

A PAPER LOOKING AT TRENDS IN TECHNOLOGY AS THEY
APPLY TO ELECTRONIC COMMERCE AND THE REGULATORY
ISSUES THAT ARISE

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1. DRIVERS OF CHANGE

“Information superhighways are one of those rare technologies that are actually more powerful and promising than the hype surrounding them” George Gilder in *Forbes* 6th June 1994.

Personal Computers will continue to be more cost/effective and will penetrate more and more homes. The voice networks (telephones) are well established and mature, but the use of copper wire for high speed information transfer (data, image, and voice) is a major inhibitor for growth. In the future, the increase in “bandwidth” (the speed of transfer of data between computers) will be exponential. Today most of us use bandwidths of 14.4 kbs (kilo, or thousand bits per second) or 28.8 kbs to transfer data between computers. This translates to about 1,500 or 3,000 characters of information per second.

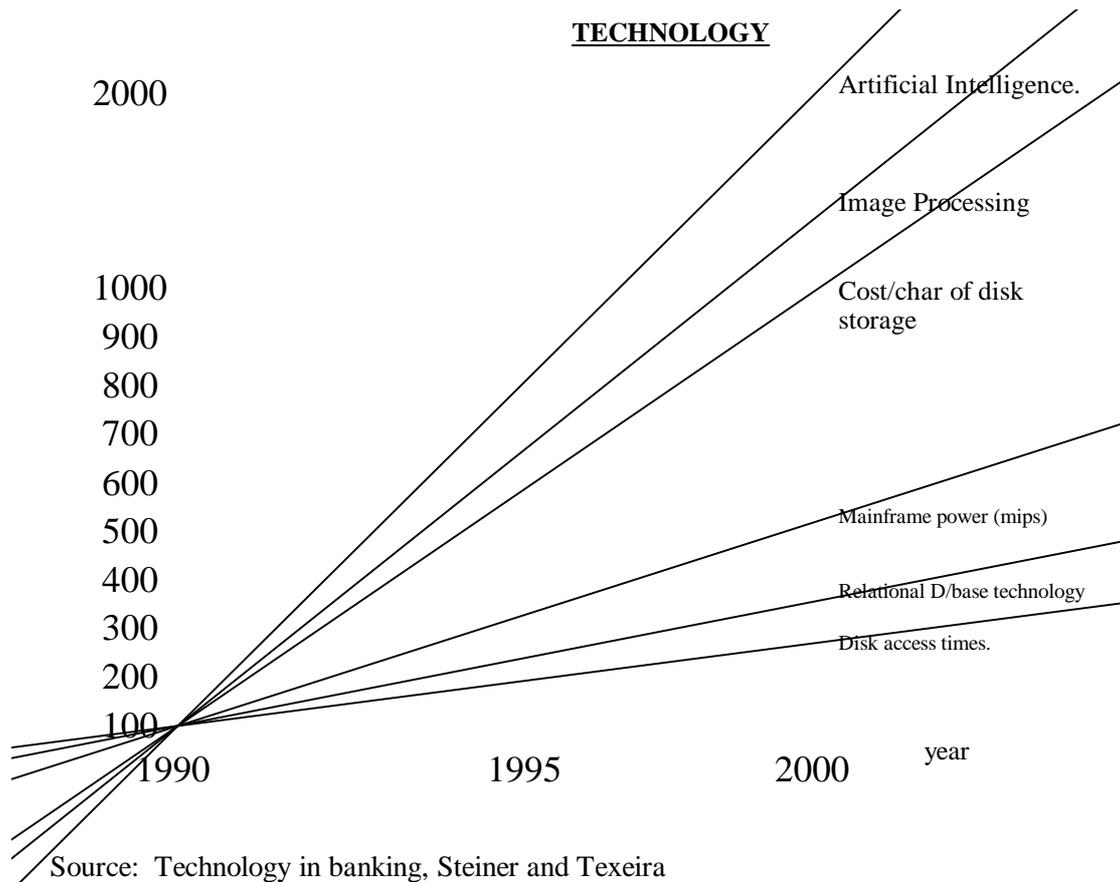
Telstra will make the integrated services digital network (ISDN) more accessible to consumers. ISDN speeds will initially provide approximately 6,500 characters of information to be transferred per second, and later this will be doubled as a result of compression technologies. The Optus and Telstra cables, which are initially intended for cable TV, will also shortly allow data transfer. The speed for cable data transfer will start at 200,000 characters per second, then move to 1 million and later (1999 ?) to 10 million characters per second. This is a rapid increase in bandwidth and will allow sophisticated images and graphics to be transferred.

