
# Towards Successful Support for Australia's Small and Medium-sized Enterprises

## CSIRO

**August 1993**

This document records the main points of a study carried out for CSIRO by McKinsey & Co in April-June 1993, with the assistance of a small team from CSIRO. Responses by CSIRO to the study recommendations are included at the rear of the document.

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## INTRODUCTION

CSIRO's mission is to carry out scientific research to assist Australian industry, to benefit the Australian community and to encourage the application of the results of its own or other scientific research

Over the past 5 years CSIRO has developed a strong working relationship and effective models of interaction with large firms

Now CSIRO is concerned to improve its ability to work with small and medium-sized enterprises (SMEs) because they are playing an increasingly important role in Australia's economic development

In April 1993 CSIRO established a team with the assistance of McKinsey & Company to investigate how CSIRO can strengthen its support for SMEs in the future

This report introduces some new models for interaction with SMEs which the team thinks CSIRO should adopt to work more effectively with this dynamic and important group of Australian companies to help achieve its mission

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## EXECUTIVE SUMMARY

**The team believes that CSIRO should seize the opportunity to work more effectively with SMEs to help achieve CSIRO's mission**

### KEY FINDINGS

| | |
|---|---|
| **SMEs are important to Australia** | • Account for an increasing share of manufacturing value-added<br>• Principal source of new jobs<br>• Significant role in high value-added exports |
| **Technology is important to SMEs** | • 39% rate technology as a competitive advantage<br>• Technology is more important to high-growth exporters and to firms with a high share of exports as a percent of sales<br>• Spend heavily on R&D - on average 10% of sales revenue |
| **CSIRO is working with about 10% of SMEs with mixed impact** | • Estimated 205 collaborative research projects and 910 contract services projects with SMEs in 1992-93<br>• Cost of serving SMEs is estimated to be $40 million or 8% of budgeted expenditure in 1992-93<br>• Many examples of both successful and unsuccessful interactions with SMEs<br>• CSIRO not meeting the needs of many high value-added SMEs and 73% have not used CSIRO during the past 5 years<br>• 89% of SMEs that have used CSIRO would recommend it but with qualifications |
| **4 models for improved interaction with SMEs** | • Targeted relationship model<br>– To improve interactions with SMEs and increase chances of success<br>• Entrepreneurial innovation model<br>– To develop more successful high value-added SMEs<br>• Steinbeis/Kohsetsushi model<br>– A longer-term development for wider diffusion of Australia's technology expertise<br>• Regional technology node model<br>– A vision for Australia in the Asia-Pacific region |

**CSIRO needs to develop models of interaction that meet the commercial needs of firms at different levels of technological sophistication. We recommend 10 actions that will set CSIRO on the path of meeting this challenge**

## KEY RECOMMENDATIONS

1. Set targets for CSIRO's involvement with SMEs over time
2. Establish an Industry Outreach Group in each institute
3. Establish an accountability task force to recommend specific improvements to CSIRO's accountability and governance structures
4. Strengthen CSIRO's secondment program by integrating secondment as part of the career structure for research staff
5. Transform CSIRO's recruiting, training and reward systems to encourage more commercial behaviour
6. Encourage staff to move permanently to industry
7. Support CSIRO entrepreneurs through start-up phase
8. Subcontract more research to private SMEs
9. Establish closer links with local allies including NIES, Australian Manufacturing Council (AMC), Small Business Unit of DITARD, AUSTRADE, universities, CRCs and industry associations to improve CSIRO's ability to provide informed referrals to SMEs
10. Initiate a number of pilot programs and experiments to verify the value of CSIRO participating in a Steinbeis/Kohsetsushi program and regional technology node

## CSIRO SHOULD WORK WITH MORE SMEs

**CSIRO's mission demands that it works closely with more SMEs because they are important to Australia and technology is important to them**

**CSIRO MISSION**

> **To carry out scientific research to assist Australian industry, to benefit the Australian community and to encourage the application of the results of its own or other scientific research**

Source: CSIRO 1992 Annual Report

## SMEs Are Important to Australia

**SMEs are defined by their total sales or number of employees. Unlike the AMC's definition, they are not only exporters**

**TEAM DEFINITION OF SMEs**

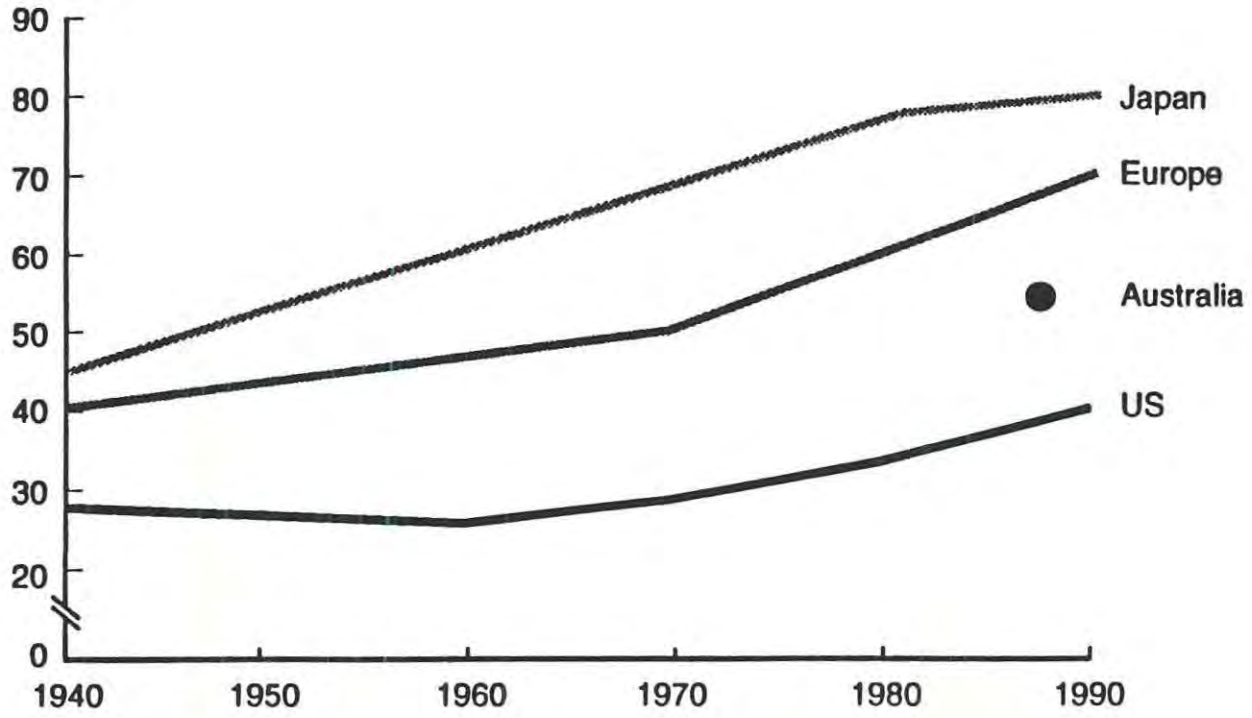
| | Lower bound | Upper bound | Industry sector | Ownership |
|---|---|---|---|---|
| **CSIRO team** | **$2 million turnover or 20 employees** | **Either $100 million turnover or 500 employees** | **High-value-added goods and services** | **Independent company or 'arm's-length subsidiary' sufficiently separate to share issues of SMEs** |
| **AMC team** | $2 million in exports | $50 million in exports | High-value-added manufacturers* | Independent company or arm's-length subsidiary which is sufficiently separate to have issues of emerging exporters |

* Treasury definition of elaborately transformed manufacturers (ETMs) plus higher value-added basic metal products and processed food

## SMEs account for an increasing share of manufacturing value-added worldwide

**GLOBAL TRENDS: THE RISE OF FLEXIBLE, SMALL-SCALE MANUFACTURING**

Percent manufacturing industry value-added by firms with 299 or fewer employees

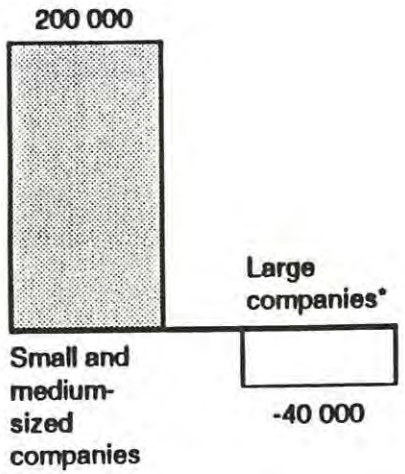



Source: David Friedman, *Flexible Manufacturing Networks*

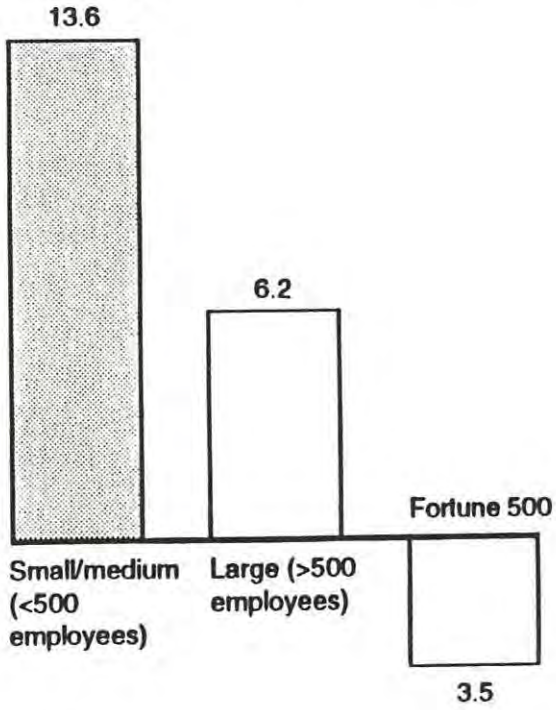
## Private sector employment growth during the past decade in Australia has been driven by SMEs. Similarly, in the US most new jobs created during the decade of the 1980s were generated by SMEs

### EMPLOYMENT CREATION

**Net new jobs created in the Australian private sector 1987-92**
Number of jobs




**Net new jobs created in US 1980-90**
Millions of jobs




* Large means ≥ 100 employees; medium and small have <100 employees

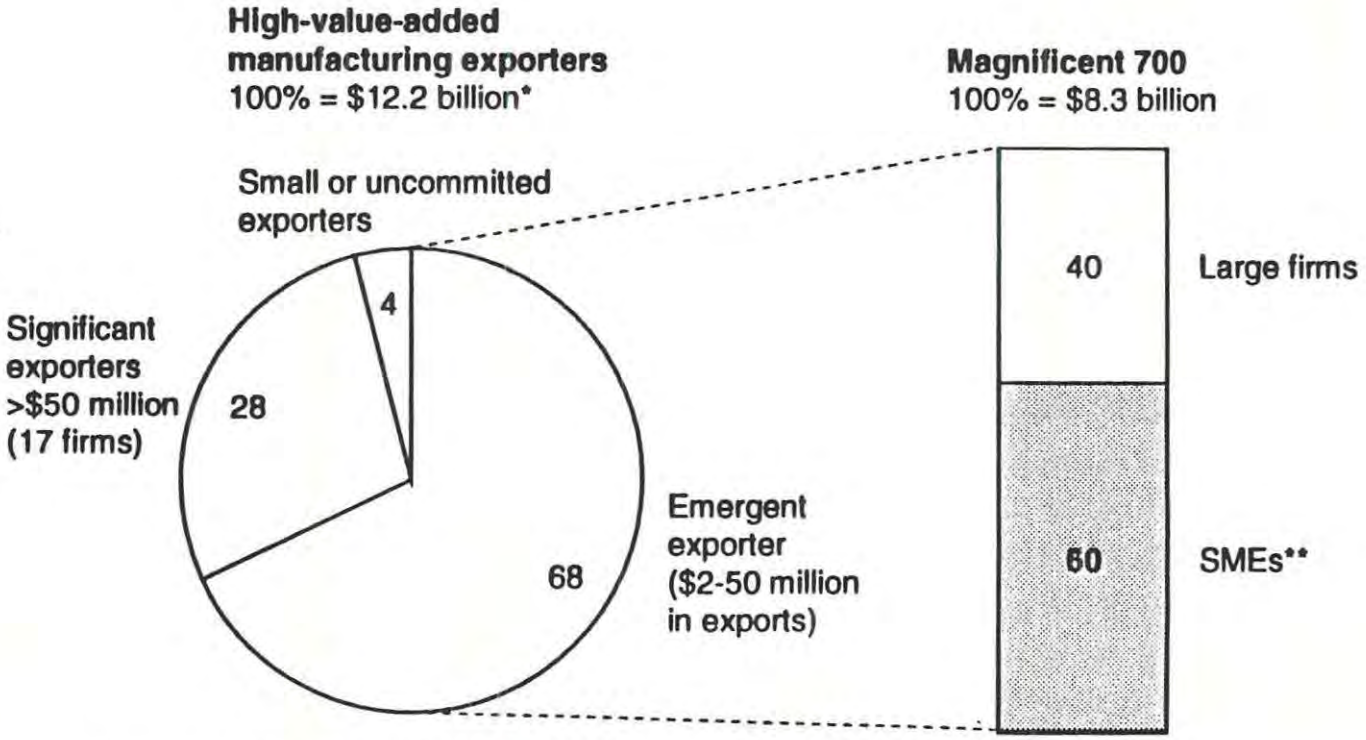
Source: ABS 6248; Small Business Administration (SBA); McKinsey team analysis

## SMEs account for an important share of Australia's high-value-added exports

**ROLE OF SMEs IN HIGH-VALUE-ADDED EXPORTS 1990-91**

*AMC SURVEY*

Percent




* Based on the definition used in the AMC/McKinsey Report on Emerging Exporters

** Firms ≤500 employees and/or $100 million in total sales

Source: ABM Top 500 exporters; AMC/McKinsey Report, December 1992; AMC Emerging Exporters Survey (which included 335 SMEs); McKinsey team analysis

## Technology Is Important to SMEs

**SMEs rated technology as the second most important source of their competitive advantage after quality**

**IMPORTANCE OF TECHNOLOGY AS A COMPETITIVE ADVANTAGE***

*AMC SURVEY*

Percent of total respondents (335 SMEs)


* Each SME interviewed was asked to tick up to 3 boxes listing major competitive advantages

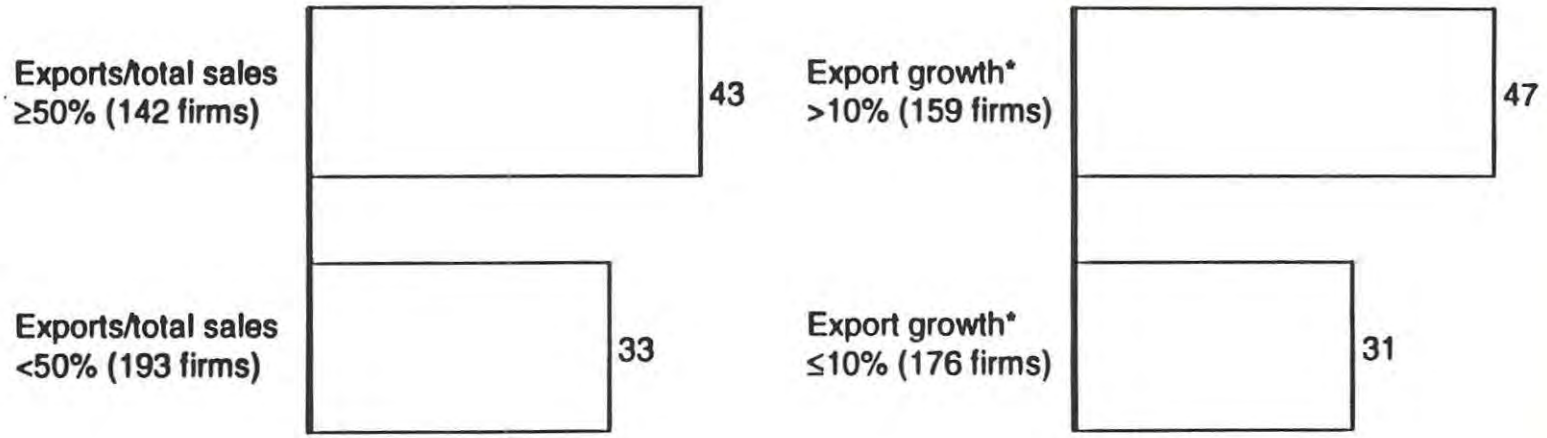
Source: AMC Emerging Exporters Survey; McKinsey team analysis

## The survey showed a strong link between export success and technology

**SMEs LISTING TECHNOLOGY AS A COMPETITIVE ADVANTAGE**

*AMC SURVEY*

Percent of respondents in each category




* Real compound p.a. for 1986-87 to 1991-92

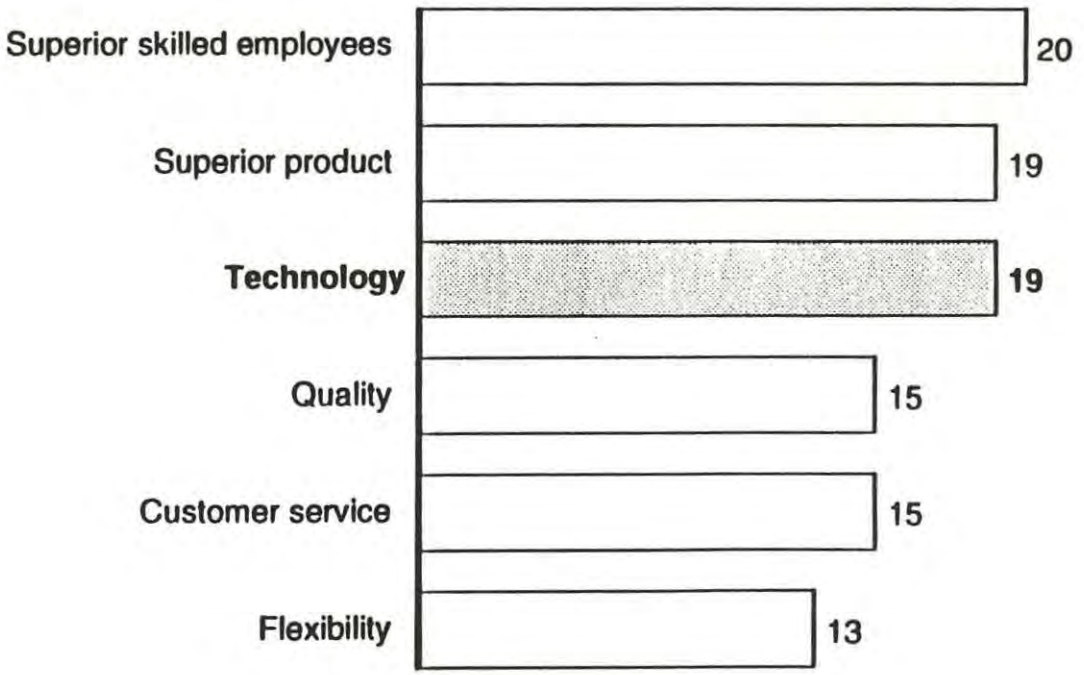
Source: AMC Emerging Exporters Survey; McKinsey team analysis

## The team's survey of an additional 79 SMEs - a sample biased towards firms that have worked with CSIRO - also showed technology as an important source of competitive advantage

**SME SOURCES OF COMPETITIVE ADVANTAGE**

*CSIRO SURVEY*

Number of respondents*




* There were 77 responses to this question; some CEOs gave more than 1 competitive advantage

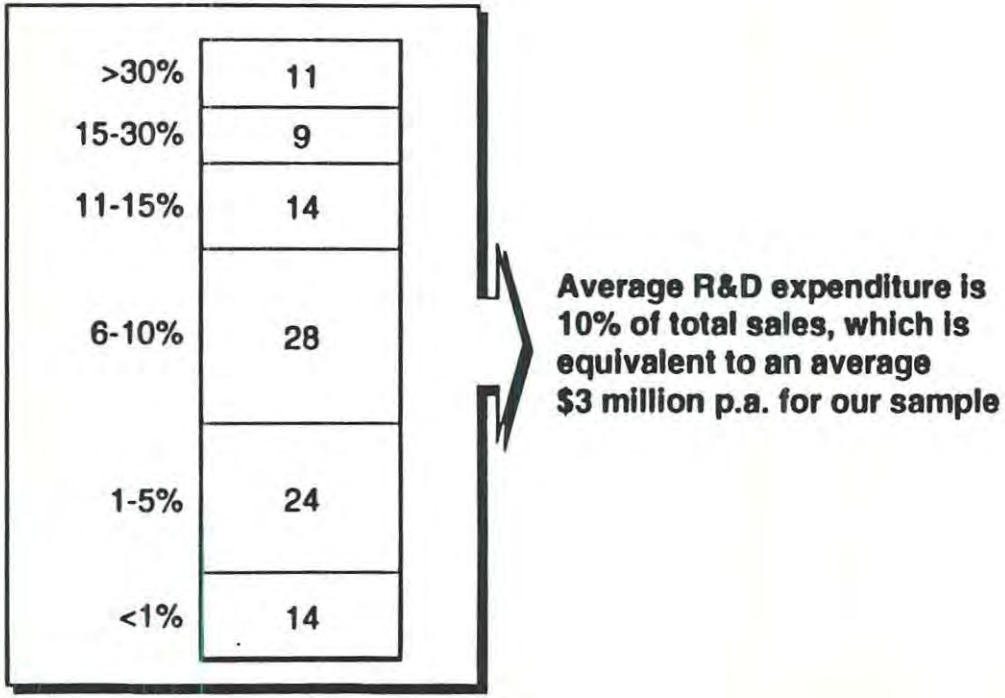
Source: CSIRO SME survey; McKinsey team analysis

**SME R&D intensity varies considerably between firms with many spending heavily on technology. On average 10% of their total sales is spent on R&D. This compares to a national average for industry of 0.5%**

