





Ensis maintains close associations with end-users through the Wood Quality Initiative Limited (WQI), an industry-supported consortium. Pictured with Ensis Chief Commercial Officer, Andrew Newman, (left) is WQI Chief Executive, Dr Keith Mackie.

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For the future New Zealand must be continually upskilling and innovating to stay ahead. Building partnerships and collaboration with industry, education, and research institutions are crucial elements in moving New Zealand.

– Rt Hon Helen Clark, Prime Minister



In June 2005, Scion became the new trading name of the New Zealand Forest Research Institute Limited. “Scion” refers to a cutting or shoot taken off an established plant in order to graft it to another rootstock. This is an appropriate descriptor of what Scion seeks to achieve - grafting our core capabilities onto new partnerships so fresh opportunities can flourish. This year’s annual report highlights the range of external partnerships and collaborations that we have formed across the organisation, and celebrates the burst of growth these relationships are bringing.

THE YEAR AT A GLANCE



The 2004–05 year saw the public unveiling of our new brand – Scion. This event signified the depth of our commitment to delivering transformational science that will expand the horizons of New Zealand’s bio-based economy.

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Our confidence in the Ensis partnership with CSIRO led Scion to complete the integration of our forestry-facing science activities into Ensis. From 1 July 2005, Ensis will grow to over 300 technical staff and approximately NZ\$60 million of activities. We now must demonstrate that this new partnership can deliver enhanced research, science and technology to the Australasian forestry sectors and establish ourselves as “thought-leaders” within these sectors.

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Through investing in new skills, Scion is future proofing existing activities, seeding new ideas and helping build new relationships with tertiary institutions. Scion has a strong tradition of investing in skills through directly supporting postgraduate degrees and post-doctorates in all its research programmes. This has effected strong organic development in existing science activities. However, this year Scion stepped beyond the historic approach and supported three post-doctorate projects at an organisational level.

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A major achievement for Scion came to fruition over the past year with the completion of the NOW Home project in Auckland. This project is the culmination of a research programme initiated by Scion in 2002 and made possible by Beacon Pathway Limited, a research consortium funded by the Foundation for Research, Science and Technology (FRST) and a unique collaboration of private and public sector shareholders.

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An outstanding milestone was achieved by Scion with the formation of the Biopolymer Network as a separate company. This partnership between Scion, Crop & Food Research, and Canesis Network enables scientists to make real headway in meaningful joint projects that will expand New Zealand's bio-based economy. The research has been funded largely by FRST with an investment of \$15.3 million over six years. Additional funding has come from specific companies.

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Forest Biosecurity and Protection now contributes to a strategic network around Biosecurity New Zealand (BNZ), dedicated to ensuring maximum protection for New Zealand's primary industries and natural resources. One of the mechanisms for enhancing this network is the "Better Border Biosecurity" (B3) venture funded by FRST, which brings science providers and key Government agencies together in a working partnership.

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New Zealand school children are getting a new perspective on forests through Forests of Life, a new educational programme developed by Scion, Massey University, and Revero web designers. Intermediate schools in Rotorua and Palmerston North are using digital technology to study and monitor areas of native forest. The students will then apply this knowledge to restore or establish an area of native vegetation. The purpose of this programme is to promote a greater awareness of ecological science and the principles of sustainability.

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This year, Scion has worked with organisations such as Ngati Whakaue Tribal Lands Incorporated and Ngati Porou Whanui Forests Limited to understand their strategic research and development needs and become one of their research providers of choice with respect to meeting those needs. Scion has a project under way with Ngati Whakaue and is in the process of developing a substantial research proposal with Ngati Porou Whanui Forests Limited.

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EXTRAORDINARY HERITAGE – EXTRAORDINARY FUTURE

Scion has an extraordinary heritage as a Crown Research Institute and its Biomaterial Futures strategy has set the stage for a no less extraordinary future.

Scion's vision is built on developing plant-based biomaterials as renewable substitutes for products derived from non-renewable resources. This includes the development of new manufacturing and waste management processes as a truly sustainable means of meeting consumer demands now and into the future.

Throughout human history, wood has been one of the world's most commonly used biomaterials, and it remains so to this day. Scion's vision of a world that uses everyday products made from renewable materials encompasses all the values of sustainability that are central to plantation forestry.

From its beginnings as the Forest Research Institute, Scion pioneered plantation forestry – developing a competitive advantage in growing trees, and building global recognition for what were groundbreaking achievements in their day. Forestry sits squarely within New Zealand's bio-based focus and the organisation remains dedicated to the forestry sector.

Over the past three years, Scion has extended its research programmes to include the development of new biomaterials from renewable resources. The organisation has now evolved into a group of knowledge-related activities with a shared vision of developing sustainable biomaterials for future generations.

Coupled with its proven track record in transformational science, Scion is determined to help New Zealand secure a leadership role in a bio-based future. The new name reflects the range of Scion's activities targeted at achieving this goal.



WHAT'S IN A NAME?

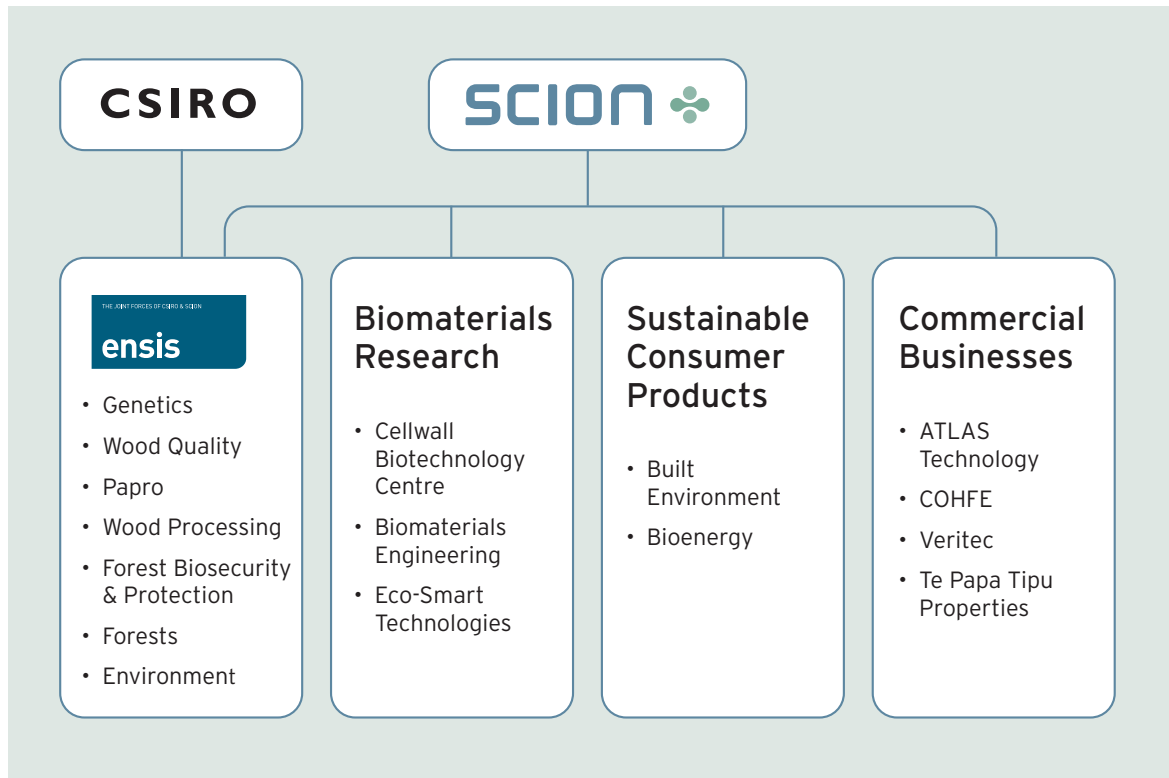
“Scion” is an old French term meaning a shoot or a twig. In current usage, a scion is a cutting or shoot taken off an established plant in order to graft it to another rootstock.

Each scion taken from a plant has the same DNA as the original rootstock. All parts of the Scion Group share the DNA, or the forestry legacy, that was established as part of the original Forest Research Institute. Scion is now multiplying that legacy.

SCION 
next generation biomaterials

OUR VISION

Biomaterial Futures: advancing the widespread utilisation of renewable materials and products from plants for economic, environmental, and social returns.



OUR STRATEGIC BUSINESS AREAS ARE:

FORESTRY RESEARCH & DEVELOPMENT:

Delivered through Ensis (the joint forces of CSIRO and Scion), now Australasia's leading supplier of research and development services to the forestry and forest products sector.

SUSTAINABLE CONSUMER PRODUCTS:

Accelerating the uptake of bio-based products, including forest products, in the marketplace.

BIOMATERIALS RESEARCH:

Undertakes transformational research and technology development to drive the creation of new biomaterials and sustainable manufacturing processes.

COMMERCIAL BUSINESSES:

Stand-alone commercial businesses that provide specialist services to niche markets.

FROM THE CHAIRMAN AND CHIEF EXECUTIVE OFFICER



*Leading Scion – Dr Russ Ballard Chairman (left)
and Dr Tom Richardson Chief Executive Officer.*

The 2004–05 year saw the public unveiling of our new brand – Scion. This event signified the depth of our commitment to delivering transformational science that will expand the horizons of New Zealand’s bio-based economy. Our brand launch was also an opportunity to share, once again, the vision we have for New Zealand’s role in a world hungry for alternatives to non-renewable materials and unsustainable production processes. More importantly, it was an occasion to join with our stakeholders, clients and staff in reflecting on their vital role in this significant shift.

We know that the global movement towards bio-based products is under way and we fervently believe that New Zealand can punch above its weight in delivering valued products into this rising opportunity. Turning such opportunities into reality is the driving force for Scion as a Crown Research Institute (CRI). We exist to conduct strategic science and to transfer technologies that spawn greater societal, economic and environmental benefits for New Zealand. Scion has committed its skills, talents and energy to this quest, just as the Forest Research Institute did over fifty years ago in support of the burgeoning plantation forest industry.

At the heart of Scion’s strategy have been the twin drivers of strengthening our contributions to New Zealand’s economy – primarily through the forestry sector, and secondly through conducting paradigm-challenging science to drive future transformations. Both of these thrusts have seen remarkable progress this year, on the back of many new partnerships.

FORESTRY-FACING SCIENCE

Forestry has been our cornerstone since 1947 and it will remain so. It is an industry that already lives the biomaterials aspirations that others are hoping to achieve – namely the sustainable production of high volume industrial biomass.

Cellulose is the most abundant polymer on earth and New Zealand has the largest proportion of certified sustainable forests in the world. So, while many sectors will benefit from the biomaterials future we describe, forestry should do so even more. Our highly productive and sustainable plantation forests will be the bedrock of New Zealand's biomaterials future.

As indicated last year, from 1 July 2004 we began to combine our forestry-facing activities with those in CSIRO's Forestry and Forest Products Division to form 'Ensis'. Ensis was launched on 1 July and has enabled us to secure science breadth and depth across the forestry and forest product value chain. The unincorporated joint venture performed admirably in its first year, with the science teams integrating well. In addition, the support teams from both Scion and CSIRO have worked tirelessly to develop systems to support staff who now span some 4500 kilometres and 9 sites. CSIRO's contributions to the management of Ensis have brought abundant new talent, enthusiasm and commitment to the partnership.

While the journey has barely begun for Ensis, we are pleased with the platform we have jointly created, and this achievement was recognised when Ensis won the Environmental, Social, Government and Community category at the inaugural TelstraClear trans-Tasman business awards.

Our confidence in the Ensis partnership with CSIRO led Scion to complete the integration of our forestry-facing science activities into Ensis. From 1 July 2005, Ensis will grow to over 300 technical staff and approximately NZ\$60 million of activities. We now must demonstrate that this new partnership can deliver enhanced research, science and technology to the Australasian forestry sectors and establish ourselves as "thought-leaders" within these sectors.

BIOMATERIALS RESEARCH

Our second commitment is to act as agents of change by looking beyond the current horizons and to stretch current thinking by undertaking fundamental science of the highest quality. The past year has seen Scion significantly grow our capability and partnerships in our "science-facing" biomaterials research areas.

Approximately, 10 new permanent science staff have been appointed, including a new Leader for the Cellwall Biotechnology Centre and a new Principal Scientist in Biomaterials Engineering. We have also lifted support for

postgraduate students in these areas. While the number of students has increased markedly, we are disappointed that many PhD-level stipend opportunities remain unfilled at year-end. We are working closely with our university partners to identify new approaches to attract New Zealand's brightest students to these emerging science fields.

Although our biomaterials research programmes provide a springboard for initiating paradigm-shifting change, we cannot do it alone. Our "Biopolymer Network" (BPN) collaboration with Crop & Food Research and Canesis Network has matured into a company in its own right in response to private sector interest in investing in the science platform. This partnership has gone from strength to strength this year, and the science teams have developed a number of new projects.

Over the past year Eco-Smart Technologies has continued its push towards commercialising technologies that have the potential to transform industrial waste management systems.

On the biotechnology front, Scion's Cellwall Biotechnology Centre hosted an international cell wall conference to bring leading European and New Zealand researchers together in Rotorua to explore the latest opportunities to create new value from plant cell walls – an increasingly versatile feedstock and one that New Zealand's primary sectors are expert at producing and processing.

SUSTAINABLE CONSUMER PRODUCTS

Our vision at Scion is to advance the utilisation of renewable materials and products from plants for economic, environmental and social returns. A key to this success will be a greater understanding of, and links with the consumer markets of both today and tomorrow. A major achievement for Scion this year was the development of Beacon Pathway Ltd and the completion of the NOW Home project in Auckland. Opened in August by the Prime Minister, Rt Hon Helen Clark, the NOW Home is a tangible example of Scion (and its Beacon partners) applying research findings to everyday issues for the benefit of society.

Improving the performance and sustainability of the built environment will remain a focus for our Sustainable Consumer Products team, and this group is now expanding its scope to provide similar insights in the wider biomaterials and bioenergy arenas.

COMMERCIAL BUSINESSES:

For many years, Scion's commercial businesses have operated along a continuum from internally focused support to wholly owned subsidiaries providing a pipeline for our research discoveries or connectivity to our research themes.

In 2004–05 we re-evaluated the strategic fit of each commercial business, its growth potential, and Scion's ability to add value going forward. These activities took considerable effort from both Scion management and the unit staff involved. The results of the reviews were that in the latter half of 2004–05 we:

Closed SignaGen - Molecular Breeding Solutions

redeploying most of the technical staff to Scion R&D groups and existing SignaGen clients to other service providers.

Sold PPC_{NZ} via a management buy-out to a talented team of senior PPC_{NZ} staff. PPC_{NZ} will remain on the Rotorua campus providing specialist agrichemical formulation services to forestry and ag-bio clients.

Repositioned Veritec and began a process to improve laboratory quality assurance and client management.

Closed FHS Ltd (trading as Vigil) due to a failure to retain key forest health surveillance and biosecurity-related contracts.

Retained ATLAS Technology which showed pleasing growth into the Australian market. This business development demonstrates that current software systems designed primarily for radiata pine can be applied to other species.

Retained the Centre of Human Factors and Ergonomics (COHFE), which has continued to successfully apply its ergonomics and human factors skills to the agricultural and food processing sectors.

Despite the need for difficult actions in some cases, the past year has left our commercial business units more aligned with the Scion Group strategy and poised to contribute more positively going forward.

MAORI

In keeping with major themes of the previous year, 2004–05 saw growth in partnership opportunities with Maori stakeholders. Notably, a preferred partnership relationship was established with Ngati Porou Whanui Forests Limited as a basis for supporting the R&D strategy of this progressive Maori-based forestry corporation.

Another highlight was the launch of Te Papa Tipu Innovation Park in cooperation with Ngati Whakaue. This locally significant event, gave an official name to the Rotorua site on which Scion is located for the first time, and lays the groundwork for an expanded business community.

ORGANISATIONAL DEVELOPMENT

The past year has presented a number of challenges with regard to change management within the organisation. Significant factors include the formation of Ensis and the rebranding of Forest Research to Scion. Because of the geographic spread of Scion's teams and partners, it is necessary for us to develop a new way of operating and leading within a virtual environment.

While addressing issues associated with organisational change, significant investment was made last year in leadership development and sabbatical programmes within Scion. Our aim is to highlight individual strengths and provide the support needed for staff to develop their potential, while encouraging them to explore greater scope in their science roles.

FINANCIAL

Group operating surplus before taxation was \$1.085 million on total revenue of \$35.199 million. The operating surplus showed a favourable variance of \$0.278 million when compared to budget of \$0.807 million. The surplus was achieved through operational performance in our business units but was impacted by two non-recurring events, namely the management buyout of PPC_{NZ} (gain of \$0.254 million) and the closure of FHS Limited (loss of \$0.327 million). This resulted in a net non-recurring loss to the surplus of \$0.073 million. Additionally, the surplus was negatively impacted by restructuring costs of \$0.348 million.

Total revenue of \$35.199 million shows a favourable variance of \$1.771 million compared to budget of \$33.428 million. Particular pleasing was growth in revenue across the overall activities of Scion, including the Ensis contribution. Ensis results were equity accounted. As Ensis is a 50:50 unincorporated joint venture, Scion

Group revenue only captures a gross margin contribution of \$3.392 million from a total Ensis revenue of \$29.555 million. Biomaterials Engineering showed a favourable revenue variance in Government revenue of \$1.224 million as a result of securing additional funding after the end of the 2004–05 budget round. Commercial revenue showed favourable variances in several core science units; however, lower commercial revenues from the commercial business units, Vigil, SignaGen and ATLAS, offset these gains.

During the year, staff were seconded to Ensis and charged for at a rate of \$5.491 million. Personnel costs which represent more than 50% of total costs were kept at a 2.15% increase on the previous period with a modest increase of 15 head count to 348 in staff numbers compared to the previous period. With an emphasis on ongoing corporate efficiency, the total operating expenses were effectively managed.

Group operating surplus included discretionary organisational reinvestment of \$0.477 million comprising \$0.180 million investment in Beacon Pathway Limited, \$0.264 million investment in student stipends and sabbatical and post doctorate programmes, and \$0.033 million in WQI Limited.

Net surplus attributable to the shareholders was \$0.619 million, compared to \$0.685 million as reported in the previous period. The lower surplus attributable to shareholders was due primarily to higher tax of \$0.371 million from higher operating surplus in the current year and the absence of tax losses brought forward in the previous year.

Net cash flows from operating activities were comfortable at \$0.961 million compared to \$3.241 million in the previous period. The reduced cash flow was due primarily to lower revenue receipts of \$6.884 million offset by a lower cash outflow of \$4.604 million, both compared to the previous period, resulting in the net decrease of \$2.280 million.

Ensis profit distribution is expected to be on an ongoing basis. However, Scion only received its first cash distribution of profits of \$1.475 million on 31 August 2005. As a result, cash and short-term deposits decreased by \$0.963 million compared to the previous year and the term debt level increased from \$2.145 million to \$2.275 million over the reporting period.

Net interest cover improved from 9.86 times to 20.72 times and is over the required covenant (of 2 times) with our bank.

The creditors and accruals increased by \$1.892 million over the previous year, due primarily to outstanding

payments for a Flowcytometer (required for advanced environmental and bioproduction biotechnology applications) and net intercompany payable to the Ensis joint venture.