At the same time as the bandwidth increases, the cost per character will dramatically reduce. Telstra have forecasted (in June 1995) that Internet traffic will be priced at about 32 cents per million characters using basic ISDN at 64 kbs and will reduce to 7 cents per million characters using cable at 2 mbs

The result of high speed data transfer at affordable prices will provide the platform for organisations to use data networks to do business with their customers.

Other technologies will increase at varying rates of cost/effectiveness. The technology index on the next page (reproduced from “Technology in Banking, Creating Value and Destroying Profits” by Thomas D. Steiner and Diogo B. Texeira) shows that three technologies will rapidly evolve in the coming years.

The importance of this information is that it could be used to develop a technology strategy. If the economics of image processing is expected to be revolutionised in the next five years, then this will be a critical factor in a decision to use the technology. Coupled with the cost/effectiveness of communications, the use of artificial intelligence may well become a major factor developing Internet-based selling strategies in the next few years.



Technology is a major driver of change, but there are other issues.

Standards are required to deliver a method that will be easy to use for the customer. The Investment Funds Association and the Financial Planning Association have recognised this at an industry level, and have developed a “Financial Services Industry Electronic Commerce Development Plan”. This report recognises that the industry must agree on standards before an electronic commerce solution can be implemented. Once the standards have been developed and agreed (expected to happen in 1996), the use of electronic commerce by the industry and the individual participants will grow quickly. Without standards, there will be little effective use of electronic commerce in that industry.

There are many regulatory issues, which will be discussed later in this report. Today there are few restrictions to stop someone wishing to operate a business on the Internet. The regulators and supervisors of financial markets in Australia (RBA, ISC, ASC, AFIC, and others) are beginning to address the issues, but regulation across nations is a difficult task, and requires, at a minimum, significant co-operation between the regulators in different countries.

The regulations, that now apply, disadvantage existing providers of financial services by allowing non-regulated organisations to provide services without the same restrictions and supervision. An example of this has developed, in Australia, with the recent issuance of stored value smart cards by banks and non-banks.

2. LIKELY NEAR FUTURE TRENDS

Growth in the number of banks/financial service providers

New players will enter the banking/payments systems arena. These may be other forms of financial services (or quasi-banking) organisations (credit card companies, insurance companies, fund managers), postal authorities, telecommunications companies, and other IT companies and related services companies (transport, eg Mayne Nickless and entertainment, eg Disney, Time-Warner and Murdoch); large government organisations (eg Department of Social Security); and alliances of a number of players (eg as contained within the NSW QuickLink consortium).

Accessibility of overseas banks will improve given the high capacity and low cost of telecommunications, and the accessibility of telecommunications based solutions, particularly those on the Internet. The regulatory environment is not expected to impede these moves, as the industry is already fairly deregulated and customers (as opposed to institutions) are not bound by banking regulations, nor significantly restricted by foreign exchange regulations. The overall effect of these moves will be to make banking more competitive and will increasingly change the nature of transaction banking into one of a commodity. However, transaction banking services providers will be desperate to differentiate their offerings, through pricing, bundling and associated services (eg get NRMA or Amex services free).

New Payment Instruments

New payment instruments will emerge. The most significant forms of these will be stored value cards and various forms of electronic money. Stored value cards will act initially as a cash replacement, but in the medium term could also replace higher value instruments, particularly travellers cheques. Electronic money will be used for Internet payments, and initially the focus will be on:

- medium sized payments (for CDs and the like) and this will explode,
- then low value payments for network-accessible content, services and software,
- then micro (less than one cent to a few cents) payments, mostly for reading,
- then, as confidence grows, large transactions will just happen.

Various forms of electronic money or other forms of value (eg electronic barter tokens) will be provided by banks, start-up technology based ventures (eg DigiCash) and even closed-groups (particularly in the form of barter).