**R&D EXPENDITURE AS A PERCENT OF TOTAL SALES**

*CSIRO SURVEY*

100% = 76 companies



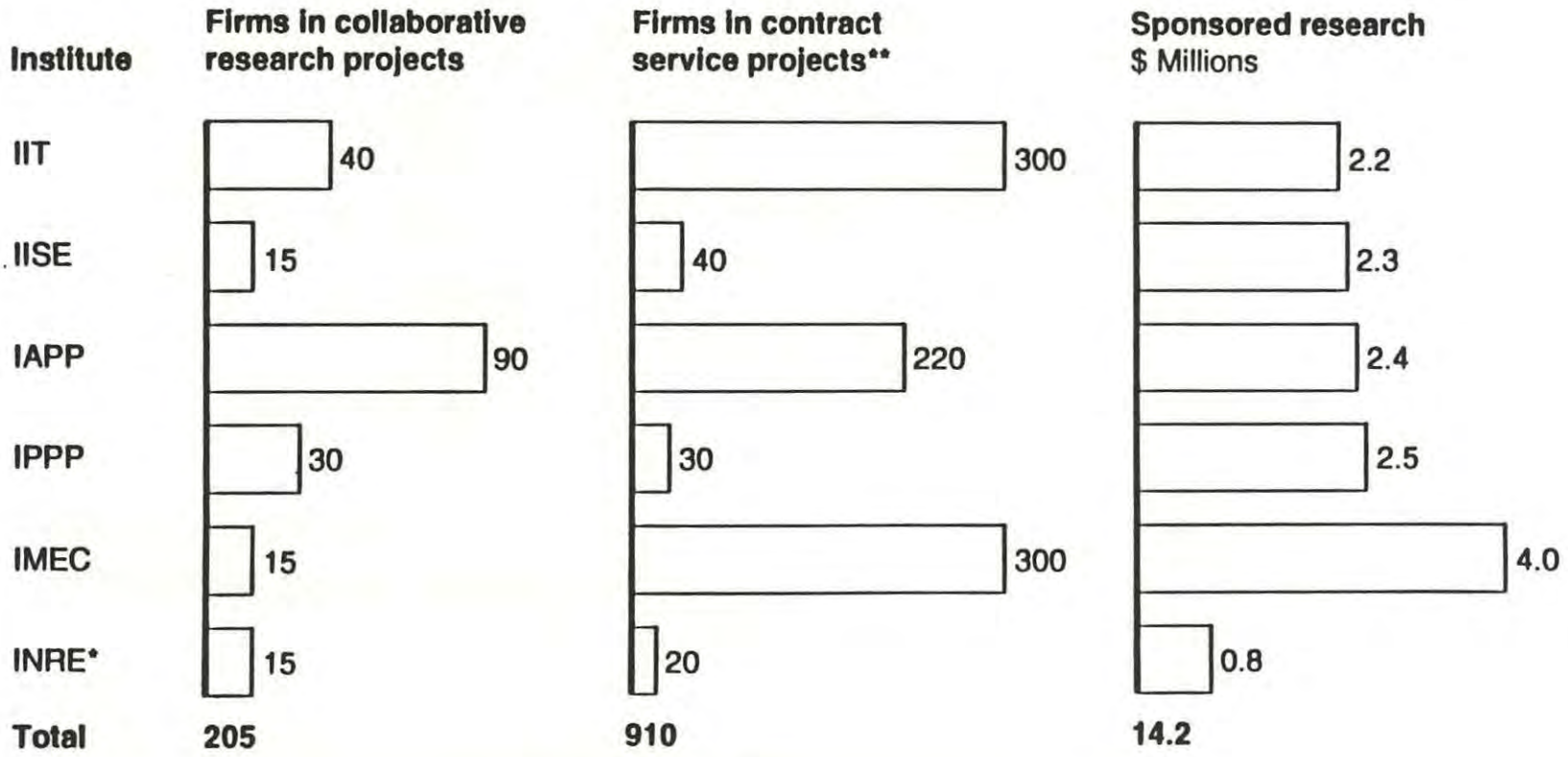

Source: OECD Science and Technology indicators 1992; CSIRO SME surveys; McKinsey team analysis

## CSIRO SERVES ABOUT 10% OF SMEs WITH MIXED IMPACT

**CSIRO's internal project tracking and costing systems do not provide accurate data. The team estimates that CSIRO participated in 205 collaborative research projects and 910 contract services projects with SMEs during 1992-93. These SMEs contributed around $14 million to CSIRO's external earnings during this period**

### CSIRO COLLABORATIVE RESEARCH WITH SMEs 1992-93

*ESTIMATE*




* INRE was unable to provide any estimates

** Includes consulting, testing, calibration, diagnostic and accreditation services

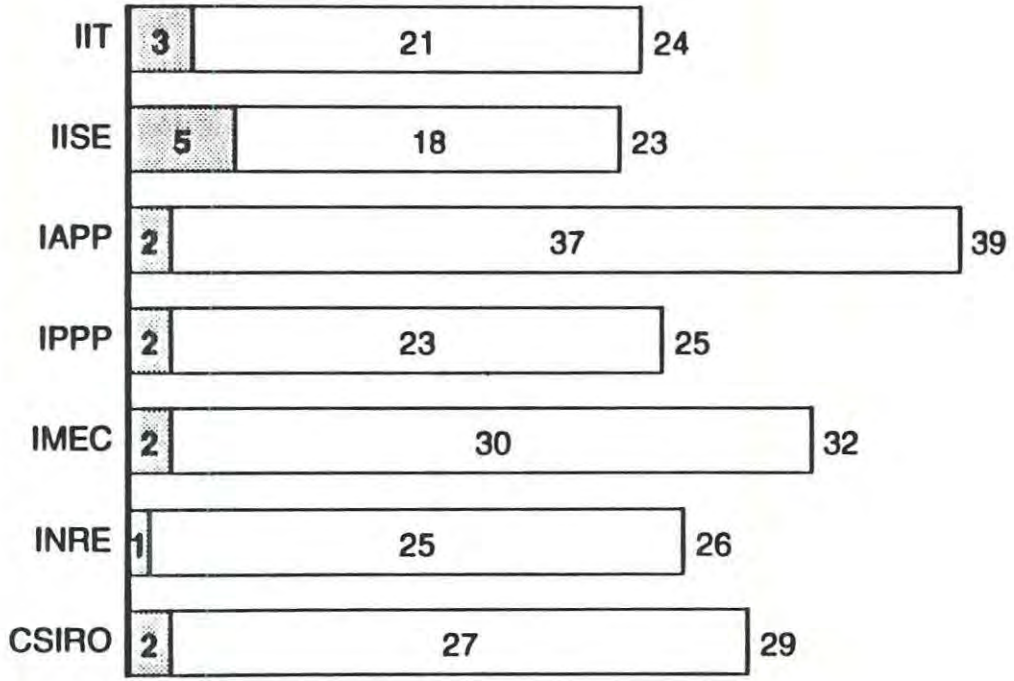
Source: CSIRO; McKinsey team analysis

## However, this work with SMEs represents a small percentage of CSIRO's total activity . . .

**SPONSORED RESEARCH* (EXTERNAL FUNDING) 1992-93** *ESTIMATE*

Sponsored research as a percent of total budget

Directly sponsored research from SMEs**




* 'Sponsored research' is defined as funds received directly from industrial and other collaboration and from competitive government and industry funding schemes

** Team estimates based on CSIRO interviews

Source: CSIRO Data Book 1993; McKinsey analysis

## . . . and comprises around 10% of SMEs

### CSIRO CONTACT WITH SMEs

*ESTIMATES*

| | | SMEs in contact with CSIRO 1992-93 | | | |
|---|---|---|---|---|---|
| Institute | Total SMEs | Collaborative research | Percentage of total SMEs | Contract services | Percentage of total SMEs |
| IIT | 4 200 | 40 | 1 | 300 | 7 |
| IISE | 500 | 15 | 3 | 40 | 8 |
| IAPP | 1 200 | 90 | 8 | 220 | 18 |
| IPPP | 1 800 | 30 | 2 | 30 | 2 |
| IMEC | 2 200 | 15 | 1 | 300 | 14 |
| INRE* | 800 | 15 | 2 | 20 | 3 |
| **Total** | **10 700** | **205** | **2** | **910** | **8** |

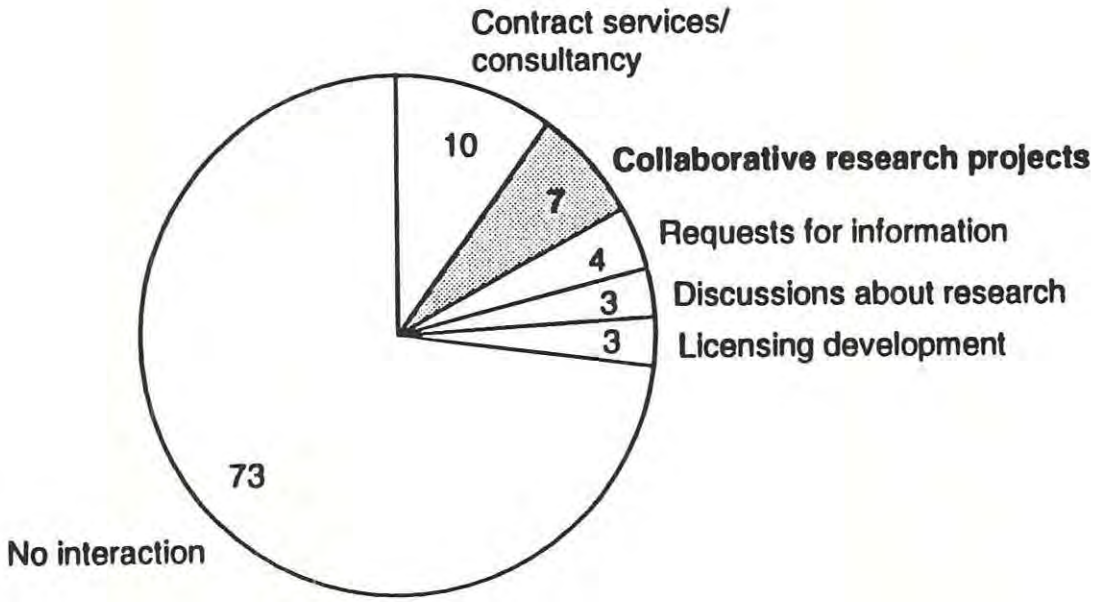
* INRE was unable to provide any estimates

Source: CSIRO Institute interviews; McKinsey team analysis; *Profiles of Australian Business*, 1992, ABS

## 73% of the more outward-looking export-oriented firms have had no interaction with CSIRO over the last 5 years

**INTERACTIONS OF HIGH-VALUE-ADDED SMEs WITH CSIRO* 1988-93** *AMC SURVEY*

100% = 335 companies



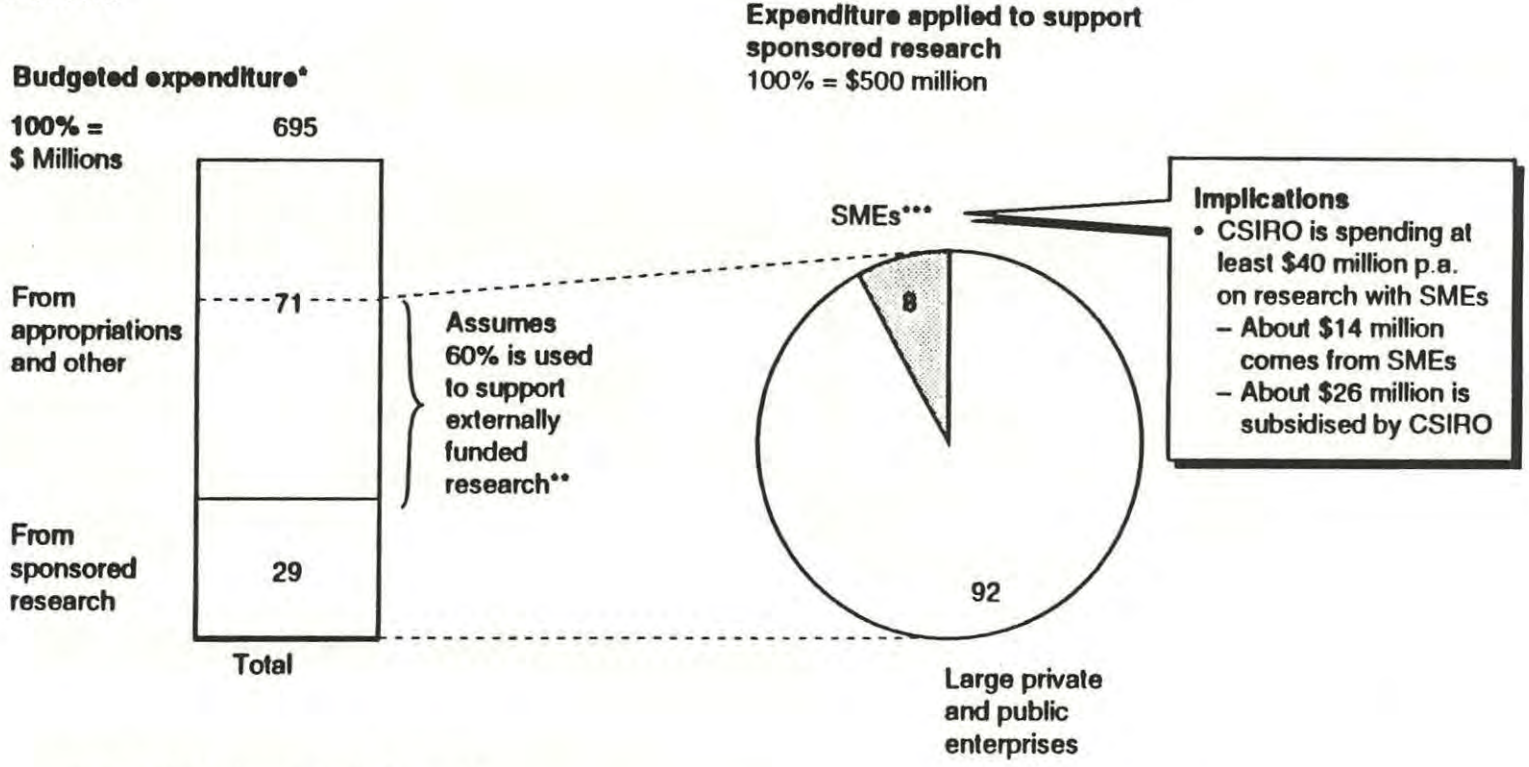

* 89 companies had 125 interactions with CSIRO (some with more than 1 division)

Source: AMC Emerging Exporters Survey; CSIRO Institute and division chiefs; McKinsey analysis

# Conservative estimates indicate CSIRO is spending at least $40 million p.a. on SMEs today

## CSIRO COLLABORATIVE RESEARCH WITH SMEs

Percent




* Includes balances carried forward

** According to the Auditor General's Report (No. 8) on CSIRO in 1991-92, divisional chiefs have estimated that between 50% and 90% of the total resources of CSIRO are being used to support externally funded research

*** The SME share of sponsored research is 8%. We have assumed that their share of expenditure equals their share of sponsored research

Source: CSIRO Budget Overview 1992-93 as at April 23, 1993; McKinsey team analysis

**No hard data on the success of this $40 million is available, but we have identified large numbers of successful and unsuccessful interactions. Unsuccessful interactions could cost CSIRO as much as $10-20 million p.a.***

## CSIRO PERCEPTIONS OF INTERACTIONS WITH SMEs

*CSIRO FOCUS GROUPS*

**Successful**

| Industry | Success factors |
|---|---|
| 1. Ceramics | • *'Entrepreneurial talents of the former staff member'* |
| 2. Environmental testing equipment manufacturing | • *'Realism about the royalty and performance standards set in the first 2 years of production'* |
| 3. Computer software | • *'Working as in-house R&D shop driven by company needs'* |
| 4. Precision manufacturing | • *'Company engineer deployed to CSIRO for 1 to 2 years'* |
| 5. Veterinary vaccine manufacturing | • *'Effective scientific and management committees involving equal representation'* |

**Unsuccessful**

| Industry | Failure factors |
|---|---|
| 1. Agriculture | • *'Difficulty concerning ownership of technology'* |
| 2. Environmental measurement | • *'Too far ahead of potential market'* |
| 3. Wool processing | • *'Process too long to meet SME's tight production deadlines'* |
| 4. Health care | • *'Process too long'* |
| 5. Manufacturing | • *'Lack of manufacturing experience'* |

* We have no international comparisons on the success rate of public research organisation work with SMEs but recognise that there are always risks associated with research projects

Source: CSIRO internal focus groups

## CSIRO's staff report mixed experiences with SMEs, many finding their interactions with SMEs frustrating and broadly unsuccessful

### CSIRO FRUSTRATIONS DEALING WITH SMEs

*CSIRO FOCUS GROUPS*

| Type of problem | Focus group comments |
|---|---|
| Can't achieve the 30% funding target | • *'CSIRO cannot achieve its 30% external funding objectives with this class of company'*<br>• *'Believe CSIRO expertise has been paid for by taxation'*<br>• *'SMEs that we traditionally deal with are currently cash strapped'* |
| They are unable to meet CSIRO's contractual terms | • *'SMEs cannot cope with the legal/performance requirements inherent in a research collaborative agreement or licensing agreement'*<br>• *'Scared of legal formulations'*<br>• *'SMEs reluctant to allow CSIRO to retain 'ownership' of generated intellectual property'*<br>• *'Risks of SMEs suing CSIRO'* |
| We are unable to respond quickly enough | • *'Do not understand that CSIRO cannot 'just drop everything' to tackle their problems'*<br>• *'SMEs want urgent responses for product tests and have little concept of scheduling'*<br>• *'They want fast answers to ill-posed problems'* |
| SMEs want commercialisation not R&D | • *'SMEs often do not have a great technological depth and have trouble taking laboratory processes and turning them into commercial products'* |

Source: CSIRO focus groups; McKinsey team analysis

Continued . . .

## CSIRO FRUSTRATIONS DEALING WITH SMEs (Continued)

CSIRO FOCUS GROUPS

| Type of problem | Focus group comments |
|---|---|
| SMEs want commercialisation not R&D (continued) | • *'Risk of company going out of business or not having sufficient resources for all stages in commercialisation'*<br>• *'. . . limited capacity to take an IT prototype and develop it to a commercially viable product'* |
| SMEs lack technical skills | • *'Too few senior people with technical skills'*<br>• *'Problem of the lack of depth in company to handle technical questions from (customers)'*<br>• *'Lack of technical expertise within SMEs often results in CSIRO doing most of the work that should be done by the company'* |
| Relationships with SMEs unstable | • *'Risk of company going out of business . . . '*<br>• *'Change of ownership midstream'*<br>• *'Lack of stability, e.g. some firms sell out when things are good - capitalise on short-term gains and do not look at long-term returns'*<br>• *'SMEs will pull the plug more quickly on projects with unexpected developments'* |

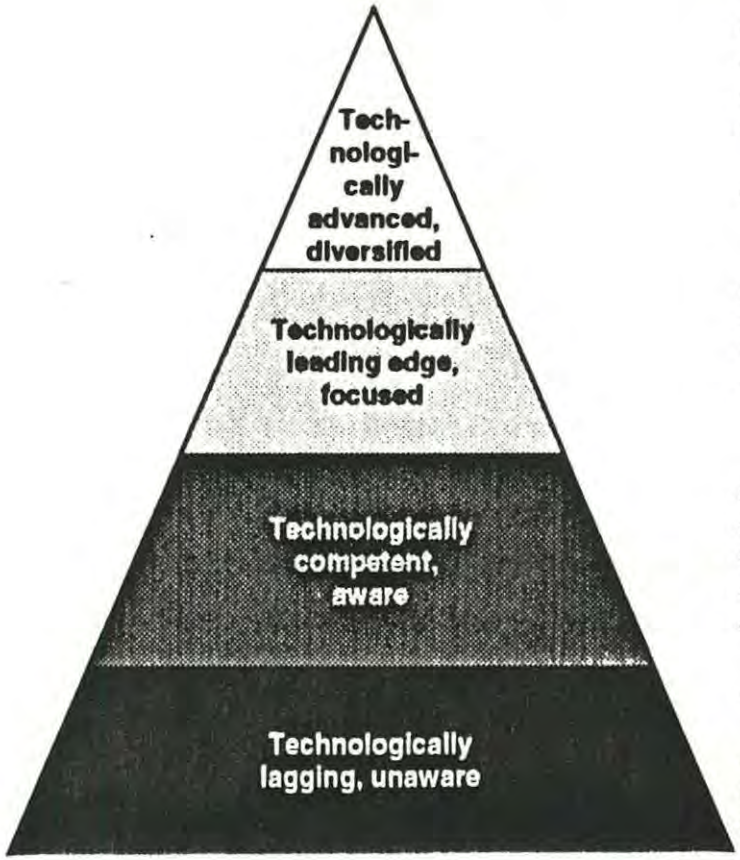
Source: CSIRO focus groups; McKinsey team analysis

## MODELS FOR IMPACT ON SMEs

**Firms in Australia fall into 4 categories according to their level of technological sophistication**

### COMPANY SEGMENTATION BY TECHNOLOGICAL SOPHISTICATION

*CONCEPTUAL*



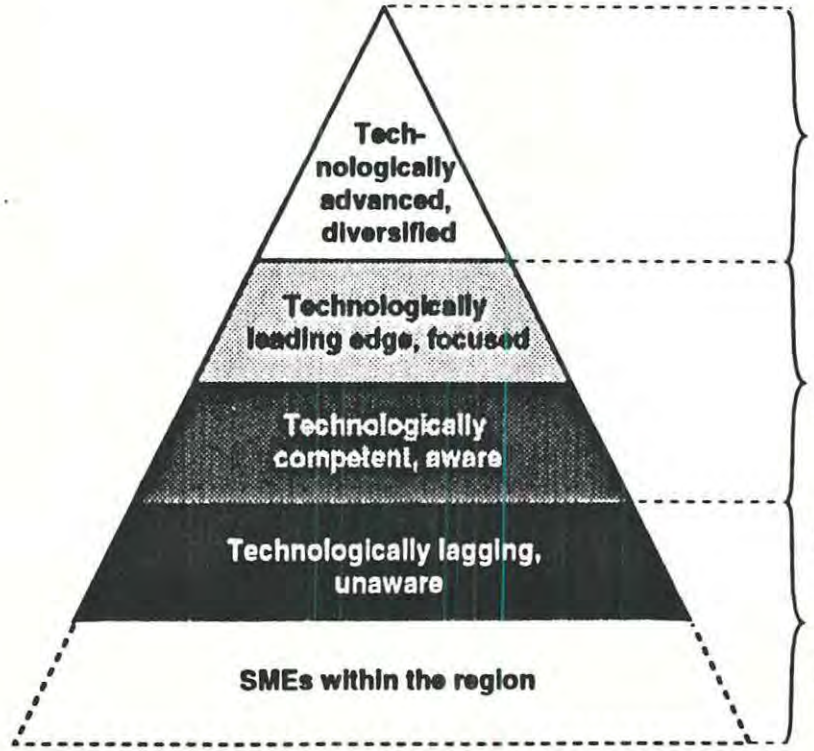

| Characteristics | Example |
|---|---|
| • Highly innovative, state-of-the-art products<br>• Interested in advancing in a broad range of technologies<br>• In-house research capability<br>• Network of contacts with domestic and foreign research institutions<br>• Very skilled in transforming research results into marketable products/processes | • BHP<br>• MIM<br>• Dupont |
| • Highly innovative, state-of-the-art products<br>• Limited in-house research<br>• Maintain close contacts with research institutions<br>• Extremely skilled in achieving practical results from joint research projects | • Cochlear<br>• Soltec<br>• JNA |
| • Products and processes often reaching niche limits<br>• Technology issues realised by key technical managers<br>• Limited ability to define and articulate own technology needs<br>• Limited knowledge of relevant public research institutions<br>• Limited project management skills for joint research projects | • NetComm<br>• Inductoheat |
| • Business based on proliferation of traditional products and processes<br>• Unaware of technological threats/opportunities<br>• Lacking clear vision of future technological needs<br>• No personal contacts with research institutions | • Koala King<br>• GR Davis |

Source: McKinsey & Company, Inc.