Scion invested \$2.154 million in capital expenditure. A significant portion, \$1.3 million was invested in the Flowcytometer, a Scanning Electron Microscope that provides a level of magnification almost to the threshold of viewing molecules and atoms, and in a Titrimetric Off-gas Analyser for bioreactor engineering.

In February 2005 Scion transferred its land assets to a wholly owned subsidiary, FR Properties Limited, at book value of \$1.135 million. FR Properties Limited has been renamed Te Papa Tipu Properties Limited as part of the organisational re-branding.

On 25 August 2005 it was resolved that FHS Limited, a wholly owned subsidiary of New Zealand Forest Research Institute Limited, would cease trading as of 1 October 2005. As a result under FRS5, Events After Balance Date, the financial statements of FHS Limited cannot be prepared on a going concern basis. Due to this change in the basis of accounting, an adjustment of \$0.327 million has been made to the accounts.

CONCLUSIONS

2004–05 was an extraordinary year for our institute. While reengineering the Scion Group structure and business model, and launching pivotal new partnerships to underpin the long-term strategy, the staff and management remained focused on achieving science outcomes and financial targets. To surpass budgeted earnings before interest and tax (EBIT) and secure strong footholds in all aspects of our strategy is a testament to the commitment of our Board, management and staff to the journey we have begun.

In that light, we wish to record our appreciation of two departing leaders: Chairman, Brian Armstrong; and Chief Executive Officer, Bryce Heard. Brian completed his 6 years as Chairman of Scion on 30 June 2005 and Bryce Heard stepped down as Chief Executive Officer on 31 March 2005. Brian and Bryce led the organisation through the strategy reviews that culminated in our “biomaterials” strategy and under their leadership we began assembling much of the framework for the new Scion Group.

Finally our heartfelt thanks go to our staff, management, Board, partners and collaborators for their continuing commitment. We look forward to the coming year as Scion seeks to multiply and grow our forestry legacy through still more new relationships and fresh opportunities.

SCIENCE STRATEGY AND INVESTMENT

The 2004–05 year was one of Scion's most successful in building investment into critical areas of organisational endeavour. Although we have again seen growth of external investment in science, the key focus has been on delivery and wise utilisation of that investment.

The mission of a CRI is not simply about doing science but about leveraging that science to deliver economic, environmental, and social outcomes for New Zealand. Simply put, this is about creating jobs, security and enhancing the quality of life for all New Zealanders.

Scion is also very conscious of its responsibility to the New Zealand forestry sector. Forestry is New Zealand's third largest industry and delivers a multitude of financial and non-financial benefits to the nation. Although Scion's biomaterials strategy has taken its research into activities beyond the traditional domain of forestry, its vision to deliver new materials and systems from plants is entirely compatible with future proofing and enhancing the value of forestry to the nation.

Some significant events this last year have included the transformation of the Radiata Pine Breeding Company into a Foundation for Research Science and Technology (FRST) Consortium; the establishment of a multi provider - multi partner entity focusing on improving border biosecurity; progress in consolidating capability in soil science; and enhancing trade acceptance for wood products.

The key levers underpinning science and science delivery are skills, partnerships and investment. In all these areas Scion has made substantial strides over the past year.

SKILLS

Through investing in new skills, Scion is future proofing existing activities, seeding new ideas, and helping build new relationships with tertiary institutions. Scion has

a strong tradition of investing in skills through directly supporting postgraduate degrees and post-doctorates in all its research programmes. This has effected strong organic development in existing science activities. However, this year Scion stepped beyond the historic approach and supported three post-doctorate projects at an organisational level.

The three inaugural post-doctorates are:

Dr Lang Quanfeng who joined the Eco-Smart Technologies team from the Chinese Academy of Science in Beijing where he studied the molecular biology of aniline degradation. Aniline is a toxic pollutant associated with many industrial waters. Quanfeng will be applying genomic and metagenomic approaches to explore the role of microbial populations present in biological treatment systems. Special emphasis will be given to microbial genes that break down complex wastes, as well as those that may provide a means of obtaining value from industrial wastes through generating valuable industrial by-products.

Dr Ahmed Osman joined Scion in early 2005 to reinforce the growing capability in the organisation in the conversion of tannins into valuable specialty chemicals. His particular expertise in biotransformation is adding considerable insight into tannin degradation, and hence how to better exploit materials such as bark.

Aynsley Tizzard has joined the soils research team based in Christchurch. Her project is focused on investigating the impact on tree growth and quality of the soil ecology, by applying beneficial bacteria.

Another strategy employed over the past year has been to support short-term staff sabbaticals. These are a highly effective means of exposing scientists to different environments, people, and skill sets and thereby achieving multiple benefits for specific projects while also building meaningful networks outside both Scion and New Zealand.

The first sabbatical recipient was Cathy Hargreaves from the Ensis Genetics group. Cathy spent time at the United States Department of Agriculture's National Seed Storage Laboratory in Fort Collins, on a project involved with meristem cryopreservation. Dr Nava Navaranjan from Ensis Papro was the second recipient. He spent 10 weeks



Partnerships work on many levels. Andrew Karalus from Weyerhaeuser (left) and Dr Russell Burton (Scion Group Manager, Investments) were key players in the establishment of the Radiata Pine Breeding Company.

at Monash University in Melbourne further honing his skills in finite element analysis - specifically developing a model to describe the compressive stress and strain behaviour of corrugated paperboard packaging (see page 26).

PARTNERSHIPS

Partnerships work on many levels - those between research enterprises, those between research and commercial enterprises, and those in research investment companies. Scion itself purchases research outcomes through organisations such as WQI Limited, the Radiata Pine Breeding Company Limited, and Beacon Pathway Limited. These form a critical part of achieving science delivery as well as vastly enhancing market connectivity and relevance.

The transformation of the Radiata Pine Breeding Company into a FRST consortium, provided a substantial boost in the size of the programme that the Company can support and gave it the ability to leverage even greater value into the sector. Andrew Karalus from Weyerhaeuser chaired the Establishment Board for this Consortium in what must surely be a model partnership between many industry players including Australian companies, research enterprises, and FRST.

INVESTMENT

It has been said that a vision without funding is a hallucination. There is no doubt that the strengthening of New Zealand's bio-based economy will not occur without serious investment into all aspects of delivering technologies and capabilities. Even to sustain the current activities requires investment. The new year will see the application of a new fund, the CRI Capability Fund, through the Ministry of Research Science and Technology focused on sustaining and growing key capabilities aligned to supporting the forestry and related bio-based materials industries.

Scion has invested this initial funding into areas aligned to protecting and sustaining forestry assets such as: biosecurity and environmental forestry; enhancing value from forestry assets; technical aspects of market acceptance; and, in building whole new product opportunities through the key platforms of biotechnology, bioconversion and natural products engineering.

TECHNOLOGY COMMERCIALISATION

Scion considers technology development and commercialisation are critical processes to deliver transformational change to the New Zealand economy.

In 2002, Scion increased its emphasis on technology development and commercialisation. Previously, the organisation had enjoyed some success with commercialising technologies (e.g. Embryogenesis, Wood Hardening, Dryspec) but that success was sporadic and the seeds of new commercial developments were difficult to discern.

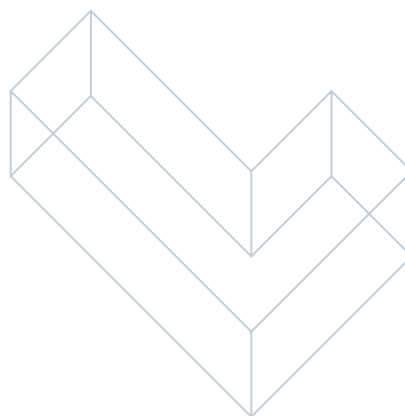
In late 2003, the pivotal decision was made to implement best-practice stagegating processes to guide technology development and commercialisation. These processes were licensed from StageGate Inc. of Canada, and then customised and rebranded for use within Scion.

TechMate Development is a traditional product development stagegating process. It traverses the territory from product idea to market launch and is strongly influenced by financial and market considerations. Such focus is essential to optimise the chances of success. However, it is not particularly suitable for the more speculative technology developments (the transformational technologies) undertaken in research organisations such as Scion, other CRIs, and universities. Uncertainty in terms of technical and commercial success results in a high rate of attrition that stifles invention. Thus, a further process, TechMate Research has been introduced which brings the same disciplines of project management and stagegating, but places more emphasis on technical development rather than potential for market uptake/commercial success as the primary criterion for advancement. Essentially TechMate Research is a forerunner to TechMate Development.

Both processes ensure the involvement of multifunctional teams examining technical, intellectual property (IP), marketing, commercial, and financial issues in parallel through all stages of the process. An independent gatekeeping committee approves progress of a project to the next stage of development on the basis of satisfactory performance to date, an approved research and development plan, and an acceptable business case. Non-performing projects or those with low market opportunity are stopped - an essential of stagegating.

In parallel with StageGate implementation, a series of technology audits and reviews were held across the organisation - and these are still ongoing - to gain an understanding of the status of technology development in what was previously a technology-push environment. Technology audits and reviews were essential to achieve initial prioritisation and selection prior to placing technologies into the TechMate processes.

A major ingredient to reshaping the technology portfolio was the establishment of Ensis and its subsequent decision to use the TechMate process to guide technology development. In the current year a series of technology audits and reviews were undertaken in Ensis Wood Quality, Ensis Wood Processing and Ensis Papro, which represented an amalgam of CSIRO and Scion technologies. Selected technologies are now being progressively entered into the TechMate process. Ensis Genetics will be reviewed in late 2005 together with the three Units that joined Ensis on 1 July 2005.





Eco-Smart Technologies Unit Leader, Dr Trevor Stuthridge (left) and Andar Business Development Executive, John Maskill have developed a partnership to look at innovative waste management technologies.

The Scion Group technology portfolio now comprises some 37 technologies, all of which have been reviewed and are subject to active stagegate management. Their distribution is as follows:

TECHNOLOGY DEVELOPMENT STAGES	NUMBER OF TECHNOLOGIES
- Early Technical Assessment	10
- Advanced Technical Investigation	13
- Early Product Development	7
- Advanced Product Development	4
- Market Entry	3

This represents the beginnings of a healthy portfolio with a flow of technologies progressing along the pipeline. Attention also focuses on capturing and documenting the myriad of ideas that feed the pipeline, and overlaying these with effective strategic IP management.

Ten technologies have been prioritised for specific attention as having potential either to be licensed or to attract a significant investment/development partner. The StageGate process in delivering strong business cases and value propositions based on robust technical, financial and market analysis is providing increased confidence and ensuring a greater chance of success.

Amongst the group of prioritised technologies are some that are already attracting commercial interest. These include:

- an industrial wastewater clean-up process for biological waste streams - including pulp and paper and food processing
- a test machine for improving quality and cost control in the manufacture of corrugated paper board
- chemical modification of wood to improve stability and durability
- a non-destructive test for improving manufacture of fibre-cement board
- a biodegradable biomass-bioplastic composite material for disposal products.

From a situation of essentially an unmanaged technology development process characterised by "hundreds of ideas" and few, if any, commercialisable products, there has been a pleasing turnaround over the last three years. Scion now has a managed and disciplined process for technology development and a portfolio of emerging and near-market technologies.

In association with these developments Scion has also been upskilling in the market intelligence and technology commercialisation arenas. Good science alone is not sufficient to take inventions to market. Fundamental to this upskilling has been their embodiment in the technology project teams. The result has been a greater understanding of commercial realities by the scientists, and of the demands of science by the commercialisers.

SUSTAINABLE CONSUMER PRODUCTS

Part of Scion's challenge is to identify widespread applications for biomaterials in industrial and consumer markets. The Sustainable Consumer Products theme is represented by a new group within Scion that builds on existing capabilities. This group aims to accelerate the uptake of forestry and other bio-based products through understanding market drivers and how these impact on the built environment and bioenergy.

A major achievement for Scion came to fruition over the past year with the completion of the NOW Home project in Auckland. This project is the culmination of a research programme initiated by Scion in 2002 and made possible by Beacon Pathway Limited, a research consortium funded by FRST and a unique collaboration of private and public sector shareholders.

The NOW Home serves as a tangible example of how Scion is applying research techniques to find ingenious solutions to modern everyday issues. While timber has always played a central role in New Zealand's built environment, Scion is reviewing a wide variety of plant-based materials for options in composites, plastics, and polymers which might be used for construction and a huge range of other applications, resulting in more sustainable outcomes.

Since the establishment of the NOW Home project, Scion has been further pushing the boundaries on new materials and systems to improve the performance and sustainability of housing. Systematic analysis and interpretation of future trends in demographics and the social environment, allow Scion to plan research and development with

a greater degree of insight. By looking intensively at consumer behaviour, researchers are able to ask specific questions about what is important to end-users and consumers, and how they use the products in houses. From this information it will be possible to develop new products for roofing, flooring, cladding, and other building components, which have greater appeal.

"Eco-houses with the latest energy-saving devices have been built before, but this time the consortium aims to develop standard house plans that typical New Zealand families can afford."

NZ Herald

NOW HOME

The NOW Home concept arose directly from the heart of Scion's Biomaterial Futures strategy, which seeks to advance commercially viable biomaterials through developing products that consumers and manufacturers will want and need, especially in a resource-constrained world.

This project will test the viability of a design concept that aims to balance a number of potentially conflicting sustainability criteria including: affordability, health, aesthetics, performance and resource use. Intensive research was undertaken before choosing the building materials, reflecting the balance between these interests. Designs took into account New Zealand's changing demographics, environment, sociology and the way people live in their homes - all research provided through Scion's consumer focus and insight.

The NOW Home will allow scientists to test laboratory-based concepts, and deliver New Zealand solutions. Collaboration via the Beacon Pathway consortium,



Celebrating the opening of the NOW Home, John Gifford (left), Group Manager, Sustainable Consumer Products with Beacon Pathway General Manager, Nick Collins.

a partnership aiming to promote research and share knowledge about sustainable construction, exemplifies Scion's goal to promote the uptake of sustainable biomaterials in the marketplace. Founding partners with Scion include Building Research, Fletcher Building, and Waitakere City Council.

BIOENERGY

Beyond biomaterials, plants also offer scope for alternative energy sources. The ratification of the Kyoto Protocol has highlighted the advantages of bioenergy as a carbon-neutral fuel. Scion has a small, targeted research group that is developing strong credibility in the sustainable energy market. The increasing need for energy self-sufficiency is a key driver of research in this area along with defining appropriate market solutions.

Over the past year, Scion has continued to work with the forest industry to promote the use of wood waste from forestry operations and wood processing as a major energy source. This involves mapping the potential energy resource and providing energy-system analysis to help the industry achieve cost-effective utilisation. The bioenergy

group has adapted a Danish heat plant and cogeneration model to New Zealand conditions. This model evaluates heat demand in large operations that run a heat plant for an industrial boiler. Known as, EnergyPRO, it is suitable for designing, optimising, and analysing energy projects, including any combination of fossil fuels, biofuels, and geothermal energy.



BIOMATERIALS RESEARCH

The world is now witnessing extraordinary growth in the development of materials and energy sources that are renewable and sustainable. This revolution is reshaping the nature of both manufacturing and consumer products. Three years ago, Scion launched a strategy to lead New Zealand into this revolution. The full impact of this strategic shift is now being felt as the Biomaterials Research groups grow in strength, making the Biomaterial Futures vision a reality.

Scion recognises that plants hold the key to the biomaterials revolution. Not only are they renewable, they are wonderful factories for natural polymers and chemicals as well as physical materials. Plants are the source of new materials such as polymers, resins, other specialty chemicals, and composites. The development of such high performance materials and their integration into high-end consumer products, such as houses, are the key focus for Scion's biomaterials strategy. These materials can be used to substitute for materials made from non-renewable resources.

Over the past year, Scion's capability has been strengthened through increased investment and strategic partnerships that bring together other organisations with similar goals. Biomaterials research at Scion is divided into three transformational science groups: the Cellwall Biotechnology Centre (CBC), Biomaterials Engineering, and Eco-Smart Technologies. Scion has invested in specialised

equipment and recruited new scientists during the past 12 months, many with international expertise in their respective fields. Scion has also grown its student and post-doctoral programmes across the whole organisation to provide mutually beneficial opportunities to developing scientists.

While supporting the advancement of transformational research in these areas, significant effort has gone into reviewing the strategies and business plans of the three biomaterials research groups. This process ensures greater alignment of the different research programmes towards a common goal.

"We're aiming to involve industry more to solve relevant industry problems as we move into a more sustainably based industrial era."

Dr Chris Downs, Chairman – Biopolymer Network Ltd

CELLWALL BIOTECHNOLOGY CENTRE

The CBC focuses on utilising plant cell walls as fundamental components of renewable biomaterials. The full potential of this resource will be realised through advanced genetic technologies, which is a Scion strength.

Many scientists in other research organisations study the function of primary cell walls, which are laid down while plant cells are still expanding and growing. These functions have a major influence on the economic gains achieved through crop improvement, particularly as they affect various qualities of fruits and vegetables as foods. Scion has developed world-class capability in researching secondary cell walls, which form the backbone of woody plants. The structural and biological nature of these cell walls makes them valuable sources of fibres and biochemical compounds that provide opportunities for new material development.



Scion has an active student programme with the University of Auckland. Professor Philip Harris (left) from the University's School of Biological Sciences is supervising Cellwall Biotechnology Centre PhD student, Carsten Ade.

A highlight of the past year has been the exploration of the links between primary and secondary cell walls. An international symposium held at Scion facilitated mutually beneficial interactions between leading New Zealand and German scientists currently researching either primary or secondary plant cell walls across several important export sectors, including horticulture and forestry. The first joint New Zealand–German symposium was enormously beneficial for both groups by providing them with a unique opportunity for exchange of information and understanding of cell wall linkages across these two areas of research. Delegates from Germany joined New Zealand scientists from a range of research organisations, including HortResearch and Crop & Food Research. The symposium was supported by the Royal Society's International Science and Technology (ISAT) Linkages Fund under the New Zealand/Deutsche Forschungsgemeinschaft programme, HortResearch and Scion.

Last year saw the appointment of Dr Tim Strabala as the Unit Leader of CBC. Originally from the United States, Tim's background in biotechnology has focused on developing, implementing, and analysing data from plant gene function screening programmes. These skills are highly complementary to the CBC research programme, which utilises a powerful gene identification, testing and deployment pipeline including: gene discovery; screening of genes that potentially affect wood and cell formation; genetic mapping of desirable traits such as wood density; functional analysis of these genes through genetic engineering; and environmental risk assessment.

GROWING NEW SCIENTISTS

An active student programme between Scion and the University of Auckland has seen the placement of several bright MSc and PhD candidates in CBC, focusing mainly on gene discovery and screening. This collaborative arrangement allows students to benefit from working in an applied research environment, while Scion builds new science capability.

Over the past year, CBC has also entered a partnership agreement with the Gateway Programme, which hosts young students to undertake a period of work experience in industry. This programme has allowed a student to perform hands-on science in the tissue culture laboratories, assisting with routine tissue transfers and basic analysis techniques.