Increase in importance of credit cards

The importance of credit cards will increase for payments and receipts. Organisations (including Governments) will make increasing use of credit cards for payment purposes to increase the convenience and efficiency of end users who need to make purchases, and to reduce the burden of accounts payable processing - eg the Department of Finance is committed to having 50% (by number, not value) of payment transactions made by credit card. Corporate credit cards will evolve to include greater security (ie to limit the nature or amount of purchases) and to provide enhanced reporting. They will be marketed under various guises including 'Purchasing Cards'. Credit cards will be increasingly used as the payment mechanism for medium-value phone, mail and Internet based payments.

However, there is a scenario where credit card usage will implode, but not until the next decade.

Once stored-value (for off-line) and debit (for on-line) is on the same card (eg MasterCard has already developed such a product), credit is only needed as a means of covering account-balance shortfalls. Banks will find that overdraft arrangements will be simpler to administer, and cheaper than credit-card insurance/fraud losses. By making appropriate offers to their clients, first the usage of credit cards will drop, and then the population of credit-cards will too. Visa, MasterCard and EuroPay will survive, because they're trapping the debit-card transaction-switching market, and will seek to do the same for identified stored-value transactions. (However, the Mondex system, which is sometimes claimed to be technically superior to the Visa and MasterCard products, may undermine their plans, hence the interest that MasterCard has in buying Mondex, possibly to kill it).

Adoption of Smart Cards

Magnetic stripe cards are fairly easy to counterfeit and are causing security problems on a worldwide basis. The banking industry will start to migrate from magnetic-stripe based cards to smart cards in order to reduce the losses attributable to fraud. But the banks will also need the extra functionality required to provide enhanced services and greater security for the customer and the bank/financial services provider. Over time this will result in multi-function cards that could embody debit card, credit card and stored value functions, as well as other non-banking functions.

Increase in the use of remote access personal computing based electronic banking

Electronic banking, both by organisations and individuals, will increase as the major banks and providers of accounting software unleash their personal computer based software offerings. Many of these will be Internet based. In providing this means of

time, distance and location independent access, banks will be allowing for extended access to banking services after hours and on weekends/public holidays to the payment system.

Banking will become a seven day per week, rather than a five day per week activity. The software offerings will allow for the interrogation and management of accounts (and probably other financial assets - eg investments in the medium term), and the conducting of financial transactions. Increased use will be made of direct electronic debit and credits. This does not only refer to personal computers, and includes all chip devices that have a form of data entry, communication and a screen; other forms of this will be personal organisers, palmtop computers, smart-telephones, and in time, possibly super-smart cards. In addition there will be more accessibility through public access terminals at airports, hotels, shopping centres, government offices and other major buildings.

Increase in the use of telephone banking

The telephone is expected to become the major piece of end-customer technology for 'electronic banking' for the next few years, given its universality and ease of use. Two forms of telephone based services will be offered. Interactive (or Integrated) Voice Response (IVR) solutions will allow customers to use their touch-tone phones as 'quasi terminals'. These solutions will interact directly with the banks'/service providers' computers. Human-operator based services using advanced computer-telephony integration (CTI) solutions will become a major means for customers to undertake a range of banking solutions, without the limitations and technology comprehension requirements of IVR. These are expected to be modelled along the already extremely successful Citibank model.

Continuation in the trend of a reduction in bank branches

Conventional banks, under pressure to compete with 'lean and mean' competitors will reduce costs by reducing the number of branches, a trend that began with the introduction of ATMs. More end-customer services will be provided by agency arrangements (eg through Australia Post) or via technologies. The end result may however be to leave certain classes of customers with reduced banking services.

Assuming not all banks follow the same strategy, then if the early-movers aren't followed too quickly, then the late-movers will see a flow of some kinds of customers to them (especially among the elderly, conservative and country-folk - and not all of them will be poor pensioners). If the late-movers can work out a way to make this kind of business pay (most likely by picking up agency work, like Australia Post shops only different, eg. insurance, couriers, car-hire, ...), then we will end up with a valuably differentiated set of offerings, and still one or two bank-branches in every town and suburb. It is expected that the credit unions will provide valuable services in some regions that experience a reduction in bank branch numbers.

Increase in banking kiosks

Small, 'high-street' facilities which are unstaffed or minimally staffed will start to appear (Citibank have a number of these in Australia). Cut-down facilities will appear in shopping centres and even inside retail outlets - eg supermarkets, hotels, entertainment venues, clubs and community facilities. These will contain advanced Automated Teller Machines (ATMs) which will increasingly evolve into full service kiosk machines that offer a wide range of functions, beyond those currently provided by ATMs. These will often be combined in the same premises with other technology facilities such as video-conferencing and document scanning facilities to allow for complex transactions with bank officers based at remote call centres.

