explained.

"Better still, it is completely safe around children and pets. There is no unsightly mess to clean up and it may be discarded following a successful trapping."

The innovative mouse trap design is just the latest award winner for Invetech at the Australian Design Awards.

# *INSTRUMENT DEVELOPMENT IN PARALLEL WITH PRODUCT DEFINITION AND CORE TECHNOLOGY REFINEMENT**

By Ian Macfarlane, Peter Leigh-Jones and David Fry

***Computerised aircraft simulators for pilot training are today a commonplace instructional tool. Aircraft simulators provide realistic, software-generated representations of the visual world and the physical response of an aircraft to external conditions and the control inputs of the simulator pilot. The value of aircraft simulators is the safe, fast and cost-effective acquisition of flying skills in a realistic "virtual world."***

In the world of in-vitro diagnostic (IVD) product design, simulation is the representation of system processes and physical behaviors using computer-based mathematical models. Product simulation delivers value by enabling designers to rapidly test and refine core technologies and design concepts on "virtual prototypes" in the early development stages, before making significant commitment to costly and time-consuming hardware development.

The key benefits of simulation applied to instrument development are:

- Valuable "test flight" information and feedback to users, designers and other stakeholders
- Detailed analysis of system behaviors that would be impossible, prohibitively expensive and time-consuming to perform on physical systems
- Reduce development cycle-time through "on-screen" testing and optimization of designs, often surpassing the traditional iterative design-build-test-fix/refine cycle
- Rapid evaluation of tolerance-level variations in product designs to determine the performance sensitivity to real-world variability

***The time and place for simulation***

The application of simulation has grown in the last decade through such factors as:

- The performance of improved tools to comprehensively and accurately represent the physical world
- Inclusion of specialised tools such as Finite Element Analysis (FEA) as standard modules within widely used CAD-CAM software
- The availability of powerful and inexpensive computers has made previously impractical simulations feasible
- Increased awareness and acceptance of the capabilities and value of simulation among scientific and engineering communities

Closer to home, simulation has been applied to many areas of an IVD instrument development including:

- Graphical user interface (GUI) simulators to rapidly develop and refine screen look and feel and to obtain user feedback
- Electronic communication protocol simulators to test communication functions
- Analysis of the efficacy, safety and fault tolerance of scheduling and sequencing algorithms representing instrument process-flows
- Electronic circuit simulators to test core function performance
- Thermal analysis and design optimisation of sample-heating systems
- Motion simulation of instrument mechanisms for clash detection and clearance analysis in multiple operating modes
- Mold flow analysis to optimise the manufacturability and quality of plastic components

The application of simulation is largely driven by the technical capability of the tools available, the skill and experience of those performing the simulation and the cost/benefit of the approach. Figure 1 describes potential applications of simulation during each development stage.

In a recent project to develop a new instrument platform, the core detection system required a high performance impedance measurement subsystem. Simulation was used to explore alternative circuit designs that delivered the performance required while maintaining tight cost targets, existing intellectual property and other physical constraints on the system. This detailed simulation was a three-month exercise requiring one to two people. It is estimated that the work required to provide the same results from the physical design-build-test-fix/refine cycle, may have taken 12 months and increased costs significantly. This work has been proven through physical testing, with physical system performance matching expectations. In this instance the use of simulation tools substantially reduced the development time for the core technology (which was on the critical path). It enabled the interface to the detection subsystem to be defined before the initial simulation work was completed, and the remainder of the development program moved ahead in parallel.

In another project, a point-of-care instrument required very accurate temperature control to ensure that a diagnostic test was performed at the correct temperature. There were numerous heat sources within the instrument that could have influenced this. A complex FEA model of the internal physical and thermal environment could have determined the scale of any problem and been used to test

