

## **13 Trade metrology – The trade metrology department of the SABS**

### **13.1 Overview of trade metrology**

The purpose of trade metrology is to provide confidence in transactions. To do so, a trade metrology system provides a means of controlling weights and measures of goods and products, and plays a particular role in protecting individual consumers from short measure or unfair trading practices.

The practices generally involved in trade metrology are : standardisation of measuring instruments and measurements, a regime for verification that measuring instruments continue to function accurately over their lifetime of use, a point-of-sale inspection regime for items such as pre-packaged goods, and sanctions for improper use of instruments or inaccurate measure of products.

As technology has advanced, some of the practices involved in trade metrology have become useful for controlling a wider range of measurements that affect consumers, and the broader field of application is generally referred to as legal metrology. Measurements made for regulatory purposes (e.g. speed control, blood alcohol content), for utility metering (e.g. water, gas and electricity metering), for service metering (e.g. taxi meters, time metering of telephone calls), for medical purposes (e.g. electrocardiographs, auditory function), and for environmental control (e.g. air and water pollution levels, noise monitoring) are all examples of the widening field of legal metrology.

National governments determine the areas of legal metrology that operate within their economies, usually driven by the level to which consumers in these economies expect to minimise the risks in transactions. The majority of nations have a trade metrology framework as a minimum, with many nations also adopting a broader legal metrology framework. It has been recommended (Recommendation 9) that South Africa adopt a legal metrology framework as part of its general treatment of technical regulations. The following discussion focuses primarily on trade metrology, but notes the legal metrology implications where relevant.

#### **13.1.1 Overview of the South African situation.**

The Trade Metrology function was originally established in South Africa by the Trade Metrology Act and administered by DTI from 1923 until 1991. The function then devolved to SABS, where it is currently located in a Department within the regulatory division of SABS.

The Trade Metrology functions vested in the SABS through the Trade Metrology Act are, in broad terms: training, examination and appointment of verifiers and inspectors; maintenance and calibration of measuring standards appropriate for trade metrology functions; type approval of measuring instruments; certification and re-certification of measuring instruments; and conduct of inspections and consequent actions if non-conforming measuring equipment or goods are identified.

The new South African Constitution of 1994 identified consumer protection as a provincial responsibility, and this led to responsibility for the inspection function associated with trade metrology being transferred, in theory, to the Provinces. In accordance with the provisions of the Trade Metrology Act, this transfer was authorised by the Minister for Trade and Industry following consultation with the SABS Council. However, Provinces have inadequate resources and skills to provide inspection services and, in practice, SABS maintains an inspectorate capability and performs this function on behalf of some of the Provinces. Since the SABS inspectorate is too small to provide national coverage, the inspection regimes in some areas are inadequate or non-existent.

Although SABS maintains control of the verification system, the delivery of most verification services is provided by accredited private sector laboratories. SABS provides verification services in some areas that are not viable for private sector delivery e.g. remote rural areas.

The accreditation of verification laboratories has been undertaken by SABS in the past but is being passed to the national accreditation agency, SANAS.

In areas where SABS does not have certain technical capabilities, it has called upon the NML to provide services. For example, the pattern approval and calibration of breathalysers has been devolved to the chemical metrology section in the NML.

### **13.1.2 The regional situation**

The legal (including trade) metrology bodies of economies in the South African Development Community liaise through the SADC Cooperation in Legal Metrology (SADCMEL). SADCMEL aims to develop mutual confidence between legal metrology bodies in the region, to harmonise procedures and practices in legal metrology and to achieve equivalence of activities. The emphasis in the region is on legal metrology, with trade metrology being a subset.

### **13.1.3 The international situation**

The international focal point for legal (including trade) metrology is the International Organisation for Legal Metrology (OIML) which has the objective of promoting the global harmonisation of legal metrology procedures. OIML was established by international convention in 1955, and SABS is the representative organisation for South Africa. The SABS representative is a member of the OIML Presidential Council.