# We have developed 4 models for CSIRO to have more impact on these groups of firms

## OVERVIEW OF RECOMMENDATIONS

*CONCEPTUAL*




CSIRO has developed ways of working successfully with larger firms

1. CSIRO can work successfully with more firms in this group using a **targeted relationship model**
2. Many high growth SMEs are managed by **entrepreneurial innovators**. CSIRO can play a major role in developing these people
3. CSIRO should act as a catalyst to create technology transfer networks based on the **Steinbeis/Kohsetsushi model**
4. CSIRO should embark on a 20-year strategy to build Australia as the **regional technology node**

Source: McKinsey team analysis

## Targeted Relationship Model

**We believe CSIRO could achieve significantly higher and more consistent impact on SMEs by adopting a targeted relationship model. This model focuses CSIRO's efforts on SMEs with the highest likelihood of commercial success and ensures CSIRO meets their technology needs over time by adopting a relationship based approach**

### TARGETED RELATIONSHIP MODEL

Firms tell us there is a real commercial role for CSIRO to work with SMEs if CSIRO can adopt a more commercial and timely approach

CSIRO's own extensive experience with SMEs points to the necessity for a targeted relationship model

This model only works for firms that can afford to spend around $100 000 p.a. on external R&D

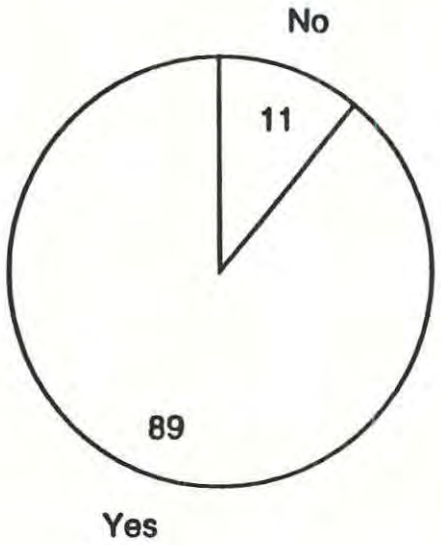
CSIRO will need to commit to a number of significant changes to succeed

## Firms tell us there is a real commercial role for CSIRO. Almost 90% of the firms who we surveyed that have worked with CSIRO would recommend CSIRO to other firms, with some qualifications

**WOULD YOU RECOMMEND CSIRO***

*CSIRO SURVEY*

**100% = 54 respondents**




**Selected quotes**

*'Yes, but would be concerned on a commercial basis. Scientists have been told to be very commercial but do not appear to have their feet on the ground'*

*'No . . . CSIRO are intellectually aloof'*

*'Yes, but with some reservations. Make sure you know what you are getting into and understand the consequences'*

*'Yes, but good lawyer needed'*

*'Yes, but you have to be clear about what you want. They have a tendency to charge too much. They are too driven by 30%'*

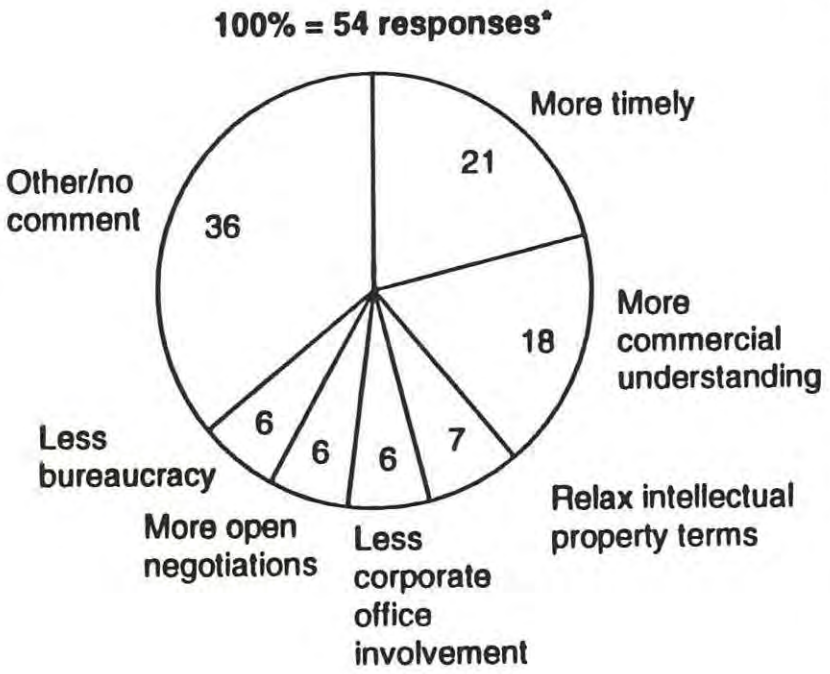
* Response to question - 'Would you recommend CSIRO as a source of assistance?'

Source: CSIRO SME Survey; McKinsey team analysis

## These qualifications relate mainly to timeliness, level of commercial understanding, ownership of intellectual property, and contractual negotiations

### HOW SME INTERACTIONS WITH CSIRO COULD BE IMPROVED

*CSIRO SURVEY*




**Selected quotes**

- 'Time frames too long, too slow, deadlines hardly ever met'
- 'Contract research too expensive for small organisation'
- 'An organisation with big 'R', but small 'd'
- 'Scientifically excellent but no commercial value'
- 'Very little commercial nous regarding licence and royalty agreements'
- 'Trying to be market relevant, but have a way to go'
- 'Poor interaction between CSIRO divisions - this impedes progress of projects'
- 'No accountability'
- 'CSIRO finds it difficult to get at what industry wants'

* Out of our 79 interview respondents 54 had previous contact with CSIRO

Source: CSIRO SME survey; McKinsey analysis

## CSIRO needs to work with SME clients on their terms

### SME NEEDS BASED ON 79 INTERVIEWS

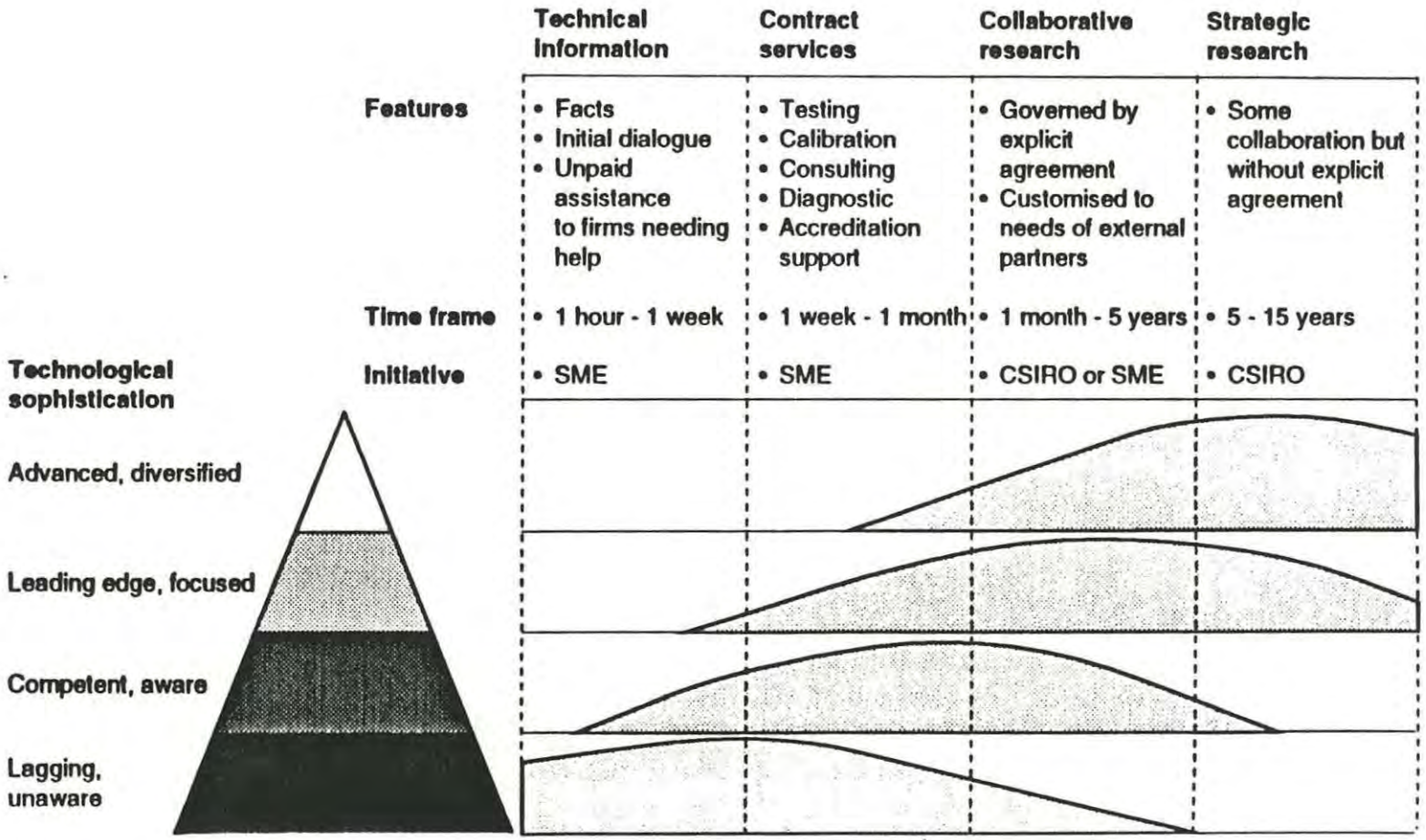
| | |
|---|---|
| **More contract services** | • Both product and process<br>• Elements differ through the firm's product life cycle |
| **More targeted, relevant communication** | • Focused delivery of information<br>• Face-to-face contact |
| **More commercial approach** | • Understanding of commercial context<br>• Demonstration of value proposition<br>• Simple clear contractual arrangements/IP rules<br>• Explicit scoping of cost and time |
| **More timely** | • Rapid response to enquiries<br>• Delivery of results quickly |
| **More of a holistic approach** | • Help with innovation planning, marketing and financial problems |

Source: McKinsey team analysis

## SMEs have a greater need for technical information and contract services than larger firms. This need varies with the firm's technological sophistication

### FIRM TECHNOLOGY NEEDS

*CONCEPTUAL*



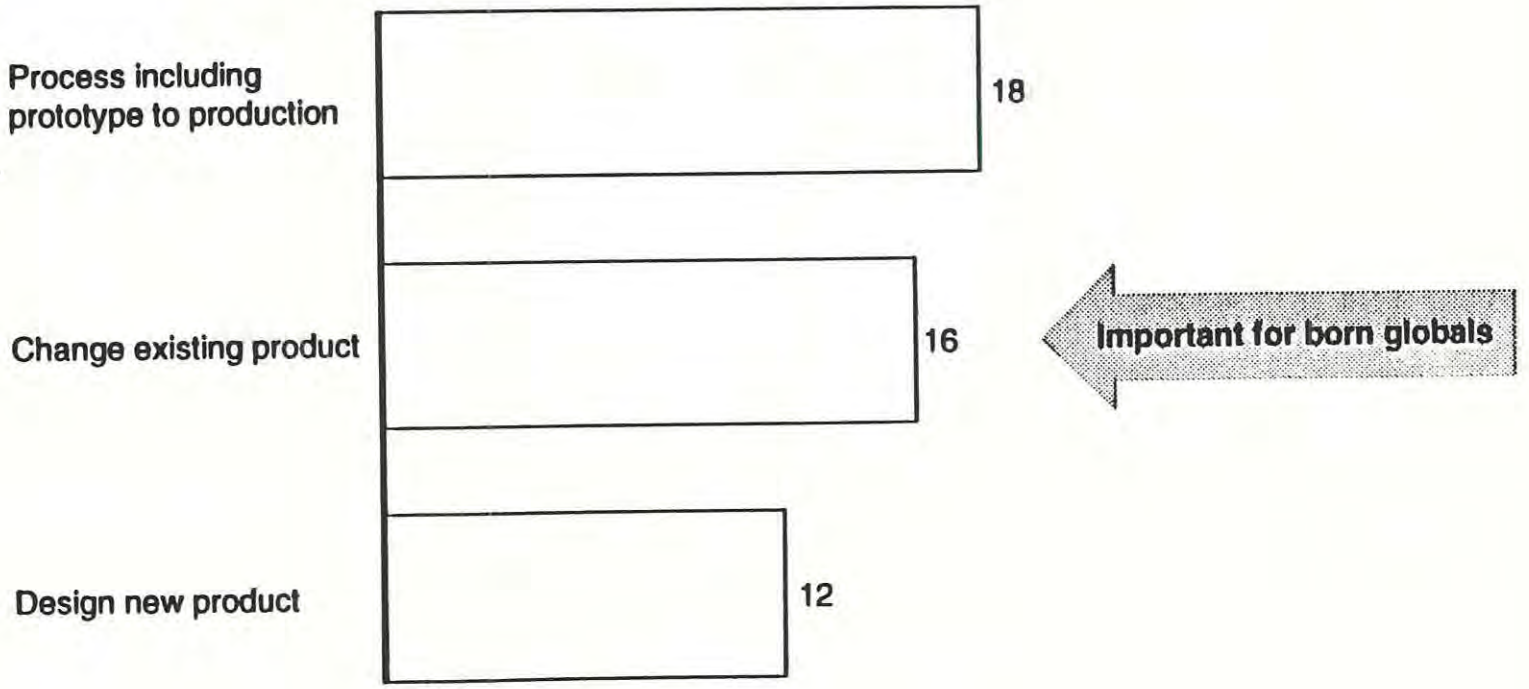

Source: McKinsey & Company, Inc.

**Our interviews with SMEs indicate that process problems and changes to existing products were more significant growth challenges than designing new products for many firms. Born global firms expressed a particular need for assistance in changing existing product specifications as they entered new overseas markets**

**RESPONSE TO QUESTION: WHAT WERE YOUR MAJOR TECHNOLOGY CHALLENGES DURING GROWTH**

*CSIRO SURVEY*

Number of respondents*

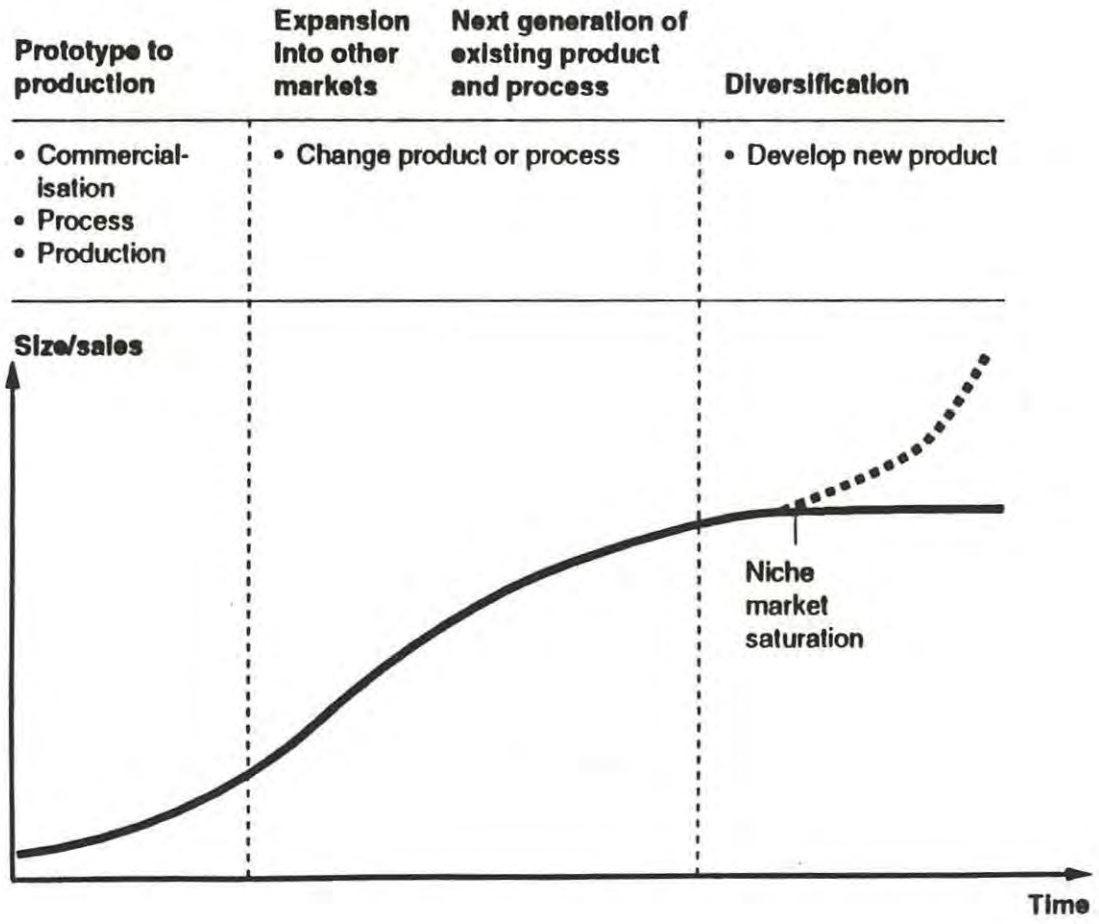



* A total of 79 SMEs were interviewed

Source: CSIRO SME Survey; McKinsey team analysis

**It appears that SMEs' technology problems change over time. Initially they require assistance to get prototypes into production. As additional markets are targeted, existing products need to be tailored to new customer needs. As the product reaches niche potential, new products need to be developed**

## SME TECHNOLOGY NEEDS OVER PRODUCT LIFE CYCLE

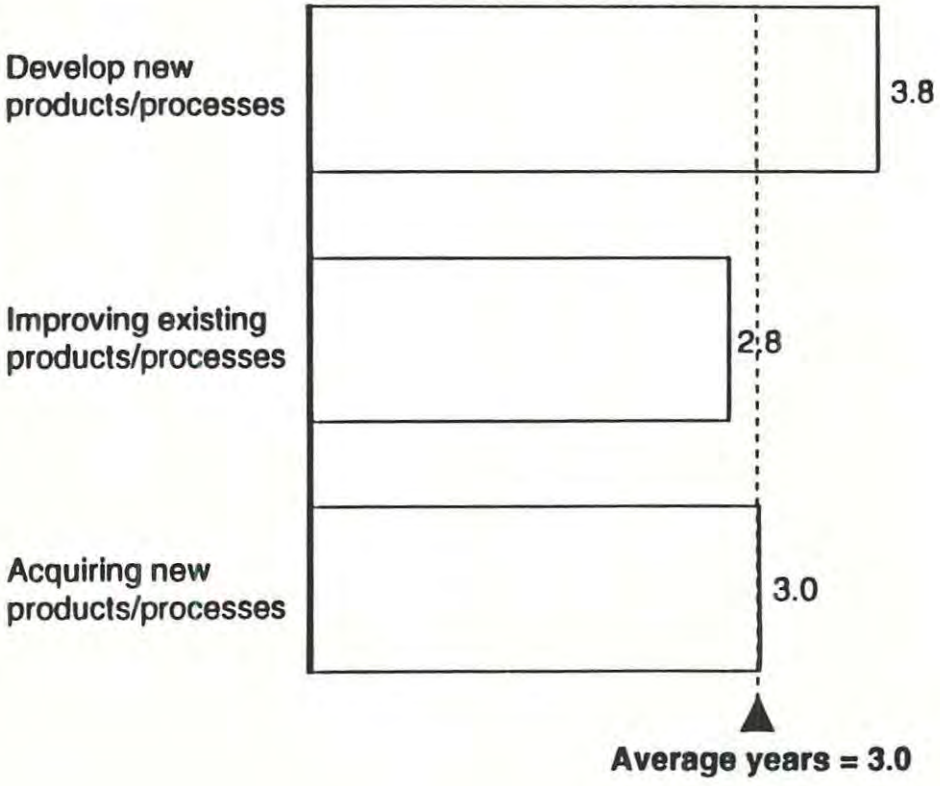


## SMEs emphasise the importance of timeliness, with a maximum time-to-market of around 3 years from gestation

**MAXIMUM TIME SMEs ARE WILLING TO WORK AT MAJOR PRODUCT/PROCESS DEVELOPMENT**

*CSIRO SURVEY*

Years

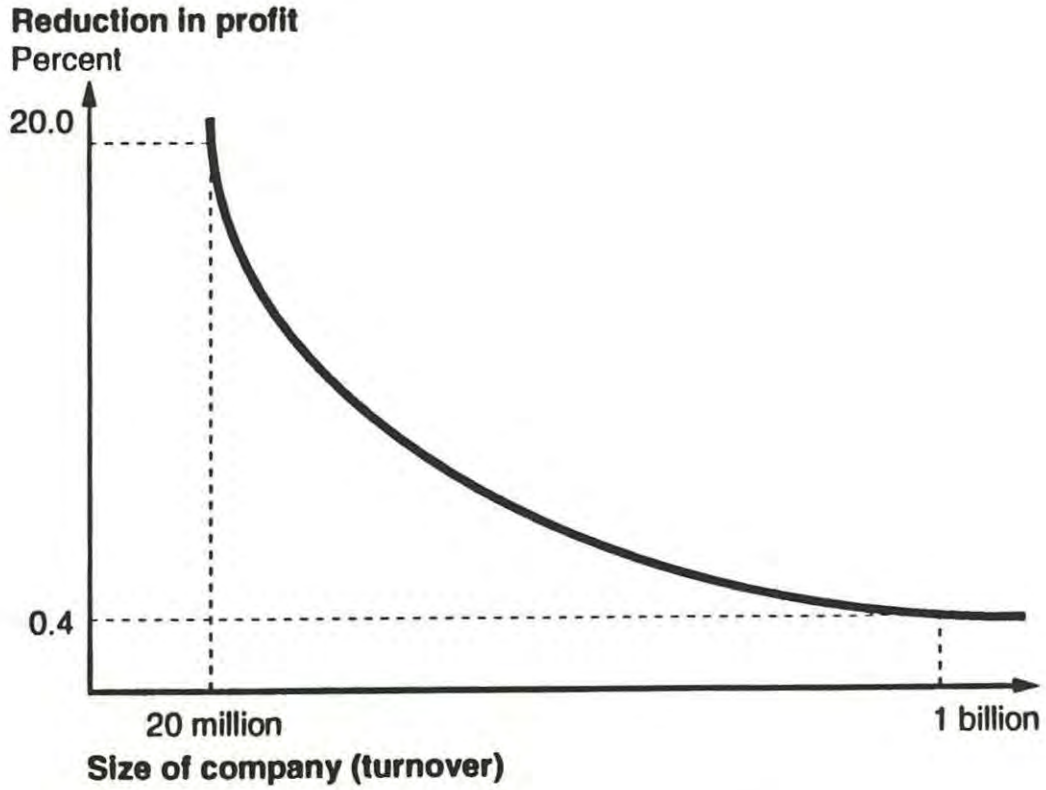



Source: SME interviews; McKinsey team analysis

## SMEs require explicit scoping of cost and time because a cost blow-out will have a much larger proportional impact on their profitability than for large companies

**IMPACT OF A 20% COST OVERRUN ON A $1 MILLION RESEARCH PROJECT***

*ILLUSTRATIVE*




* Assumes 5% return on sales

Source: McKinsey team analysis

**Comments from SMEs indicate a shortfall in CSIRO's historical performance meeting their needs. We believe this is the main reason why only 7% of the high value-added SMEs surveyed have participated in collaborative research projects with CSIRO during the past 5 years**

## SME INTERACTION NEEDS: QUOTES

*CSIRO SURVEY*

| Need | SMEs that have worked with CSIRO | SMEs that have not worked with CSIRO |
|---|---|---|
| 1. Focused delivery of information | • You have to know what you want as an answer before you ask CSIRO to do it<br>• Information needs to be more focused, specific to company's needs | • Did not know CSIRO worked with firms<br>• Half of us don't know what they are doing in there<br>• Not currently clear what CSIRO has to offer in our field<br>• No access to summaries of pertinent research and probable costs of involvement<br>• Best to communicate through specific industry-based media, seminars and associations |
| 2. Face-to-face contact | • All we see of CSIRO is when they want something signed<br>• CSIRO would have more success with face-to-face promotion of their facilities and services<br>• Where you get one-on-one contact, can get very good outcomes | • Have never worked with CSIRO and have no real knowledge of how they work or function. They have never contacted our company<br>• Personal rapport essential<br>• CSIRO should initiate discussions about services it can provide |
| 3. Rapid response to enquiries | • CSIRO took 3 months to get back to us | |
| 4. Understanding of commercial context | • CSIRO is not willing to go out and talk to customers to understand real issues | • Commercially naive |
| 5. Demonstration of value proposition | • Dressed up as a collaboration but really a mechanism for CSIRO to get external funding<br>• GIRD grants are a fancy way of funding CSIRO | • Show us they have strengths<br>• They want megabucks |

Source: CSIRO SME Survey; McKinsey team analysis

Continued . . .