WALKING THE TALK

The relationship between the CBC and Tangata Whenua has continued to develop strongly and is now seen as a working model for other research organisations to follow. This relationship was exemplified by the production of an educational booklet on Scion's genetically modified pine field trial. The publication arose from a partnership with local Mana Whenua hapu, who interact with CBC in a number of areas, including monitoring of the trial. The strength of this partnership was further demonstrated at the Environmental Risk Management Authority hui on "Maori Perspectives in Genetic Modification" held at the Orakei Marae in Auckland. Mana Whenua representative, Penengarū Moke-Delaney, and Dr Phillip Wilcox of CBC gave a combined presentation on the effectiveness of the current engagement model, in a community where there are significant concerns about this technology.



The Biopolymer Network is a partnership between Scion, Crop & Food Research and Canesis Network. Pictured (left to right) are Dr Warren Grigsby, Scion, Dr Jafar Al-Hakkak, Crop & Food Research, and Dr Alisa Roddick-Lanzilotta, Canesis Network.

BIOMATERIALS ENGINEERING

An outstanding milestone was achieved by Scion with the formation of the Biopolymer Network as a separate company. This partnership between Scion, Crop & Food Research, and Canesis Network enables scientists to make real headway in meaningful joint projects that will expand New Zealand's bio-based economy. The research has been funded largely by FRST with an investment of \$15.3 million over six years. Additional funding has come from specific companies.

Good progress is being made in the area of specialty chemicals, through a project aimed at evaluating the potential of bark extracts or derivatives in a range of applications. Some of the potential applications are now attracting interest from industry.

The last 12 months have also seen continued development of new relationships with commercial clients. In particular, this reflects a growing interest among plastics processors in bio-based polymers as potential replacements for petrochemical formulations.

These partnerships provide unprecedented stimulus for the Biomaterials Engineering group, which is going from strength to strength in terms of resources and staff numbers. A number of senior scientists have been recruited, including Principal Scientist Dr Roger Newman. Formerly with Industrial Research Limited, Roger is one of New Zealand's leading biochemists in cellulose and natural products research.

Additional investment has also been made in scientific and manufacturing equipment, allowing researchers to produce laboratory-scale samples of new materials, including thermoset composites utilising harakeke (flax) and other natural fibres.

MOULDING THE FUTURE

Also within the Biopolymer Network programme, Scion researchers have been leading the development of a new moulding process to create sustainable plastic foam from polylactic acid (PLA). Foamed bioplastic materials offer the potential to replace polystyrene foams in high-volume applications such as packaging. They can also be used in composite sandwich constructions requiring high strength to weight ratios, such as boat building. The advantage of PLA is that it holds similar performance characteristics to oil-based plastics, while being derived from a sustainable resource and allowing for biodegradability upon disposal.

Although PLA is one of the most cost effective bio-plastics currently available, it is not easily foamable into thick sections of low density. Scion has devised an approach that produces individual PLA foam structures in the form of blocks and panels. These samples can then be used in performance tests for strength, stiffness, thermal insulation, and acoustic/vibration damping etc.

ECO-SMART TECHNOLOGIES

Effective management of waste streams arising from bioproduction is a critical element in achieving a sustainable biomaterials future. From an economic and technical perspective, targeting the proactive use of industrial waste streams can challenge existing paradigms for waste treatment and support the generation of added-value chemicals and renewable resource-based feedstocks.

Scion's Eco-Smart Technologies group is developing advanced waste management systems, environmental biotechnologies, and risk assessment strategies to meet this "Waste-2-Gold" challenge. A multi-disciplinary approach, encompassing industrial microbiology, bioprocess engineering, green chemistry, and ecotoxicology has created unique synergies which are providing innovative technology solutions for those seeking a sustainable alternative to waste disposal.

During the past year, Scion's research programme has continued to explore opportunities for improved remediation and exploitation of carbon-rich, nutrient-deficient industrial wastewaters, such as those from the pulp and paper, food processing, pharmaceutical and petrochemical sectors.

In the pulp and paper sector, a conduit for this engagement has been the Waste Minimisation Project Committee, a pan-industry environmental management collaboration with Scion that has operated for over 10 years. The Eco-Smart Technologies team has used analysis of historical data, application of fundamental wastewater treatment knowledge, implementation of appropriate monitoring, and reduction of contaminants at source to improve environmental performance for end-users. In one case, a benchmarking exercise of a New Zealand pulp and paper mill showed that, for a mill of its type, it is now the highest performing site in the world with respect to the stated parameters.

Scion's patented N-Fix Technology processes use bacteria which are able to use nitrogen directly from the atmosphere, offering significant economic and environmental benefits to end users. The exciting capabilities of these nitrogen fixers have generated multiple opportunities for innovative waste management and the production of advanced biomaterials, such as biodegradable plastics. N-ViroTech®, a first-generation waste treatment technology, has now entered its pre-commercial phase. Scion has created a research and development partnership with a New Zealand company, Andar Holdings Limited, to develop and test a commercial prototype of this novel process. This relationship combines Scion's biotechnology expertise with Andar's capabilities in hardware design and end-user implementation.

FUTURE-PROOFING OUR ENVIRONMENT

Appropriate environmental risk assessment tools are required to ensure that New Zealand's continued development proceeds in a fully sustainable manner. Scion, Landcare Research, and the University of Waikato's Centre for Biodiversity and Ecology Research have completed a nationally relevant project on methods for determining the effects of pollution on fish populations living in New Zealand lakes and rivers. The Ministry of Environment's Sustainable Management Fund supported the project with co-sponsorship from a broad range of regional and city councils and industry partners.

Five study sites in the North and South Islands were located in consultation with tangata whenua, regional councils, and industry. A study was carried out to determine the types of stressors these waterways received including industrial effluent, municipal wastewater, and mixed agricultural runoff. Overall, this research demonstrated that a wide range of impacts is occurring on fish in New Zealand. However, the impact of pollution in New Zealand rivers is not extreme when compared with the level of adverse effects seen in other more populous and industrial countries. One of the most significant observations for New Zealand was that some sources of pollution, particularly where temperature is elevated, might be benefiting pest fish populations and thus directly threatening native biodiversity. This study highlighted the importance of continued monitoring in order to ensure the protection of New Zealand's unique ecosystem and to encourage sustainable activities.

RESTORING NATURE NATURALLY

High nutrient concentrations have been compromising the quality of New Zealand lakes for many years. This problem has been observed most acutely in Taupo and Rotorua lakes, which receive large volumes of runoff from farmland. The Eco-Smart Technologies group has begun working closely with Environment Bay of Plenty and fellow researchers at the University of Waikato to develop sustainable solutions for reversing the conditions that lead to deterioration of these aquatic ecosystems. One method, now under development by Scion uses a novel zeolite-based product to absorb phosphorus from the water. Zeolite is a naturally occurring volcanic mineral found in abundance in the Bay of Plenty region. While other nutrient-removal chemical treatments of the lake waters are under consideration, it is hoped that these zeolite products will prove more desirable. Pilot-scale trials of this process are currently under way in one of the Rotorua lakes.

ENSIS

– THE JOINT FORCES OF CSIRO AND SCION

The forest industry is increasingly important to New Zealand and Australia, with a total annual turnover now exceeding \$20 billion. The continued prosperity of this sector depends on research and development that will drive innovation and derive greater value from the resource. The formation of Ensis was an active response to this need, providing the necessary scale to help the Australasian sector remain globally competitive.

Ensis was established in July 2004 as an unincorporated joint venture between the two largest Australasian forestry R&D providers, Scion (then Forest Research) and CSIRO. With the combined forces of its parent companies, Ensis now ranks among the largest independent forestry research and development organisations in the world, offering depth and breadth across the value chain. This unique trans-Tasman initiative enhances the collective research capabilities by combining valuable science resources for the economic, environmental, and social benefit of both countries.

In March 2005, Ensis won a trans-Tasman Business Award sponsored by TelstraClear in New Zealand and Telstra in Australia. The award recognises a public sector, statutory body or not-for-profit organisation that has successfully developed initiatives to build stronger trans-Tasman relationships. This honour recognised the daring, innovative nature of this concept, being the first major trans-Tasman (Government-owned) science joint venture where science delivery capacity has been integrated into one operation.

The partnership has now successfully completed its first full year of operation, involving 220 people in five locations throughout Australasia, working in trans-Tasman teams. This represented the first stage of Ensis' establishment. Throughout the year, preparation was made for the second stage, which incorporates three additional forestry-facing units within the parent companies. These units are: Forest Biosecurity and Protection; Forests; and Environment. As from 1 July 2005, these new units will complement the work of Ensis' four original strategic business units: Papro (pulp, paper and packaging), Wood Quality, Wood Processing, and Genetics.

This expansion completes the integration of the core forest research and development capabilities of the parent organisations and allows Ensis customers and stakeholders to benefit from enhanced research activities across the entire forestry value chain.

"The Ensis initiative sends a strong signal that New Zealand and Australia can lead the way in developing science that will help to grow our key industries."

Hon Steve Maharey, Minister of Research, Science and Technology.

THE JOINT FORCES OF CSIRO & SCION

ensis





Ensis researchers work in "virtual" teams on each side of the Tasman. Dr Satish Kumar (left) is based in Rotorua while his colleague Dr Harry Wu works at Ensis' Melbourne campus.

ENSIS GENETICS

The establishment of the Radiata Pine Breeding Company (RPBC) over the past year represents a significant change in the way tree improvement research is funded. The new research consortium has been developed with funding from FRST in partnership with 17 shareholding companies, ranging from forest owners, seed producers, and technology innovation companies, including strong Australian participation. Ensis is the key research provider for the consortium, with the University of Canterbury's (UoC) School of Forestry also strategically aligned. The primary objective of this partnership is to develop superior varieties of radiata pine and to better predict their future performance, hence improving the economics of forestry.

Another significant milestone for Ensis Genetics was the delivery of plants to Corrections Inmate Employment, which have been used by prison inmates to establish stoolbeds for cuttings. This delivery marks an important phase of the ongoing project, because it enables the hands-on involvement of the inmates to manage stoolbeds for cutting production of superior tree stocks for the first time. The new variety, known as 20/20 Clearpine, features tree quality characteristics specific to the customers of this new radiata pine breed.

While the traditional focus of forestry in New Zealand has centred on radiata pine, there is still significant interest in other species. Of particular note is the growing public interest in native trees as plantation species, offering both timber and non-timber values. The introduction by Government of the Permanent Forest Sink mechanism provides further incentive for landowners to plant native species for the purpose of carbon sequestration.

Two publications were released by Ensis Genetics in the past year, "Kauri" and "Native Trees", both of which have required multiple print runs to satisfy demand for this valuable management information.

Research into cypress utilisation also received a boost with the importation of breeding material from Canada. The purpose of this research programme is to produce hybrids that are better suited to New Zealand conditions, providing better canker resistance and wood quality traits. The project is supported by the Royal Society's ISAT Linkages Fund, and involves valuable collaboration with the Forest Service Coastal Tree Breeding Group in British Columbia. This enables New Zealand to benefit from the cypress breeding programmes carried out in Canada.

Open potential

The best gains in radiata pine breeding programmes have been achieved using controlled pollination, where both parents are clearly identified. While control-pollination has become an industry standard in New Zealand, this method does have its limitations with other commercial tree species, such as *Eucalyptus*. In order to overcome these limitations, Ensis Genetics has developed a genetic marker ("fingerprint") method using *Eucalyptus nitens* to determine the paternity of open-pollinated seed, where the mother is known but not the father. The efficiencies of this approach are significant, because it captures the best genetic gains from open-pollination, while avoiding the additional costs associated with control-pollination. This practical application of genetic marker technology represents a large step forward in selection practice that has far-reaching implications about how breeding populations and seed orchards are managed, for all tree species.



Capability in the wood quality programme has been substantially enhanced by the Ensis partnership, giving access to specialised staff in Australia. Dr Geoff Downes (left) is based in Tasmania while his co-worker Dr Jonathan Harrington works in Rotorua.

ENSIS WOOD QUALITY

The research undertaken within the Ensis Wood Quality group assists forest owners, investors, and wood processors to transform the sector from a cost-focused commodity-driven industry to a more profitable value-added industry. As a pathway to enable this transformation, Ensis Wood Quality maintains key associations with end-users through the Wood Quality Initiative Limited (WQI), and the Plantation Management and Stand Growth Modelling Cooperatives, which are long-standing partnerships with industry.

WQI continues to drive most of the commercial research activities within the Wood Quality group with a focus on developing tools that will enable log buyers and sawmillers to segregate logs based on wood quality characteristics. In addition to the WQI programme, FRST funded research is progressing the development of tools to measure fundamental wood properties in a way that underpins commercially focused applications.

Capability in the wood quality programme has been substantially enhanced by the Ensis partnership, giving access to specialised staff based in Australia. As part of the expanded resources within the group, New Zealand researchers now have more efficient access to SilviScan®, a premier international tool developed by CSIRO to assess the anatomical properties of wood.

Weaving the threads

WQI, Ensis, and the University of Canterbury (UoC) have jointly developed PQSim, a product quality simulator that predicts the performance of timber based on wood quality parameters. This technology unites computer models developed by Scion and UoC researchers, and allows these models to be applied to a range of problems relating to tree growth and wood performance.

Components of the package simulate key aspects of the value chain from growth modelling and sampling, through to wood drying and timber utilisation. The purpose of PQSim is to weave these separate threads into a single strand, which will tie together different science disciplines to assist wood quality research and create decision support tools for end-users.

Looking into logs

Log buyers and wood processors have always wanted to be able to see inside logs, so they can detect features of economic importance. A new scanning technology is being developed by the Centre of Human Factors and Ergonomics (COHFE) and Ensis scientists to use radar for scanning the internal structure of logs and standing trees. The radar scanner uses microwaves and runs off a 12-volt battery, giving it significant advantages over X-ray scanning approaches, which are expensive to use and potentially damaging to human health. A US patent was secured this year for the application of this technology and further development is now under way.



The A-grader technology reflects the partnership between research and manufacturers. Ensis scientist Doug Gaunt (left) is pictured with Falcon Engineering Managing Director, Greg Trowbridge who builds the A-grader machinery.

ENSIS WOOD PROCESSING

The Ensis Wood Processing team provides R&D support to a manufacturing sector that must constantly respond to market pressures at both a domestic and a global level. The expanded Ensis Wood Processing team brings more research capability to address these important issues in close association with industry clients.

Wood protection activities continue to represent the major focus for this group as the industry seeks to overcome structural problems associated with leaky buildings. Modern consumers require a greater range of choice when buying timber products. Not all buyers are content with using timbers treated with wood preservatives, and there is a growing aversion to using non-sustainable hardwood timbers extracted from rainforests. This leaves the timber industry with the challenge of supplying plantation-grown durable timber without the use of harmful chemicals.

A number of new and improved wood protection systems are under development in partnership with commercial companies. These systems include a range of chemical and non-chemical treatments. Scientists are also studying fungal interactions with bioactive molecules of natural origins, to explore the possibility of developing benign approaches to wood preservation.

Other activities of the group include work to understand the fundamental science underpinning wood drying processes, the development of durable medium-density fibreboard, timber engineering, and the development of low-formaldehyde-emitting and formaldehyde-free adhesives.

Thermal modification

Thermal modification involves heating timber to high temperatures in the absence of oxygen. This results in a permanent change in the chemical composition of the wood, giving improved durability and performance. While thermal modification of timber is a commercial reality in Europe, its application on radiata pine is relatively new. To investigate the potential for using this technology in New Zealand, Carter Holt Harvey Limited (CHH) invested in a pilot facility, which was used by Ensis wood drying specialists to study physical, mechanical, and durability characteristics of thermally modified radiata pine. Initial results suggest that thermal modification can provide a chemical-free alternative for applications where durability and stability are required. Potential end-uses include house cladding, garden furniture, moulding, and joinery. CHH is currently investigating the commercial opportunities of this technology.

A-graded partnership

Major progress was made over the past year in commercialising the A-grader™ technology. This grading machine uses sound waves to measure stiffness in green and dry lumber. A number of units have now been installed in New Zealand sawmills, with good prospects for future sales. Ensis timber engineers developed this technology in partnership with Falcon Engineering. The same partnership between scientists and the Taranaki-based engineering firm previously gave rise to the E-grader™, which offered a similarly innovative approach to timber grading.



ENSIS PAPRO

Ensis Papro has significantly expanded the R&D capability available to pulp, paper, and packaging manufacturers. The Ensis Papro team now has 44 staff, representing substantially more expertise of relevance to industries in both countries. In addition to the Ensis partnership, a number of other collaborations offer a more integrated approach to problem solving in this highly competitive sector.

Over the past year, a new functional packaging research programme was initiated with support from FRST. This collaboration between Ensis Papro, Canesis Network, Crop & Food Research, Massey University, the University of Auckland, and Victoria University of Wellington, aims to develop new packaging systems for the export of fresh horticultural or seafood produce. The programme includes expertise in a range of different areas from food quality to barrier coatings on paperboard.

Previous packaging research within Ensis Papro focused mainly on the materials themselves. The new functional packaging collaboration represents a significant boost to the existing programme, because it combines all of the relevant science disciplines available to overcome problems associated with our physical isolation from major export markets. The integrated packaging systems arising from this programme will extend the shelf-life of fresh produce, ensure that consumers overseas are presented with top-quality, and allow the surface freighting of highly perishable produce.

In addition to these research collaborations, Ensis Papro also has a long track record of working with commercial partners. The past year has seen a step-change in the relationship between Ensis Papro and Visy Industries, an international paper, packaging, and recycling company. This relationship has evolved from a technical service arrangement to a co-investment initiative that will focus on optimising recycled fibre at an industrial level.

During his sabbatical period at Monash University in Melbourne, Ensis Papro scientist Dr Nava Navaranjan (left) also spent time with his Ensis colleague, Dr Steve Loffler.

Developments in this area will improve the quality and cost-effectiveness of recycled paper products on the global market.

Delivering the goods

Ensis Papro scientist Dr Nava Navaranjan completed a Scion-sponsored period of sabbatical research at Monash University in Melbourne. He worked with Monash researchers using finite element analysis to model "creep" behaviour in corrugated boxes, taking into account the high and fluctuating humidity that affects boxes stored in refrigerated units. This model also measures the impacts that handholds, ventilation holes, folds, and corners have on box performance. By creating a model to predict box performance under a variety of conditions, scientists can save on the time and money spent testing boxes in the laboratory. Finite element analysis is also used within Ensis to predict the performance of solid wood, composites, and other biomaterials.

Barrier coatings

As part of the Functional Packaging Programme, a dispersion barrier coating has been developed to protect paperboard boxes from short-term changes in moisture levels. Tests have shown that the coating significantly improves box performance in fluctuating high humidity, which allows a reduction in the fibre content of the boxes while still meeting strength standards. The coating is comparatively inexpensive, printable, and can be applied using existing commercial equipment. It also meets environmental standards, which are given a higher priority than ever by customers and regulatory authorities. The technology has now been patented and industry interest is encouraging. Pilot trials are planned to evaluate runnability and performance on commercial equipment.



Forest Biosecurity and Protection Unit Leader Dr Brian Richardson (left) and Forest Biosecurity Research Council Chairman, Jeremy Fleming are united in their efforts to ensure maximum protection for New Zealand's plantation forests.