OIML develops Recommendations, which contain the technical specifications for type approval and/or verification of measuring instruments, and guidelines are also published for reporting on tests on particular classes of instruments. Over 100 types of measuring instruments are covered by current OIML Recommendations. The Recommendations are developed by committees composed of OIML members and, at present, OIML maintains 18 Technical Committees and 49 Sub-Committees. South Africa is represented as a participating member on 9 Technical Committees and 20 Sub-Committees, and as an observer on 2 Sub-Committees. The areas in which South Africa is not represented are mass and density, pressure and force (except for strain gauges), temperature, acoustics and vibration, optics, ionising radiation, measurement of pollutants, physico-chemical measurements and medical measurements. Most of these areas are part of the broader legal metrology context whereas South Africa has concentrated on trade metrology requirements.

OIML has also introduced an OIML Certificate System for 30 types of instruments and has designated Issuing Bodies for such Certificates. Member economies can elect to accept OIML Certificates as evidence of compliance of measuring equipment with the metrological specifications in the respective OIML Recommendations. This process avoids the costs of re-testing in multiple economies. To date, most of the Issuing Bodies are in Europe, reflecting the European Community's desire for an open market between its member states.

## **13.2 Positioning, recognition and governance of trade metrology organisations**

### **13.2.1 The South African situation**

The Trade Metrology System in South Africa is governed by three acts, namely

- Trade Metrology Act, Act 77 of 1973.
- Measuring Units and National Measuring Standards Act, Act 73 of 1973. and
- Standards Act, Act 29 of 1993

The governance of trade metrology functions is defined in legislation. The Minister of Trade and Industry carries ultimate responsibility for governance through the Trade Metrology Act. However the administration of the Trade Metrology Act is assigned by the Minister to the SABS Council which is constituted under the Standards Act, and the functions that the SABS Council must or may exercise in relation to trade metrology are defined in the Trade Metrology Act. The Trade Metrology Act also empowers the Minister of Trade and Industry, on the advice of SABS Council, to appoint any statutory body or provincial government to carry out functions specified in the Act and the devolution of functions to provincial governments has been promoted by the Constitutional provisions discussed earlier.

The Trade Metrology Act also requires the Minister to appoint a Trade Metrology Advisory Committee to advise the Director of Trade Metrology in the execution of functions under the Act. At present the Advisory Committee consists of 5 members, appointed in their capacity as individuals, and membership of the Committee is reviewed annually. Since the Committee's role is advisory, it can only influence the governance process rather than participate in it.

### **13.2.2 The international situation**

The majority of economies surveyed for this study have developed or are developing a framework for legal metrology, within which trade metrology is a subset. Some economies are even extending the application of legal metrology provisions beyond the usual range of measurements for trade, commerce and regulation; for example, Malaysia has new legislation under development for broadening of the scope of legal metrology to include health, safety, medical, forensic science and environmental issues.

The governance of trade metrology systems is often split between national and sub-national levels of government. Typically the national level has responsibility for legislation, co-ordination and pattern approval, and the sub-national level has responsibility for verification, inspection and sanctions. The economies surveyed in this study showed variety in the degree of integration of the national and sub-national levels. In Brazil, the national institution INMETRO provides the national level functions and owns the facilities that are used for verification and inspection activities in the various States. However the States employ the verification and inspection personnel. In the UK, the National Weights and Measures Laboratory provides the national level functions, and the Local Area Co-ordinating Body on Food and Trading Standards provides national co-ordination of the sub-national stratum in which local authorities own the facilities and employ Trading Standards Officers. In Australia, the National Standards Commission provides the national level functions, and State-based weights and measures authorities conduct the sub-national tasks. By contrast, in Malaysia, all functions are controlled at national level, with the legislative and pattern approval functions being carried out by SIRIM Bhd and the verification, inspection and enforcement activities by the Department of Domestic Trade and Consumer Affairs. Clearly there is no model that is inherently better than others, and none of the models will be satisfactory if they are inadequately coordinated and resourced.

Government policy on privatisation is another factor to be considered in the positioning of legal metrology functions. International comparisons indicate that there are different philosophies regarding trade metrology verification and inspection functions. As a broad generalisation, the two ends of the spectrum are as follows:

- In developed nations with well-established histories of legal metrology, the trend is turning towards privatisation of functions. For example, in Europe, when the Measuring Instruments Directive comes into force, it will permit manufacturers of measuring instruments to verify and stamp their products (under certain conditions). Although it is intended that there will be greater point-of-sale inspection of the system, there are no guidelines (and possibly limited resources) to undertake this function. One could extrapolate to say that public confidence is at such a level that there is less need for the regulatory regime to be delivered entirely within government.
- In developing economies, particularly where uniformity is in question or fraud is a consideration, there is still a strong requirement for government control of the regulatory regimes.