## SME INTERACTION NEEDS: QUOTES (Continued)

*CSIRO SURVEY*

| Need | SMEs that have worked with CSIRO | SMEs that have not worked with CSIRO |
|---|---|---|
| 6. Simple, clear contractual arrangements | • Reached agreement on terms of project with section head, but subsequently prevented from proceeding by inflexibility of SIROTECH<br>• Long time to draw up contract | • Staffed by scientists, bureaucrats or lawyers<br>• It is essential to conduct initial interactions on an open and trusting basis |
| 7. Explicit scoping of cost and time | • CSIRO have a tendency to charge too much. They are too driven by 30%<br>• Contract research too expensive for small organisation | • I would want to see an estimate of cost and time up front |
| 8. Ownership of intellectual property generated | • CSIRO's IP contracts have to be seen to be believed<br>• CSIRO's vision of intellectual property being unique and marketable without a shelf life, which definitely does not apply to information technology<br>• We want to guard our IP and always ensure IP is assigned | • Discussions fell through over issue of intellectual property ownership |
| 9. Delivery of results quickly | • Excessive time frames in achieving developed product | • Waste of time and public money because of delay<br>• Need to transfer technology rapidly and efficiently |
| 10. Help with innovation planning, marketing and financial problems | • Often the marketing and commercialising costs are very high - government assistance would help<br>• Where we have identified opportunities, CSIRO has been helpful in doing something about it | |

Source: CSIRO SME Survey; McKinsey team analysis

## CSIRO's own experience with SMEs points to a number of lessons

### CSIRO BEST PRACTICES IN WORKING WITH SMEs

*CSIRO FOCUS GROUPS*

| Best practice | Requirements |
|---|---|
| 1. Screen SME to maximise potential for success | • Firms have<br>– Minimum of 4 years in business<br>– Earlier product success<br>– Marketing plan for commercialising the technology<br>– Credible plan for financing their share of the collaboration with CSIRO<br>– Credible plan for financing the commercialisation following collaboration with CSIRO<br>– Strategic business plan<br>– Energy and commitment of managing director |
| 2. Use targeted and personal promotions | • Promote CSIRO through industry journals, trade fairs and industry associations<br>• Look for opportunities such as 'business breakfasts', seminars and CSIRO membership of industry associations to discuss sectoral issues with SMEs<br>• Invite SMEs to participate in Divisional and Institute Advisory Committees<br>• Meet the managers of SMEs face to face |
| 3. Demonstrate willingness to meet the SME's need, not CSIRO's | • Approach interaction on basis of assisting the company, not on basis of meeting CSIRO's 30% requirements<br>• Ensure research proposals demonstrate CSIRO's capacity to add value to company products/processes<br>• Be willing to negotiate on non-cash items such as secondments<br>• Participate in informal discussions to assess the company's problems<br>• Undertake testing, short-term consultancy or information transfer if this best meets the need<br>• Work within the company's time frame and strategic process to find opportunities for further collaboration<br>• Be willing to take multi-divisional, team-based approach |
| 4. Build trust-based relationship early | • Be clear and open about the terms of engagement without being unduly legalistic<br>• View each new interaction as the first step in a long-term relationship, and be willing to take a 'loss leader' approach in this context<br>• Provide technical backup when needed |

Source: CSIRO focus groups; McKinsey team analysis

Continued . . .

## CSIRO BEST PRACTICES IN WORKING WITH SMEs (Continued)

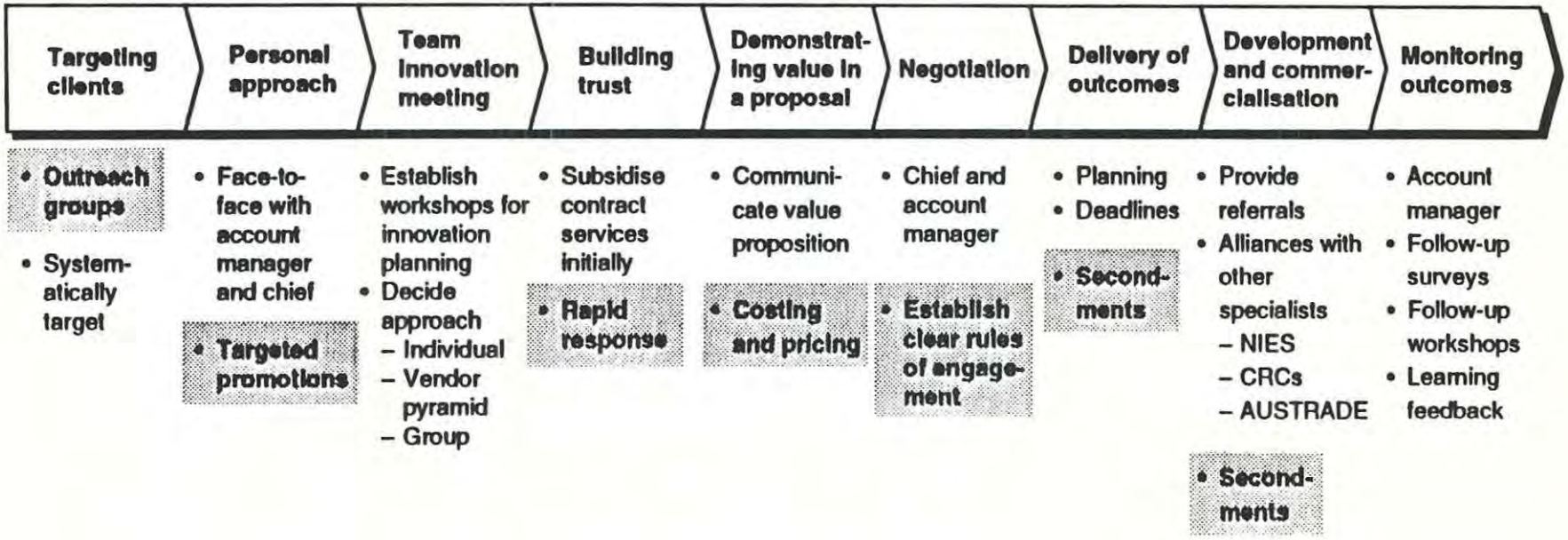
*CSIRO FOCUS GROUPS*

| Best practice | Requirements |
|---|---|
| 5. Encourage secondments | • Provide more secondments in and out as an effective way to transfer skills and encourage an appreciation for the value of technical R&D |
| 6. Ensure quick CSIRO decision making | • Respond to initial inquiries quickly<br>• Ensure legal and other advisers are involved early in the process to prevent hold-ups later on<br>• Streamline approvals process for shorter term work |
| 7. Be more flexible with intellectual property arrangements | • Intellectual property is less important in industries with very short product life cycles like manufacturing and software, so CSIRO should not waste too much energy on securing IP protections if this will delay the SME's development time<br>• Structure contracts and pricing to quarantine CSIRO background IP and allow company to exploit contract specific IP<br>• Allow SMEs to pay full cost and keep ownership of IP or pay royalties |
| 8. Where collaborative research is to be undertaken with SMEs, assist with follow-through to commercialisation where possible | • Provide technical backup<br>• Encourage SMEs to seek advice on business development, marketing etc.<br>• Where appropriate assist with patent support and/or international accreditation processes |

Source: CSIRO focus groups; McKinsey team analysis

## We recommend a model of engagement for developing successful relationships with SMEs, with attention placed on key elements

### MODEL OF ENGAGEMENT




Source: McKinsey team analysis

## Despite the large number of SMEs and their importance to Australia there is a finite number than CSIRO can work with on a sustainable collaborative research basis. If CSIRO targets 1 000 SMEs, pulls 500 into collaborative research each year, and charges them 50% of total costs - this would increase CSIRO's subsidy of SMEs from $26 to $43 million

### MODEL OF ENGAGEMENT

*ESTIMATE*

| | Targeting clients | Personal approach | Team innovation meeting | Building trust | Demonstrating value in a proposal | Negotiation | Delivery of outcomes | Development and commercialisation | Monitoring outcomes |
|---|---|---|---|---|---|---|---|---|---|
| **Resources** | • Account manager (total of 36) | • Account manager<br>• Chiefs | • Account manager<br>• Project manager | • Project manager | • Account manager | • Account manager<br>• Chiefs | • Project manager<br>• Research staff | • Account manager<br>• Project manager | • Account manager |
| **FTE days per SME** | 2 | 1 | 3 | 5 | 2 | 2 | 155 | 35 | 5 |
| **Total SMEs** | 1 000 | 1 000 | 1 000 | 1 000 | 1 000 | 750 | 500 | 500 | 500 |
| **Total cost*** $ Millions | 1.5 | 0.8 | 2.3 | 3.6 | 1.5 | 1.2 | 59.7 | 13.5 | 1.9 |

**Investment in SME relationships $11 million**

**Collaborative research $75 million**

**Total cost - $86 million**
**SME payments - $43 million**
**CSIRO contribution - $43 million**

* Assumes FTE cost per day is $770

Source: McKinsey analysis

## This model only works for firms that can afford to spend around $100 000 on external R&D

### MODEL OF ENGAGEMENT

*ESTIMATE*

| | Targeting clients | Personal approach | Team innovation meeting | Building trust | Demonstrating value in a proposal | Negotiation | Delivery of outcomes | Development and commercialisation | Monitoring outcomes | |
|---|---|---|---|---|---|---|---|---|---|---|
| **FTE days per SME** | 2 | 1 | 3 | 5 | 2 | 2 | 155 | 35 | 5 | |
| • Dedicated to SME | 2 | 1 | 3 | 5 | 2 | 1 | | | | |
| • Share of interactions that do not get to collaborative research | | | | | | | | | | |
| **Cost per SME** Dollars* | 3 000 | 1 600 | 4 600 | 7 700 | 3 000 | 2 300 | 120 000 | 27 000 | 4 000 | **= 173 000** |
| **Contribution from SME** | | | | SMEs receive maximum subsidy for contract services of 5 FTEs/year | | | Assumes SME pays 50% of total relationship cost = $87 000 or pays 60% of total collaborative research project cost<br><br>Over time CSIRO should migrate SMEs to pay 100% of total collaborative research project costs | | | |

* Assumes FTE cost per day is $770

Source: CSIRO interviews; McKinsey analysis

## This 'minimum scale' client contribution can be achieved through 3 approaches for interaction

### 3 APPROACHES FOR SUSTAINABLE INTERACTION

| Individual SME | Vendor pyramid | SME research group |
|---|---|---|
| Working with individual firms that have sufficient R&D intensity to fund an annual involvement with CSIRO of around $100 000 | Working with SMEs as part of a hierarchy of industry vertical relationships | Working with SMEs as part of a targeted research group |

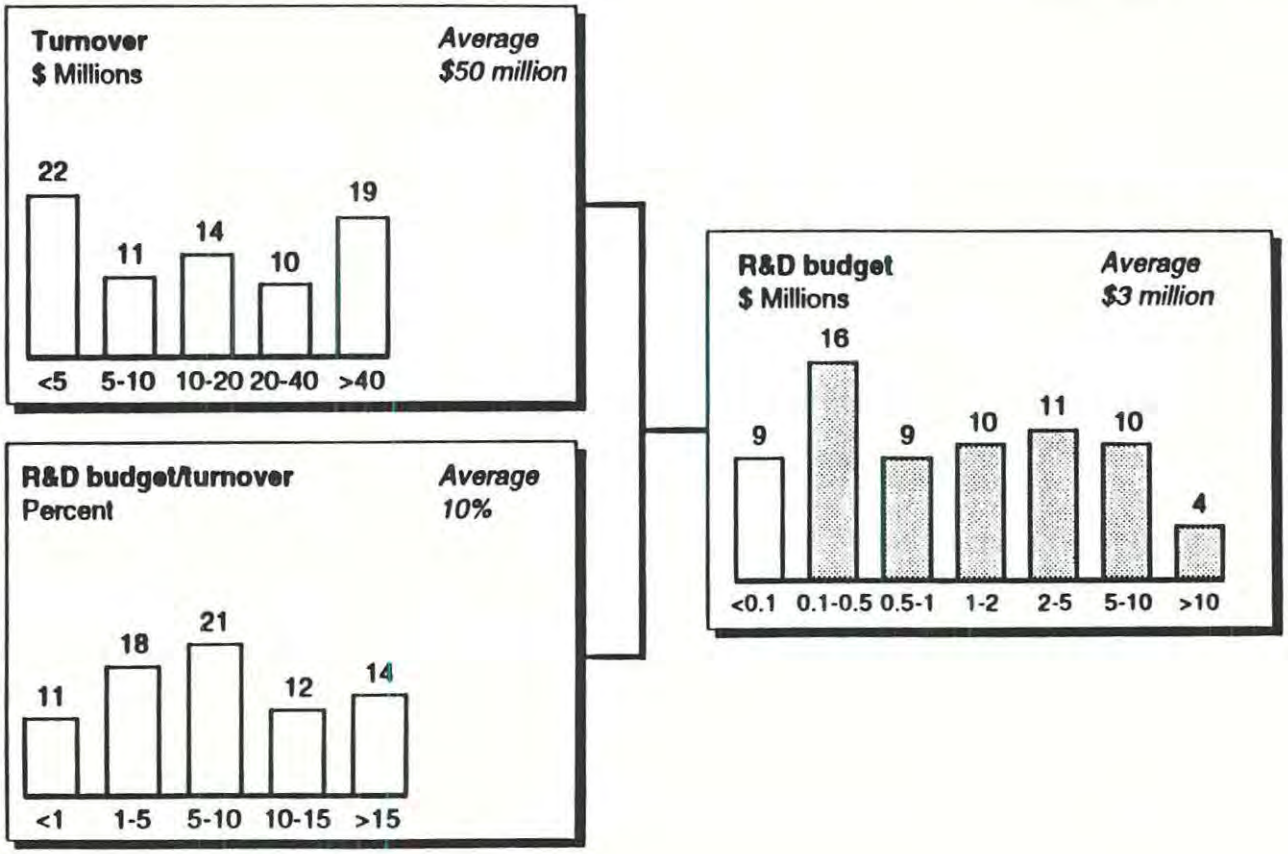
Source: McKinsey team analysis

## Interviews with 79 SMEs suggest that many have sufficiently large R&D budgets for CSIRO to maintain a sustainable collaborative research relationship

### R&D SCALE OF INDIVIDUAL SMEs

100% = 79 firms*

SMEs with R&D budgets large enough to support annual CSIRO costs of $100 000




* Some firms did not answer all questions

Source: CSIRO SME survey; McKinsey team analysis

## CSIRO has many examples of successful collaborative research partnerships with individual SMEs

### SUCCESSFUL CSIRO COLLABORATION WITH INDIVIDUAL SMEs

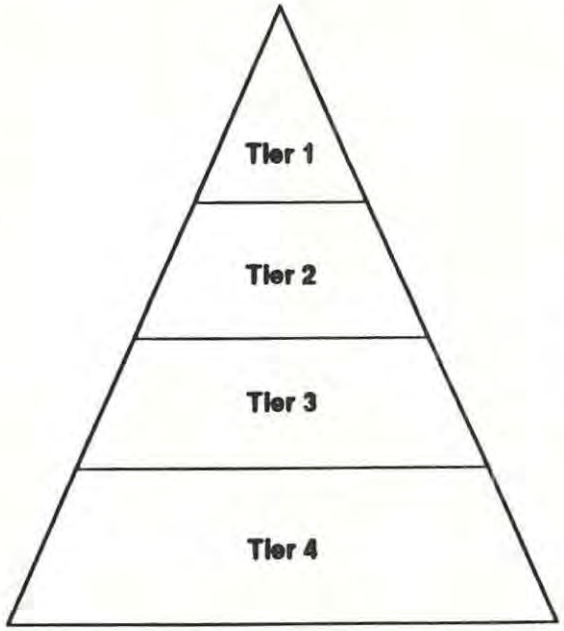
*EXAMPLE*

| Firm | Division | Description of interaction |
|---|---|---|
| Mineral Control Instrumentation | Coal Technology | • Initial development by CSIRO of instrument to monitor photochemical smog<br>• Licensing to MCI for commercial development and marketing with continuing input from CSIRO |
| Nilcra Pty Ltd | Materials Science and Technology | • Development of engineering ceramics, notably PSZ (partially stabilised zirconia) by CSIRO and transfer to Nilcra<br>• Further development of manufactured products by the company with development support from CSIRO |
| Welding Industries of Australia (WIA) | Manufacturing Technology | • Development of synchropulse welding unit by CSIRO based on plasma arc technology<br>• Transfer to WIA for commercialisation and as basis for advanced welding units employed widely in Australia and overseas |

Source: McKinsey team analysis

## SMEs can also be CSIRO collaborative research clients as part of a vendor pyramid, where project funding is jointly shared with larger customers of the SME

### VENDOR PYRAMID: AEROSPACE



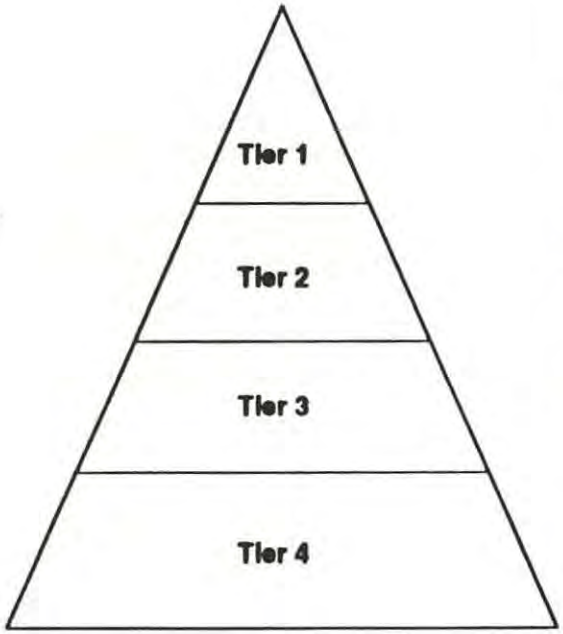

| Description | Example | Interaction process |
|---|---|---|
| Suppliers of final goods to end users | Boeing (US) | CSIRO negotiates a long-term collaborative research partnership |
| Suppliers of specialised intermediate goods | Hawker de Havilland (Aust.) | CSIRO pulls Hawker de Havilland into research to become a potential supplier of aircraft components |
| Suppliers of less specialised intermediate goods | Aerospace Technologies of Australia | CSIRO pulls ASTA into research to become a potential supplier of composite materials and other components |
| Suppliers of materials and standard components | Specialist Australian engineering firms involved in airframe design, avionics and test equipment | CSIRO pulls firms into research to supply specialised ongoing services for airframe assembly and design |

Source: Aymever Consulting Services; McKinsey team analysis

# We can envisage a similar vendor pyramid relationship in telecommunications

## VENDOR PYRAMID: TELECOMMUNICATIONS

*HYPOTHETICAL*




| Description | Example | Interaction process |
|---|---|---|
| Suppliers of final goods to end users | Telecom | CSIRO identifies Telecom equipment need and gets them to sponsor research into development of this equipment |
| Suppliers of specialised intermediate goods | Nortel | CSIRO pulls Nortel into collaborative research as global systems vendor |
| Suppliers of less specialised intermediate goods | Exicom (Aust.) | CSIRO pulls Exicom into collaborative research to become the local Australian commercial supplier of the equipment and to provide equipment support |
| Suppliers of materials and standard components | | |

Source: McKinsey team analysis

## CSIRO can work with SMEs as part of a targeted research group. CSIRO have had some positive experiences with this approach in Australia

### CSIRO SYNDICATED FAN RESEARCH PROGRAM

| CSIRO objectives | Participants | Funding approach | Process |
|---|---|---|---|
| • Pull together a syndicate of fan users and manufacturers with a common interest in new fan design tools<br>• Build upon CSIRO's experience from the aircraft industry in computational fluid dynamics | • CSIRO Division of Building, Construction and Engineering<br>• Fan users (especially mining companies)<br>• Fan manufacturers | • Syndicate raised $200 000 for a 2-year research project<br>• CSIRO subsidised about 50% of total costs | • Research team leader and AMIRA marketed the project to potential participants<br>• AMIRA helped assemble mining company users and managed syndicate<br>• Manufacturers became associate members of AMIRA for the duration of project<br>• Syndicate members gained 2-year exclusive right to use design tools<br>• Some contracted CSIRO to work on their particular application |

