Standards Australia Limited ABN 85 087 326 690
286 Sussex Street GPO Box 476 Sydney New South Wales 2001
Telephone +61 2 8206 6000 Facsimile +61 2 8206 6001
www.standards.org.au

19 December 2006

Mr Mike Woods
Presiding Commissioner
Public Support for Science and Innovation Study
Productivity Commission
PO Box 80
Belconnen ACT 2616

Dear Mr Woods

Standards Australia welcomes the opportunity to provide a submission on the draft report on public support for science and innovation. The draft report is an important stock-take of this crucial field.

Recognition of role of standards in innovation and productivity

Standards Australia particularly supports the statement at page Appendixes G.1 note 1: 'The CIE [the Centre for International Economics] and Standards Australia make a convincing case that standards can play a useful role in the diffusion of knowledge and productivity growth.'

The final report of the Commission's research study on standards and accreditation makes a similar remark at Box 2.1: '[T]he direction of the results are at least consistent with the theory that standards permit the diffusion of technological developments and hence act as a spur to economic growth.'

The CIE report contained a useful chart showing how standards can assist the diffusion of knowledge. This chart deserves highlighting again (see Attachment A to this submission).

Quantitative impact of standards

While recognising the role of standards in the economy, both your draft report and the final report on standards and accreditation question the numbers attributed to this impact. Like the Commission, Standards Australia and our consultant, the CIE, are well aware of the methodological issues surrounding estimation in this field and we welcomed the exposition at Appendix G. 1 of the semi-parametric method for calculating the impacts of research and development expenditure on the economy.

Standards Australia commissioned the CIE to use the semi-parametric method to look again at the impacts of the stock of standards on productivity in association with R&D spending. We do not necessarily accept that the semi-parametric method is better than the econometric method originally employed but we recognise that the semi-parametric approach provides a useful additional estimate of the impact of standards.

Attachment B to this submission is an extract from the CIE's further work. It concludes that, using a combined measure of the stock of knowledge (standards combined with R&D), *the inclusion of standards increases the apparent contribution of R&D-based knowledge to multifactor productivity by around five percentage points.*

Next steps: Obtaining more information

Qualitative and quantitative material gives us some insights into the economic impact of standards on the economy. More information is needed, particularly at the micro level.

In the United Kingdom, the 2005 Community Innovation Survey by the Office for National Statistics found that 'technical, industry and other service standards' were important sources of information to enable business innovation. For the businesses surveyed, standards were *a more important source of innovation information* than were: conferences, trade fairs and exhibitions; professional and industry associations; scientific journals and trade/technical publications; consultants, commercial laboratories and private R&D institutes; universities and other higher education institutes; and government or other public research institutes. (Source: 'First findings from the UK innovation survey, 2005': http://www.dti.gov.uk/files/file26156.pdf , accessed 18 December 2006.)

In Australia, the equivalent survey of businesses by the Australian Bureau of Statistics (*Innovation in Australian business, 2005*: cat. no. 8158.0) only asks questions about '*government* regulations and standards'. That is, it does not ask about the impact on innovation of *industry* standards, including Australian Standards.

Given the relative importance in the UK of standards compared with publicly supported drivers of innovation (such as universities and government research institutes) it seems important to establish whether a similar pattern applies in Australia.