### 13.2.3 Conclusions

The survey of stakeholders and industry conducted for this study is described later. However, it indicated that the decentralised inspection function in South Africa is not operating effectively and requires urgent attention. Also, the Constitutional requirements for provincial governments to take responsibility for enforcement of trade metrology have not been met adequately. This has implications for governance. Governance of a trade metrology system should vest in government and a central coordinating function within government is needed.

**Recommendation 47: Responsibility for enforcement of trade metrology be returned to national government, and the function not be devolved to provincial governments until such time as they have the necessary resources to address the responsibilities.**

The Minister of Trade and Industry carries legislative responsibility for governance of the trade metrology system and devolves the administration to the SABS Council through the Trade Metrology Act. Clearly this devolution has not resulted in adequate resourcing of the system, possibly because of the separation of responsibility and delivery. Therefore it is appropriate that a central coordinating agency for the trade metrology system (the Trade Metrology Unit) be located within DTI in order that the requirements and resources be clearly visible to the Department and the Minister. To maintain continuity of operation, this Unit may absorb some of the SABS staff who have had involvement in the policy development aspects of the trade metrology system. Obviously the Trade Metrology Unit will not deliver all of the functions required in the trade metrology system. However it will have responsibility for assigning the functions to delivery agencies and accountability for ensuring the functions are delivered.

**Recommendation 48: A Trade Metrology Unit be established within DTI to take responsibility for coordination of the national system of trade metrology, including overall administration of the Trade Metrology system**

Having centralised the coordination of trade metrology functions within government, the next step is to examine where the constituent processes specified in the Trade Metrology Act can be delivered. On the one hand, it is possible to maintain the *status quo* and centralise these functions in SABS. However the redefined status of SABS may affect the positioning of trade metrology activities in the proposed new structure (Section 10.2). An alternative, particularly given the centralised coordination of the system in government, is to distribute the delivery of the functions. DTI may still elect to place some of the functions with an agency such as the re-defined SABS regulatory function, but the following principles should also be considered in relation to re-distribution of functions.

- Can the function be placed with an organisation that already has a core national responsibility in that area ? For example, SANAS has a core responsibility for accreditation and the SABS has already recommended that the function of accrediting verification laboratories be relocated to SANAS. The NML has a core responsibility for measurement standards and the technical capability to undertake pattern approval and calibration, and has been called upon already to support legal metrology activities in the area of standardisation of force measuring devices. Moreover, the proposed adoption of a legal metrology framework in South Africa (see Section 7.1.4) will create requirements for pattern approval of many types of instruments, some requiring new technology in which NML will already have expertise as part of its measurement standards responsibilities. Therefore the placement of pattern approval with NML is a more versatile long-term solution which will cater for a broader range of instruments than those used in trade metrology.
- Can the function be delivered by a number of competing organisations, in which case it can be opened up to contestability ? For example, a range of private sector organisations are capable of providing suitable accuracy of measurement for verifying inspectors' standards of mass, length etc. Provided that these organisations are SANAS-accredited to ensure technical competence and that the overall integrity of the verification chain is monitored by DTI's Trade Metrology Unit, it would be possible to accept private sector, contestable delivery of the service.

In regard to international and regional representation, the NML already represents South Africa in the activities of the International Bureau of Weights and Measures (BIPM) and the SADC Cooperation in Measurement Traceability (SADCMET). There are synergies in the NML also supporting South Africa's representation at the counterpart legal metrology organisations, the International Organisation for Legal Metrology (OIML) and the SADC Cooperation in Legal Metrology (SADCMEL).

Any re-distribution of the kind suggested below should also consider whether existing SABS' staff with special expertise in trade metrology can be placed in the relevant organisations to maintain continuity of domestic and international functions.