Growth of intermediaries

The importance of intermediaries in the payments system area will increase. These may take the form of brokers who will constantly be seeking to get the best package of financial services at the lowest cost for clients, as well as providers of one-stop/single-point payment services who will manage the complexity of the multiple forms of payment that clients will need to accept.

3. TYPES OF PAYMENT SYSTEMS

Banking is changing - and with the Internet there are many new innovations for allowing payment for goods and services.

The definition of electronic banking is to allow for the initiation of transactions and the processing of banking data using telecommunication lines and computers and/or other devices. This has been occurring for some time with corporate customers who have been using electronic banking for account statements, payment instructions, treasury management, and other complex functions and applications. The Internet has now allowed consumers with a personal computer and a modem to use electronic banking applications from their home.

The Internet provides a marketplace for consumers to shop from home, make buying decisions, and then arrange for payment to take place. There are a number of different levels that can be used to allow payment to occur.

1. The Telephone

A merchant can advertise the goods/services on the Internet, and then ask for the customer to use the telephone to provide details of their credit card. This is no more than an extension of an advert in a newspaper or magazine asking for payment to be made by using the telephone. The merchant will ensure that the payment is approved before parting with the goods.

2. Use the Internet to transmit the credit card details.

Under this scenario, the consumer is asked to fill in an on-line form which asks for the credit card details. The details are transmitted by electronic mail over the Internet, and again the merchant will obtain approval from the card company that the payment is approved. The risk of this is that "hackers" will attempt to obtain your credit card details and then use these to make other purchases. Visa and MasterCard (along with IBM, Netscape, Microsoft and others) have agreed to develop standards for secure Internet transactions. The standard is known as SET (Secure Electronic Transactions) and is based on the use of cryptographic techniques. SET will be available in early 1997, and will quickly "kick-off" an increase in credit card payments over the Internet.

Cybercash is a payment system that uses its own, proprietary, security system to allow payment for goods using regular credit cards. Cybercash is expected to move to the use of SET once this becomes a de-facto standard.

3. Stored Value Systems

Stored Value Cards (SVCs) have been in operation for some time. Telephone companies (the "PhoneCard") and Transport operators (weekly tickets) issue cards

with value for the payment of the use of their services. These are closed systems. Open systems are now appearing, where a SVC issuer (usually a bank) will issue cards with value (say \$200, but can be re-loaded with more value) and the cards can be used to purchase goods and services at a wide range of merchants (fast food, transport, newsagents, etc). These are known as open systems.

The value is usually stored on a plastic card, but can also be stored on any other device - such as the hard disk of a personal computer. Thus a consumer can transfer money from a bank account to a hard disk. The bank will do this only after the equivalent amount has been debited to the consumer's bank account, or added to a credit account. The consumer can then transfer portions of the value from the hard disk to the merchant providing the goods or services. The merchant will check that the issuing bank approves the payment.

One problem with these systems is the lack of privacy concerning what is being purchased. Both the merchant and the bank could be aware of the buying habits of the purchaser.

4. Virtual Cash Systems

The DigiCash company solved the privacy issue by designing a system (E-cash) that is acceptable to the bank, the merchant and the consumer regarding privacy and authentication.

The consumer, using DigiCash software, will "create" digital coins and random numbers will then be assigned to each coin. The "coins" are sent to the bank who will authenticate them, and debit the consumer's bank account. Using special cryptographic techniques the "coins" are then returned to the consumer with new numbers. The coins are now anonymous, untraceable and authentic and can be used by any merchant accepting this money. The merchant, upon receipt of these coins, will transfer them to the bank for credit to their bank account. The numbers are then deleted, ensuring that duplicates cannot be created.

There are a number of regulatory issues regarding this type of system. The criminal authorities are concerned that money launderers will be attracted by a system that cannot be traced by organisations such as Austrac. The banks are concerned that new entrants (that are not banks) can and do issue electronic money, without any supervision.

5. Virtual Banks

With virtual payments now in existence, the next step is a virtual bank. That is, a bank that appears only on the Internet. The First Virtual Bank (address: <http://www.fv.com>) is the first entrant in this new field, but in reality it is seen as a competing credit card clearing system. Currently the process for payments using a virtual bank are slow, but over time this will become speedier and smoother in operation.