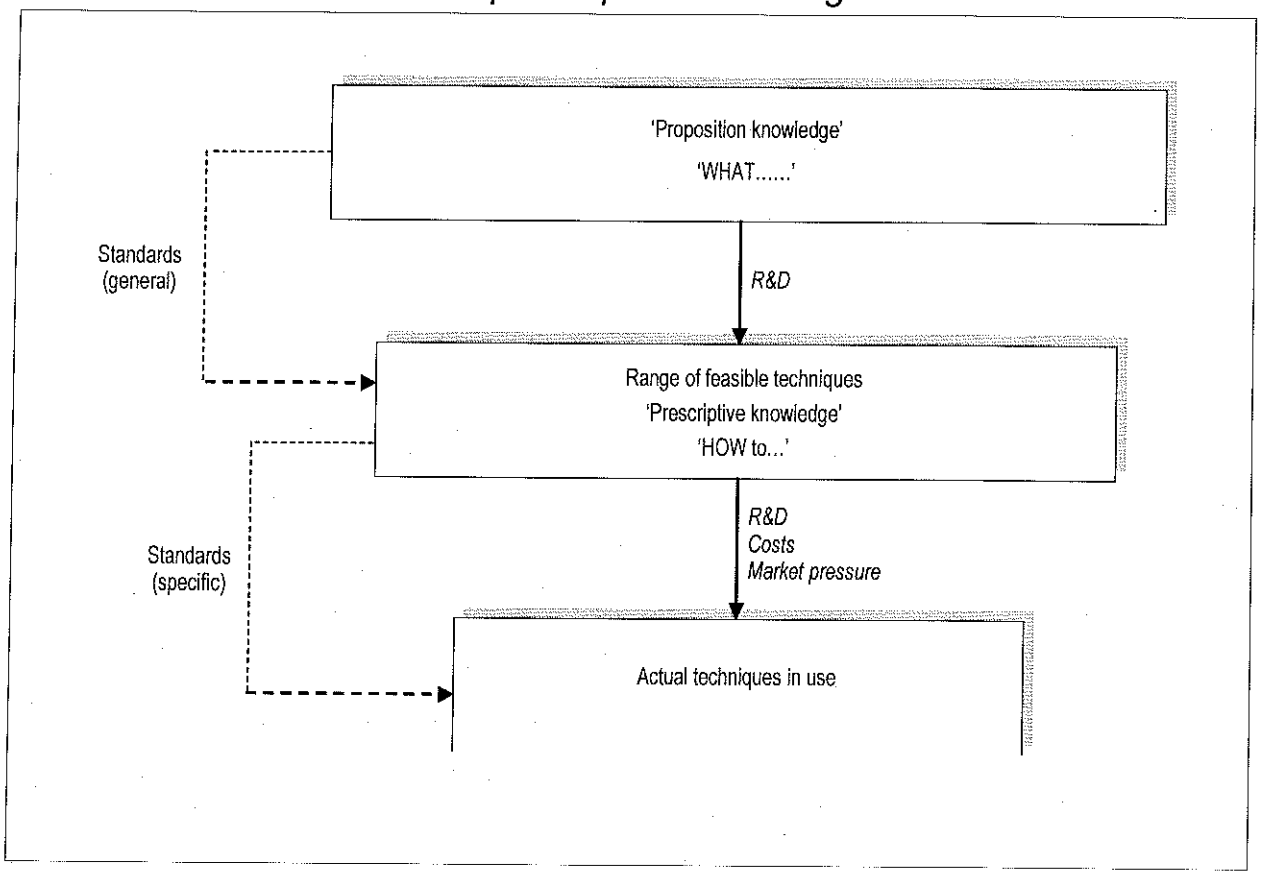
Conclusion

Standards Australia believes that the Commission, in its final report on public support for science and innovation, should recommend that the regular surveys of business innovation conducted by the Australian Bureau of Statistics should include questions about how Australian Standards can support innovation in the economy.

Yours sincerely

John Tucker
Chief Executive Officer

Attachment A: Standards as prescriptive knowledge



Attachment B: 'Semi parametric' estimates of role of standards

The idea behind the estimates

The basic idea behind the semi parametric estimates presented by the PC in Appendix G of their *Science* report starts with observation that of all the ways of accumulating knowledge within the economy, R&D is only one, and perhaps a relatively small one. The idea of a semi parametric estimate is to impose a prior restriction on the overall role of R&D and then see what estimates of R&D rates of return emerge as a result.

This idea is implemented by noting that growth in MFP [multifactor productivity] is likely to be composed of a number of components:

- Those driven by R&D spending;
- Those determined by the business cycle; and
- Those determined by a range of other factors (which might include, for example, foreign R&D, non-R&D innovation, competition, various methods of diffusion of ideas or even standards).

The 'range of other factors' is likely to provide for a significant share of the long run change in MFP. The PC report points out a number of reasons for this, in particular foreign R&D and various forms of non-R&D innovation.

The implicit constraint on empirical estimates suggested by this idea is imposed by assuming that on average the growth in these 'other factors' is a fixed proportion of the growth in MFP itself. This proportion, (called •••or 'Omega') could take a range of values. The PC prefers a value of 0.8 (but undertakes considerable sensitivity analysis around this value).

Another aspect of the PC's analysis in Appendix G is to couch the results in terms of the share of MFP growth accounted for by the various factors. This idea is very useful as it allows a focus on the relative contribution of the various factors that determine MFP growth.

Application to standards

In principle, standards as a means of diffusing knowledge comprise one of the 'other factors' that determine MFP growth. This means that it should be possible to include a standards variable in the estimating equation in order to get some idea of the relative importance of standards in contributing to MFP growth.

A practical issue, however, is what while the PC provide a good argument for choosing a value of ••of 0.8 in distinguishing between the contribution of R&D and 'other factors', it is not clear what an appropriate value would be in the case of standards. Put another way, what proportion of the 'other factors' do standards comprise?

Given that it is not clear how to answer this question, the discussion of the estimates that follows will focus on the relative contributions of R&D versus standards.