**Recommendation 49: In taking up its Trade metrology responsibilities, the DTI should carefully review the location of trade metrology responsibilities and re-allocate them in a manner which best meets the needs of trade metrology. The DTI trade metrology regulator may delegate specific responsibilities to recognised organisations**

A possible model for allocation of responsibilities for trade metrology could be as follows :

- (i) Policy development and maintenance of relevant legislation – DTI.
- (ii) Inspection and enforcement activities - DTI or its nominated agency (with delivery by provincial and regional offices where appropriate capability exists).
- (iii) Training activities – DTI or its nominated agency (with technical input from NML).
- (iv) Overview of verification activities – DTI or its nominated agency (with delivery by SANAS-accredited private sector laboratories).
- (v) Accreditation of private sector verification laboratories – SANAS.
- (vi) Technical inputs to policy, type approval and technical input to training activities – NML.
- (vii) Calibration – NML, or other appropriate SANAS-accredited calibration laboratories (as warranted by accuracy requirements).
- (viii) Representation at the International Organisation of Legal Metrology – DTI trade Metrology (with NML policy input).
- (ix) Representation at the SADC Cooperation in Legal Metrology – NML (with DTI policy input).

### 13.3 Functions

SABS reports that, in formulating specifications for measuring instruments used in trade metrology, OIML Recommendations are taken into consideration where they exist and may be adopted without change as national standards. Some standards developed in South Africa are being used as well.

The international review indicated that, while there may be a mix of OIML and locally-developed specifications in use amongst trade metrology organisations, there is overwhelming intention to phase out the latter and adopt OIML Recommendations wherever possible in order to facilitate international harmonisation and recognition.

Clearly South Africa should align with the international trend to use OIML Recommendations. However, to ensure that these Recommendations are suitable for use in South Africa, it is extremely important that South Africa participate in the formulation of OIML Recommendations, both for its own interests and for the interests of the SADC region. To that end, South Africa must be represented at the international meetings for drafting of relevant Recommendations to ensure that that the South African position is given due consideration.

There is an additional consideration in the adoption of OIML Recommendations. By adopting the Recommendations, South Africa will develop capability to test to the provisions of these Recommendations. In the longer term, this builds the capability for South African institutions to apply to OIML to become an Issuing Authority for OIML Certificates for the relevant Recommendations. As pointed out in the introductory section, most of the current Issuing Authorities are in Europe so it may be important for South African manufacturers, and the SADC region, to have a local Issuing Authority.

**Recommendation 50: Recommendations of the International Organisation of Legal Metrology (OIML) be adopted wherever applicable to satisfy the provisions of legal (including trade) metrology. Specifications from other sources be used only in exceptional cases where the OIML Recommendations do not cover particular South African requirements.**

**Recommendation 51: South Africa must continue to participate in the drafting of OIML recommendations, including attending the international meetings of committees that are drafting recommendations of direct relevance to South Africa. These national interest activities be funded by Government.**

## 13.4 Funding

### 13.4.1 The South African situation

Funding for trade metrology is obtained from a mixture of core Government funding and revenue from commercial activities. Maintenance of policy, legislation, training and inspection services are supported by SABS core funding derived from Government. Testing and pattern approval of measuring instruments are provided on a fee for service basis by the SABS and, in accordance with the provisions of the Trade Metrology Act, the Minister for Trade and Industry sets the fees for these services. The SABS has pointed out that the level of fees does not represent cost-recovery. With the transfer of verification activities to the private sector, the expenditure incurred and the income derived by the SABS from this activity is declining and will decline further.

The total funding break-down is as follows:

**Table 23: Funding of the trade metrology system**

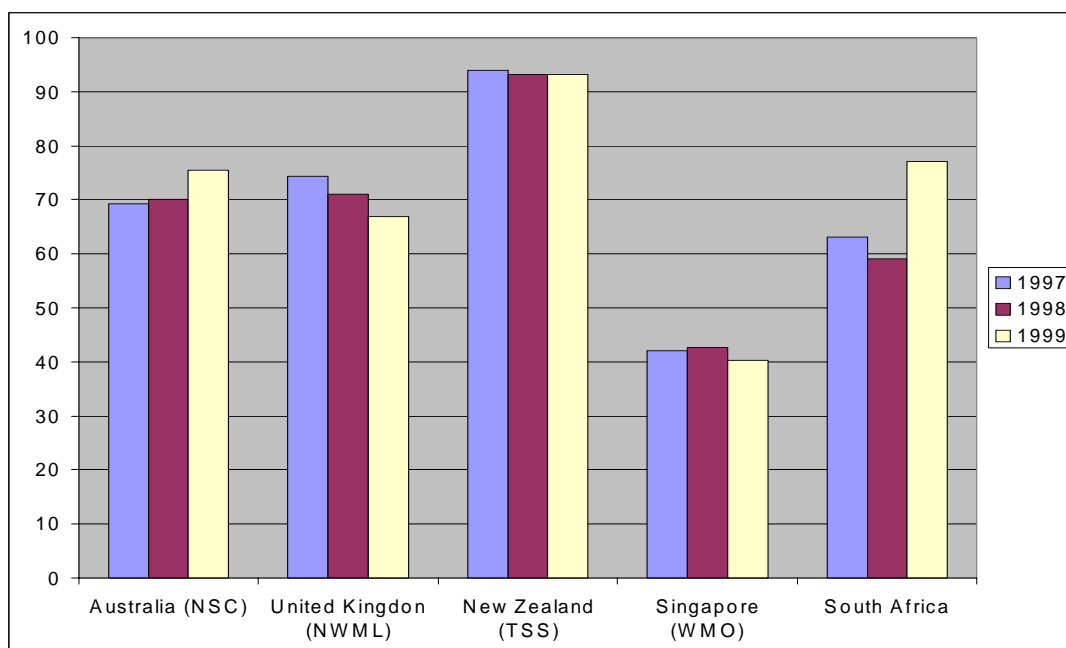
Year	SABS Core funding	DTI MOU funding for special projects	Test and services income	Accreditation income	Government funding as % of total
1997/1998	R 4.4 m	-	R 1.6 m	R 1 m	63%
1998/1999	R 4 m	R 0.37 m	R 1.3 m	R 1.7 m	59%
1999/2000	R 8.9 m	R 0.37 m	R 1.5 m	R 1.2 m	77%
2000/2001	R 10.2 m	R 3.5 m	R 2 m	R 1.4 m	80%

The 1997/98 Peer Review of the SABS identified the under-funding of trade metrology functions by government, particularly in regard to inspection services, and recommended that this be addressed by DTI and DACST. The Peer Review also recognised that there were some savings to government by the use of competent private sector providers to deliver services such as calibration and verification. However that review noted that, where the market segment is unattractive to the private sector (e.g. in rural areas), the government must fund the shortfall in services to ensure that there is equitable delivery of trade measurement control to the community.

### 13.4.2 The international situation

A number of surveyed institutions were able to provide data that showed the level of government funding together with the revenue from other sources as applicable (e.g. pattern approval fees, verification fees, or fines). The data from these institutions are plotted in the figure below.

**Figure 18: Percentage of Government Funding of Legal Metrology Institutions' Total Income**



**Note:**

*NSC government funding includes special purpose funding for its operation of the Secretariat for the Asia Pacific Legal Metrology Forum (APLMF).*

*Data for Australia and United Kingdom do not include funding of the verification and inspection activities conducted by state and local government authorities outside NSC and NWML. The New Zealand data do include the activities of its weights and measures inspectors.*

In some instances, it was not possible to estimate government investment as a percentage of total income, either because income returned directly to consolidated government revenue (eg. Malaysia) or because some government funding passed directly to delivery agencies and not through the national legal metrology institution (e.g. Brazil). However in these cases, the same

principles of charging fees for services applied. In general, a principle of recovering direct costs for services was used but an instance of cross-subsidy was reported in Brazil where it was thought that the full cost of verifying taximeters would be prohibitive for users.

Surveyed economies also provided data on the number of inspectors per head of population, with the following results : Malaysia, 1:33,000. Iceland : 1:100,000. Brazil, 1:230,000. New Zealand, 1:380,000. Singapore, 1:875,000. Clearly this index cannot be used as a sole means of predicting appropriate levels of inspection resources.

### **13.4.3 Conclusions**

Regrettably, the inadequacies in trade metrology resources that were identified by the 1997/98 Peer Review of SABS are still in evidence. It is recognised by all stakeholders that the South African trade metrology system is underdeveloped, especially in the inspection function, and that funding is needed urgently to restore adequate national coverage of the system.

The SABS has prepared estimates of the costs to provide an adequate trade metrology system based on SABS administering a central regulatory authority and nine provincial offices covering technical and non-technical (e.g. packaging inspection) activities. (The SABS estimates also make reference to some management positions for legal metrology purposes but no details of the areas of operation are specified and these costs are assumed to be minor in relation to the estimates provided for the trade metrology functions.) The SABS envisages a graduated increase in funds over a four year period, rising from R17.8 M to 35.3 M. Compared with the year 2000/2001 funding of R 17.1 M for trade metrology, 80% of which is contributed by government, there is a substantial additional investment required to obtain national coverage of the trade metrology system, and the doubling of the current funding allocation over a four year period is not unrealistic.