FOREST BIOSECURITY AND PROTECTION

The Forest Biosecurity and Protection unit has achieved an outstanding year in terms of strengthening New Zealand's science capability in this vital area. The activities of this unit complement the changes made by Government to the administration of biosecurity policy, involving the formation of Biosecurity New Zealand (BNZ) within the Ministry of Agriculture and Forestry (MAF).

Forest Biosecurity and Protection now contributes to a strategic network around BNZ, dedicated to ensuring maximum protection for New Zealand's primary industries and natural resources. One of the mechanisms for enhancing this network is the "Better Border Biosecurity" (B3) venture funded by FRST, which brings science providers and key Government agencies together in a working partnership. As a result of this initiative, Forest Biosecurity and Protection is collaborating with Crop & Food Research, AgResearch, HortResearch, and Lincoln University to ensure that relevant biosecurity research is undertaken for the national good, and that findings are implemented as early as possible.

Another highlight has been the formal constitution of the Forest Biosecurity Research Council (FBRC). This is a partnership between the New Zealand Forest Owners' Association, MAF, the Lincoln University Centre for Advanced BioProtection Technologies, and Ensis. Over the past year the benefit of this partnership has become evident as it steers and supports research of direct value to plantation forest growers and of wider benefit to New Zealand.

These new strategic partnerships, which also include closer working ties with Australian researchers, have enabled Forest Biosecurity and Protection to lift their science capabilities to a new level. Building on the growth of previous years, the unit has recruited new staff and upgraded facilities. As a result, the group offers greater depth in the full range of science disciplines required to

protect forests including entomology, pathology, mycology, pest management, ecological modelling, spray application technologies, and rural fire management.

The healthiest approach

The FBRC partnership has enabled an increased focus on research to overcome problems associated with *Nectria fuckeliana*. This fungus is associated with stem malformation in radiata pine plantations in Southland and Otago, where it is impacting on the value of appearance-grade timber. Forest Biosecurity and Protection scientists are playing a key part in understanding the biology of this disease, with support from the FBRC, FRST, and the Nectria Focus Group, a consortium of companies who own forests in the affected areas. This collaborative approach demonstrates the advantages of combining the best available resources to develop biosecurity management solutions for the common good.

Fighting fire with fire

Collaboration with CSIRO has allowed Forest Biosecurity and Protection scientists to join part of an internationally recognised fire research team. Over the past summer, fire researchers from both organisations came together to conduct a series of experimental burns on a Canterbury farm. Data from these burns will lead to improved fire behaviour models for use in real situations where managers need to predict where a fire may spread to, and at what rate. It will also enable them to make better decisions to protect the safety of fire fighters, and to evacuate residents from their homes when necessary. The project combines expertise from CSIRO fire researchers and fire agencies across Australia, New Zealand, and the US, including the Australian Bushfire Co-operative Research Centre, which promotes collaborative research towards bushfire management solutions.

SUSTAINABLE FOREST MANAGEMENT

Forest management research has seen a major shift in emphasis in response to international and Government drivers. This has led the Sustainable Forest Management group to build capability in ecosystem services, focusing on the benefits accruing through forestry that are not directly timber product related. These non-timber benefits include carbon sequestration, biodiversity, protection of water supplies, erosion control, food and medicinal products, and eco-tourism. Accounting for these factors can make significant differences to the economics of forestry as a land use.

During the past year, Unit leader Dr Tim Payn attended the fifth meeting of the United Nations Forum on Forests as a member of the New Zealand Government delegation. His presence at this meeting is seen as an important step in positioning Ensis as a major contributor to international and national policy and science development in core research areas. Also on an international level, the group has contributed to a review of the 67 indicators that have been set by the Working Group on the Conservation and Sustainable Management of Temperate and Boreal Forests (the Montreal Process) to determine sustainability in forest management practice. This review involves all of the 12 countries that participate in the Montreal Process as part of a growing worldwide commitment to the sustainable management of natural resources.

While seeking to address the issues associated with forestry on a global scale, the Sustainable Forest Management group also works on an applied local level. The group has leading expertise in developing systems for utilising planted forests in the treatment of municipal wastes. In the past year, the team has worked with the University of Canterbury and the Christchurch City Council to run a series of workshops with Christchurch residents. The aim of this project is to involve the community in considering a range of options to dispose of or reuse the biosolids waste of the city. This example illustrates how an integrated approach to forest management can serve social, environmental, and economic needs in the widest sense.

Climate change

The ratification of the Kyoto Protocol in February 2005 has highlighted the role of forestry in terms of broader ecosystem services. The Carbon team is working to develop a Carbon Monitoring System for New Zealand's

forests that can be used to report on national carbon stocks. A prototype system for plantation forests, designed by Ensis in collaboration with Landcare Research under contract to the Ministry for the Environment, has been trialled in the Nelson/Marlborough area to test plot designs, field measurements, and carbon models. This pilot study has been carried out to address many of the issues relating to estimation of the carbon pools and fluxes on those forestlands, with recommendations for a national inventory. This system will be used by the Government to determine the amount of carbon credits New Zealand may claim in the first commitment period 2008 to 2012.

Growth and yield

A new productivity index and associated growth model for radiata pine have been completed and tested in plantations in New Zealand and Australia. The 300 Index model represents a significant improvement over existing models in terms of its accuracy and applicability, and has been tested across a wide range of sites and silvicultural regimes. The productivity index is defined as the standing volume mean annual increment at age 30 of a standardised regime and is more precise in defining site productivity than an index measure, site index, based on dominant height alone. Both the model and the index are being widely used by industry and owners of small woodlots.

Biodiversity and ecology

Maintaining biodiversity within forests is a major challenge throughout the world, particularly where logging puts pressure on the natural environment. In New Zealand and many other countries, planted forests can help with the protection of natural forests and biodiversity. The Sustainable Forest Management group has featured prominently in international forums over the past year. Several staff members gave presentations at a conference of the International Union of Forest Research Organisations (IUFRO) and the World Wildlife Fund on 'biodiversity in planted forests' in France.

This year, Dr Eckehard Brockerhoff became Scion's first principal investigator in a Marsden Fund project, together with Professor Dave Kelly from the University of Canterbury. The project relates to the ecology of forest and grassland plants and insects, and it is entitled "Evolving with feast and famine: the dynamics of tri-trophic mast-seeding food chains".



With the help of Ensis scientist Brenda Baillie, Mokoia Intermediate student Catherine Goodrick (left) uses a Proscope to project microscopic images of a leaf to the laptop.

FORESTS OF LIFE

New Zealand school children are getting a new perspective on forests through Forests of Life, a new educational programme developed by Ensis, Massey University, and Revero web designers. Intermediate schools in Rotorua and Palmerston North are using digital technology to study and monitor areas of native forest. The students will then apply this knowledge to restore or establish an area of native vegetation. The purpose of this programme is to promote a greater awareness of ecological science and the principles of sustainability. The Ministry of Education funds Forests of Life, with support from a number of other sponsors. Government Ministers, the Hon Trevor Mallard and Hon Steve Maharey, launched the pilot projects in the schools.



COMMERCIAL BUSINESSES

Scion has a range of stand-alone commercial businesses that operate as an extension of the core research activity. They have varied in performance over the past year, with some growing and others becoming unviable. Major attention has been focused on these businesses, addressing their overall performance and strategic fit within Scion.

ATLAS TECHNOLOGY

ATLAS Technology is involved in the development, marketing, sale, and support of software for the forestry sector. Currently servicing clients in Australia and New Zealand, ATLAS has plans to expand to other markets with selected partners and investors. Particularly pleasing over the past year was revenue growth in Australia to more than 30% of total. Expansion into Australia has demonstrated that current software systems designed primarily for radiata pine can be applied to other species.

The success of ATLAS is dependent on its client relationships and the effectiveness of the software tools in meeting client needs. Forestry companies are demonstrating a growing interest in securing off-the-shelf applications, rather than investing internally in software development. ATLAS introduced a product development process in which key partner clients are regularly and actively included in the design-and-build phases of new products. Through this process, the product range was significantly enhanced in the last year with the release of three new products: GeoMapper - for producing forest maps; Forecaster™ - for optimising silvicultural regimes to maximise harvest return; and Harvest Manager - for harvest planning.



Research units within Scion also work in partnership. Karen Bayne, Sustainable Consumer Products, and Dave Moore, Centre of Human Factors and Ergonomics, worked together to help design the NOW Home (see page 16).

COHFE (CENTRE OF HUMAN FACTORS AND ERGONOMICS)

COHFE is a recognised leader in the application of ergonomics and human factors applied predominantly to agricultural and forestry work environments. With less demand for forestry-related research in this area, COHFE has successfully applied its skills to the agricultural and food processing sectors. A notable achievement was the establishment of a two-year joint research programme on Musculoskeletal Disorders in the meat and seafood industries with New Zealand's Accident Compensation Corporation (ACC), Department of Labour, and the Health Research Council.

This year, COHFE's customers have ranged from the ACC, Royal New Zealand Airforce, and Department of Internal Affairs, to Meat & Livestock Australia. COHFE received significant media profile on farm safety for All Terrain Vehicles and from work into slips, trips and falls in the dairy sector.

VERITEC

Veritec is a niche analytical chemistry laboratory providing testing services of soil, foliage, wastewater, and wood for Scion's research units and external clients. Veritec met its financial target this year. A pleasing factor in this result was revenue secured from new test methods developed over the last two years for cellulose-based carbohydrate and wood preservative tests (triazoles and permethrin).

The future strategic direction for Veritec was reviewed in light of increased demand in niche areas. Scion sees the development of a competitive commercial service as key to ensuring that a viable and high-quality service is offered to all clients and to supporting the growth of the biomaterial research areas.

Veritec has started to implement an externally-benchmarked quality system and has secured client management skills to further develop growth of the business in the coming year.

PLANT PROTECTION CHEMISTRY NEW ZEALAND

PPC_{NZ} was sold during the year via a management buy-out. An approach from the experienced, long-serving scientists and technical staff seeking to manage their own research and development company precipitated the discussions which culminated in the buy-out.

PPC_{NZ} started from a traditional base of research within the forestry sector, and successfully applied its pesticide formulation knowledge to benefit a range of other sectors. Due to the vision and commitment of core staff, PPC_{NZ} is a successful business and is recognised as a world-leader in agrichemical formulation, application, and efficacy. Scion was expected to add limited value to PPC_{NZ} going forward, and hence it was appropriate for PPC_{NZ} to forge ahead as a standalone business.

SIGNAGEN

SignaGen, a high volume DNA testing service for forestry, ag-bio, and livestock businesses, ceased operation this year. SignaGen was formed in 1998 and initially flourished in response to significant early adoption of the technologies it developed, particularly in the dairy industry and bespoke research service provision. It was expected that demand for gene testing from the forestry and ag-bio sectors would grow rapidly, however this did not eventuate.

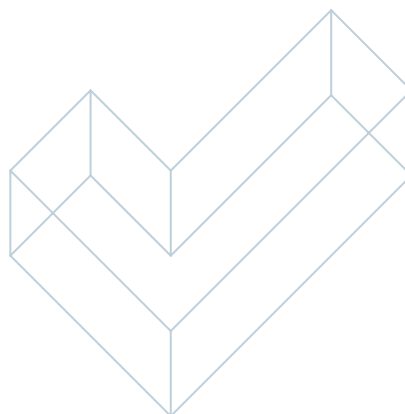
Despite significant efforts in cost reduction, process efficiency, and underlying growth, particularly in the sheep business in Australia and New Zealand, SignaGen was unable to gain critical revenue levels. The business was closed in April 2005 with most technical staff deployed to R&D groups within Scion, and key clients transferred to other providers in the market.

VIGIL (FHS LIMITED)

FHS Limited trading as Vigil is a wholly owned subsidiary of Scion involved in the early detection services designed to protect New Zealand trees and forests from pest and diseases. It also provides emergency response capability aimed at the control and eradication of exotic pests.

Due to reduced revenue from incursion response work, Vigil underwent a restructure in mid 2004-05 to reduce operating costs in line with projected revenue. This resulted in Vigil operating at a modest profit for the second half of this financial year.

As the year closed Vigil was unsuccessful in retaining a significant contract and in the following month was also unsuccessful in securing 75% of the budgeted business for the new financial year. It was therefore decided that Vigil would cease trading. Since this decision was made prior to the signing of the annual accounts the financial impact has been reflected in the financial statements.



TANGATA WHENUA



Scion has experienced a year of growth in partnership opportunities with Maori. The organisation's Maori strategy has built on significant advances in relationship development highlighted last year by being part of the growing expansion of Maori economic pathways. Scion, through its biomaterial futures strategy, has created the opportunity to work with Maori landowners who are gearing themselves towards innovative and practical, sustainable solutions.

Maori economic development

This year, Scion has worked with organisations such as Ngati Whakaue Tribal Lands Incorporated and Ngati Porou Whanui Forests Limited to understand their strategic research and development needs and become one of their research providers of choice with respect to meeting those needs. Scion has a project under way with Ngati Whakaue and is in the process of developing a substantial research proposal with Ngati Porou Whanui Forests Limited.

Business opportunities also flowed from two collaborative hui held during the year, one in Rotorua and one in Kaikohe. This was a joint effort with AgResearch and HortResearch and was focused on primary land-based industries. The hui enabled Scion to identify opportunities for collaboration and new partnerships with Maori that would drive economic advancement.

Maori engagement

The Tangata Whenua Consultative Committee completed its first full year of operation and addressed a number of key matters, especially those relating to Forest Biosecurity and Protection issues. The inputs from science staff to the committee have been enlightening for members, and equally the responses to science staff have enabled a holistic approach to projects, particularly where environmental risks are present.

FR Properties Limited, recently renamed Te Papa Tipu Properties Limited as part of the organisational rebranding, developed a three-year business plan based on the collaborative governance framework Scion has established for the subsidiary company. The company manages the land estate in Rotorua and is finalising a ten-site subdivision for leasing in early 2005–06 as part of the Te Papa Tipu Innovation Park development.

Maori in science

This theme within Scion's Maori strategy had reduced focus during the year due to personnel secondments within the Maori Strategy team. However, terms of reference for input to degree development at Te Whare Wananga o Awanuiarangi are advancing, and we are hoping to expand relationships with the University of Auckland's Business School through business-related projects in Sustainable Consumer Products.

Maori awareness

Treaty of Waitangi workshops were the highlight of the year with regard to learning and development opportunities for staff. Participation in these has opened up opportunities to include Maori-focused organisational development programmes for staff to assist them with Maori engagement processes. The workshops were attended from Board level all the way through to the science units and feedback was very positive.



This year Scion has worked with Ngati Porou Whanui Forests Limited. Recently, Scion Chief Executive Officer Dr Tom Richardson (left) and Ngati Porou Whanui Forests General Manager, Chris Insley signed a Memorandum of Understanding.

A CULTURAL AWAKENING

All Crown-owned organisations must put into practice the principles of the Treaty of Waitangi. A course on Te Tiriti did exactly that for Greg Steward, a scientist who specialises in indigenous species. The Treaty programme was entitled "The Gift of Opportunity" and to Greg that was an apt name. It placed the Treaty into a solid historical context and Greg soon had the opportunity to put its principles in action.

Not long after the workshop, Greg was asked to provide a type of harakeke (flax) known as "Tarere" from Ensis' collection back to its ancestral home, inland from Gisborne. Traditionally cultivated by weavers at Tarere Marae the flax known simply as "Tarere", was destroyed a few years ago during an unsupervised cleanup operation at the marae.

Fortunately, a specimen of the Tarere plant had been kept in a living archive at the Ensis Nursery in Rotorua since it was collected over 30 years ago by botanist Rene Orchistson. Greg says this example points to the value of institutional collections in helping to preserve biodiversity, not only for its ecological value, but also for its cultural significance. "We were able to remove several divisions off the archived plant and cultivate new plants for re-establishment at their original home."

Instead of sending the revered plant back to its original marae home via courier, Greg made a personal delivery of the taonga. It was in his words a spiritual, cultural and career awakening. "I felt as if I had done something worthwhile. I saw the tears in the kuia's eyes." The flax was back home to be woven into the lives and fabrics of its people again.



Greg Steward (left) with Te-whanau-a-iwi representative, Oho Brown. Members of the iwi couldn't believe their luck when it was found that Tarere's harakeke had been preserved in the Ensis collection in Rotorua. "The repatriation of the harakeke means that we can carry on the tradition of our tupuna using the materials that they specially cultivated for their weaving," Oho said.

STAFF ACHIEVEMENTS

Scion's success relies on the contribution of its people. The organisation is pleased to acknowledge and congratulate those staff that attained special success during the year.

Medals/Awards

Dr Nava Navaranjan and Cathy Hargreaves were the recipients of the Scion Scientist Sabbatical Development Award. This new award is part of the organisation's drive to support more fundamental research and to create more science collaborations.

Cathy and Nava were provided with salary, travel, accommodation, and research costs to undertake fundamental science at leading host organisations. Cathy spent her time developing meristem cryopreservation techniques at the National Center for Genetic Resources Preservation in the United States while Nava travelled to Australia's Monash University to further his understanding of finite element modelling.

The inaugural Scion Chairman's Award for Science Excellence was presented to Dr Tod Ramsfield and Dr Ping Xu. The award will be presented annually to encourage promising scientists at Scion to develop their research projects.

Scion was successful in obtaining a FRST PhD grant, over three years, for Hayden Smith, a University of Auckland PhD student. Hayden's research project is exploring opportunities to create and utilise a new class of hydrogen peroxide activator. These can be used to oxidatively synthesise novel bioactives or biopolymers from plant-based waste streams.

Scott Fraser's paper was awarded the best student presentation at the New Zealand Land Treatment Collective annual conference.

Tripti Singh won a Ron Cockcroft Award enabling her to attend the annual conference of the International Research Group on Wood Protection held in India. At the conference Tripti was presented with the inaugural Gareth Williams Scholarship for her outstanding student research.

Dr Ralf Möeller was awarded funding from the Korean Science and Engineering Foundation to attend the joint Korea-Japan seminar on cell wall formation as an international expert.

Dr Möeller and Dr Adya Singh were awarded ISAT Linkage funding from the Royal Society to organise the first joint New Zealand-Germany symposium on plant cell walls.

ISAT Linkage funding was also awarded to Dr James Turner who spent time at the University of Wisconsin-Madison and to Dr Warren Grigsby who visited the University of British Columbia.

Eco-Smart Technologies scientist Murray Smith won a Queen Elizabeth II grant. Murray spent three months on sabbatical at the National Research Council of Canada's Institute for Marine Biosciences Proteomics Technology Development Laboratory located at Dalhousie University, Halifax, Nova Scotia.

Dr Luis Gea won a Scholarship from the European Union to undertake a project to revise the breeding strategy for Douglas fir and radiata pine in Spain and Portugal.

Dr Eckehard Brockerhoff became Scion's first principal investigator in a Marsden Fund project, together with Professor Dave Kelly from the University of Canterbury. Their project relates to the ecology of forest and grassland plants and insects.

Fellowships/Memberships

Cellwall Biotechnologist, Dr Christian Walter, has been appointed to the Editorial Board of the International Journal of Tree Physiology.



In what was a unique situation for two Scion staff, Dr Meeta Patel successfully defended her PhD thesis while her supervisor Dr Robert Franich completed his MBIE (Master of Business Innovation and Entrepreneurship) degree.