Source: McKinsey team analysis

**In the UK, the Leatherhead Food Research Institute has found a valuable niche assisting food industry SMEs with their technology transfer needs . . .**

## LEATHERHEAD FOOD RESEARCH INSTITUTE (UK)

| Membership | Cost | Services provided |
|---|---|---|
| • Mainly SMEs from the food industry<br>• Some international members (including 12 from Australia) | • Different levels of subscription are possible<br>• Most members pay a fixed sum, e.g. $5 000 p.a.<br>• Individuals can also participate in contract research projects<br>• 100% privately funded | • Information newsletter/library facilities<br>• Seminars/conferences<br>• Enquiries on technical, legislative or market issues (24 hours)<br>• Business consultancy services<br>• Troubleshooting<br>• Access to laboratories, i.e. for testing<br>• Brokerage to buy members outside research<br>• Generic results of strategically targeted research |

Source: McKinsey team analysis

## . . . but there are cultural barriers to this type of targeted research group model in Australia

### TARGETED RESEARCH GROUPS

| Australian experience | Overseas experience |
|---|---|
| Local Leatherhead initiative faltered due to a lack of interest from local SMEs | In Germany, Steinbeis and Fraunhofer Gesellschaft organise SME research groups in areas of common interest |
| 62% of the SMEs we surveyed indicated a low interest in small business research clubs | In Japan, Kohsetsushi arranges cohorts of SMEs to share experiences and access latest technology quickly |
| Some success with large firms in the mining industry (AMIRA) | |
| SME attitudes may slowly be changing<br>• CSIRO Sensory Research Centre<br>• Australian Scientific Instruments Export Group<br>• Telecommunications Export task force<br>• DITARD networking programs<br>• NIES<br>• CRCs<br>• AUSTRADE networking programs | |

Source: McKinsey team analysis

## CSIRO needs to commit to a number of significant changes to successfully implement the relationship model

### STEPS TOWARDS WORKING BETTER WITH SMEs

| | |
|---|---|
| **Establish an outreach program** | • Dedicated Institute account managers<br>• Systematise understanding of clientele and develop targets<br>• Arrange visits and manage relationship<br>• Prepare promotions program to market to SMEs |
| **Extend secondments** | • Almost all successful CSIRO cases included people transfer<br>• McKinsey & Company's work for research organisations in Holland and Germany confirms the central importance of secondments and people transfer as mechanisms for delivering technology transfer to SMEs |
| **Establish rapid response capability for targeted clients** | • Contact through account manager<br>• Support of chiefs and project managers |
| **Strengthen governance and accountability processes** | • Understanding cost is critical for collaborative research<br>• Upgrade pricing guidelines to price according to value<br>• Introduce confidentiality procedures and ask clients to sign indemnifications |
| **Provide clear rules of engagement** | • Decide model of approach<br>• Include due diligence requirements<br>• Establish standard legal and IP options<br>• Specify accountabilities for completing work<br>• Define approach to monitoring |

Source: McKinsey team analysis

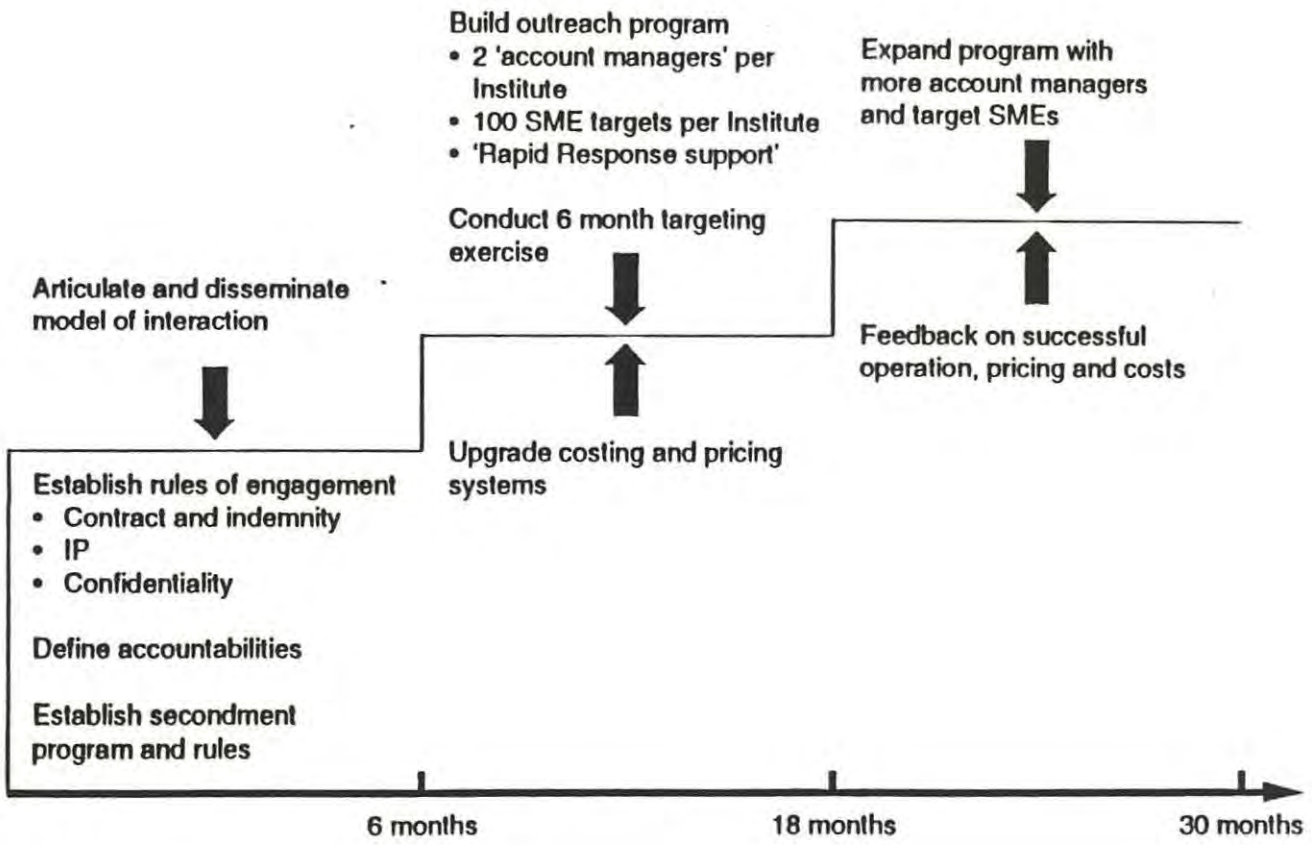
## The first step in implementation is developing target SME client lists

### DEVELOPING TARGET SME CLIENT LISTS

| | Target sectors | Understand sectors | Screen particular firms |
|---|---|---|---|
| **Activity** | Establish target sectors through CSIRO research priorities | Understand sector structure and market dynamics<br>• Identify industry clusters and value chains<br>• Describe domestic and international vendor pyramids<br>• Understand domestic and international regulatory regimes | Screen-selected SMEs based on CSIRO's experience of SME characteristics for success<br>• Capacity to commercialise<br>• Ability to pay CSIRO |
| **Resources** | CSIRO priorities exercise | Initially - 2 people per Institute for 6 months with outside surveys of key criteria such as R&D spending history and product history of firm | |

## CSIRO should expand the program in manageable steps

### IMPLEMENTATION: ESCALATING STAIRCASE OF CAPABILITY AND COMMITMENT



## The Entrepreneurial Innovator Model

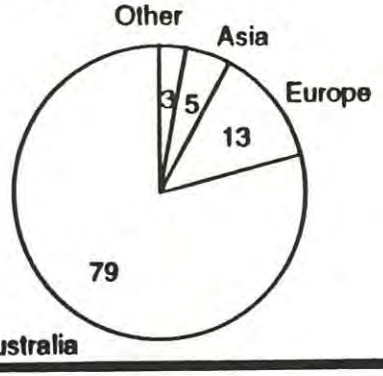
# The leaders of the high-growth SMEs can best be described as 'entrepreneurial innovators'

### PROFILE OF SME MANAGING DIRECTORS

*CSIRO SURVEY*

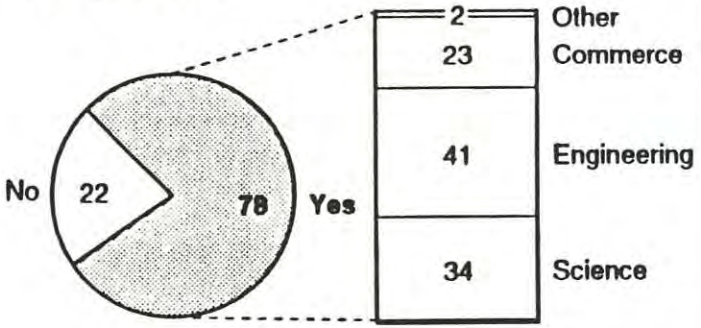
**Most born in Australia**

**Place of birth of CEOs**
100% = 79 CEOs



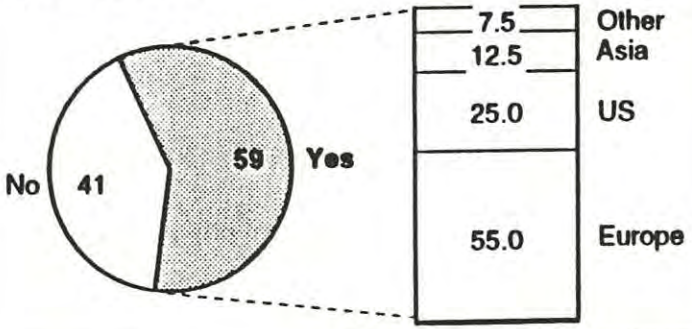

**Engineering, science and commerce qualifications**

**CEO tertiary qualifications**
100% = 79 CEOs




**Many have lived overseas***

**CEOs who have lived overseas**
100% = 79 CEOs




**Catalytic event**

**Why they created SME**

Interest in science, engineering and technology from childhood or family

Employment frustration/dissatisfaction

Saw opportunity from previous work or overseas experience

Strong desire to work for themselves

* Resided overseas for a period of at least a year

Source: CSIRO SME survey; McKinsey team analysis

## CSIRO can play an important role in actively developing more entrepreneurial innovators for Australia

### MECHANISMS TO DEVELOP ENTREPRENEURIAL INNOVATORS

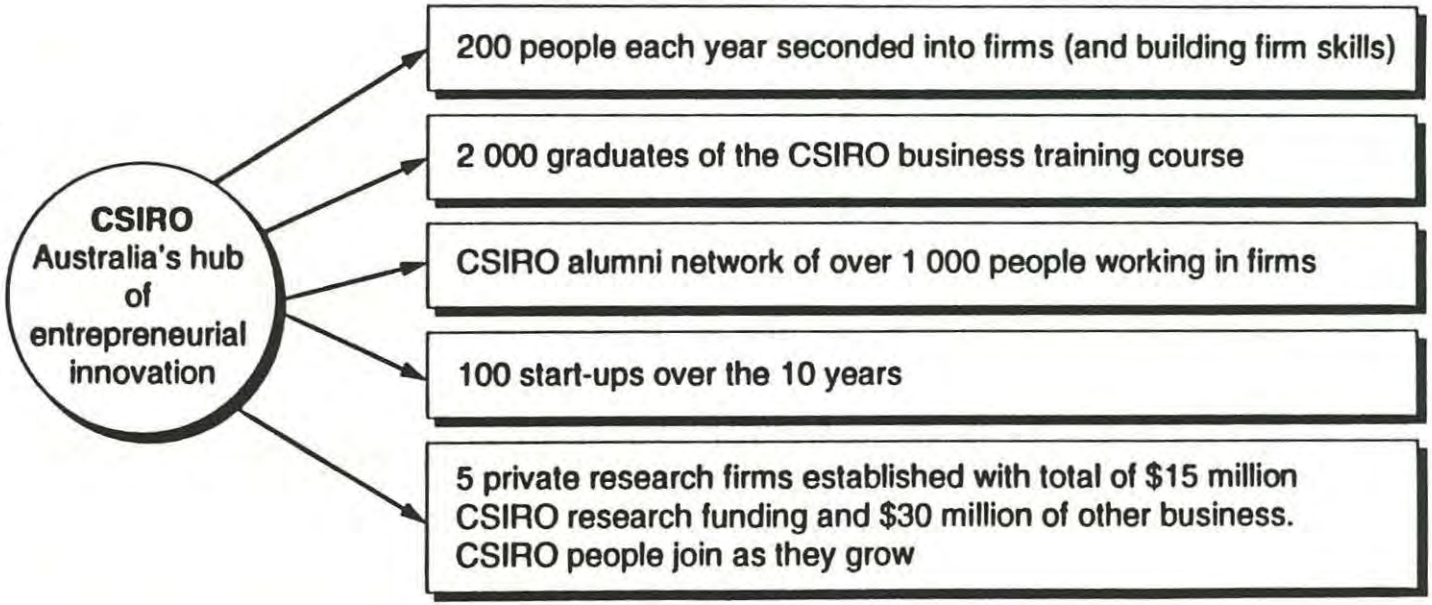
**Mechanisms to develop entre-preneurial innovators**

| | |
|---|---|
| Secondment program part of career structure | • 5% staff (200 people) on program at any one time<br>• Career path designed to allow secondment<br>• Staff should be encouraged to spend 2 years out of the first 5 on secondment and 1 year out of every 5 thereafter<br>• Advancement linked with successful secondment |
| Transform recruiting, training and reward systems to encourage commercial behaviour | • Cohort business training across CSIRO in negotiation skills, project management, entrepreneurism, marketing and finance<br>• Recruit more mid-career CSIRO people from private sector<br>• Change PPE to explicitly reward secondment, practical achievement and successful commercial outcomes<br>• Allow staff to take 'sweat equity' in their commercial achievements |
| Encourage staff to move permanently to industry | • First appointment for term of 3 years (up or out policy)<br>• Genuine (internal) outplacement assistance<br>• Build a strong alumni network<br>• Seek 100 extra people p.a. leave for industry |
| Support CSIRO entrepreneurs through start-up phase | • Generous leave without pay to establish enterprise<br>• Low rent access to essential equipment and facilities<br>• Incubator space in CSIRO |
| Subcontract more research to private SMEs | • Encourage CSIRO staff to establish private sector research organisations like Invetech<br>• Aim to subcontract $10-20 million of research to these firms by 1995<br>• CSIRO to retain share in the firms and royalties from any technology that is commercialised |

Source: McKinsey team analysis

## This model could have significant impact on entrepreneurial innovation skills in Australia

**VISION OF ENTREPRENEURIAL INNOVATION IN 2002**



## The Steinbeis/Kohsetsushi Model

**Although there are many technology programs and strong skills in the public sector in Australia, there is no widespread practical, accessible front-line advice mechanisms for firms**

### TECHNOLOGY ASSISTANCE PROGRAMS AND RESOURCES

*ESTIMATE*

**Over 45 technology assistance programs**

- 150% tax incentive
- Grants for industrial R&D
- Generic technology grants
- NIES
- Advanced Manufacturing Technology Development Program
- Partnerships for Development
- Discretionary Grants Scheme
- Cooperative Research Centres
- Plus 37 more

**Extensive resources and skills***

| | Number of staff | Budget |
|---|---|---|
| **CSIRO** | 7 000 ** | $700m |
| **UNIs** | 18 000 | $1 000m |
| **DSTO and other public research institutions** | 14 000 | $600m |
| **Total** | **39 000** | **$2.3b** |

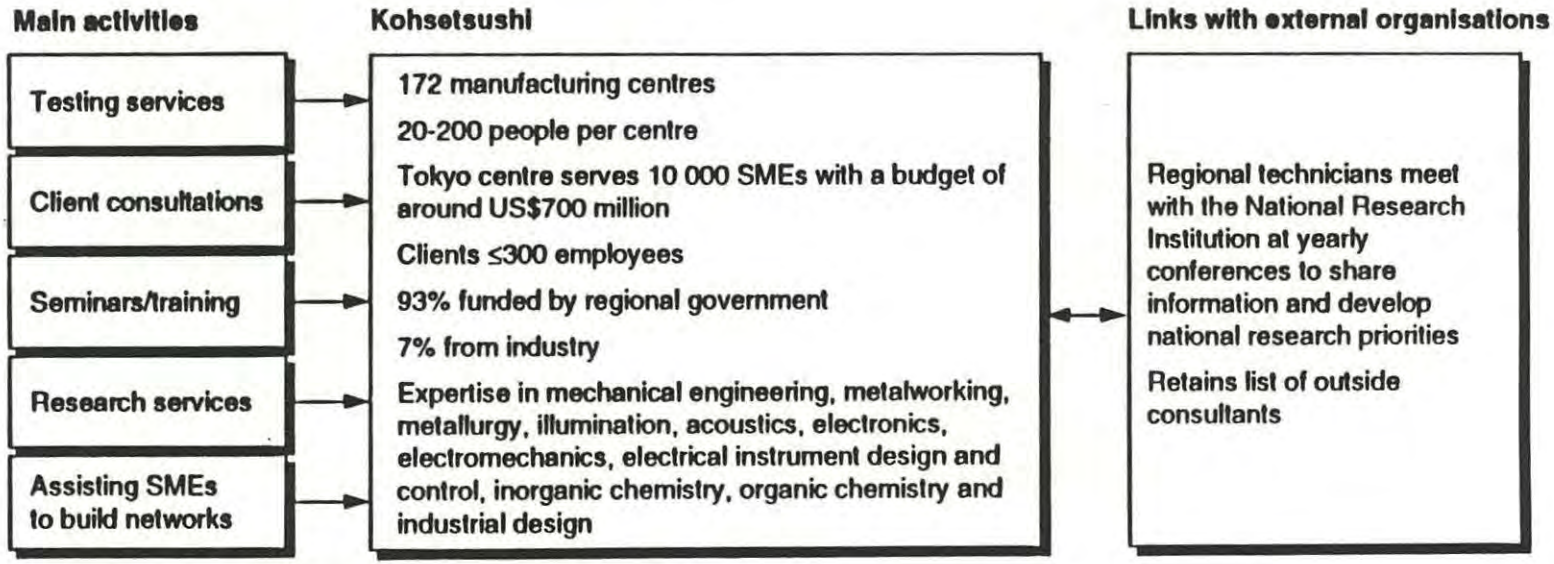
* 1988-89 data

** 1992 data

Source: NIES; Australian Science and Innovation Resources Brief 1992; DITAC

## Our review of overseas models has identified an important gap in Australia's innovation support. In Japan, over 170 'Kohsetsushi' centres provide practical, accessible, front-line technology advice to firms

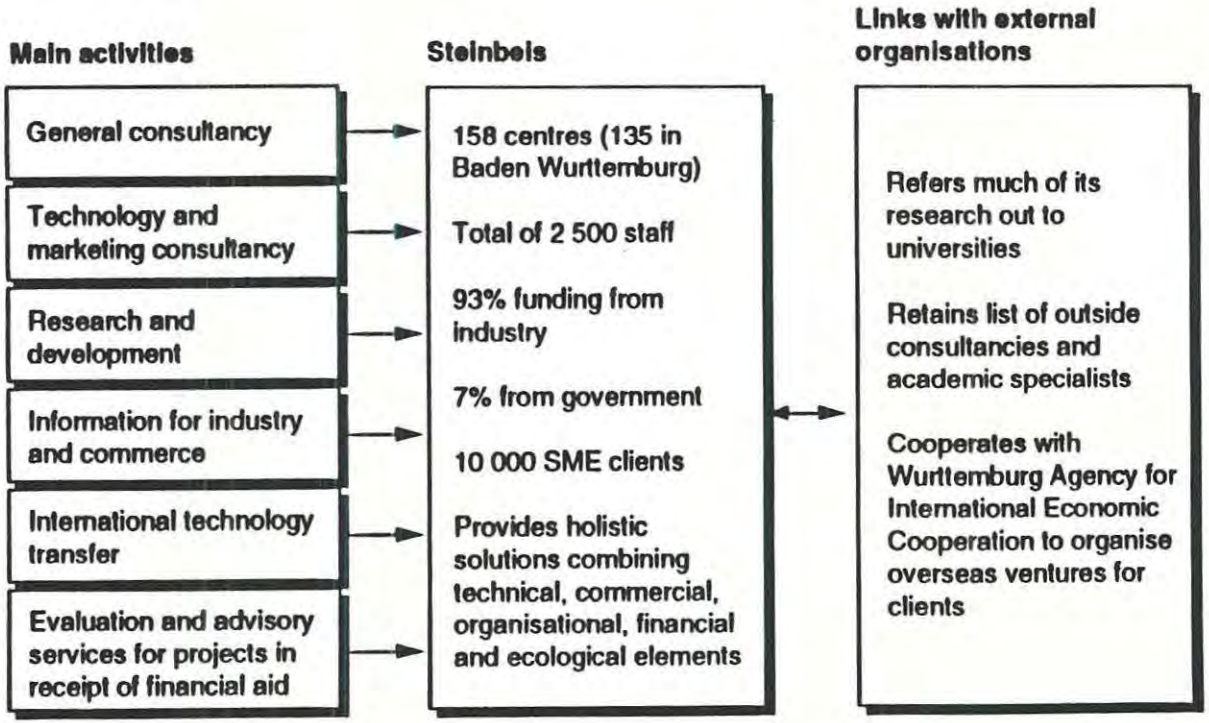
### KOHSETSUSHI CENTRES (JAPAN)




Source: Interviews; McKinsey team analysis

## In Baden Wurttemburg in Germany, a network of over 158 Steinbeis Gesellschaft centres provide integrated front-line assistance to firms around a strong technology core