Given that the estimates prepared by SABS may not be transferable directly to the new structure proposed in Recommendation 49 for the trade metrology system, there would be a need for a new costing and this could be prepared by the proposed Trade Metrology Unit of DTI.

The costing estimates for the trade metrology system should be based on the following principles :

- National interest activities should be funded by government. These activities include policy formation, international representation, inspection, training and enforcement activities. Fines collected through enforcement activities should be returned to government.

- Other activities for which a fee can be charged by either government or private sector providers, including type approval, calibration, verification, and accreditation of private sector verification laboratories, should be funded on a fee-for-service basis.
- A proportion of government investment will be required to establish and maintain infrastructure for type approval testing, but costs of renewal of infrastructure should be offset through a depreciation charge in the fee for services.

**Recommendation 52:** The proposed Trade Metrology Unit of the DTI undertake an urgent review of funding requirements to restore trade measurement inspection functions in the Provinces, and sufficient funds immediately be allocated by Government to re-establish this function under centralised control.

## 13.5 The trade metrology system meeting the needs of industry

### 13.5.1 Addressing the current needs

On numerous occasions and in numerous forums associated with this review, industry representatives have expressed their concern over the state of the trade metrology system, and in particular the inspection functions. This concern is reflected in the survey conducted as part of this review, which returned the results shown in the table below. Despite the high level of importance attached to the function, the effectiveness was not rated highly.

<b>Awareness</b>	<b>Very High</b>	<b>High</b>	<b>Average</b>	<b>Low</b>	<b>Very low</b>	<b>Don't know</b>
<b>Percentage</b>	23%	9%	30%	9%	9%	20%
<b>Importance</b>	<b>Very High</b>	<b>High</b>	<b>Average</b>	<b>Low</b>	<b>Very low</b>	<b>Don't know</b>
<b>Percentage</b>	36%	23%	18%	7%	9%	8%
<b>Effectiveness</b>	<b>Excellent</b>	<b>Good</b>	<b>Adequate</b>	<b>Poor</b>	<b>Very poor</b>	<b>Unknown</b>
<b>Percentage</b>	8%	13%	32%	17%	8%	19%

The lack of effectiveness of the overall trade metrology system in South Africa is a significant concern, with many industry sectors indicating that the inspection function devolved to provincial level is near collapse. In fact in three provinces there are no inspectors at all. The trade metrology function of SABS, which includes type approval, inspection of pre-packaged goods, verification in some instances, and calibration in some instances, is not perceived by industry to be highly effective. There is general agreement that the overall trade metrology function is under-funded and in dire need of re-building the capacity lost over the past years.

These observations reinforce the case for the centralisation of trade metrology under a single coordinating authority and for the appropriate investment to be made to deliver satisfactory capability. Recommendations to this effect have been made earlier in this report.

### **13.5.2 Addressing the future needs**

In the longer term, industry and the community at large will expect that South Africa provides a legal metrology system, rather than simply a trade metrology system. A legal metrology system constructed on principles that will support international harmonisation and recognition will facilitate a variety of functions. Manufacturers of equipment will be able to obtain local type approval and market the equipment without further testing in the markets of MRA partners. Users of imported equipment will be able to avoid costly and unnecessary re-testing by accepting the type approvals of MRA partners. and the South African community will be protected from dumping of equipment that has failed to meet legal metrology requirements in other countries. The recommendations relating to development of a legal metrology system are made earlier in this report.

The principle of opening up the functions of trade and legal metrology to private sector providers is being adopted steadily in the international community, and this creates more opportunities for industry in South Africa. Already the verification functions in trade metrology in South Africa have been opened to accredited private sector laboratories. In future, if the trends in the European Measuring Instruments Directive are adopted more widely, the type approval function may also be opened to the private sector. While an increase in private sector involvement is the obvious trend, it should not be assumed that government can abrogate its responsibilities in this area. There must continue to be some central co-ordination to ensure the integrity of the system. There are also likely to be areas of market failure, such as the instance discussed earlier in which the private sector does not provide verification services in low return rural areas, and in these cases the government must provide services to ensure equity.