Results for estimates including standards

We have undertaken a number of estimates of the impact of R&D and standards on MFP using the methodology set out in Appendix G of the PC *Science* report. The key results are summarised in table 1 below where we have expressed the results in terms of the share of each factor in MFP growth. Detailed notes to the estimates are presented in footnotes to the table.

While we have broadly followed the PC methodology there is one slight difference in that our R&D variable is aggregate R&D rather than being constructed from two components in the same way as the PC. While the PC are concerned with analysing the rate of return to publicly induced R&D, we are concerned with understanding the relationship between total R&D and standards. Further, one of our variables is a growth in knowledge generated by a combination of R&D spending and standards which is easier to implement using a single R&D variable.

1 **Estimation results** Share of variable in total growth of MFP (percent)

	Values of Ω (Omega)			
	0.8	***0.7***	***0.6***	***0.5***
PC results				
(1) R&D[a]	14.6	22.0	29.3	36.6
CIE results				
(2) R&D only[b]	15.5	23.3	31.0	38.8
(3) R&D[c] *along with*:	9.7	14.5	19.4	24.2
(4) Standards[d]	6.1	9.2	12.2	15.3
Ratio of Standards share to R&D share	0.6	0.6	0.6	0.6
(5) Combined knowledge measure[e]	18.2	27.2	36.3	45.4
Amount added by combining standards with R&D (Row (5) minus row (2))[f]	2.6	4.0	5.3	6.6

[a] These are taken from Table G.5 of the PC *Science* report. The total figure is calculated by adding the first two rows of Table G.5.

[b] Our estimates differ slightly to those of the PC, probably because of slightly different variable definitions. Our R&D variable is total R&D, rather than as defined by the PC. There may also be slightly different values for our CYCLE variable because of different implementations of the Hodrick-Prescott filter. Like the PC, we use labour quality adjusted MFP and our data starts in 1984-85 and goes to 2002-03 giving 19 observations. For the case where Ω is 0.8, the PC coefficient on the CYCLE variable is 0.12 (t- stat 5.0) while ours is 0.10 (3.38). The PC coefficient on the R&D variable is 0.018 (4.6) while ours is 0.024 (3.28).

[c] The underlying coefficient is 0.015 (1.5) when Ω is 0.8.

[d] The underlying coefficient is 0.023 (0.96) when Ω is 0.8

[e] The underlying coefficient is 0.0213 (4.69) when Ω is 0.8.

[f] May not add exactly due to rounding

Source: PC Appendix G, CIE estimates.

Results with R&D alone

Row (1) repeats, for comparison, the results reported in table G.5 of the PC *Science* report. This shows (when • = 0.8) that the share of R&D in MFP growth over the period was 14.6 per cent. Row (2) shows the CIE estimates for the equivalent estimating equation to row (1), but using our slightly amended variables. Our results are very similar, with a share of 15.5 per cent (rather than 14.6 per cent) when • is 0.8.

Results with separate identification of R&D and standards

Rows (3) and (4) report shares of R&D and Standards respectively. These come from an estimating equation where standards are added in as a separate variable. The results show, for example when • is 0.8, that this has the effect of reducing the share of R&D to 9.7 per cent and implies a share of standards of 6.7 percent. Looking at the column where • is 0.7, the share of R&D returns to 14.5 per cent (similar to the PC's preferred value) and the share of standards is 9.2 per cent.

Looking at the relative shares of R&D and standards indicates that the share of standards is around 60 per cent of the share of R&D.

An important issue with these results is that the underlying coefficients are not statistically significant.

Results with the combined stock of knowledge measure

Row (5) shows the results for the stock of knowledge variable defined as a combination of R&D and standards. Where • is 0.8, the share of this stock of knowledge is 18.2 per cent. This is 2.6 percentage points higher than the stock of knowledge variable defined as R&D alone. As the value of • declines, this increment in the share increases slightly (up to 6.6 per cent when • is 0.5).

Discussion of implications

The results presented here should be treated with caution for the reasons outlined in the original report as well as those identified above. However, using the methodology adopted in Appendix G of the PC *Science* report indicates that:

- The share of standards in MFP growth is likely to be lower than the share of R&D in MFP growth — with the share of standards around 60 per cent of the share of R&D.
- Using a combined measure of the stock of knowledge (standards combined with R&D) indicates that the inclusion of standards increases the apparent contribution of R&D based knowledge by around 5 percentage points. This can be interpreted as an upper bound to the contribution of standards to MFP growth through R&D.

- It is important to consider standards in conjunction with other measures of knowledge generation (such as R&D), as standards can only play a role in disseminating knowledge if there are also mechanisms to generate new knowledge in the first place.

These findings are based on the same underlying data as the original report. As previously noted, taking the estimates of the role of standards further requires additional data.