### STEINBEIS GESELLSCHAFT (GERMANY)

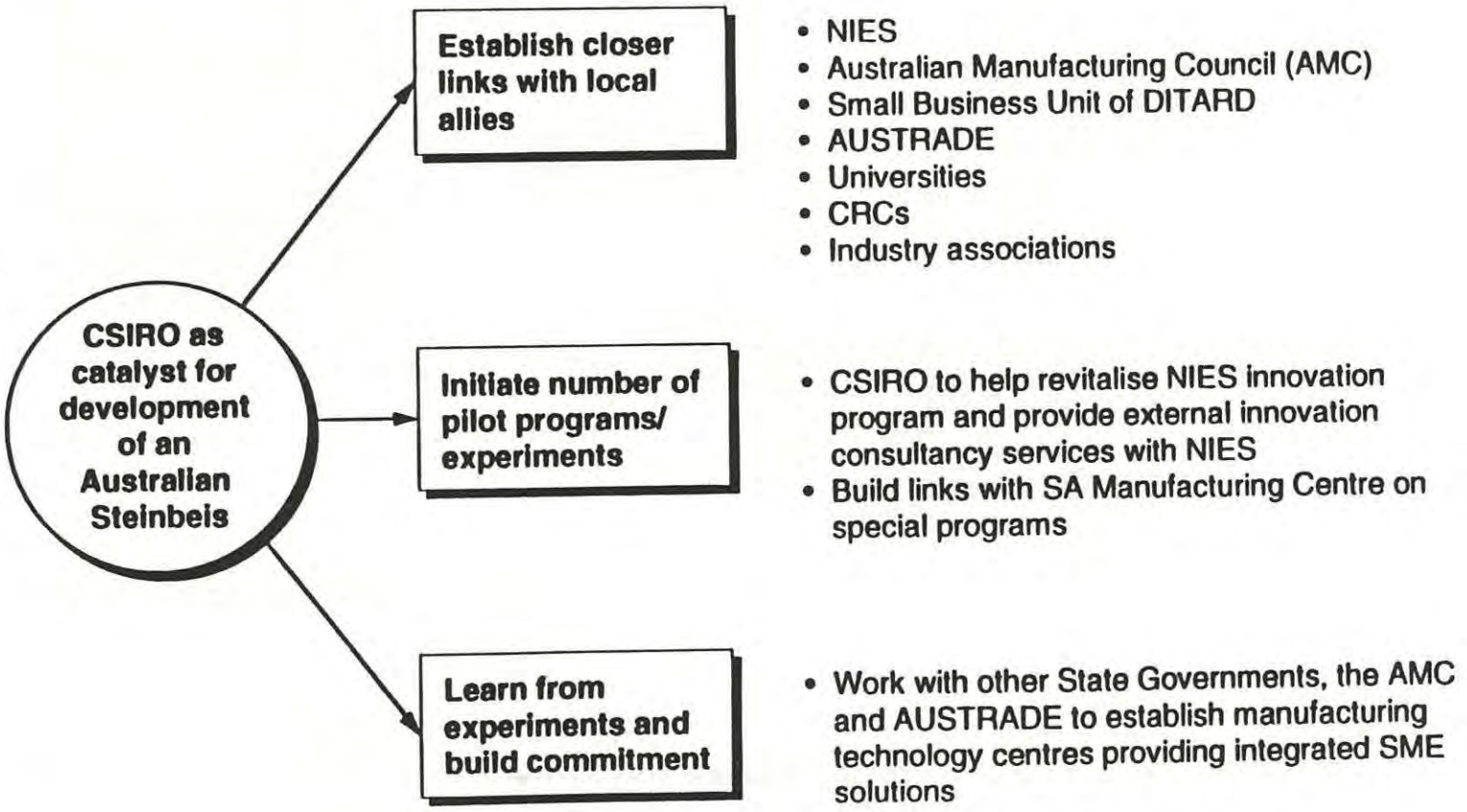



Source: Steinbeis Gesellschaft 1992 Annual Report; interviews; McKinsey team analysis

**CSIRO could be an important catalyst in creating high-profile focal points, similar to the Steinbeis/Kohsetsushi centres, for the development of practical front-line technology assistance to SMEs across Australia. CSIRO needs to initiate a number of experiments with other local organisations to learn and build commitment to the concept**

## CSIRO RECOMMENDED APPROACH

*PRELIMINARY*

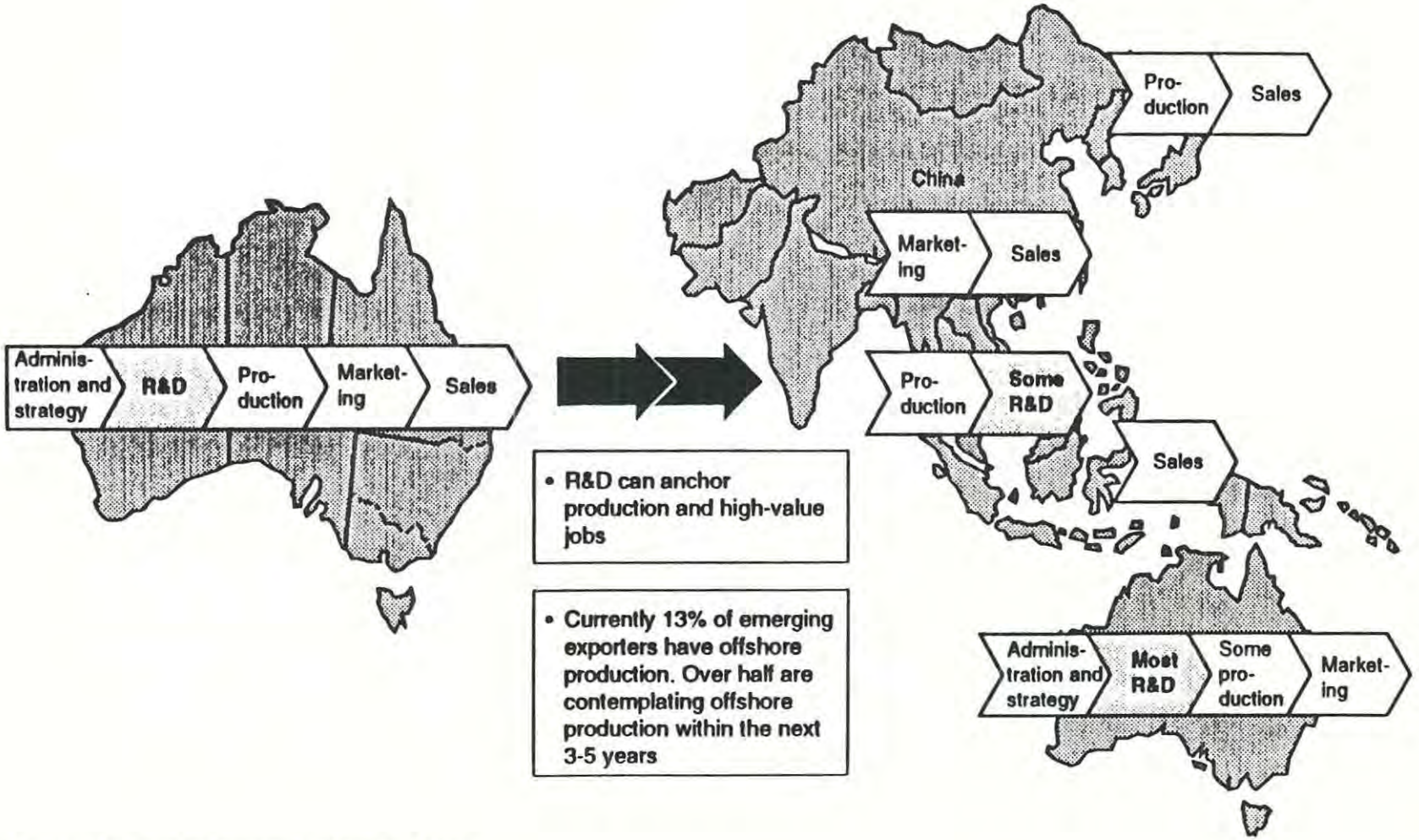



Source: McKinsey team analysis

## Regional Technology Node Model

**SMEs' business systems are internationalising and Australia can attract more regional SME activity by attracting regional R&D activity**

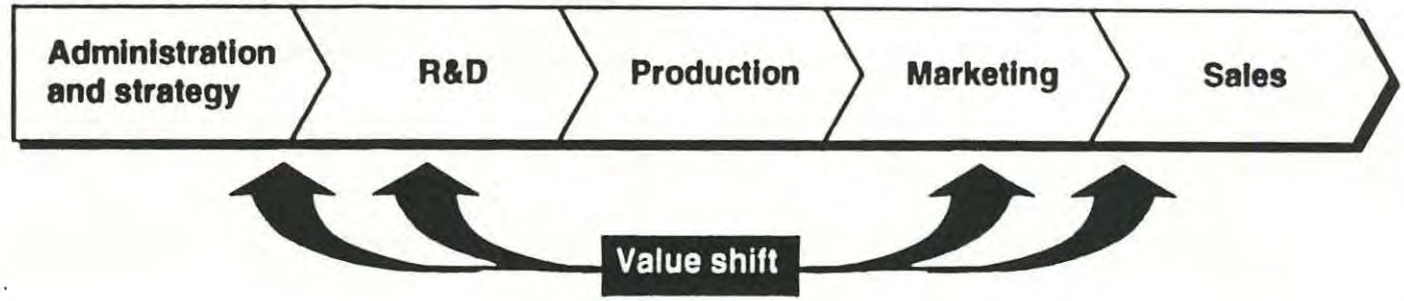
**INTERNATIONALISING BUSINESS SYSTEMS**




Source: AMC/McKinsey Report, December 1991

## And in many industries, value is shifting from production into product and process design and the customer relationship

### SHIFTING VALUE IN SME BUSINESS SYSTEMS




Becomes a commodity

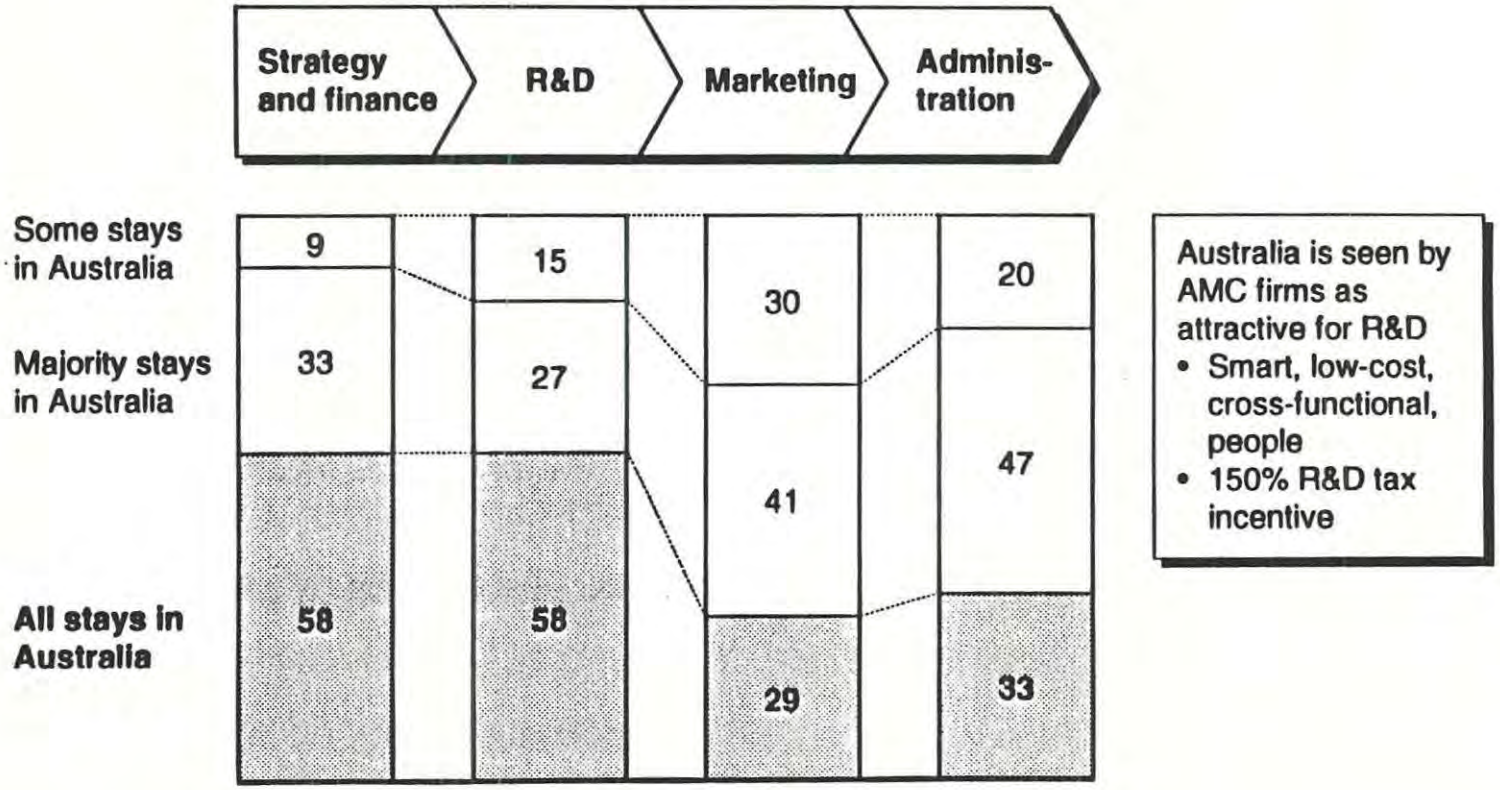
OR

Goes to lower cost sites

| Example | Australian example |
|---|---|
| GE Walkman<br>• Production cost small (Mexico and Malaysia)<br>• Value is in design (US) and brand (US) | Ansell rubber products |

## In this emerging environment R&D can anchor jobs in Australia as some production goes offshore*

### SHARE OF BUSINESS SYSTEM STAYING IN AUSTRALIA

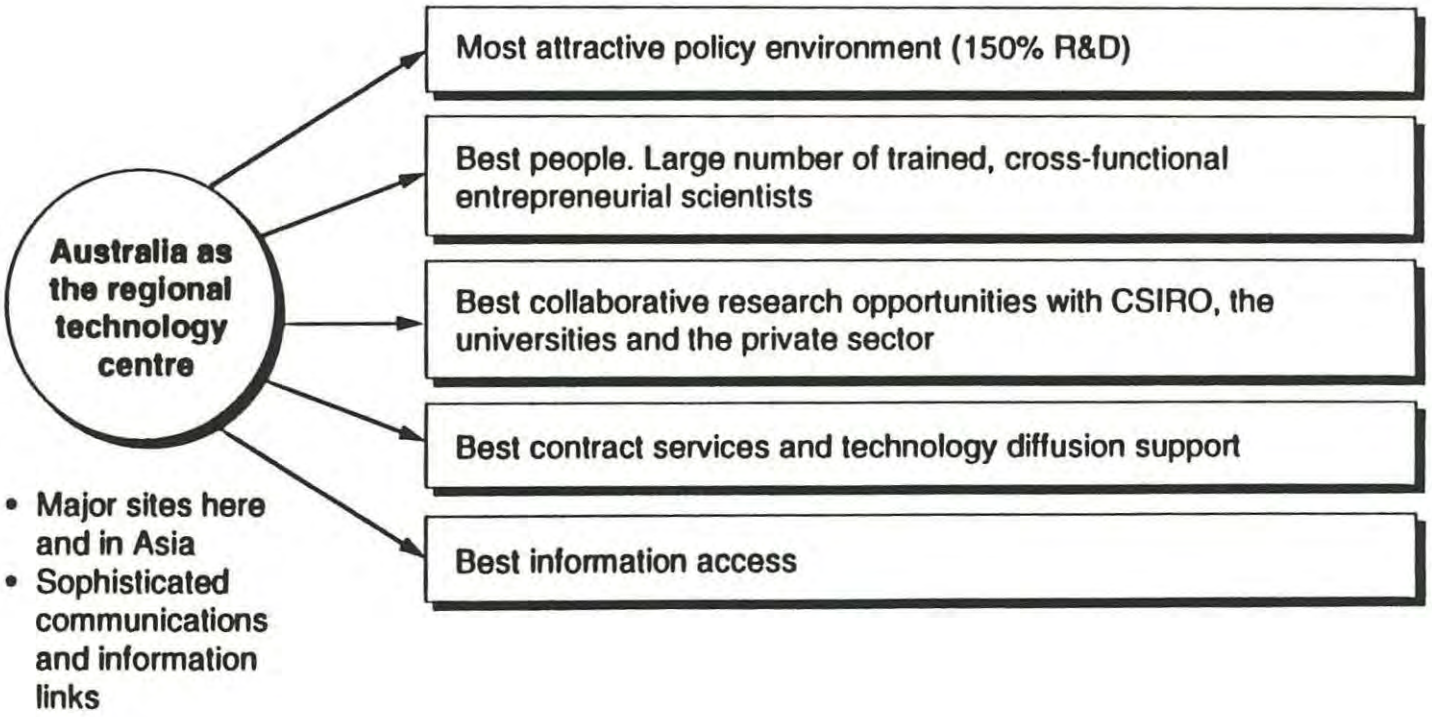



* Based on 39 respondents with offshore production

Source: Survey responses

**CSIRO can help anchor Australian R&D and production jobs, and attract other SMEs in the region to situate R&D and critical production here by establishing Australia as the centre for SME technology activity in the region**

**VISION FOR AUSTRALIA'S FUTURE COMPETITIVENESS**



# APPENDICES

- **Data sources and approach**

- **Additional findings from CSIRO SME survey and from the AMC Emerging Exporters survey**

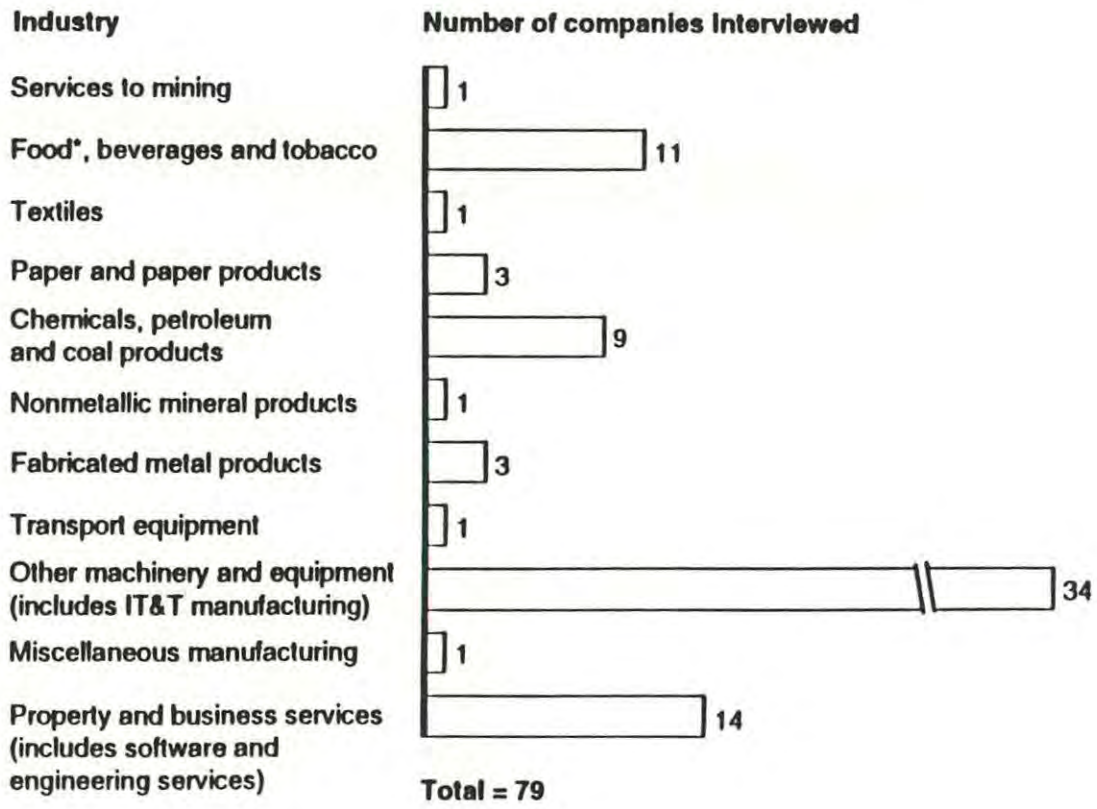
- **Assessment of the 30% external funding requirement**

- **CSIRO RESPONSES TO STUDY TEAM RECOMMENDATIONS**

## These 79 SMEs included a diversity of industry classifications

**INDUSTRY CLASSIFICATION OF OUR INTERVIEWS HIGH VALUE-ADDED SMEs**

Number of companies




* Excludes primary produce (ASIC 01)

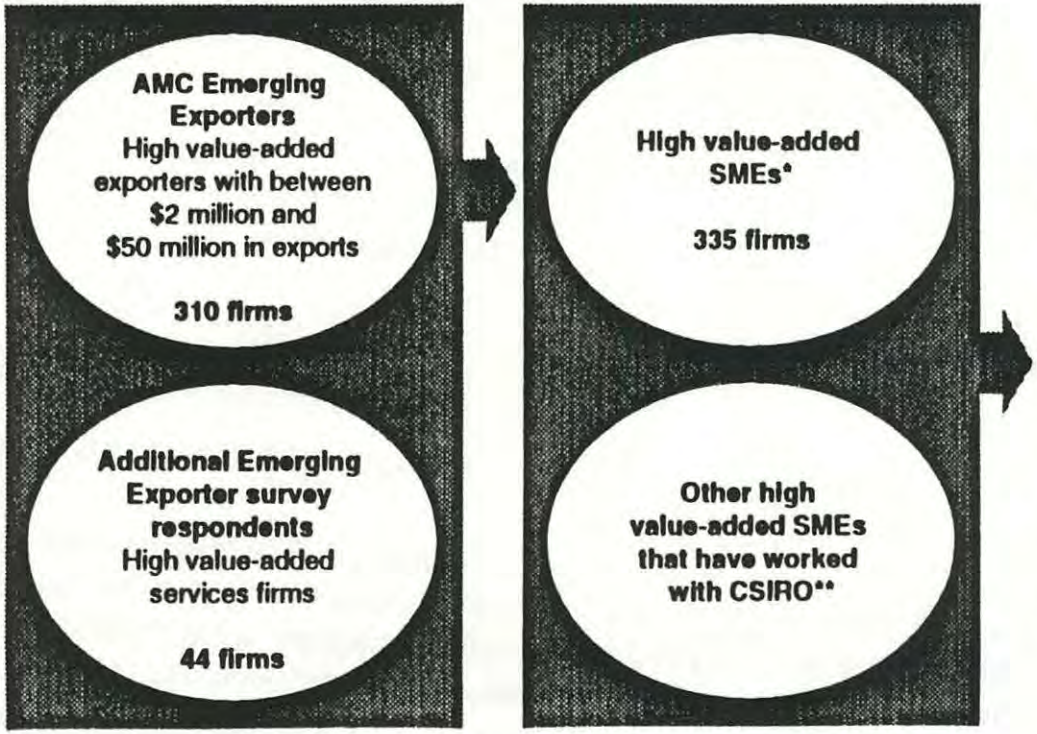
Source: CSIRO SME survey; McKinsey team analysis

# ADDITIONAL FINDINGS FROM CSIRO SME SURVEY AND FROM THE AMC EMERGING EXPORTERS SURVEY

## OUR DATA SOURCES AND APPROACH

**Our project utilised data based on an internal view from CSIRO staff, external views from high value-added SMEs and an overseas view of approaches to providing technology support to SMEs**

### DATA SOURCES FOR THIS PROJECT




**Internal view**
Focus groups with 30 senior CSIRO staff and interviews with selected senior CSIRO managers

**External view**
79 firms interviewed and focus groups with 30 firms

**Overseas view**
Review of overseas models of technology transfer including McKinsey & Company projects in Holland, Germany and the UK