Dr Bob Allison, Dr Robert Franich, Dr Dave Cown and Dr Bryan Walford were elected Fellows of the International Academy of Wood Science.

Dr Dave Cown was honored with a Fellowship of the International Academy of Wood Anatomists. He was also elected to the international management committee of the International Union of Forest Research Organisations (IUFRO), Division 5, and appointed Associate Editor of the South African Journal of Forestry.

Dr Toni Withers has been appointed a sectional editor for a new journal "Insect-plant Interactions".

Dr Ping Xu was appointed Adjunct Professor of the Central South Forestry University in China.

Dr Adya Singh received a Fellowship from the Japan Society for the Promotion of Science.

Qualifications

In what was a unique situation for two Scion staff, Dr Meeta Patel successfully defended her PhD thesis while her supervisor Dr Robert Franich completed his MBIE (Master of Business Innovation and Entrepreneurship) degree.

Lisa McMillan completed her MSc degree from the University of Auckland with first class honours.

After several years study at Oregon State University in the United States, Dr Hamish Marshall returned to New Zealand having completed his Master of Forestry and PhD degrees.

Dr James Carpenter completed his PhD on the topic of Composites Reinforced With Natural Fibres at the University of Wales, Bangor.

Dr Haydon Jones was awarded his PhD in Soil Pedology from the University of Waikato.

Sporting triumphs

Scion staff members continue to shine on the international sporting stage.

Eco-Smart Technologies Microbiologist Sonia Foote continued her world-class success on the mountain bike. Along with her busy race schedule throughout New Zealand, Sonia travelled overseas to compete in Australia, Hawaii, Belgium, and France. She achieved a world ranking of 31 for Elite Women at the Mountain Bike World Championships.

Success at the New Zealand XTERRA Triathlon championships qualified Katrin Walbert for the XTERRA World Championships in October 2005.



FINANCIAL STATEMENTS

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NAME FOR ROTORUA SITE

Along with its new brand, Scion officially named its Rotorua site – Te Papa Tipu Innovation Park. Meaning "Growth from the land", Te Papa Tipu is a Maori name that has historical associations with the site. The 114 hectares of park-like grounds on the outskirts of Rotorua are shared by a number of other businesses, many of which are related to the forest industry. Scion is promoting the site as an excellent location for companies who wish to form part of an innovation community.

At a special dedication ceremony attended by staff, tenants and representatives of the local Rotorua community, Kaumatua Ben Hona (left) and Scion Chairman Brian Armstrong unveiled a plaque.



DIRECTORS' REPORT

Principal activities

New Zealand Forest Research Institute Limited is a company registered under the Companies Act 1993 and our principal activity is to conduct research in accordance with the purpose and principles specified in Sections 4 and 5 of the Crown Research Institutes Act 1992 (the Act). Scion, the trading name of New Zealand Forest Research Institute Limited, has met all the obligations under the Act in the year ended 30 June 2005.

Scion is a commercially focused science and technology company, delivering solutions to both commercial and Crown clients. The principal research facility is located in Rotorua.

Scion, at balance date, has 10 wholly-owned subsidiaries: FHS Limited (FHS), Liro Limited, N-Fix Technologies Limited, Forest Research (Australasia) Pty Limited, Forest Research (Australasia) #2 Pty Limited, ATLAS Technology Limited, SignaGen Limited, FR Properties Limited (since named Te Papa Tipu Properties Limited), Scion Australasia Limited, Scion Group Limited, and two associates - 25% ownership of Frontline Biosecurity Limited, and 25% ownership of Beacon Pathway Limited. Scion is also a member of a consortium with an 11.36% shareholding in WQI Limited.

FHS, currently trading as Vigil, provides a range of services to industry, government, local and regional authorities aimed at the early detection of pests and diseases. Subsequent to balance date a decision was made to close Vigil's operations effective 1 October 2005.

Forest Research (Australasia) Pty Limited is the Australian trading vehicle. The Company is a New Zealand registered company.

FR Properties Limited owns the Group's land assets.

Scion Australasia Limited is a special purpose company for an unincorporated joint venture with Australia's national science agency, CSIRO.

N-Fix Technologies Limited and Liro Limited are non-trading companies.

ATLAS Technology Limited, SignaGen Limited, Scion Group Limited and Forest Research (Australasia) #2 Pty Limited are shelf companies. Forest Research (Australasia) #2 Pty Limited is an Australian registered company, held for name protection purposes.

Frontline Biosecurity Limited is an incorporated joint venture, the purpose of which is to collaborate in the

research, development and commercialisation of the heat disinfestation process and other biosecurity processes.

Beacon Pathway Limited carries out research in the area of sustainability in the built environment.

WQI Limited (Wood Quality Initiative) is a Consortium with 15 other shareholders.

The Centre for Advanced Composite Materials Limited (CACM) was liquidated during the year.

Summary of Group Financial Results to 30 June 2005

	2005 \$000	2004 \$000
Operating Revenue	35,199	39,022
Surplus before taxation	1,085	780
Taxation expense	466	95
Net surplus attributable to the Shareholders	619	685
EQUITY		
Issued and paid up capital	15,716	15,716
Retained earnings	9,117	8,498
Total equity	24,833	24,214

The business of Scion involves science and innovation in sustainable forestry, wood, and fibre product technologies. Core activities comprise research and economics, consumer market knowledge, built environment, environmental impacts of processing and production, wood quality, pulp and paper, materials science, engineered wood products, wood processing, forest biosecurity and protectiontree nutrition and physiology, management decision support and harvesting systems, silviculture, propagation, molecular biology and genetics.

In response to a comprehensive planning exercise that built off strategic market intelligence, Scion has broadened its scope of business to embrace the plant-based (non-food) biomaterials value chain.

Remuneration and compensation

Remuneration and compensation included salary performance awards, superannuation benefits, pay-outs of equity leave provisions and redundancy payments. Some other benefits were not quantified and therefore excluded, including staff parking, home telephone and fax costs, and membership of relevant professional societies.

BANDS	NUMBER IN EACH BAND
\$290,000 – \$299,999 *	1
\$240,000 – \$249,999	0
\$220,000 – \$229,999**	1
\$180,000 – \$189,999	1
\$170,000 – \$179,999	1
\$160,000 – \$169,999	3
\$150,000 – \$159,999	0
\$140,000 – \$149,999	2
\$130,000 – \$139,999	2
\$120,000 – \$129,999	5
\$110,000 – \$119,999	5
\$100,000 – \$109,999	4

* Denotes Remuneration of Outgoing Chief Executive

** Denotes Remuneration of Incoming Chief Executive (Appointed from within the Company)

Compensation and other benefits totalling \$639,396 was paid to 19 people who ceased to be employees.

Dividend

No dividend payment is recommended (2004: nil).

Directors' profiles (as at 30 June 2005)

Mr Brian Armstrong (Chairman) - is a Consultant and Company Director. Mr Armstrong is currently a Director of Kiwifruit International Limited and a number of private companies. Mr Armstrong has considerable experience in international business, his own entrepreneurial ventures and a private investment consultancy. Mr Armstrong held a range of positions with Zespri Group - Deputy Chair of Zespri Group Ltd and Chair of Zespri International Ltd and Director of NZKMB. He was Chair of Athenberry Holdings Ltd. Mr Armstrong holds an MSc (Hons) and a BCom.

Mr Bryce Whitcher (Deputy Chairman) - is Group Director, Industrial, of Beca Carter Hollings and Ferner Ltd and the former CEO of Electronic Data Holdings Ltd. He is also a Director of several other companies in the Beca Group. Mr Whitcher previously held senior management positions with Tasman Pulp and Paper and Fletcher Challenge Paper both in New Zealand and Chile. Mr Whitcher holds a BSc in Chemistry.

Dr Russell Ballard, CNZM, (Director) - is an independent, non-executive Director. Dr Ballard is Deputy Chairman of the New Zealand Correspondence School, a Director of TeamTalk Ltd, a member of the Council of Massey University, a Trustee of the teacher's retirement scheme and an external Director on the Ministry of Social Development Risk and Assurance Committee. Previously Dr Ballard held several Chief Executive positions in the public service including the Ministry of Forestry, Department of Education, Ministry of Agriculture and Fisheries and Land Information New Zealand. Dr Ballard

holds a MAgrSc and PhD (forest soils) and a Diploma in Company Direction from the Institute of Directors (UK).

He is a member of the New Zealand Institute of Directors and a Fellow of the New Zealand Institute of Management.

Mr Giff Davidson OBE, JP (Director) - is a professional Company Director, Chairman of Animal Control Products Limited, Chairman of the Korea/New Zealand Business Council and Chairman/Trustee of three private forest trusts. He has been involved for over 20 years in the education area. Mr Davidson is a Trustee of the Pacific Cooperation Foundation and Honorary Consul for Romania in New Zealand. He is past and now Vice-President of the New Zealand Institute of International Affairs, past Chairman and now Life Member of the New Zealand Chamber of Commerce and past Chairman of the Energy Efficiency and Conservation Authority. He had a long and successful business career with Shell NZ Holdings Ltd.

Ms Margaret Emerre (Director) - is Relationship Manager with the Leadership Development Centre. She was formerly the Manager RS&T of the NZ Forest Industries Council and CEO of the Queensland Science and Technology Council, Director of the Queensland Innovation Centre, Director of the Electronic and Electricity Industry Training Organisation, and is a Director of ADKAM Ltd. Ms Emerre has also managed the Graduate Business Development Programme at Victoria University. She holds an MSc, a Post Graduate Diploma in Administration, a BSc in Biological Sciences and a Diploma in Physical Education. Ms Emerre also holds a Certificate in Company Directing from the Institute of Directors.

Mr Temuera Hall (Te Arawa, Ngati Tuwharetoa) (Director) - is Managing Director of LTF Limited, Investment Company, a subsidiary of Lake Taupo Forest Trust Holdings. Mr Hall is also a Director of Tuwharetoa Ltd, Coordinator for the Tuwharetoa Wananga and a Director of T3000 Financial Services. Mr Hall holds a BSocSci majoring in Geography.

Ms Bronwyn Monopoli (Director) - is a qualified accountant with her own practice based in Nelson. She currently serves on the boards of the Cawthron Institute, Sentinel Limited, HumanWare Group Limited, the WearableArt Development Trust, the Nelson Millennium Centre Trust, the New Zealand International Arts Festival Trust, and the Visitor Information Network. She has previously served as a Director of a wide range of companies and Government bodies including the Rural Bank, Housing New Zealand, Landcorp, the New Zealand Wool Board, the New Zealand Merino Company, Trade New Zealand and Tourism New Zealand. Ms Monopoli has a BAgrSci and a BBS. She is a fellow of the New Zealand Institute of Chartered Accountants and chairs the Primary Sector Committee of the Institute.

Mrs Jane Taylor (Director) - is a Barrister in the areas of civil law and equity, and a Company Director. Mrs Taylor previously practised as a Chartered Accountant. Her business background includes business and share valuations, corporate finance, insolvency and company reconstruction, and litigation support. Mrs Taylor has a long association with the forest industry and was previously a Director of Forestry Corporation of New Zealand. Mrs Taylor holds an LLB (Hons), an LLM with first class honours, a Post Graduate Diploma in Accountancy, a BSc (Hons) Forestry, and is a member of the Institute of Directors, New Zealand Law Society, and the New Zealand Institute of Chartered Accountants.

Directors' interests

Any business the company has transacted with organisations in which a Director has an association has been carried out on a commercial "arms-length" basis.

Directors' remuneration

	SCION 30 JUNE 2005	ENSIS 30 JUNE 2005	FR PROPERTIES 30 JUNE 2005	30 JUNE 2004
Brian Armstrong	45,000	32,000		52,750
Bryce Whitcher	28,400	14,500		28,750
Jane Taylor	25,250	1,500		24,000
Giff Davidson	21,250			19,750
Temuera Hall	21,250		3,000	21,750
Margaret Emerre	21,250			20,500
Bronwyn Monopoli	20,347			8,000
Russell Ballard	20,347		0	
External Director				
Dooley Kahukiwa			3,200	
Total	\$203,094	\$48,000	\$6,200	\$175,500

Change in Directors

Mr Brian Armstrong completed his term as Chairman of Scion on 30 June 2005. Dr Russell Ballard has been appointed Chairman from 1 July 2005.

Use of company information

During the year no notices were received from members of the Board requesting to use Scion information received in their capacity as Directors which would not otherwise have been available to them. There have been no additions to the Interests Register.

The state of the Company's affairs

A commentary on the year's performance is outlined in the Chairman and Chief Executive Officer's Report and in the opinion of the Directors, the state of the Group's affairs continues to be satisfactory and the outlook bright.

Auditor

In accordance with Section 21 of the Crown Research Institutes Act 1992, the Audit Office is Auditor for the Company and pursuant to Section 29 of the Public Finance Act 1977 has appointed Ernst & Young to undertake the audit on its behalf.

Directors' indemnity and insurance

Scion has insured all Directors and the Directors of its subsidiaries against liabilities to other parties (except to Scion or a related party of Scion) that may arise from their position as Directors. The insurance does not cover liabilities that may arise from criminal actions.



For and on behalf of the Board

R Ballard

Chairman

25 August 2005

Management statement

The following statement from management is made in accordance with Section 42 of the Public Finance Act 1989:

1. The management is responsible for the preparation of the annual financial statements and the judgements used in these;
2. The management is responsible for establishing and maintaining a system of internal control designed to provide reasonable assurance as to the integrity and reliability of the financial reporting; and
3. In the opinion of the management, the annual financial statements for the year ended 30 June 2005 fairly reflect the financial position and operations of the New Zealand Forest Research Institute Limited.



R Ballard

Chairman

25 August 2005



TE Richardson

Chief Executive

PERFORMANCE TARGETS

Scion's performance against the targets contained in the 2004–2007 Statement of Corporate Intent was:

	ACTUAL	ACTUAL	BUDGET
	2004	2005	2005
Group Revenue (\$000) ¹	38,948	35,157	29,781
EBIT Margin (EBIT % of Revenue)	2.04%	3.2%	2.99%
Return on average equity	2.87%	2.52%	2.2%
Return on average total assets ^{2,3}	2.04%	1.78%	1.9%
Equity ratio	69.76%	68.97%	76.0%
Quick ratio:1	1.05	1.05	1.39
Gearing	4.66%	8.40%	12.8%
Interest coverage	9.86	20.72	11
Free cashflow to average total assets	9.47%	2.70%	5.7%
NON-FINANCIAL PERFORMANCE MEASURES ⁴			
Staff Composition (FTEs)			
Research	263	276	276
Management and Support	70	72	70
Total FTEs	333	348	346
Revenue per FTE (\$000) ⁵	125	134	119
Science Output and Excellence			
Science reviews for Excellence	3	2	2
Papers in International externally refereed journals, series or books	139	138	75
Papers in local, internally or editor refereed journals, series, or books	102	79	70
Research monographs or books	2	11	4
Conference papers	100	75	120
New inventions patented ⁶	6	7	4
New licences	38	40	15
Confidential client reports	363	314	380
Application and promotion of science			
Number of industry seminars	199	126	50
Number of current Tech NZ contracts	3	4	2
Workshops or fieldays	28	35	60
Number of MSc and PhD Students supported	48	55	17
Number of post-doc programmes	3	7	3
Social Responsibility/Community	Report	See report	Report
Environment Responsibility	Report	See report	Report
Maori Relationships			
Consultation with Maori	Report	See report	Report
Learning and development	Report	See report	Report
Maori scholarships	0	0	2
R&D proposals involving Maori	6	3	5
Benefit to NZ	Report	See report	Report
Good Employer			
Policies to meet provisions of CRI Act	Report	See report	Report
% time in training	0.6%	1%	3%
Number of Post Grad Students supported	30	23	30
Work days lost in work related accidents	9	1	0
Human Capital Protection	Stats & report	See report	Stats & report

¹ On 1 July 2004 the Scion-CSIRO unincorporated joint venture (UJV) commenced operations. Group revenue includes 50% (the Scion component) of Ensis gross margin contribution.

² Note return on average total assets is calculated using a post-tax return.

³ The Board notes that Scion's return on assets is impacted by reinvestment into the science capability of the business and the existence of surplus assets.

⁴ Non-Financial Performance includes outputs from the Scion component of the UJV.

⁵ Revenue per FTE assumes the Scion Group revenue plus 50% of Ensis revenue, less the Ensis gross margin contribution to the Scion Group. FTE numbers comprise Scion employees including those seconded to Ensis.

⁶ Two granted patents, five provisional patents.

NON FINANCIAL PERFORMANCE

POLICIES TO MEET PROVISIONS OF THE CROWN RESEARCH INSTITUTES ACT, 1992

Scion complies in all respects with its obligation under the CRI Act.

SOCIAL RESPONSIBILITY/COMMUNITY

Scion continued its ongoing commitment to support a number of social and community activities.

This year, the annual Suffrage Scholarship was awarded to Lauren Du Fall who commenced a Bachelor of Technology at the University of Waikato in 2005.

The Suffrage Scholarship is open to young women from all secondary schools in the Rotorua region and provides a cash grant along with vacation work at Scion throughout the scholar's under-graduate years. This year the 2003 and 2004 Suffrage Scholars have joined Lauren and worked at Scion during the vacation period.

Scion is committed to providing employment opportunities for under-graduate students during their vacation period. This year 33 under-graduates availed themselves of the chance to supplement their income and to gain work experience in a research environment.

Sponsorship funding, staff time for judging, and category awards were provided to the Bay of Plenty and Canterbury Science Fairs. The organisation also granted support to community initiatives including Science Alive, Community Watch, the Kids Foundation, the Cancer Society, and the Rotary Club's Children's Film Festival.

Scion is proud to grant financial assistance for staff in their many sporting activities. Support was provided to several teams to participate in their chosen events including the Cateye Moonride (24-hour mountain bike event), the Taupo Day/Night Thriller (mountain biking), the Rotorua marathon and local inter-club tennis and badminton competitions. Funding and in-kind support was also given to Katrin Walbert and Sonia Foote to compete in international triathlon and mountain bike events.

Once again, the annual Children's Christmas party was a great success. Sixty-five children along with their parents, grandparents and caregivers were entertained with party food and games and each received a gift from Santa.

In partnership with the Rotorua District Council, Scion supports a School Holiday programme at the Rotorua campus catering for children from the ages of 5-13 during the school term breaks. Up to 70 children attend the programme with first priority given to the children of Scion and Rotorua District Council staff. The programme, which has been in operation for over 20 years, provides a range of activities and excursions such as crafts, swimming, zoo visits, golf driving, movies, treats at McDonalds and horse riding.

BENEFIT TO NEW ZEALAND

New Zealand's Crown Research Institutes are charged with conducting strategic science and to transfer technologies to the private sector that spawn greater societal, economic and environmental benefits for New Zealand. The earlier commentary in this report has demonstrated many benefits to New Zealand. Additional areas of endeavour of benefit to the nation during the year included:

Alternatives in timber framing

Ensis carried out a study to compare the water absorbency of New Zealand-grown Douglas fir and radiata pine in framing timber. This project was set up following concerns about the moisture uptake of house framing, and the requirement to use treated framing for external walls. Results indicate that Douglas fir was distinctly slower to reach 27% moisture content, which is considered to be the threshold for decay. The Building Industry Authority will use the information from the study to determine whether it is necessary to differentiate between the two species in the New Zealand Building Code.