*SIMULATION CAN BENEFIT ALL STAGES OF A DEVELOPMENT LIFECYCLE.*

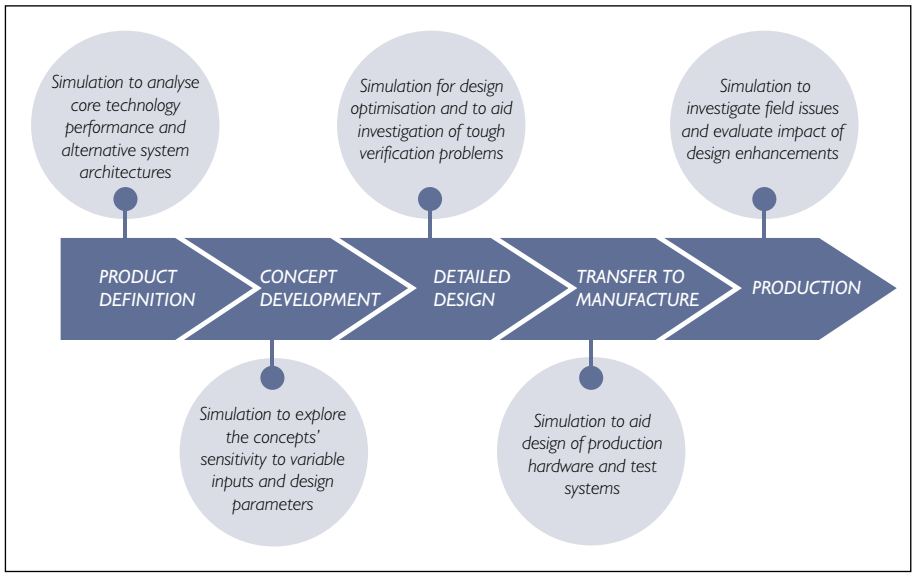


*Figure 1. Typical development stages and simulation benefits.*

**This is an excerpt from an article that first appeared in the January 2005 edition of IVD Technology Magazine.*

*In the next issue, we review the commercial considerations surrounding simulation and if warranted, how to achieve the best results.*

*Table 1. IVD technology-related simulation tools with examples of commercially available products*

| Simulation Tools and Products | IVD Technology-Related Applications |
|---|---|
| ***Spreadsheet software:*** MS Excel, Lotus 1-2-3 | Problems that can be represented by mathematical formulas and logic. Often used to model simpler and common physics, chemistry and engineering problems not requiring the more sophisticated tools.<br>Examples include instrument cycle time analysis, structural analysis, thermal analysis and dimensional tolerance analysis. |
| ***Specialised mathematical analysis software:*** MathCAD | Any problem that can be represented by mathematical formulas. Software typically includes a library of basic to very complex mathematical functions including statistical methods to develop customised models of system behaviour. |
| ***Control systems and embedded system design:*** MatLAB/Simulink, IBM/Rational Rose, IBM Rational Rose Real Time | Control system process modeling and automatic code generation<br>Embedded systems simulation, development and automatic code generation. |
| ***Scheduling software:*** MS Project | Instrument cycle-time analysis and sub-processes scheduling development.<br>MS Project was not written for short time-span events (ie, seconds or milliseconds). It can be adapted for "fast" processes. |
| ***Graphical User Interface simulators:*** Macromedia Flash, Macromedia, Director, MS Powerpoint | Hardware independent simulation of an instrument user interface. Extremely useful for gathering early feedback on usability of the interface including screen layout, design, colors, icons and work flows. |
| ***CAD-CAM software – mechanical design:*** Unigraphics (UG), Catia, Pro-Engineer (Pro-E), SolidWorks, Solid Edge | 3-dimensional mechanical component and assembly design<br>Multiple-components mechanical motion and interactions simulation, tolerance, clash and clearance analysis<br>Machining process simulation and cutting tool-path development. |
| ***Finite Element Analysis (FEA) software:*** ANSYS Multiphysics, MSC Nastran, SRAC Cosmos | Structural deflection, strain, vibration and fatigue, mechanical motion, thermal, fluid-flow, electrical, magnetic, electromagnetic, acoustics problems.<br>Linear steady-state to fully non-linear dynamic problems. |
| ***Electronic circuit simulators:*** PSpice, LTSpice | Electronic circuit logic design, signal processing, noise and thermal analysis. |
| ***Digital circuit design:*** Altera Max+Plus | Digital circuit simulation and design tool for programmable logic gate arrays. |
| ***Electronic communication protocol simulators:*** Custom developed | Partial or complete simulation of the host and peripheral device ends in a communications link, for validation and troubleshooting of the protocols. For example, a laboratory information management system host computer linked to multiple diagnostic instruments. |
| ***Software: general programming languages:*** C++, Pearl, Python | Customised instrument scheduling programs.<br>Interfacing software simulation when the actual host system is unavailable.<br>Emulators for low-level sensor inputs when the electronics are unavailable. |

potential solutions before constructing the physical hardware. However, in this case it was clear that the solution and performance requirements could be proven most cost-effectively on simple test beds. The eventual remedy of adding airflow baffles and a cooling fan were within the instrument cost limits and did not impact negatively on the instrument's other attributes.