* With either less than 500 employees or $100 million in revenue (note that not all Emerging Exporters were SMEs)

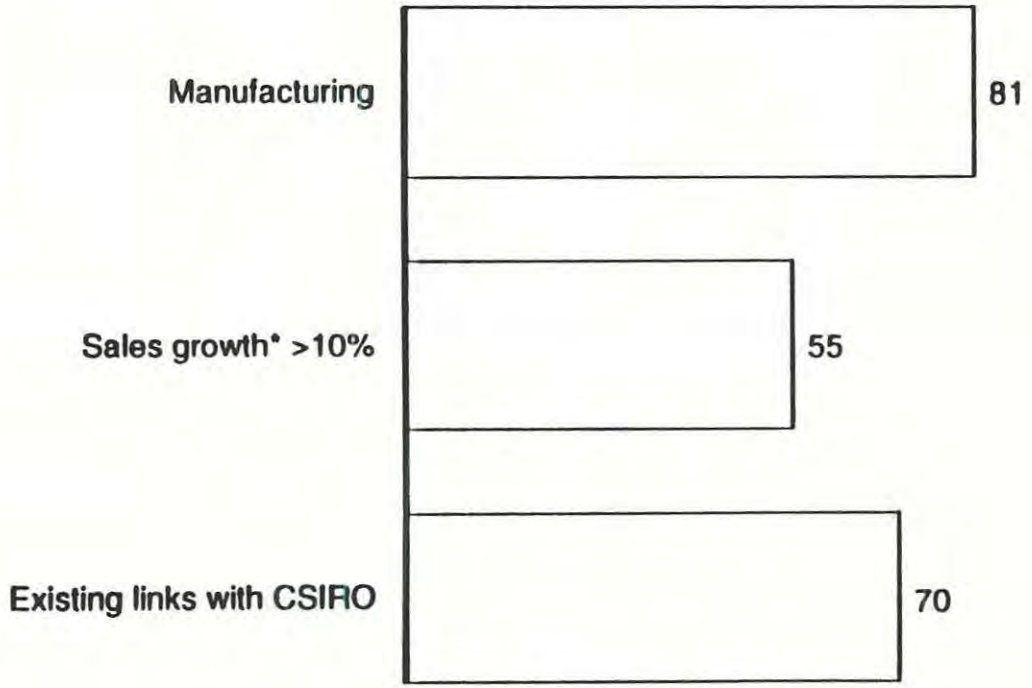
** Names and numbers provided by CSIRO staff

**The data included team interviews with 79 SMEs drawn from the AMC survey and augmented with additional high value-added service firms. While this sample of SMEs provided a valuable source of additional SME firm data, the sampling process led to some biases**

**BIASES IN CSIRO SME SURVEY**

*CSIRO SURVEY*

Percent of total SMEs surveyed



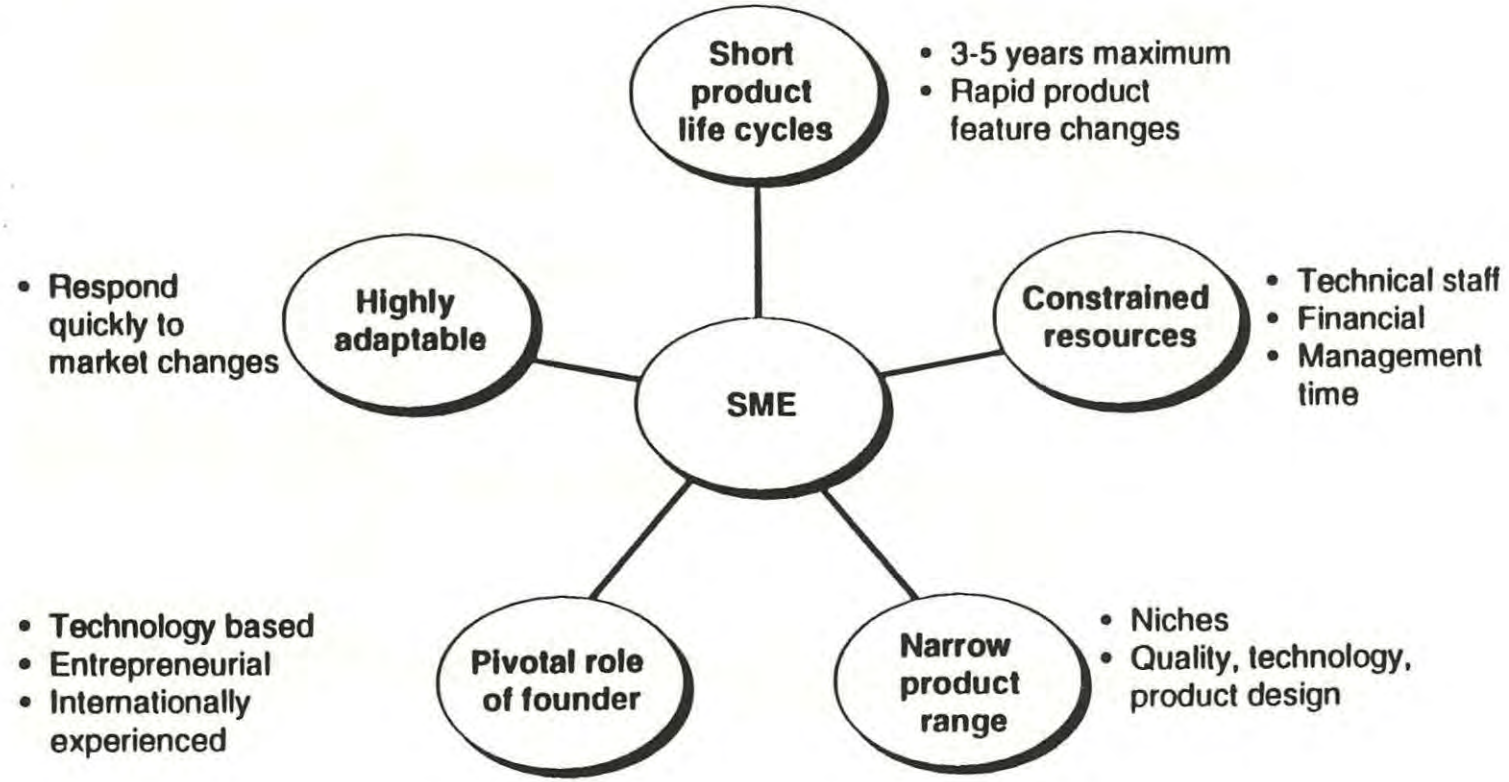

* Real p.a. over the last 5 years

Source: CSIRO SME survey; McKinsey team analysis

## High value-added SMEs have a set of unique characteristics which lead to different interaction needs from large companies

**UNIQUE CHARACTERISTICS OF SMEs**

*CSIRO SURVEY*



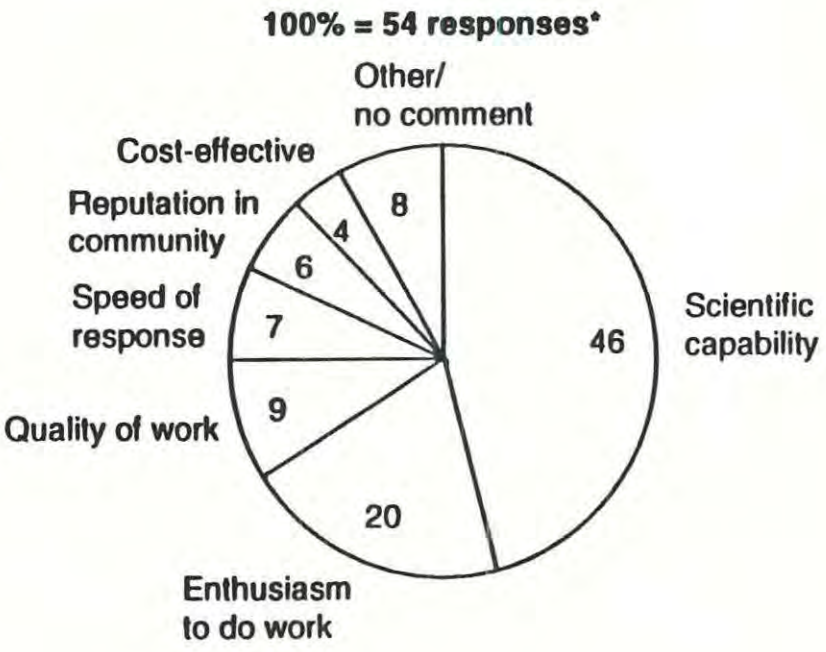

Source: CSIRO SME Survey; McKinsey team analysis

## From the client's perspective some of CSIRO's interactions with SMEs are leading to positive outcomes

**RESPONSE TO QUESTION: WHAT DID YOU THINK WAS PARTICULARLY GOOD ABOUT CSIRO?**

*CSIRO SURVEY*

Percent




**Selected quotes**

*'Some pockets of world-class excellence'*

*'Personal enthusiasm and cooperation'*

*'Willing to take on any project'*

*'Do a damn good job for funding problems they have. The exploration and mineral science division is exceptional - has made strong working relationships with industry'*

* Of the 79 SME interviewed, 54 had previous contact with CSIRO

Source: CSIRO SME survey; McKinsey team analysis

**But generally, the low linkages of high value-added SMEs with external R&D providers including CSIRO is due to the historical shortfall in the ability of external R&D providers to meet the needs of these firms**

**SME LINKAGES TO EXTERNAL R&D PROVIDERS**

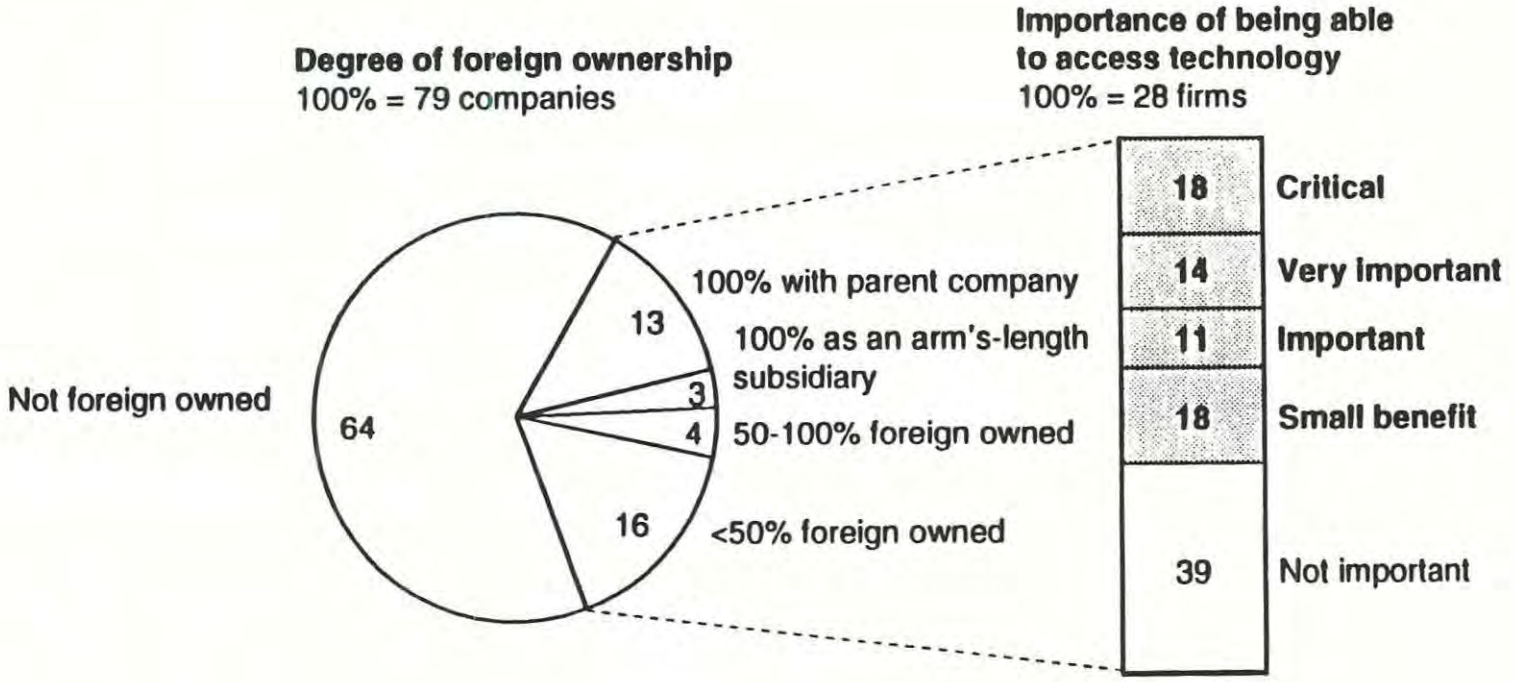
- Many are not using external R&D providers in Australia because these providers do not meet their needs - particularly in terms of cost, responsiveness, timeliness of results, value and commercial understanding
- Many identified benefits in accessing technology from foreign parent companies
- Few, and possibly none, use foreign external R&D providers
- SMEs with the highest export propensity and growth expressed a stronger need for technology as a source of competitive advantage
- Export focused SMEs - such as the born globals - expressed a greater need for assistance in changing product specifications to meet peculiar demands of a new foreign market
- The smaller companies have the least interaction with CSIRO but a higher percentage of small companies list technology as important to their competitive advantage
- We could find no connection between firms' industry or product and their use of external R&D providers. Our sample of IT and software SMEs indicated similar R&D issues to the other high value-added SMEs interviewed, though most operated in markets with very short product lifecycles and therefore placed less importance on controlling intellectual property rights

**Just over a third of the SMEs interviewed have any degree of foreign ownership, and most believe there is a benefit in accessing technology from the foreign company**

**DEGREE OF FOREIGN OWNERSHIP**

*CSIRO SURVEY*

Percent

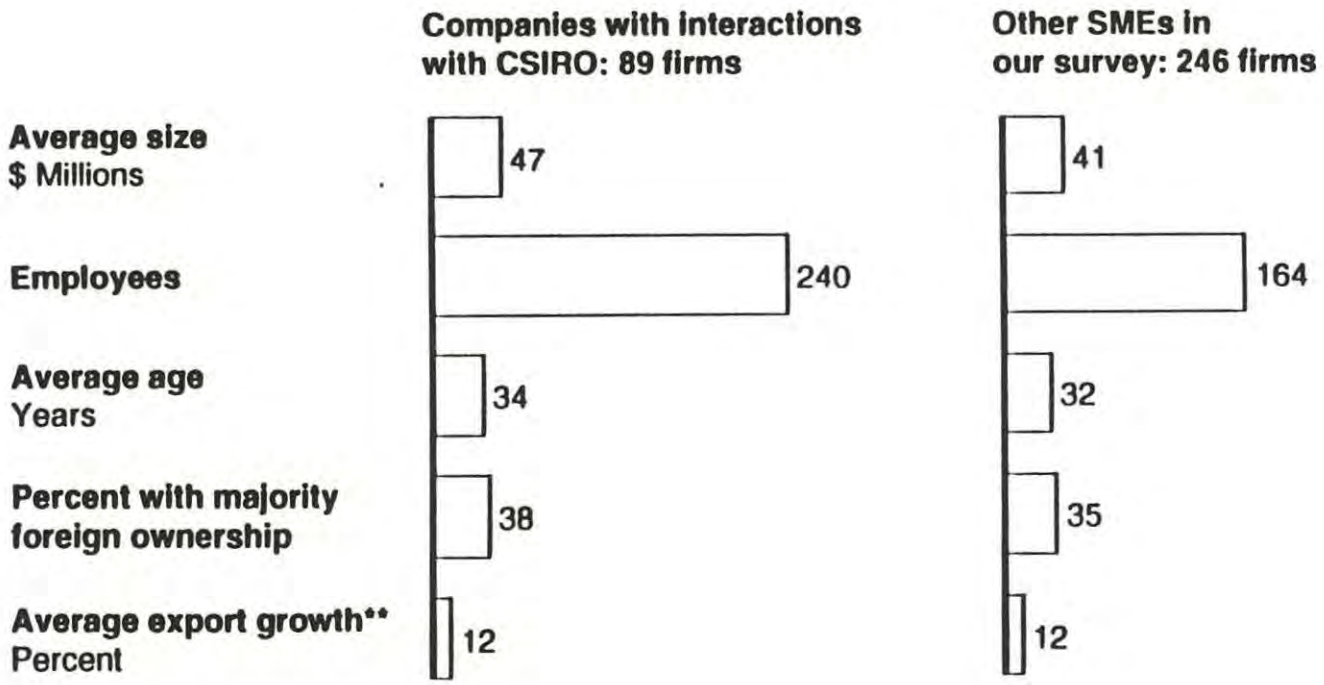



Source: CSIRO SME Survey; McKinsey team analysis

**Companies that have links with CSIRO are larger, older and have less foreign ownership than the average SME in our survey. There is no difference in the average export growth of companies with interactions with CSIRO**

## CHARACTERISTICS OF COMPANIES INTERACTING WITH CSIRO*

*AMC SURVEY*




* Firms that have had interaction with CSIRO in the last 5 years

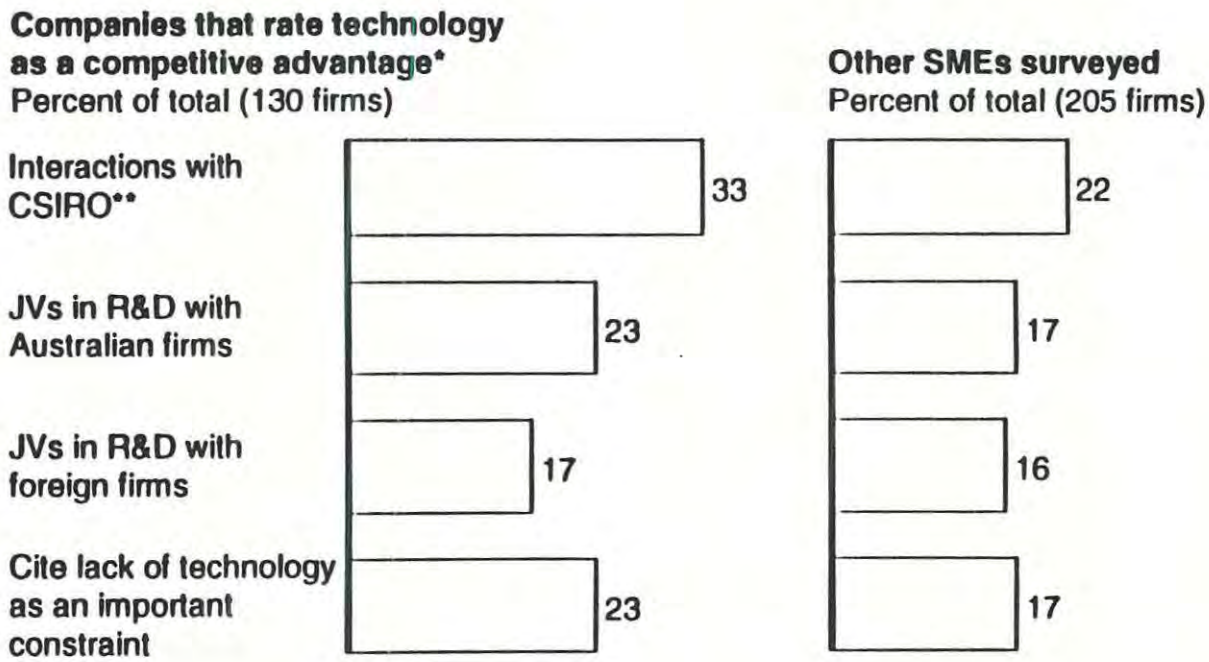
** Compound real p.a. for 1986-87 to 1991-92

Source: AMC Emerging Exporters Survey; CSIRO Division Chiefs

## Companies that cite technology as a competitive advantage are more likely to be working with CSIRO, have joint ventures in R&D with other Australian companies and to consider lack of technology as an important constraint to growth

**FIRM CHARACTERISTICS**

*AMC SURVEY*




* One of 3 competitive advantages specified

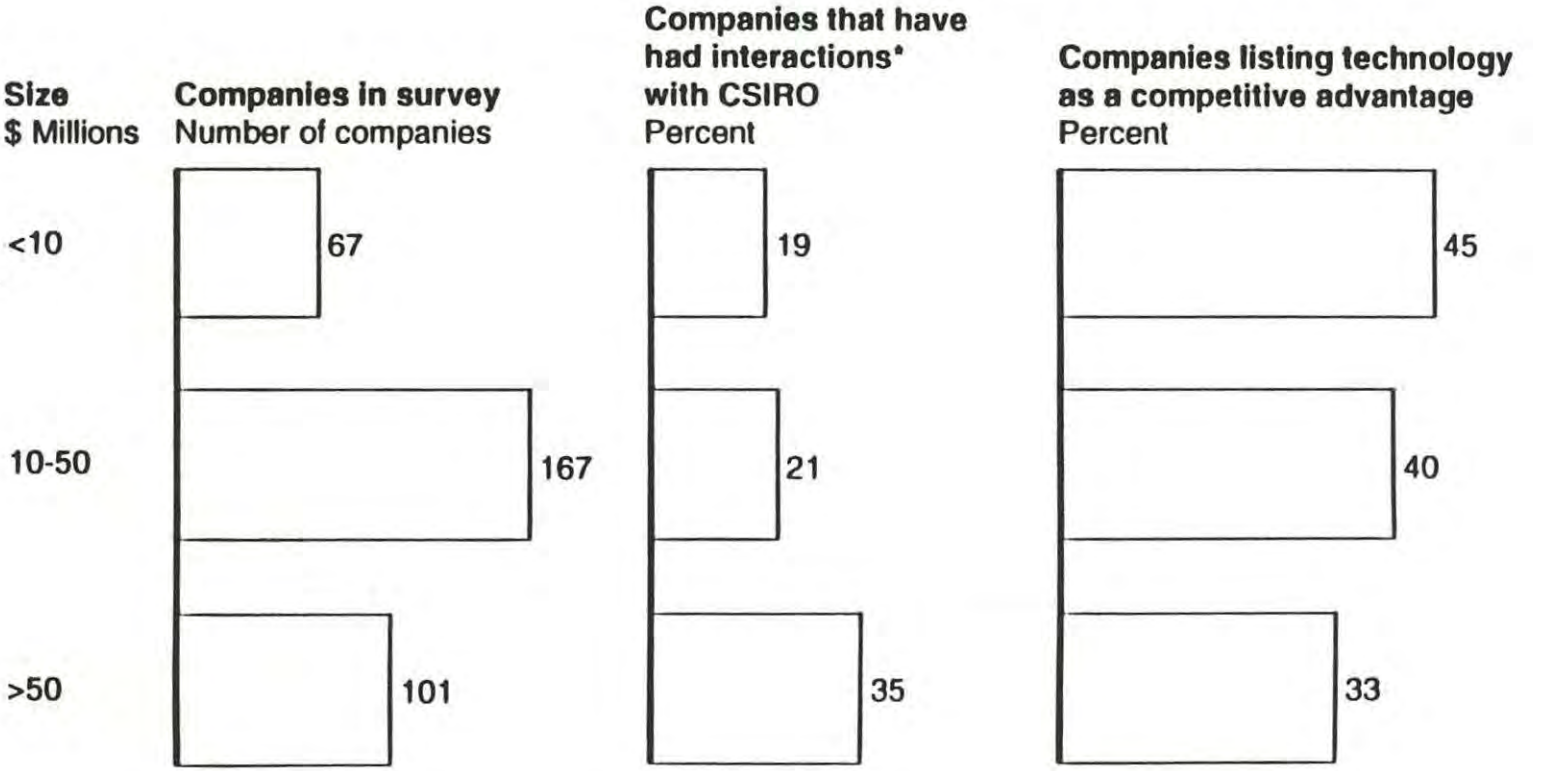
** Over the last 5 years

Source: AMC Emerging Exporters Survey; McKinsey team analysis; CSIRO Division Chiefs