Summary

The introduction of electronic money allows breaking the values into any amount - not just those issued by the central bank of a country. Micro payments (less than one cent) are also possible, and useful for payment of content type products.

There are constant changes in the alliances between the players in this market, adding confusion to merchants and consumers. The first real solution emerging seems to be the credit card SET based systems, with the others needing to settle before they will become acceptable payment systems.

4. REGULATORY SITUATION

The regulatory authorities are constantly assessing the impact of new technologies, and their current thinking (the talk by Bernie Fraser, of the Reserve Bank, on the 5th July 1996 being an indication of this) can be summarised as below:

Talk of changes to regulatory structure is premature, and the best option is to let the regulatory structure evolve with technological change. The benefits of this approach are:

There were excesses associated with the early years of deregulation, but the nation did not have to prop up the financial sector, unlike other sectors.

There are now benefits in the form of more innovative and competitively priced products.

The existing framework does not appear to be inhibiting financial sector development.

Current regulators will attempt to anticipate market developments, and will either 'head-off' a development or accommodate it.

An innovative financial sector requires scope for private initiative, and these should be encouraged to develop products prudentially rather than be reined in by pre-emptive regulations.

By watching, regulators are well placed to balance risk-taking and stability, market incentives and regulations.

An example is the stored value smart cards (being issued by banks and others) where the Reserve Bank is monitoring the trials and assessing policy implications. They are not currently considering any new regulations.

However, the 1996 Reserve Bank Annual Report has identified a number of policy issues regarding stored value schemes. These issues relate to security, financial standing of issuers, facilitation of money laundering, and the possibility of loss of seigniorage. As a number of the schemes have international dimensions, the RBA says it is working with other central banks to ensure that internationally consistent supervisory requirements are applied to these schemes.

Regulatory Options

1. Introduce laws that make a system illegal.

But, the laws can only apply to residents of the country making the laws; and the laws can only apply to companies with an address in the country making the laws. It will also be difficult to monitor adherence to any laws.

2. Introduce technical restrictions, that make it impossible to use illegal services

It is possible to create lists of illegal services, or of valid services, at the ISP (Internet Service Provider) level. This will have the effect of controlling all users who use the ISPs of that country. An example of this has recently been announced in Singapore. To get around this restriction, a user can dial an ISP that is outside of the country and the rules. The cost of telephone calls are coming down and is a realistic option to overcome the restrictions.

3. Have all countries co-operate to regulate the Internet worldwide

Some countries (eg Australia, USA, and some European nations) appear to be co-operating at this level. However it would need to include all countries for a system to fully work.

4. Promote public awareness of the effect of dealing with organisations that are operating against the spirit of consumer protections.

Slow, but sets the scene for buyer beware. However, this will be likely to happen and will be of advantage to organisations with a well established record.

5. Make local rules penalising (by tax disincentives) users who purchase financial products outside of Australia.

This requires the co-operation of all financial institutions in Australia and the various regulators.

(Digital signatures will play a role in securing the transaction and providing for non repudiation as part of the ability of the law enforcers to check).

6. Provide an environment in Australia that will be competitive with the rest of the world.

5. REGULATION OF FINANCIAL SYSTEMS ON THE INTERNET

The use of an effective electronic money system on the Internet will provide opportunities for low payments and this in turn will cause an expansion of trade and commerce. The existing payment systems are costly and include many controls and regulations imposed by bureaucratic governments. These controls may be irrelevant to the requirements of business in the next century. One option is to not allow any form of electronic money because regulatory control will be too difficult. Another option is to recognise that national boundaries will be superseded by the new payment systems operating in “Cyberspace”.

What are the regulatory issues?

1. Prudential Supervision

Confidence in electronic money would quickly fall away, if any issuer was to get into trouble and was unable to redeem value. Trouble could be because of criminals being able to counterfeit the value of an issuer, or if the issuer themselves were to act imprudently.

It is possible to treat stored value (on smart cards and on Internet accounts) the same as deposit accounts, and subject them to the same requirements. But if a non regulated institution were to issue stored value (as does now happen), then they fall outside the control of the various regulatory bodies.

The seigniorage earned by the Reserve Bank in the past year amounts to about \$2.4 billion (the most profitable organisation in Australia). If this were reduced in any significant way, then the loss would need to be made up by additional taxation, or the government might need to cut expenditure. It seems likely that the government would “wind in” the float that was being accumulated by stored value issuers before there was any significant impact. Another alternative is for the Reserve Bank to become the issuer of stored value in Australian currency.