Upskilling in proteomics research

Eco-Smart Technologies scientist Murray Smith completed a three-month sabbatical at the Institute for Marine Biosciences (IMB) Proteomics Technology Development Laboratory at Dalhousie University in Halifax, Canada. Funded by a Queen Elizabeth II travel grant, Murray learnt about current techniques related to proteomics applications (measuring proteins and enzymes), method development, and advanced instrumentation. The sabbatical was very successful, substantially up-skilling Scion's capabilities in this critical area. A lasting collaboration between the IMB and Scion is envisaged in which information and technology will be shared. Incorporating the laboratory practices of an internationally renowned proteomics facility into standard methodology at Scion will enable the development of a centre of excellence in the field.

Protecting New Zealand's forests

Forest Biosecurity and Protection scientists, Dr Darren Kriticos and Dr Karina Potter completed a survey of *Uraba lugens* in Tasmania, Australia, to help assess the risk to New Zealand from this pest. The survey was designed to establish the climatic limits for this serious pest, and the results clearly extended the known distribution. This information revealed that the pest could potentially pose a threat to Eucalypt plantations and amenity plantings throughout New Zealand.

Two provenances of Japanese Gypsy moth, and four provenances of Fall webworm, were trialled in feeding and oviposition bioassays of up to 27 New Zealand endemic forest plant species, sourced from the arboreta of Europe. Both species of defoliator showed similar responses to the host plants offered. Overall, they favoured hardwood species commonly found in Europe and North America such as oak, maple, elms and cherry, putting New Zealand's urban parks and gardens at greatest risk. Horticulturalists who grow apples, cherries and other tree fruit crops have equal cause for concern. Indigenous plant species were shown to be relatively unpalatable, as were plantation forest species.



National databases and collections

As part of FRST's additional investment in Databases and Collections, the Scion Herbarium (a significant national database and collection) received considerable new funding. The investment will allow researchers to upgrade the herbarium database system and to process a backlog of herbarium specimens. It will also be used to develop intranet and web accessible query interfaces for clients and stakeholders, and to photograph and store digital images of selected existing specimens to allow remote viewing.

Sharing Scion's knowledge with the world

Forest Biosecurity and Protection Scientist Ian Hood participated at the 11th IUFRO conference on root and butt rot diseases held in Poland. About 70 key scientists attended from countries in Europe, the United States, Australasia, and Japan. The meeting included presentations on research into important forest tree root diseases, particularly Armillaria and Heterobasidion, which cause serious problems in many parts of the world. Ian presented a paper on research into Armillaria root disease in radiata pine plantations in New Zealand.

Ian also received funding from the Oregon Swiss Needle Cast Cooperative to travel to the United States and give the keynote presentation at a meeting "Growing Douglas fir in the Swiss Needle Cast Zone" held at Eugene, Oregon. The Swiss needle cast fungus, present in Douglas fir throughout New Zealand, is responsible for a serious decline of Douglas fir stands planted on the coastal strip of Oregon. Ian's presentation, entitled "Swiss Needle Cast – The New Zealand Experience", was based on research undertaken at Ensis.

Ian's colleague, Dr Tod Ramsfield, visited South Africa where he worked at FABI (Forestry & Agriculture Biotechnology Institute) at the University of Pretoria. DNA was extracted from *Fusarium circinatum* and close relatives to continue development of the pitch canker diagnostic test. While in Pretoria, Tod attended the International *Fusarium* Workshop, which was an excellent opportunity to delve into the world of *Fusarium* taxonomy. Representatives of all the major species were present for the participants to observe using both morphological and molecular techniques. Scientists attended the workshop from South Africa, Europe, and South America and it was an excellent opportunity to speak with scientists who work in countries where the pitch canker pathogen has recently arrived. The trip was extremely successful with

regard to increasing the size of Ensis' DNA collection, increasing knowledge as well as networking. The Ministry of Agriculture and Forestry (MAF) funded the visit.

In keeping with this theme, a biosecurity conference was held by IUFRO in Hanmer Springs. This was the first international conference on this topic to be held in New Zealand and was organised by Dr Eckeard Brockerhoff. Forest biosecurity experts and entomologists from New Zealand, Australia, Japan, China, South Africa, and Europe shared the latest research from around the world under the theme "forest diversity and resistance to native and exotic insect pests".

International forest resource assessment

At the request of MAF, Dr Chris Goulding represented New Zealand at the joint session of the United Nations Economic Commission for Europe (UNECE) Timber Committee and the Food and Agricultural Organisation's (FAO) team of specialists on Forest Resource Assessment, held in the United States. This was the tenth and final meeting under terms of reference approved in 1995. Experts on national/large scale assessment from 12 countries across Europe, the USA, Canada, and New Zealand attended, along with representatives from UNECE, FAO, the Montreal Process, and the Pan European Ministerial Conference on Protection of Forests. A recommendation put to the meeting was to convene a new Team of Specialists on "Monitoring Forest Resources for Sustainable Forest Management in the UNECE region". The main focus of the new team will be on reporting on Criteria and Indicators for sustainable forest management and to contribute to the cooperation of global forest resource assessment. The meeting emphasised the increasing importance of non-timber values and sustainability in forest management, and the prospect that lack of expertise and practice in these areas could in the future form part of non-tariff barriers to New Zealand exports.

Biodiversity in plantations

Ensis scientist Dr Eckeard Brockerhoff and Dr Hervé Jactel of the National Institute for Agricultural Research (INRA) in France were awarded a grant from the French Government (under the framework of the France and New Zealand Cultural Agreement) to continue their collaboration on forest insects and biodiversity in planted forests.

Snap audit of quarantine facilities

The Ensis Quarantine Facility was the subject of a "surprise" audit by the Compliance and Enforcement Group of Biosecurity New Zealand. Prompted by a male painted apple moth (PAM) found in a pheromone trap in Auckland, the audit was intended to confirm that the recent trap find was not the result of operational shortfalls in the breeding and rearing containment facilities contracted as part of the PAM response. Ensis' security and rearing procedures and protocols were scrutinised and the ensuing report concluded that no action was required and commented that Ensis's "excellent handling practices were supported by a clean and secure invertebrate containment facility".

Czech specialist shares his expertise

Dr Milos Knizek, a world specialist in the taxonomy and bionomy of bark and ambrosia beetles, spent time in New Zealand with Ensis researchers to identify keys for beetle genera in the families of *Scolytidae*, *Platypodidae*, *Cerambycidae* and *Buprestidae*. Bark beetles are tiny, usually 2–7 mm in length, and they bore into wood or live under the bark of trees. They have an important role in nature to help break down dying or fallen trees in the forest. However, extreme conditions can force bark beetles to infest healthy trees, particularly during population outbreak situations. Prior to Milos' visit, there was no New Zealand identification key for bark and ambrosia beetles.

National support

Scion also provides benefit to the nation through contributions to Government agencies, companies, and stakeholders across a range of sectors. These include:

- Provision of high quality and cost-efficient consultancy, research, and development services.
- Undertaking joint development and commercialisation projects with the private sector.
- Licensing and/or assigning technology developments to New Zealand companies.
- Provision of turnkey customer solutions.
- Representing New Zealand in international organisations.
- Publishing science papers, and organising conferences, workshops, field days and seminars.



After completing the Presentation Training course, Scientist, Tripti Singh went on to win an award for her presentation at an international conference. Learning and Development Manager, Alyson Howell (left) and Tripti reflect on her success.

- Active participation in, and membership of, a number of industry, research, and business associations in New Zealand and internationally including the International Union of Forest Research Organisations, the Bioenergy Association, International Energy Association, New Zealand Forest Industries Council, New Zealand Association of Crown Research Institutes, the Sustainable Business Network, New Zealand Pine Manufacturers' Association, Forest Industry Engineering Association, Australasian Pulp and Paper Industry Technical Association, New Zealand Timber Design Society, New Zealand Timber and Truss Association, the Structural Engineering and Timber Manufacturers' Association, and the Plastics Industry Association.
- Operating research and development cooperatives in major areas of research and development.

Scion has strong science and industry linkages both nationally and internationally. This ensures effective science delivery and an international perspective to its activities.

FROM GOOD TO GREAT

People are Scion's greatest asset. To go from strength to strength as an organisation, Scion has continued with the "Good to Great" programme, which encompasses all aspects of organisational learning and development from leadership development to basic skill enhancement. This programme is a major contributor to building "star performers".

Visionary leadership – from strength to strength

This component of the programme aimed at leaders is centred on 360-degree feedback. The process highlights individual strengths and feeds into mentoring with coaching, feed forward, and appropriate development building on the existing strengths.

Management development

Some scientists, as well as pursuing their science, move into the area of team management. Management Development Programmes help them develop the skills they need to be successful in this area. The Targeted Selection programme enables them to recruit the right people to their team by matching role competencies with

the candidate. Learning how to assess motivational and organisational fit completes the process of recruiting "star" achievers.

Individual and generic skill enhancement

The achievement and career enhancement programme

To ensure that people understand how what they do aligns with the organisational goals, Scion has introduced an Achievement and Career Enhancement (ACE) programme. More than just an annual performance review, the ongoing programme involves comprehensive training in goal setting, and the giving and receiving of coaching and feedback. Survey results demonstrate that people are much more satisfied once they know what Scion is trying to achieve as an organisation and how their work contributes to those goals.

Developed in 2004, the programme includes an individual development plan. Performance reviews in 2003–04 identified a number of training needs, which were taken into account for this year's programmes. Training has been designed to align with corporate goals, to add value to Scion's already outstanding science output, and to create the conditions in which the organisation's reputation can flourish.

Over the past year, a number of courses and team building programmes were delivered by Human Resources, with the occasional assistance of external training specialists. An example of a specialist programme is the science–writing programme, which helps scientists hone the skills of writing papers, thus presenting findings and results more clearly for clients. Equally, the presentation skills course has helped scientists improve their ability to present findings at conferences and, indeed, to clients. Pride and confidence in Scion's organisational competence is now becoming a trademark of public addresses by staff. In addition, the Treaty of Waitangi programme has given our people a better understanding of the Treaty and what it means, enhancing our ability to build relationships with Maori, which is very important to Scion's strategy (see page 32).

Mentoring – building science capability

A mentoring group for younger scientists has proved very successful in developing this group's confidence in their chosen career. Visiting speakers included Professors David Ryan and NK Kasabov – engineering science specialists from the University of Auckland, Kate McGrath, from McDiarmid Institute in Wellington, and Professor Jacqueline Rowarth, an agricultural scientist from Unitec.

Renewal – Managing change

This has been a big year in terms of change management with the formation of Ensis and the rebranding of Forest Research to Scion. Because of the geographic spread of the Scion and Ensis teams a new way of operating and leading is in development.

STAFF EXPERIENCES OF THE "GOOD TO GREAT" PROGRAMME

Achievement and career enhancement

Christian Pilaar was coached in the two-hour course on how to assess performance of staff, and how to encourage and motivate them into goals aligned with the organisation's aims. "The goals of ACE are laudable," he observed. "It's in its third year of implementation, and this course is fine tuning – ensuring our focus is in the right places."

Christine Devillard said that the goal of the ACE is to help team members improve and develop. "The training programme has been very useful to me. It was a kind of workshop, involving practice sessions. For instance we could learn how to handle difficult discussions. As a line manager, it has helped me understand the ACE process and how to run ACE review meetings in an effective way."

Presentation skills

Tripti Singh won an award to participate in an annual international conference. She had to present the final part of her PhD to 250 scientists in India. To prepare, she undertook the Presentation Skills course. "In this course, my weaknesses were identified, as well as my strengths. I was able to work on these," she said. She delivered her research and won the inaugural conference award including US\$1,000 for the excellence of her presentation. "Judgment was also passed on the content, but this award was basically for how I delivered it," she commented.

Jonathan Harrington polished up on his presentation skills when he was faced with the prospect of persuading a client to a new action. "I've always been someone who did presentations on the fly", he commented. "I learnt not to. Structuring material is important. In a technical context, you need to structure so people turn their brains on, and you take them with you." He rated the course as practical and definitely worthwhile.

Targeted selection

Brian Richardson took part in a Targeted Selection training course to help pick the right candidates for upcoming positions. "It gave me a better structure and a process - a plan," he said. The tips for interviewing emphasised the need to ask questions that elicited examples of real-life behaviour. "Candidates also need to leave having had a positive experience, regardless of whether they get the job," he adds.

Scientific writing

Carolyn Hodgson registered for the Scientific Writing course as a refresher and to develop her technical writing skills. After three half-day sessions, which she admits were an 'eye opener', she emerged with greater writing flow, improved grammar and more effective structuring in her writing. She gave the course a 'nine out of ten'. "As my career develops I'll be writing more and more on my own," she anticipates. "I needed to know the basic rules better - why something was not reading well, or how to change things."

Stuart Anderson concurred. "I thought it was really worthwhile. I learnt a lot. Scientific writing is so different from normal writing. I think this will allow me to make a major contribution. It was really timely."

Health and safety

Scion has renewed its tertiary-level accreditation status with the Accident Compensation Corporation's Workplace Safety Management Practices Audit Programme. Scion continues to display exceptional practices in relation to health and safety in the workplace, injury prevention in the workplace, and continuous improvement of workplace health and safety systems.

Several areas of health and safety were given a face-lift during the year, including an on-line centralised hazard register, and new accident and hazard management procedures. Scion Health and Safety Representatives continue to provide excellent input into the way health and safety are managed effectively to a high standard throughout the organisation.

Equal employment

Scion is a member of the Equal Employment Opportunities Trust.

Corporate governance

The New Zealand Forest Research Institute Limited Board is appointed by the Shareholding Ministers to guide and monitor the business of the company and its subsidiaries, which constitute the Scion Group. The Board has eight Directorships including the Chairperson, and they normally meet 11 times a year.

Responsibility for the management and administration of the company is delegated to the Chief Executive Officer, who is responsible to the Board.

The Board has two committees, Audit and Risk, and Remuneration and Organisation.

The function of the Audit and Risk Committee is to assist the Board in carrying out its responsibilities under the Companies Act 1993 and the Financial Reporting Act 1993 in respect of the company's financial accounting practices, policies, and controls, and to review and make appropriate inquiry into the audits of the company's Financial Statements by external auditors.

The Remuneration and Organisation Committee assists the Board to review and approve senior executive remuneration arrangements as well as the Group's human resources strategy.



AUDIT REPORT

To the readers of New Zealand Forest Research Institute Limited and Group's financial statements for the year ended 30 June 2005

The Auditor-General is the auditor of New Zealand Forest Research Institute Limited (the company) and group. The Auditor-General has appointed me, David H Morrow, using the staff and resources of Ernst & Young, to carry out the audit of the financial statements of the company and group, on his behalf, for the year ended 30 June 2005.

Unqualified Opinion

In our opinion:

- The financial statements of the company and group on pages 49 to 63:
 - comply with generally accepted accounting practice in New Zealand; and
 - give a true and fair view of:
 - the company and group's financial position as at 30 June 2005; and
 - the results of operations and cash flows for the year ended on that date.
- Based on our examination the company and group kept proper accounting records.

The audit was completed 25 August 2005 and is the date at which our opinion is expressed.

The basis of our opinion is explained below. In addition, we outline the responsibilities of the Board of Directors and the Auditor, and explain our independence.

Basis of Opinion

We carried out the audit in accordance with the Auditor-General's Auditing Standards, which incorporate the New Zealand Auditing Standards.

We planned and performed the audit to obtain all the information and explanations we considered necessary in order to obtain reasonable assurance that the financial statements did not have material misstatements, whether caused by fraud or error.

Material misstatements are differences or omissions of amounts and disclosures that would affect a reader's overall understanding of the financial statements. If we had found material misstatements that were not corrected, we would have referred to them in our opinion.

The audit involved performing procedures to test the information presented in the financial statements. We assessed the results of those procedures in forming our opinion.

Audit procedures generally include:

- determining whether significant financial and management controls are working and can be relied on to produce complete and accurate data;
- verifying samples of transactions and account balances;
- performing analyses to identify anomalies in the reported data;
- reviewing significant estimates and judgements made by the Board of Directors;
- confirming year-end balances;
- determining whether accounting policies are appropriate and consistently applied; and
- determining whether all financial statement disclosures are adequate.

We did not examine every transaction, nor do we guarantee complete accuracy of the financial statements.

We evaluated the overall adequacy of the presentation of information in the financial statements. We obtained all the information and explanations we required to support our opinion above.

Responsibilities of the Board of Directors and the Auditor


The Board of Directors is responsible for preparing financial statements in accordance with generally accepted accounting practice in New Zealand. Those financial statements must give a true and fair view of the financial position of the company and group as at 30 June 2005. They must also give a true and fair view of the results of operations and cash flows for the year ended on that date. The Board of Directors responsibilities arise from the Crown Research Institutes Act 1992, the Public Finance Act 1989 and the Financial Reporting Act 1993.

We are responsible for expressing an independent opinion on the financial statements and reporting that opinion to you. This responsibility arises from section 15 of the Public Audit Act 2001, section 21(1) of the Crown Research Institutes Act 1992 and the Public Finance Act 1989.

Independence

When carrying out the audit we followed the independence requirements of the Auditor-General, which incorporate the independence requirements of the New Zealand Institute of Chartered Accountants.

Other than the audit, we have no relationship with or interests in the company or any of its subsidiaries.



D H Morrow
Ernst & Young
On behalf of the Audit-General
Auckland, New Zealand

CONSOLIDATED STATEMENT OF FINANCIAL PERFORMANCE

For the Year Ended 30 June 2005

	NOTE	GROUP ACTUAL 2005 \$000	GROUP BUDGET (UNAUDITED) 2005 \$000	GROUP ACTUAL 2004 \$000	PARENT ACTUAL 2005 \$000	PARENT ACTUAL 2004 \$000
OPERATING REVENUE	2	35,199	33,428	39,022	30,848	37,772
Surplus/(Deficit) Before Taxation	3	1,085	807	780	(82)	1,946
Taxation expense/(credit)	5	466	266	95	(36)	92
NET SURPLUS/(DEFICIT) ATTRIBUTABLE TO THE SHAREHOLDERS OF THE PARENT COMPANY	19	619	541	685	(46)	1,854

CONSOLIDATED STATEMENT OF MOVEMENTS IN EQUITY

For the Year Ended 30 June 2005

	NOTE	GROUP ACTUAL 2005 \$000	GROUP BUDGET (UNAUDITED) 2005 \$000	GROUP ACTUAL 2004 \$000	PARENT ACTUAL 2005 \$000	PARENT ACTUAL 2004 \$000
EQUITY AT 1 JULY 2004		24,214	24,283	23,545	24,029	22,175
Net surplus attributable to parent entity shareholders		619	541	685	(46)	1,854
Movement in Foreign Currency Translation Reserve	6	-	-	(16)	-	-
Total Recognised Revenues and Expenses for the Year		619	541	669	(46)	1,854
EQUITY AT 30 JUNE 2005		24,833	24,824	24,214	23,983	24,029

The accompanying notes form part of these financial statements.