## The smallest companies have the least interaction with CSIRO but a higher percentage of small companies list technology as important to their competitive advantage

### COMPANY SIZE AND LINKS TO CSIRO: AMC SURVEY

AMC SURVEY




* Over the last 5 years

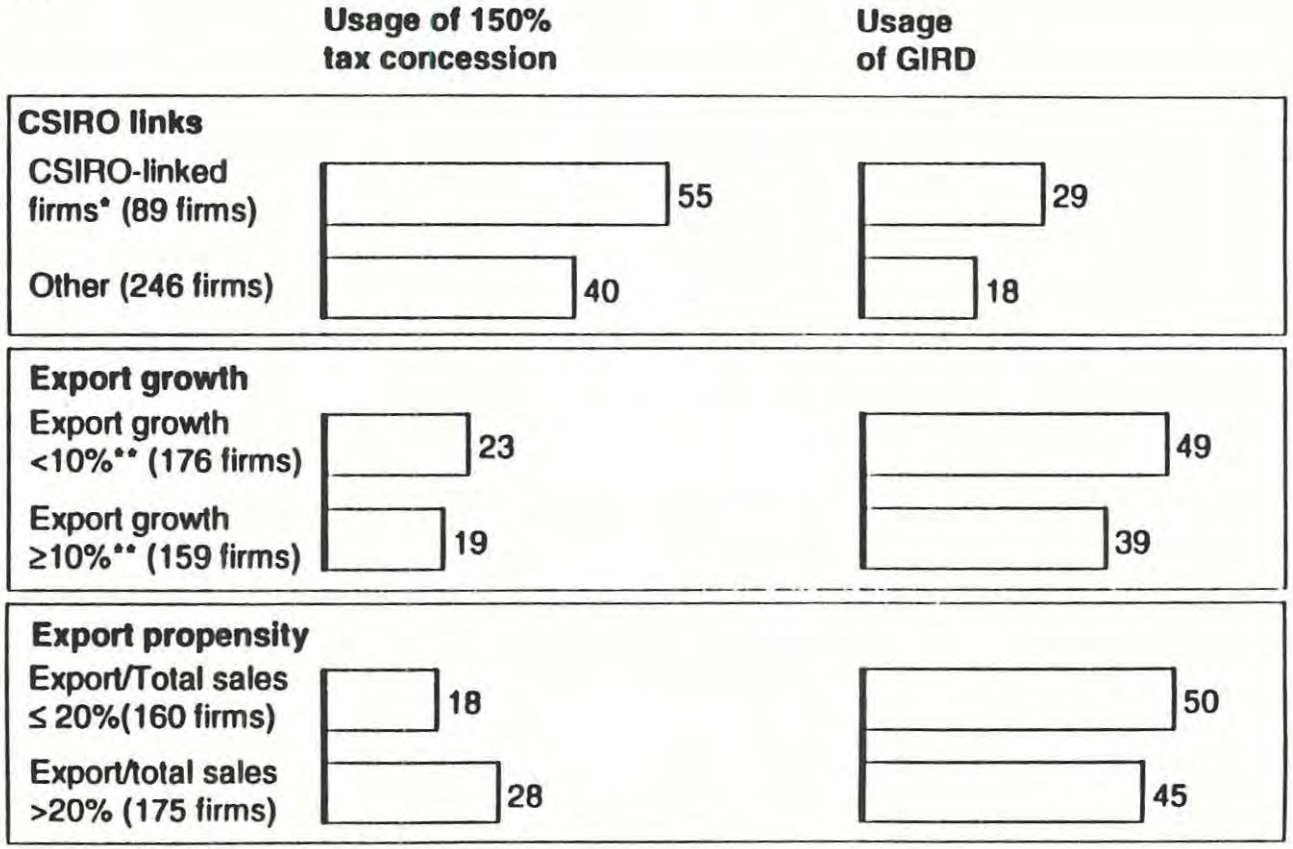
Source: AMC Emerging Exporters Survey; McKinsey team analysis; CSIRO Division Chiefs

## Companies that have had interactions with CSIRO are making more use of government assistance programs

### USAGE OF GOVERNMENT ASSISTANCE SCHEMES FOR R&D

AMC SURVEY

Percent




* Firms who have had some interaction with CSIRO over the last 5 years

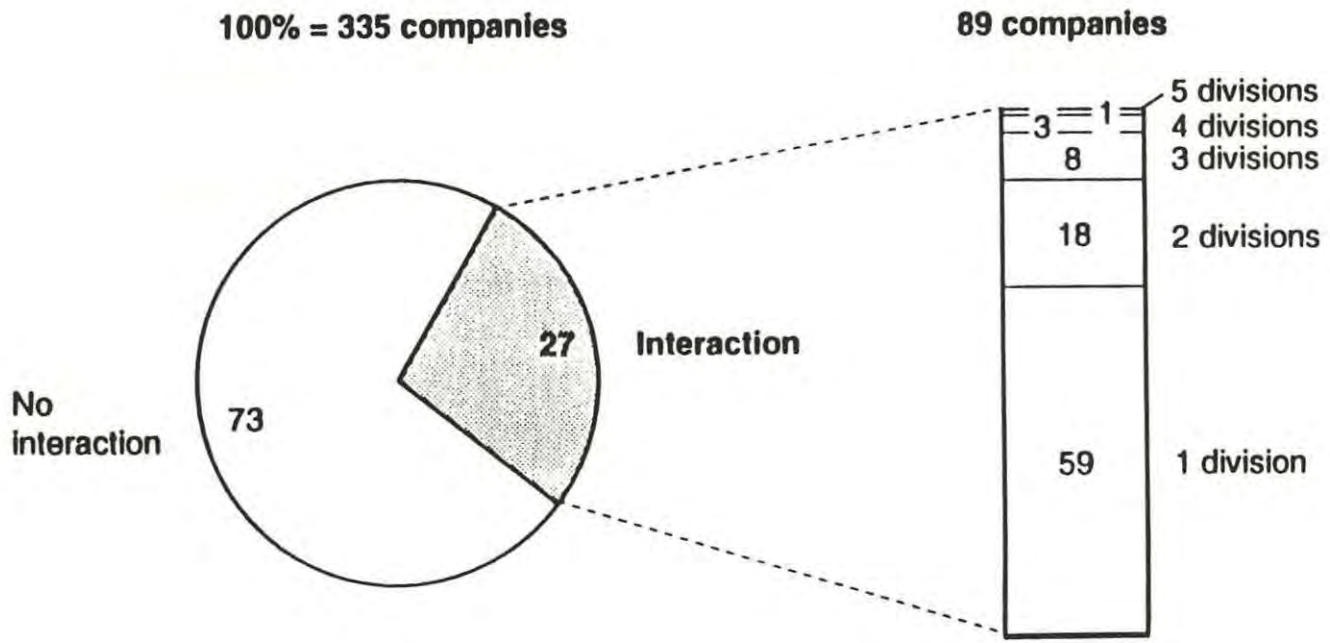
** Real compound p.a. for 86/87 to 91/92

## Of the SMEs which had interactions with CSIRO over the last 5 years, the majority worked with 1 division only

**EXTENT OF MULTI-DIVISIONAL INTERACTION**

*AMC SURVEY*

Percent



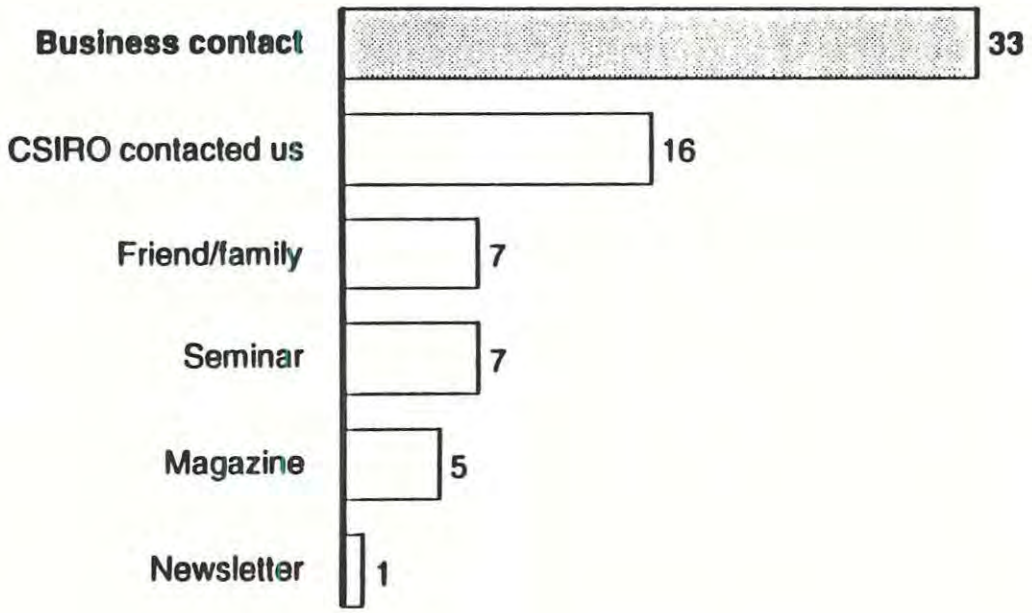

Source: AMC Emerging Exporters Survey; McKinsey team analysis

## Most SMEs learnt about CSIRO services through a business contact

**HOW SMEs LEARNT ABOUT THE CSIRO SERVICES THEY USED**

*CSIRO SURVEY*

Number of SMEs*




* Some companies listed more than 1 source; 31 firms gave some other source

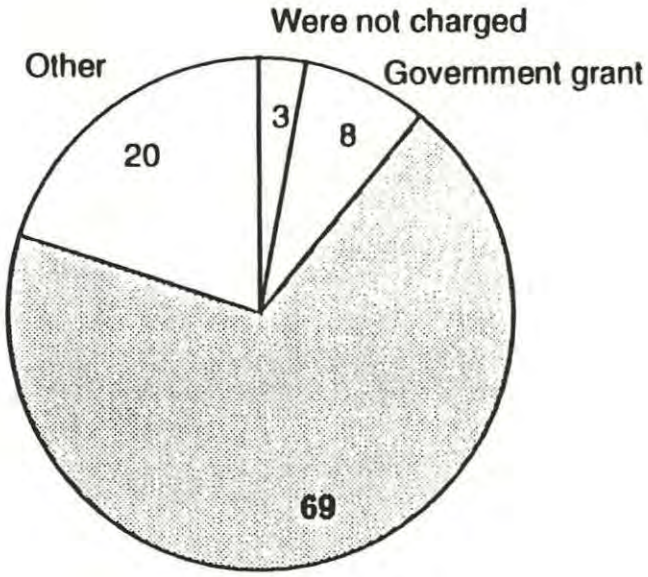
Source: CSIRO SME Survey; McKinsey team analysis

## Almost all SMEs financed their interactions with CSIRO from internal funding. None used external borrowing or finance from their parent company

**METHOD OF FINANCE FOR INTERACTIONS WITH CSIRO**

*CSIRO SURVEY*

100% = 79 companies



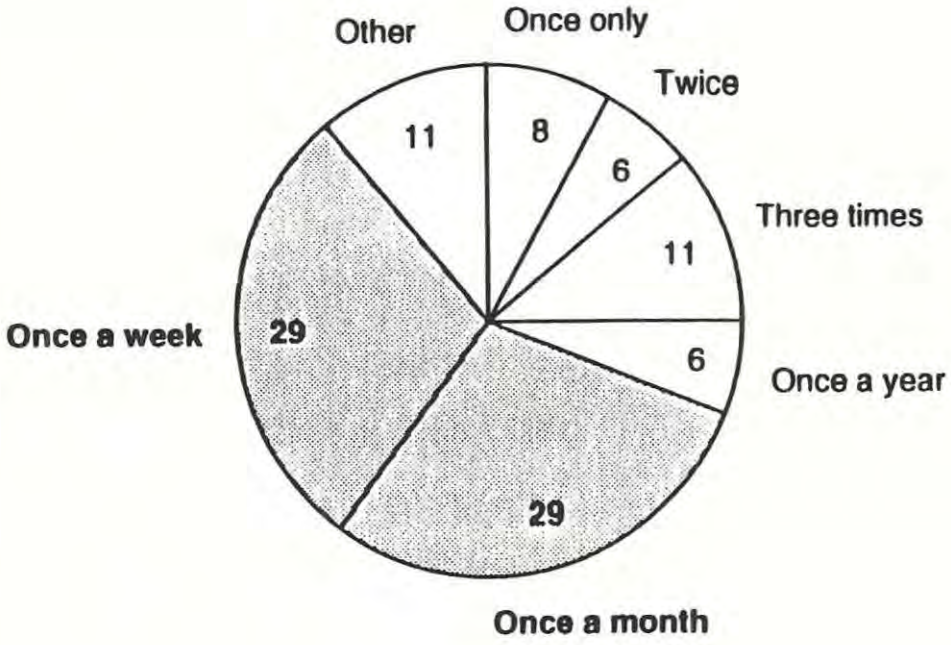

Source: CSIRO SME Survey; McKinsey team analysis

## Most companies using CSIRO deal with them once a week or once a month

**HOW FREQUENTLY SMEs WORK WITH CSIRO**

100% = 54 companies

*CSIRO SURVEY*



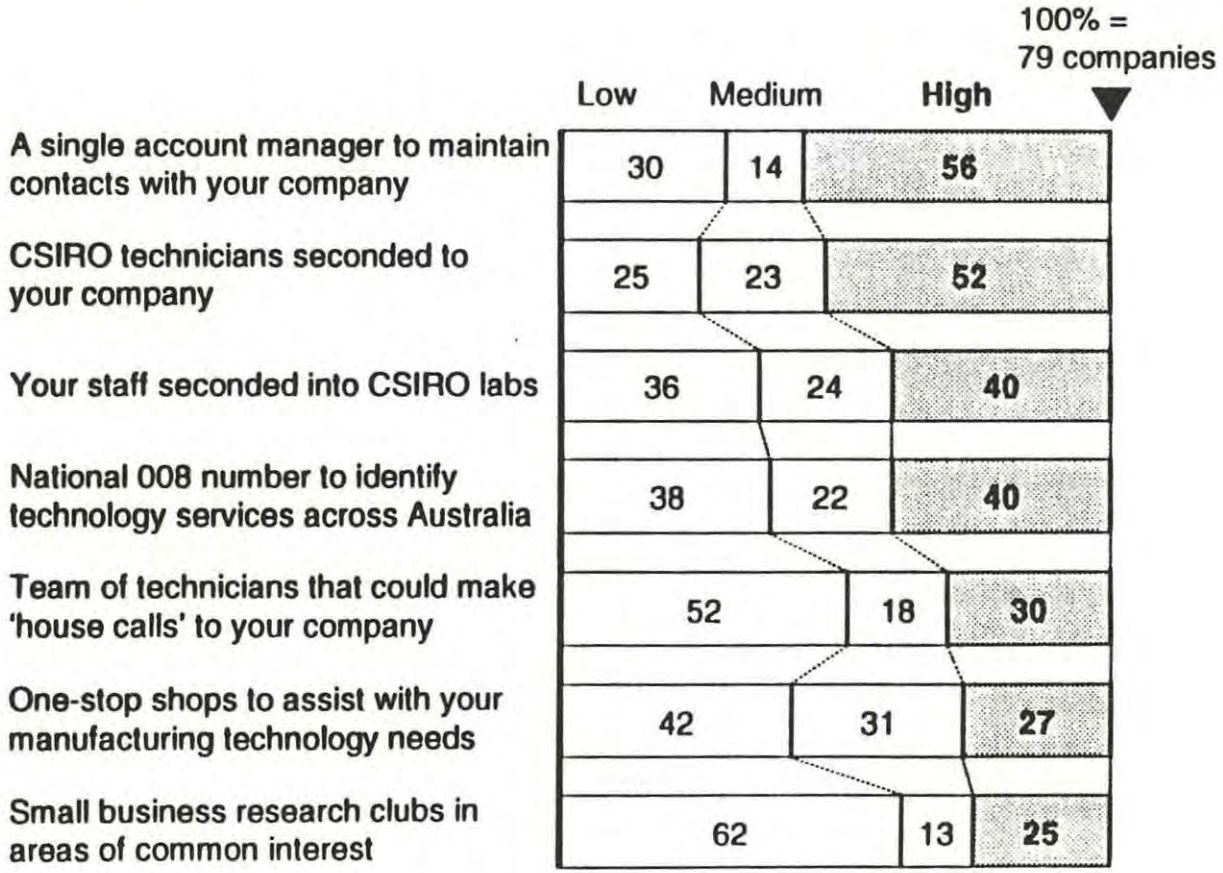

Source: CSIRO SME Survey; McKinsey team analysis

## The most highly valued potential new services were the introduction of account managers and secondment of CSIRO staff to companies

### THE VALUE OF POTENTIAL NEW SERVICES

*CSIRO SURVEY*

Percent




Source: CSIRO SME Survey; McKinsey team analysis

## The SMEs offered many views on the importance of government financial assistance

**RESPONDENTS' VIEWS ON GOVERNMENT FINANCIAL ASSISTANCE IN DEVELOPING TECHNOLOGY**

*CSIRO SURVEY*

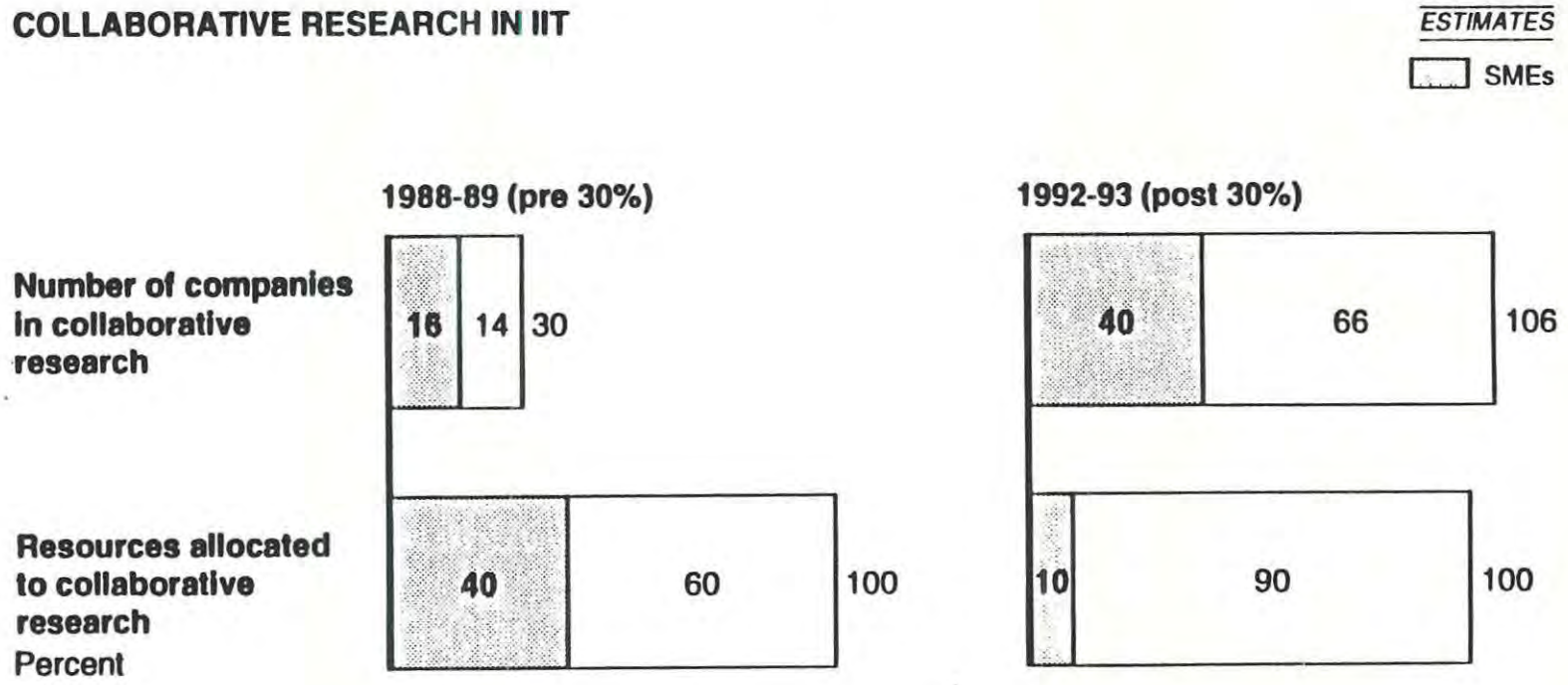
| Views of SMEs | Selected quotes |
|---|---|
| Government assistance is considered very important with 76% of respondents having used government assistance | *150% has been a driving factor for keeping R&D within Australia. Will be less effective with 33% corporate tax* |
| The 150% tax deduction needs to be extended to other ownership structures including partnerships and trusts | *Ineligible for 150% as we are a partnership not a company* |
| The definition of R&D needs to be broadened to include costs of commercialisation | *Often the marketing and commercialising costs are very high - government assistance would help* |
| Grants are important not only financially but also as a sign of confidence in the ability of the company to succeed | *The grants represented a moral support which was more important than the actual dollars involved. They provided independent encouragement to proceed* |
| Some SMEs do not have the time or resources available for the grant application process | *Ability to prepare submissions is limited* |

Source: CSIRO SME Survey; McKinsey team analysis

# ASSESSMENT OF THE 30% EXTERNAL FUNDING REQUIREMENT

**The 30% external funding requirement is often cited as a constraint on SME projects from CSIRO's perspective. The experience of the Institute of Industrial Technologies (IIT) suggests that, since the introduction of the 30% external funding requirement, the number of SMEs involved in collaborative research has increased but not as fast as for larger firms**

**COLLABORATIVE RESEARCH IN IIT**




Source: Interviews; McKinsey team analysis