The decision to conduct a simulation requires due consideration of viable alternatives, and the technical and commercial constraints applicable to the system under development.

IVD technology-related simulation tools, their application areas and examples of commercially or freely available products are presented in Table 1. The list in Table 1 is not exhaustive. It reflects tools which the authors have experience with. Alternative products and further reading on any of these tools can be found on the internet by searching on the application areas or product names. There is also a great deal of printed literature available focusing on each of the specific application areas for simulation.

*Paul Wright, as CEO of Invetech, Australia's leading technology, engineering and design company, provided this insight into "the innovation advantage: how innovation in processes, people and products creates value for your organisation" to "ceoforum.com.au", Australia's leading website for CEOs ...*

Invetech
BRINGING IDEAS TO LIFE

# ***Innovation:*** *How to establish an innovation advantage*

In the previous article of the series, we looked at defining three levels of innovation – incremental, substantial and radical – and examined how an innovation strategy can be defined to meet a company's strategic business needs. In this article, we provide various suggestions on where to source innovation.

### *Where to look for innovation*

Given the differing nature of the levels of innovation discussed above, it will come as no real surprise that the potential sources of innovation differ. Thus, aligned with the innovation portfolio dictated by a company's strategy, there should be a mix of processes for generating innovation. Based on our own experience at Invetech and on our work with clients large and small from both Australia and overseas, the following are some suggestions for identifying innovation that might be relevant to your business:

#### *Watch the market carefully*

Unexpected market or industry structure changes provide potential opportunities (and threats). In addition, changes in demographics, social moods, values, norms, even in lifestyle, may require innovative solutions to emerging needs. For instance, Johnson and Johnson responded to declining birthrates in Western markets by encouraging adults to use their baby products while Gerber, a company focused on baby needs, started selling insurance to over 50's .

#### *Existing customers are often a valuable source of innovation*

Consider immersing yourself and/or a team of market facing and delivery people in your customer's business to gain greater insight. Observing "a day in the life of" your client may provide valuable data on unmet needs and point to innovative solutions to existing problems. In addition, disruptions in your customer's industry may also yield circumstances where innovative products or services may be just the answer to new or emerging needs. Working cooperatively with leading or innovative customers may also help foster innovation. For example, companies such as 3M and Nortel networks have used the lead user approach, pioneered by Dr Eric Von Hippel at MIT's Sloan School of Management, to generate new products in areas ranging from the wireless internet to infection control.

#### *Suppliers can also provide valuable input*

Similarly, your suppliers have a vested interest in working with their market-leading customers. The development of strong partnerships with key suppliers will facilitate open discussions addressed at identifying your emerging business needs and identifying possible innovative solutions that integrate the best of both businesses.

#### *Learn from experience*

Unexpected success and failures can provide new and potentially valuable information. Don't sweep failures under the table but instead use them to explore what learnings may create innovation in current or new markets.

#### *Take a trip forward in time*

Scenario generation or other similar forward-looking techniques provide avenues to new possibilities. Ask questions like "What if, in 10 years' time…..? How could that have happened?" In these sessions, it is important to engage a range of input, particularly from different technological perspectives, to ensure that opportunities at the boundaries of existing disciplines can be identified.