CONSOLIDATED STATEMENT OF FINANCIAL POSITION

As at 30 June 2005

	NOTE	GROUP ACTUAL 2005 \$000	GROUP BUDGET (UNAUDITED) 2005 \$000	GROUP ACTUAL 2004 \$000	PARENT ACTUAL 2005 \$000	PARENT ACTUAL 2004 \$000
EQUITY						
Share capital	7	15,716	15,716	15,716	15,716	15,716
Retained earnings		9,105	9,083	8,486	8,267	8,313
Foreign currency translation reserve	6	12	25	12	-	-
		24,833	24,824	24,214	23,983	24,029
NON CURRENT LIABILITIES						
Term debt	8	2,275	3,180	2,145	2,275	2,145
		2,275	3,180	2,145	2,275	2,145
CURRENT LIABILITIES						
Creditors and accruals	9	9,677	3,156	7,785	10,520	8,843
Tax payable	5	188	-	-	93	-
		9,865	3,156	7,785	10,613	8,843
		36,973	31,160	34,144	36,871	35,017
NON CURRENT ASSETS						
Property, plant and equipment	10	25,074	25,399	24,835	23,911	24,817
Deferred tax benefit	11	1,074	743	681	989	682
Investments in subsidiaries	13	-	-	-	52	52
Investments in associates	13	20	-	20	30	30
Loan	13	294	173	432	240	340
Intangible assets	12	-	-	-	-	-
		26,462	26,315	25,968	25,222	25,921
CURRENT ASSETS						
Cash and short term deposits	14	(1)	-	962	(109)	398
Debtors and prepayments	15	6,750	4,207	6,321	11,426	7,849
Investment in joint venture	13	3,392	-	-	-	-
Inventories	16	156	450	428	156	428
Tax receivable	5	-	-	178	-	178
Current portion of loan	13	105	105	120	67	76
Advance to associate	13	76	83	83	76	83
Equipment for resale		33	-	84	33	84
		10,511	4,845	8,176	11,649	9,096
		36,973	31,160	34,144	36,871	35,017

For and on behalf of the Board, who authorised the issue of these accounts on 25 August 2005.



CHAIRMAN



DIRECTOR

The accompanying notes form part of these financial statements.

CONSOLIDATED STATEMENT OF CASHFLOWS

For the Year Ended 30 June 2005

		GROUP ACTUAL	GROUP BUDGET (UNAUDITED)	GROUP ACTUAL	PARENT ACTUAL	PARENT ACTUAL
	NOTE	2005 \$000	2005 \$000	2004 \$000	2005 \$000	2004 \$000
CASH FLOWS FROM OPERATING ACTIVITIES						
Cash was provided from:						
Receipts from customers		31,735	29,188	38,622	30,792	36,979
Interest received		51	36	48	27	36
Income tax received		-	-	-	43	-
		31,786	29,224	38,670	30,862	37,015
Cash was applied to:						
Payments to employees		15,250	16,225	21,021	14,637	20,033
Payments to suppliers		15,066	10,835	14,298	12,782	12,798
Interest paid		48	121	88	48	88
Income tax paid		461	208	22	-	20
		30,825	27,389	35,429	27,467	32,939
Net cash flows from operating activities	19	961	1,835	3,241	3,395	4,076
CASH FLOWS FROM INVESTING ACTIVITIES						
Cash was provided from:						
Proceeds from sale of property, plant and equipment		-	-	6	-	3
Proceeds from loan repayments		119	265	22	75	14
		119	265	28	75	17
Cash was applied to:						
Purchase of property, plant and equipment		2,154	2,500	2,342	2,154	2,342
Purchase of investments		-	-	20	-	20
Advance to associate		-	-	83	-	83
Other advances		16	-	-	16	-
		2,170	2,500	2,445	2,170	2,445
Net cash flows used in investing activities		(2,051)	(2,235)	(2,417)	(2,095)	(2,428)
CASH FLOWS FROM FINANCING ACTIVITIES						
Cash was provided from:						
Increase in term debt		130	400	-	130	-
		130	400	-	130	-
Cash was applied to:						
Repayment of term debt		-	-	1,115	-	1,115
Net advances to subsidiaries		-	-	-	1,934	1,300
		-	400	(1,115)	(1,934)	(2,415)
Net cash flows from financing activities		130	400	(1,115)	(1,804)	(2,415)
NET INCREASE (DECREASE) IN CASH HELD						
Add opening cash brought forward		962	-	1,260	398	1,171
Less effect of exchange rate change on foreign currency balance		(3)	-	(7)	(3)	(6)
Ending cash carried forward	14	(1)	-	962	(109)	398

The accompanying notes form part of these financial statements.

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS

For the Year Ended 30 June 2005

1. Statement of Accounting Policies

Reporting Entity

New Zealand Forest Research Institute Limited is a Crown Research Institute registered under the Companies Act 1993. The group consists of New Zealand Forest Research Institute Limited, its subsidiaries, associates, and joint venture interests.

New Zealand Forest Research Institute Limited is a reporting entity for the purposes of the Financial Reporting Act 1993.

The financial statements and group financial statements of New Zealand Forest Research Institute Limited have been prepared in accordance with the Financial Reporting Act 1993.

Measurement Base

The group follows the accounting principles recognised as appropriate for the measurement and reporting of financial performance and financial position on a historical cost basis, with the exception that the forest asset has been revalued and FHS Limited, a wholly owned subsidiary of New Zealand Forest Research Institute Limited, is reported on a liquidation basis.

On 25 August 2005 it was resolved that FHS Limited would cease to trade. Under FRS5, Events After Balance Date, if such a decision is made after balance date but prior to the signing of the accounts, the financial statements cannot be prepared under the going concern basis. Accordingly adjustments have been made to reflect the liquidation value of the assets and liabilities of the subsidiary. A summary of the adjustment made is provided in Note 25.

Specific Accounting Policies

The following accounting policies, which materially affect the measurement of financial performance and the financial position, have been applied:

a) Principles of Consolidation - Purchase Method

The consolidated financial statements include the parent company and its subsidiaries. The group financial statements are prepared using the purchase method of consolidation. All intercompany transactions and unrealised profits and losses between the group of companies are eliminated from the financial statements on consolidation. In the parent company financial statements investments in subsidiaries are stated at cost.

b) Associate Companies

These are companies in which the group holds substantial shareholdings and in whose commercial and financial policy decisions it participates.

Associate companies have been reflected in the consolidated financial statements on an equity accounting basis which shows the group's share of surpluses in the Consolidated Statement of Financial Performance and its share of post acquisition increases or decreases in net assets, in the Consolidated Statement of Financial Position.

c) Joint Ventures

The interest in the unincorporated joint venture is accounted for as a partnership and is therefore equity accounted.

d) Goodwill

Goodwill represents the excess of the purchase consideration over the fair value of the net tangible and identifiable intangible assets, acquired at the time of acquisition of a business or an equity interest in a subsidiary, or associate company. Goodwill is amortised by the straight line method over the period during which benefits are expected to be received. This is a maximum of five years.

e) Property, Plant and Equipment

All items of property, plant and equipment are valued at the cost of purchase from the Crown as at 1 July 1992 adjusted for subsequent additions at cost, disposals and depreciation. Property, plant and equipment other than land, forest assets and capital work in progress are recorded at cost less accumulated depreciation. Land and capital work in progress are recorded at cost. Forest assets were revalued by using the net present value of the after tax cash flow for each individual crop as at 30 June 2003.

Expenditure incurred on property, plant and equipment is capitalised where such expenditure will increase or enhance the future benefits provided by the asset. Expenditure incurred to maintain future benefits is classified as repairs and maintenance.

When an item of property, plant and equipment is disposed of the difference between the net disposal proceeds and the carrying amount is recognised as a gain, or loss, in the Statement of Financial Performance.

Depreciation is provided for using the straight-line method to allocate the historical cost, less an estimated residual value, over the estimated useful life of the asset.

The useful lives of the major classes of assets have been calculated as follows:

Buildings and improvements	40-60 years
Plant and equipment	4-15 years
Furniture and fittings	10 years
Motor vehicles	3-7 years

The database within the books and periodicals is depreciated over 5 years.

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS

For the Year Ended 30 June 2005 (continued)

1. Statement of Accounting Policies (continued)

f) Debtors

Debtors have been valued at estimated net realisable value, which is considered to be fair value. Provision has been made for potential bad debts.

g) Inventories

Consumable stores are valued at the lower of cost, on a weighted average price of stock on hand, and net realisable value.

Costs incurred in the establishment of nursery stocks to be sold during the next planting season are recorded as nursery work in progress. Cost of nursery stock includes labour and consumables only.

h) Research and Development Costs

Research costs are expensed in the period incurred. Development costs are expensed in the period incurred unless certain criteria for asset recognition are met. Capitalised development costs are amortised over future periods in relation to expected future revenue. Unamortised costs are reviewed at the end of each balance date to determine the amount (if any) that no longer meets the criteria. Any amount so identified is written off.

i) Employee Entitlements

Provision has been made for benefits accruing to employees for annual leave in accordance with the provisions of employment contracts in place at balance date. Long service leave and retirement leave provisions are based on an actuarial valuation.

j) Leases

Operating lease payments, where the lessors effectively retain substantially all the risks and benefits associated with ownership of the leased items, are included as an expense in the Statement of Financial Performance in equal instalments over the lease term.

k) Goods and Services Tax (GST)

The financial statements are prepared on a GST exclusive basis.

l) Foreign Currencies

Transactions in foreign currencies are converted at the New Zealand rate of exchange ruling on the date of the transaction. Monetary assets and liabilities at year-end are converted to New Zealand dollars at the exchange rate ruling at balance date and exchange variations arising from these translations are recognised in the statement of financial performance.

The assets and liabilities of independent foreign operations are translated at the closing rate. Revenue and expense items are translated at the spot rate at the transaction date or a rate approximating that rate. Foreign currency exchange differences are recognised in the foreign currency translation reserve.

m) Revenue Recognition

Revenue from both Government and commercial sources is recorded when earned based on the percentage of work completed or other contractual commitments. Work completed but not invoiced is recorded as accrued revenue while work invoiced but not completed is recorded as revenue in advance.

n) Taxation

The income tax expense charged to the Statement of Financial Performance includes both the current year's provision and the income tax effects of timing differences calculated using the liability method.

Tax effect accounting is applied on a comprehensive basis to all timing differences. A debit balance in the deferred tax account, arising from timing differences or income tax benefits from income tax losses, is only recognised if there is virtual certainty of realisation.

Subsequent realisation of the tax benefit is subject to the requirements of income tax legislation being met.

o) Financial Instruments

The group is party to financial instruments with off balance sheet risk to meet financing needs. Revenues and expenses in relation to all financial instruments are recognised in the Statement of Financial Performance. The group is a signatory to the International Swap Dealers Agreement.

Changes In Accounting Policies

There have been no changes in accounting policies during the year under review and all policies have been applied on a basis consistent with the previous year, except for FHS Limited, a wholly owned subsidiary of New Zealand Forest Research Institute Limited. At balance date the financial statements of FHS Limited have been adjusted to recognise assets and liabilities on a liquidation basis as the company is no longer a going concern. The effect of this change on the Group accounts is a decrease in profit, and accordingly in net assets of \$326,832.

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS

For the Year Ended 30 June 2005 (continued)

	GROUP	GROUP	PARENT	PARENT
	2005	2004	2005	2004
	\$000	\$000	\$000	\$000
2. Operating Revenue				
Government revenue	16,156	21,822	16,156	21,822
Commercial revenue	15,355	17,126	14,417	15,893
50% share Ensis joint venture (refer note 13)	3,392	-	-	-
Gain on sale of operations	254	-	254	-
Interest revenue	42	74	21	57
	35,199	39,022	30,848	37,772
3. Operating Surplus Before Taxation				
AFTER CHARGING:				
Depreciation				
- Improvements and buildings	363	346	363	346
- Plant and equipment	1,794	1,864	1,788	1,846
- Furniture and fittings	47	59	46	57
- Vehicles	12	14	11	12
- Books and periodicals	-	5	-	-
Directors' fees	257	176	251	176
Interest expense	55	88	55	88
Lease and rental costs	847	1,011	1,075	863
Personnel remuneration and expenses	15,283	20,762	14,818	19,819
Change in doubtful debts provision	107	(29)	97	(29)
Bad debts expensed	9	56	9	56
Loss on sale of fixed assets	27	20	27	7
Unrealised exchange fluctuations	3	7	3	7
Impairment of assets	10	150	-	150
Restructuring costs	348	67	253	-
Provision for closure (refer note 25)	307	-	-	-
4. Auditor's Remuneration				
Amounts payable or due and payable to the auditors for:				
Auditing financial statements				
Parent entity auditor	68	68	66	66

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS

For the Year Ended 30 June 2005 (continued)

	GROUP	GROUP	PARENT	PARENT
	2005 \$000	2004 \$000	2005 \$000	2004 \$000
5. Taxation Expense				
Operating surplus before taxation	1,085	780	(82)	1,946
Prima facie tax at 33%	358	257	(27)	642
Taxation effect of permanent differences	108	16	63	13
Tax losses recognised from previous years	-	(178)	-	-
Tax effect of subvention payment/loss offsets	-	-	(72)	(563)
Taxation expense	466	95	(36)	92
REPRESENTED BY:				
Current taxation	739	150	225	527
Tax effect of subvention payment/loss offsets	-	-	(72)	(563)
Tax losses recognised from previous years	-	(178)	-	-
Deferred taxation	(273)	123	(189)	128
	466	95	(36)	92
Opening taxation (receivable)/payable	(178)	(171)	(178)	(132)
Tax refunds	-	34	-	-
Transfer from deferred tax benefit	120	68	118	71
	(58)	(69)	(60)	(61)
Current taxation	739	150	225	527
Provisional tax paid	(493)	(81)	-	(81)
Tax losses recognised from previous years	-	(178)	-	-
Tax effect of subvention payment/loss offsets	-	-	(72)	(563)
Closing taxation (receivable)/payable	188	(178)	93	(178)
6. Foreign Currency Translation Reserve				
Balance at 1 July	12	28	-	-
Movement during year	-	(16)	-	-
Balance at 30 June	12	12	-	-

	GROUP & PARENT	
	2005 \$000	2004 \$000
7. Share Capital		
ISSUED AND PAID UP CAPITAL		
15,716,000 ordinary shares	15,716	15,716
All shares have equal rights with respect to voting, dividends and distribution on winding up.		
8. Term Liabilities		
TERM DEBT		
	2,275	2,145
The interest rate on the term debt is 7.35% reviewable daily (2004: 6.35%)		
The term debt is unsecured, but subject to financial covenants being maintained.		
The total facility available to the group is \$7,000,000 (2004: \$7,000,000).		

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS

For the Year Ended 30 June 2005 (continued)

	GROUP	GROUP	PARENT	PARENT
	2005	2004	2005	2004
	\$000	\$000	\$000	\$000
9. Creditors and Accruals				
Trade creditors	1,282	1,435	1,246	1,409
Accounts payable	2,855	1,961	2,790	1,894
Intercompany payable	-	-	1,296	1,240
Joint venture payable	493	-	493	-
Payable to directors	22	26	22	26
Revenue in advance	939	919	939	919
Provision for employee retirement and long service leave	1,467	1,291	1,462	1,286
Provision for other employee entitlements	2,312	2,153	2,272	2,069
Provision for closure (refer note 24)	307	-	-	-
	9,677	7,785	10,520	8,843
10. Property, Plant and Equipment				
LAND AND IMPROVEMENTS				
At cost	1,508	1,519	372	1,519
Less accumulated depreciation (improvements)	53	46	53	46
Net book value land and improvements	1,455	1,473	319	1,473
FOREST ASSETS				
At valuation	164	164	164	164
BUILDINGS				
At cost	18,245	18,252	18,245	18,252
Less accumulated depreciation	2,917	2,571	2,917	2,571
Net book value of buildings	15,328	15,681	15,328	15,681
PLANT AND EQUIPMENT				
At cost	29,225	27,769	29,113	27,657
Less accumulated depreciation	22,621	21,101	22,516	21,003
Less impairment	8	-	-	-
Net book value of plant and equipment	6,596	6,668	6,597	6,654
FURNITURE AND FITTINGS				
At cost	1,486	1,460	1,474	1,448
Less accumulated depreciation	1,298	1,253	1,289	1,244
Less impairment	2	-	-	-
Net book value of furniture and fittings	186	207	185	204
MOTOR VEHICLES				
At cost	186	178	184	176
Less accumulated depreciation	133	121	131	120
Net book value of motor vehicles	53	57	53	56
BOOKS AND PERIODICALS				
At cost	199	199	169	169
Less accumulated depreciation	30	30	-	-
Net book value of books and periodicals	169	169	169	169
CAPITAL WORK IN PROGRESS				
At cost	1,123	416	1,096	416
TOTAL PROPERTY, PLANT & EQUIPMENT				
At cost	52,136	49,957	50,817	49,801
Less accumulated depreciation	27,052	25,122	26,906	24,984
Less impairment	10	-	-	-
Net book value of Property, Plant & Equipment	25,074	24,835	23,911	24,817

The fair value of land and buildings as per Rating Valuation as at 30 June 2005 is \$28,093,000 (2004: \$27,643,000).

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS

For the Year Ended 30 June 2005 (continued)

	GROUP		PARENT	
	2005 \$000	2004 \$000	2005 \$000	2004 \$000
11. Deferred Tax Benefit				
Balance at 1 July	681	736	682	739
Current year movement	273	(123)	189	(128)
Over provision from previous year	120	68	118	71
Balance at 30 June	1,074	681	989	682

	GROUP & PARENT	
	2005 \$000	2004 \$000
12. Intangible Assets		
Patents		
At Cost	25	25
Accumulated amortisation	(25)	(25)
Balance at 30 June	-	-

	PARENT	
	2005 \$000	2004 \$000
13. Investments		
Investments in Subsidiaries		
Shares in subsidiaries 30 June 2004	52	52
Acquired in current year	-	-
Disposed of in current year	-	-
Shares in subsidiaries at 30 June 2005	52	52

Subsidiaries	Shares	Percentage Held	Balance Date
FHS Limited	100	100%	30 June
Liro Limited	1,000	100%	30 June
Forest Research (Australasia) Pty Limited	100	100%	30 June
N-Fix Technologies Limited*	100	100%	30 June
Forest Research (Australasia) #2 Pty Limited*	100	100%	30 June
SignaGen Limited*	100	100%	30 June
Atlas Technology Limited*	100	100%	30 June
FR Properties Limited	100	100%	30 June
Scion Australasia Limited	100	100%	30 June
Scion Group Limited*	100	100%	30 June

FHS Limited provides a range of services to industry, government, local and regional authorities aimed at the early detection of pests and diseases.

Liro Limited does not trade. It earns interest from a loan arising from the sale of an investment.

Forest Research (Australasia) Pty Ltd operates a branch in Australia providing software support services. The company does not trade in New Zealand.

FR Properties Limited was incorporated on 25 March 2004. The name was changed on 25 July 2005 to Te Papa Tipu Properties Limited. The company owns and administers the Group's land assets.

*These companies were not trading at balance date and the capital was uncalled.