2. Consumer Protection

Existing protections can be summarised as:

cash:	if cash is lost, then the consumer has lost the value.
cheques:	consumer can stop payment, banks supposed to verify signature.
travel cheques:	normally replaced if stolen, and if not used.
ATM:	receipt provided plus monthly statements.
EFTPOS:	limited liability of \$50 if PIN is protected.
credit card:	same.
stored value	cash equivalent, and should be treated the same as cash. no PIN, therefore EFT code of conduct, etc does not apply. receipts/statements will not be issued for svc transactions.
Internet cash	similar to stored value, but also similar to a deposit account and may deserve similar protections

State escheatment laws will need to be amended to deal with value left idle for a certain length of time. Lack of any laws covering unused money is currently considered a significant windfall for card issuers.

3. Taxation

Cash is used extensively in the underground (black) economy and in other illegal activities to evade taxes. The conversion of cash to an electronic form will remove the concern of transporting bulky and cumbersome large sums of cash, thus possibly making tax evasion simpler.

Many of the new electronic schemes provide anonymity of the transactions, making it difficult for authorities (such as Austrac and the Tax Office) to trace transactions. The regulatory authorities would need to insist on design features being implemented to remove these concerns.

The taxation status of transactions carried out across national boundaries is not clear. Many countries have no modern taxation statutes or double tax agreements. An on-line service provider can establish an address outside a country, where the services are supplied, so that any income ordered through on-line services in that country cannot be assessed as being within the jurisdiction of the tax authorities of that country. This could have significant impact on Australian taxation revenue.

4. Law Enforcement

SVC transactions are designed to occur off-line, and this makes it difficult to detect, track and stop a counterfeit card. However counterfeiting of SVCs is currently very difficult.

Money laundering can be facilitated by “person to person” or “computer to computer” transfers of money. Law enforcers want the transactions traced, but this is in conflict with consumers needs for privacy.

5. Codes of Conduct

The existing complaints process for handling disputes has been well established by the banks and includes the Banking Industry Ombudsman. Banks are likely to extend these mechanisms to electronic money and thus differentiate themselves from non-bank issuer of electronic money.

The codes of conduct are mostly out of date, and will need revision to allow for the new payment systems.

6. Privacy

Levels of privacy with existing payment instruments are:

cash	maximum anonymity (some exceptions), except Austrac rules
cheques:	details recorded by bank, and payee, and can be subpoenaed
travel cheques:	detailed record of where cheques was cashed, but not where spent
ATM:	ATM records that cash was issued
EFTPOS:	same as ATM
credit card:	same as ATM
stored value:	can be anonymous, or pseudonymous. Regulations do not cover
Internet cash:	same as stored value

Summary

As well as prudential and consumer protection laws, there are also "good corporate citizen" expectations in many markets.

For example, Australia, and New Zealand, have in recent years moved from a reliance on government regulation to an increased use of industry self-regulation through a variety of industry codes of practice. Some of these codes are mandatory, but most are optional with little power of the imposition of penalties. Codes of conduct are likely to be particularly important in regulation of on-line content and use of customer personal information obtained through the provision of on-line services. The need to adhere to these codes may have a substantial impact on the business case for an on-line service.

The introduction of privately issued stored value cards and on-line money has the potential to undermine the Reserve Bank's ability to monitor and control money supply and inflation. The current laws do not provide for non-regulated financial institutions to report to the RBA the amount of "money" they have issued. However this will not be an important issue whilst the total amount of value is low.

The position of the regulators is that they will not want to impose regulation prematurely for fear of stifling innovation and a fledgling industry. However, the various interest groups are pushing for some form of supervision.

- The consumer groups believe consumers need protection (privacy, unfair fees, etc).
- Banks want non-banks to be supervised where they are involved in the issue of any money, because now the banks are at a disadvantage.
- Law enforcers want laws to allow traceability of transactions.

A tension exists between the different interest groups and will need to be resolved through discussion and agreement at different levels.

Therefore the regulators will need to:

1. Accept that the challenge is global, and thus work at building a global perspective on these issues; and
2. Recognise that the issues are not just related to banking, but to all financial products, including money, investments, insurance and others.