#### *Be intentional and focused*

Substantial innovation does not just happen – it is a "play" analogous to "M&A" and requires the same focus, quality of process and caliber of team. There are a number of ways to increase focus on the identification and exploitation of innovation:

- Set up an "incubation management arm"
- Establish technology "centres of excellence" around areas selected for pioneering plays
- Establish strategic relationships – it is not within your walls but it is within your reach.
- "Cherry pick" a SWOT-team reporting to the CEO/Exec team
- Establish a separate business unit (eg, Holden Innovations)

#### *Don't ignore the possibility for radical innovation*

If more fundamental research is undertaken within the company, ensure that it is directed, focused and productive and subjected to a rigorous review and decision-making process. The philosophies employed by Robert G Cooper in his "Stage-Gate" process are valuable even in early stage research. In addition, set up a process of regularly reviewing patents in relevant areas. Regular and focused interaction with academics can also stimulate ideas based on emerging research. A relatively cost-effective way of generating more specific research outcomes is to sponsor a PhD student. Participation in Cooperative Research Centres (CRCs) of relevance may also provide access to latest technology trends that may spark innovative product opportunities.

*First published in www.ceoforum.com.au*

# News

## *Invetech appoints experienced business developer for US medical market*

Invetech's drive to further enhance its presence in the North American medical device and pharmaceutical markets has been bolstered by the appointment of a leading business development manager.

Mr Paul Wright, Invetech CEO, announced the appointment of Mr Robert Speziale, formerly Vice President - Marketing, Sales and Services at Tomtec, Inc., a Connecticut-based medical instrument company. Mr Speziale assumes his new duties as Vice President – Business Development at Invetech immediately.

"Robert's experience goes a long way towards expanding our move into key medical North American markets. Among other achievements, he managed the introduction of two new products each year for increases of 15-20% annually and negotiated and liaised joint development projects with 3M and Schering Plough, resulting in three new products and more than US$2 million in sales," Mr Wright explained.

Mr Speziale has over 30 years of experience in diagnostic, medical, research and instrumentation business development, marketing and sales. He started his career as a microbiologist in Boston. He moved on to join the Division of American Home Products (now Wyeth Pharmaceuticals) as a microbiology technical representative in the microbial identification field. Mr Speziale also held a succession of positions of increasing responsibility with Otisville Biotech, Orgenics International Corporation and the New York Blood Center.

In his new role with Invetech, Mr Speziale will be primarily responsible for the establishment of relationships and business opportunities with pharmaceutical and biotechnology companies to design and develop bioautomation solutions for instruments, assay platforms, manufacturing and quality control automation.

Mr Speziale will be based in Madison, Connecticut and report jointly to Invetech senior managers located in Melbourne, Australia and San Francisco, California.

***Contact:*** Jari Palander, Vice President, Invetech - USA
jari.palander@invetech.us
(415) 533 1958

## *Come and see us in 2005 …*

Each year Invetech presents its skills and services at various exhibitions and trade shows around Australia and around the world. The table below outlines where we'll be on show in the next few months. Please feel welcome to contact our Marketing Department, via e-mail <*kmc@invetech.com.au*>, for more information on any of the exhibitions.

| Exhibition | Location | Dates | Services |
|---|---|---|---|
| AACC ClinLab Expo | Orlando, FL, USA | 26-28 July | Bioautomation |
| Drug Discovery Technology | Boston, MA, USA | 8-10 Aug | Bioautomation |
| Medica 2005 | Düsseldorf, Germany | 16-19 Nov | Bioautomation |
| ASCB | San Francisco, CA, USA | 11-14 Dec | Bioautomation |
| LabAutomation | Palm Springs, CA, USA | 21-25 Jan, 2006 | Bioautomation |
| Pittcon | Orlando, FL, USA | 13-16 Mar, 2006 | Bioautomation |

*Invetech's bioautomation team at Pittcon 2005, in Orlando, Florida*

Make sure you come see us at our upcoming tradeshows.

***Invetech Pty Ltd***
*ACN 004 301 839*
*Invetech is a subsidiary of Vision Systems Limited*

*Private Bag 44*
*495 Blackburn Road*
*Mount Waverley*
*Victoria 3149 Australia*
*Telephone +61 3 9211 7700*
*Facsimile +61 3 9211 7703*
*e-mail kmc@invetech.com.au*
*www.invetech.com.au*

***Invetech (USA)***
*44 Montgomery St. Suite 1308*
*San Francisco, CA 94104 USA*
*Telephone +1 415 533 1958*
*Facsimile +1 415 693 0826*
*www.invetech.us*