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS

For the Year Ended 30 June 2005 (continued)

13. Investments (continued)

Scion Australasia Limited, a special purpose company for a new 50/50 unincorporated joint venture, was incorporated on 14 June 2004. The joint venture, Ensis, commenced operations on 1 July 2004. The parent company, New Zealand Forest Research Institute Limited transferred approximately one third of its operations into the joint venture on commencement. The group's 50% share of Ensis operations before service charges for the year ended 30 June 2005 was \$3,392,379. Net surplus is comprised as follows:

	\$000
Operating revenue	29,555
Direct costs	22,770
Gross margin	6,785
Scion Australasia's 50% share	3,392
Less service charge	1,660
Net surplus before tax	1,732

Scion Group Limited was incorporated on 2 August 2004.

	GROUP 2005 \$000	GROUP 2004 \$000	PARENT 2005 \$000	PARENT 2004 \$000
INVESTMENTS IN ASSOCIATES				
Opening share of decrease in net assets	(10)	(10)	-	-
Current year share of decrease in net assets of Frontline Biosecurity	-	-	-	-
Closing share of decrease in net assets	(10)	(10)	-	-
Cost of investments 30 June 2004	30	10	30	10
Acquired during the period	-	20	-	20
Cost of investments to 30 June 2005	20	20	30	30

New Zealand Forest Research Institute Limited has a 25% shareholding in a joint venture company, Frontline Biosecurity Limited. The company carries out research, development and commercialisation of biosecurity processes. The company has a balance date of 31 March.

On 28 June 2004 New Zealand Forest Research Institute Limited purchased a 25% share of Beacon Pathway Limited. The company carries out research in the area of sustainability in the built environment.

New Zealand Forest Research Institute Limited owned a 50% share of Centre for Advanced Composite Materials Limited. The company was wound up during the year.

The parent entity undertakes research projects with the Forest and Forest Products Research Organisation (FAFPRO) through five cooperatives. Expenditure incurred on research and recoveries from the cooperatives has been included in the financial statements. However, the parent entity's share of the residual cash assets of the cooperatives is not material and has not been disclosed.

The parent entity undertakes research projects with the Logging Industry Research Association (LIRA). Expenditure incurred on research and recoveries from LIRA has been included in the financial statements. However, the parent entity's share of the residual cash assets of LIRA is not material and has not been disclosed.

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS

For the Year Ended 30 June 2005 (continued)

	GROUP	GROUP	PARENT	PARENT
	2005	2004	2005	2004
	\$000	\$000	\$000	\$000
13. Investments (continued)				
INVESTMENT IN UNINCORPORATED JOINT VENTURE				
Opening share of gross margin	-	-	-	-
Current year share of gross margin	3,392	-	-	-
Closing share of gross margin	3,392	-	-	-
Cost of investment 30 June 2005	-	-	-	-
	3,392	-	-	-
LOAN				
Balance 1 July 2004	552	574	416	430
Repayments	(119)	(22)	(75)	(14)
Provision for write-off	(34)	-	(34)	-
Balance 30 June 2005	399	552	307	416
Term portion of loan	294	432	240	340
Current portion of loan	105	120	67	76
Total	399	552	307	416

The loan is secured by a Deed of Mortgage over the shares of IFR Technologies Limited (68.8%) and all the shares of the purchasing company.

There was an outstanding unsecured shareholders advance from New Zealand Forest Research Institute Limited to an associate, Beacon Pathway Limited of \$76,255 (2004: \$82,940).

	GROUP	GROUP	PARENT	PARENT
	2005	2004	2005	2004
	\$000	\$000	\$000	\$000
14. Cash and Short Term Deposits				
Cash on hand	2	2	2	2
Bank (bank overdraft/unsecured)	(52)	568	(161)	4
Foreign currency account	44	41	44	41
On call account	5	351	6	351
	(1)	962	(109)	398
15. Debtors and Prepayments				
Trade debtors	4,915	4,548	4,598	4,298
Provision for doubtful debts	(146)	(41)	(126)	(31)
Intercompany receivable	-	-	5,081	1,930
Other debtors	441	66	440	62
Accrued revenue	1,173	1,313	1,066	1,155
Prepayments	367	435	367	435
	6,750	6,321	11,426	7,849
16. Inventories				
Consumable stores	156	212	156	212
Nursery work in progress	-	216	-	216
	156	428	156	428

During the period New Zealand Forest Research Institute Limited transferred its Nursery business, and accordingly the work in progress, to the Ensis Unincorporated Joint Venture.

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS

For the Year Ended 30 June 2005 (continued)

	GROUP	GROUP	PARENT	PARENT
	2005	2004	2005	2004
	\$000	\$000	\$000	\$000
17. Financial Instruments				
CREDIT RISK				
Financial instruments that potentially subject the group to credit risk consist of bank balances and accounts receivable. The group generally does not require any security.				
Maximum exposures to credit risk as at balance date are:				
Foreign currency account	44	41	44	41
Current account	-	568	-	4
On call account	6	351	6	351
Receivables	6,383	4,564	5,979	4,324
Intercompany receivable	-	-	5,081	1,930
Loans/Advances	475	634	383	499

The group is not exposed to any significant concentrations of credit risk.

The above maximum exposures are net of any provision for losses on these financial instruments.

INTEREST RATE RISK

The group has term debt with the National Bank of New Zealand Limited.

Amount	Maturity	Rate	2004
\$000			
\$2,275	Reviewable daily	7.35%	6.35%

The interest rate on the bank overdraft facility of \$250,000 is currently 11.00% (2004: 10.00%). The bank overdraft interest rate is based on a floating rate set by the bank.

FAIR VALUES

Financial Instruments include:

Bank Overdraft, Foreign Currency Account, On Call Account, Short Term Deposits, Trade Debtors, Other Debtors, Accounts Payable and Term Loan.

For each class of financial instruments the carrying amount is the fair value.

At balance date the group had no interest rate swap agreements. (2004: Nil)

	GROUP	GROUP	PARENT	PARENT
	2005	2004	2005	2004
	\$000	\$000	\$000	\$000
18. Unhedged foreign currency denominated assets and liabilities				
Unhedged assets	NZD	NZD	NZD	NZD
AUD - Current	396	279	396	279
USD - Current	192	151	192	151
Unhedged liabilities				
AUD - Current	-	220	-	220
USD - Current	11	9	11	9

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS

For the Year Ended 30 June 2005 (continued)

	GROUP	GROUP	PARENT	PARENT
	2005	2004	2005	2004
	\$000	\$000	\$000	\$000
19. Reconciliation of operating surplus after taxation with cash flows from operating activities				
Reported surplus after taxation	619	685	(46)	1,854
Add (less) non cash items:				
Depreciation	2,216	2,287	2,209	2,261
Bad debts	-	56	-	56
Doubtful debts	107	(29)	97	(29)
Provision for loan write-off	34	-	34	-
Movement in deferred tax benefit	(393)	55	(308)	57
Unrealised loss on foreign currency account	3	7	3	6
	1,967	2,376	2,035	2,351
Add (less) items classified as investing activity:				
(Gain) loss on disposal of property, plant and equipment	37	20	27	7
(Gain) loss on sale of investments	(254)	-	(254)	-
Movements in working capital items:				
(Increase)/Decrease in debtors and prepayments	(3,444)	(376)	(38)	(795)
(Increase)/Decrease in inventories	258	(69)	258	(69)
Increase/(Decrease) in creditors and accruals	1,379	606	1,098	730
Increase/(Decrease) in taxation payable	399	(1)	315	(2)
	(1,408)	160	1,633	(136)
NET CASH FLOWS FROM OPERATING ACTIVITIES	961	3,241	3,395	4,076

20. Contingent Liabilities

TREATY OF WAITANGI ISSUES

Two verified land claims affecting the group currently exist:

- (i) Ngati Whakaue - covering the whole Rotorua Campus
- (ii) Ngati Wahiao - covering the southern end of the Rotorua Campus

No reliable estimates can be made of the potential financial impact of these liabilities.

21. Contingent Assets

HERITAGE ASSETS

The company has identified its herbarium collection as a heritage asset in accordance with Financial Reporting Standard No.3, Accounting for Property, Plant and Equipment. The Directors believe that there is no practical basis upon which to reliably value this collection. Therefore in accordance with Financial Reporting Standard No.15, Provisions, Contingent Liabilities and Contingent Assets, the herbarium collection meets the definition of a contingent asset.

	GROUP & PARENT	
	2005	2004
	\$000	\$000
22. Commitments		
CAPITAL COMMITMENTS:		
Estimated capital expenditure contracted for at balance date but not provided for	87	581
OPERATING LEASE COMMITMENTS:		
Lease commitments under non-cancellable operating leases:		
Within one year	585	559
One to two years	215	289
Two to five years	122	52
	922	900

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS

For the Year Ended 30 June 2005 (continued)

23. Transactions with Related Parties

New Zealand Forest Research Institute Limited is wholly owned by the Crown. All transactions with state-owned enterprises and Government departments and agencies are at arms length, and are not considered to fall within the intended scope of related party transactions.

During the year New Zealand Forest Research Institute Limited entered into the following transactions:

	PARENT	
	2005 \$000	2004 \$000
SUBSIDIARY COMPANIES		
FHS Limited		
Net cash advanced/paid on behalf of	320	557
Supply of goods and services	332	553
Amount (payable)/receivable at balance date		
- Intercompany account	330	(1)
- Net trade debtors/creditors	142	106
Liro Limited		
Net advances	(56)	(16)
Supply of services	-	-
Amount (payable)/receivable at balance date		
- Intercompany account	(1,296)	(1,240)
Forest Research (Australasia) Pty Ltd		
Net cash advanced/paid on behalf of	(466)	390
Supply of goods and services	-	599
Amount (payable)/receivable at balance date		
- Intercompany account	1,463	1,930
- Trade debtors/creditors	15	15
Scion Australasia Ltd		
Net cash advanced/paid on behalf of	493	-
Supply of goods and services	1,660	-
Amount (payable)/receivable at balance date		
- Intercompany account	2,153	-
FR Properties Ltd		
Receipt of Services	(319)	-
Paid on behalf	176	-
Transfer of land	1,135	-
Amount (payable)/receivable at balance date		
- Intercompany account	992	-

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS

For the Year Ended 30 June 2005 (continued)

23. Transactions with Related Parties (continued)

JOINT VENTURE

On 1 July 2004, New Zealand Forest Research Institute Limited transferred four business units, which approximated one third of its operations, into Ensis a 50/50 Unincorporated Joint Venture with CSIRO, Australia's national science agency.

Ensis was funded \$7,453,056 by New Zealand Forest Research Institute Limited to perform an equivalent amount of New Zealand Forest Research Institute Limited's Government contracts.

Certain staff were seconded by New Zealand Forest Research Institute Limited into the joint venture. New Zealand Forest Research Institute Limited charged \$5,490,937 for those personnel.

During the year New Zealand Forest Research Institute Limited provided other goods and services to Ensis totalling \$2,555,263.

During the year New Zealand Forest Research Institute Limited received goods and services from Ensis totalling \$447,955.

At 30 June 2005 New Zealand Forest Research Institute Limited owed Ensis \$493,472.

OTHER

Jane Taylor, a director of New Zealand Forest Research Institute Limited, supplied services to the group outside normal directors duties, totalling \$Nil (2004: \$9,000). These services were provided on normal trading terms.

Armstrong Consultancy supplied services to the group totalling \$11,500 (2004: \$6,000). Brian Armstrong, a director of New Zealand Forest Research Institute Limited, until 30 June 2005, is the principal of Armstrong Consultancy. The services were provided on normal trading terms.

Amounts outstanding at year-end are receivable and payable on normal trading terms.

No related party debts were written off or forgiven during the year (2004: Nil).

24. Provisions for Closure

	Employee Entitlements \$000	Onerous Leases \$000	Other \$000	Total \$000
Opening Balance	-	-	-	-
Provided during the year	226	66	15	307
Closing Balance	226	66	15	307

These provisions relate to the change in the basis of accounting as detailed in Note 25. These amounts represent the directors' best estimate of the costs that will be incurred to wind up the company. These amounts do not include anticipated operating losses incurred after balance date and up to date of closure.

25. Events subsequent to balance date

Effective 1 July 2005, New Zealand Forest Research Institute Limited transferred two further business units into Ensis, a 50/50 Unincorporated Joint Venture with CSIRO, Australia's national science agency. The total revenues for 2004/05 for the two units transferred was \$12,629,693.

On 25 August 2005 it was resolved that FHS Limited, a wholly owned subsidiary of New Zealand Forest Research Institute Limited, would cease trading as of 1 October 2005. As a result under FRS5, Events After Balance Date, the financial statements of FHS Limited cannot be prepared on a going concern basis. Due to this change in the basis of accounting, the following adjustments have been made:

	\$000
Provisions	307
Write down of Property, Plant and Equipment	10
Provision for doubtful debts	10
	327

26. Segment Information

The group operates principally in New Zealand providing scientific research and technology to Government and commercial clients.

COMPANY DIRECTORY

BOARD OF DIRECTORS

Brian Armstrong (Chairman) - Retired 30 June 2005

Bryce Whitcher (Deputy Chairman)

Dr Russ Ballard (Chairman from 1 July 2005)

Giff Davidson

Margaret Emerre

Temuera Hall

Bronwyn Monopoli

Jane Taylor

EXECUTIVE MANAGEMENT

Dr Tom Richardson

Chief Executive Officer (from 1 April 2005)

Bryce Heard

Chief Executive Officer (through to 31 March 2005)

Anthony Lee

Chief Financial Officer (resigned 31 January 2005)

Tupara Morrison

Group Manager, Maori Strategy

Acting Chief Financial Officer (1 February-31 August 2005)

Lionel Jeyaraj

Chief Financial Officer and Group Manager,
Corporate Services (from 1 August 2005)

Dr John Butcher

Group Manager - Strategy

Mike Lee

Group Manager - Commercial

Dr Russell Burton

Group Manager - Investments

Sylvia Hunt

Group Manager - Human Resources

John Gifford

Group Manager - Sustainable Consumer Products

Larry Little

Chief Executive, Ensis

AUDITORS

David Morrow

Ernst & Young, Auckland, on behalf of the Auditor-General

BANKERS

National Bank of New Zealand

SOLICITORS

Bell Gully, Auckland

REGISTERED OFFICE

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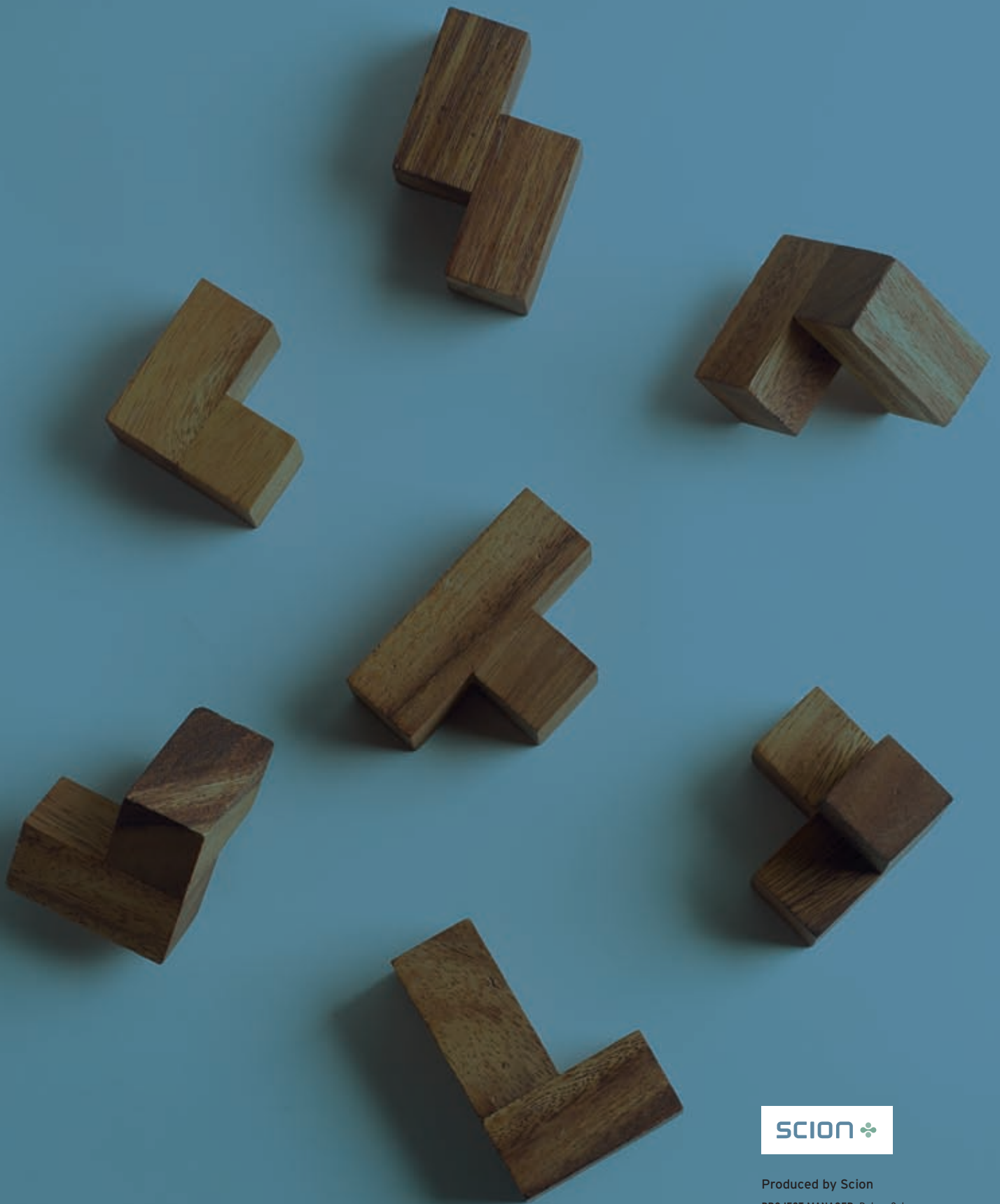
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OUR HISTORY

FROM FRI TO SCION 1947 - PRESENT

1947	Research commenced on the Rotorua campus at Whakarewarewa as a Government-owned Forest Experimental Station.
1949	The organisation was officially named Forest Research Institute (FRI) under the auspices of the New Zealand Forest Service.
1950s	Establishment of FRI forest and range experiment station at Rangiora, South Island.
1961	Appointment of Dr Dennis Richardson, Director of Research based for the first time at Rotorua.
1972	Director of Research position moved to Wellington - providing an opportunity for FRI to have a greater ability to influence policy in Wellington.
1980s	New Zealand Government introduces "user pays" policy for science funding.
1987	New Zealand Forest Service disbanded and its operations divided between three new entities: Forestry Corporation of New Zealand - commercial forest ownership Department of Conservation - non-commercial aspects Ministry of Forestry - policy and research
1992	New Zealand Crown Research Institutes established including the New Zealand Forest Research Institute Limited.
1997	FRI re-branded to Forest Research.
2003	Launch of Forest Research's Biomaterial Futures strategy.
2004-05	Ensis, the unincorporated joint venture between CSIRO and Scion, was formed on 1 July 2004. On 1 July 2005 Ensis was expanded to comprise three hundred technical staff located on nine sites throughout Australasia.
2005	New Zealand Forest Research Institute Limited launches new trading name Scion to reflect the Biomaterial Futures strategy and the multiplication of our forestry legacy.



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