The concept of security applies to all information. Security relates to the protection of valuable assets against loss, disclosure, or damage. In this context, valuable assets are the data or information recorded, processed, stored, shared, transmitted, or retrieved from an electronic medium. The data or information must be protected against harm from threats that will lead to its loss, inaccessibility, alteration or wrongful disclosure.

The protection is through a layered series of technological and non-technological safeguards such as physical security measures, background checks, user identifiers, passwords, smart cards, biometrics, firewalls, etc. Security applies to all information. The security concept is summarized in the security objective.

**Security Objective**: The objective of information security is “the protection of the interests of those relying on information, and the information systems and communications that deliver the information, from harm resulting from failures of availability, confidentiality, and integrity.”

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**Holistic approach to IS security**

- **Risk analysis/assessment**
  - Determine critical assets
  - Analyze threats
  - Statistics
  - Current / future trends
- **Establish vulnerabilities**
- **Risk mitigation**
  - Access controls
  - Audit logs
  - Computer forensics
  - Preserve the evidence
  - Re-evaluate access controls and policies

---

**Step 2 – Risk Mitigation**

The outcome from the risk assessment is used to identify the optimum set of mitigation (control) measures.
Security Controls

PROVIDE:
- Protection for vulnerabilities
- Countermeasures against access breaches

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Controls

Four types:
- Deterrent controls
  - reduce the likelihood of a deliberate attack
  - Example?
- Preventative controls
  - protect vulnerabilities and make an attack unsuccessful or reduce its impact
- Corrective controls
  - reduce the effect of an attack
- Detective controls
  - discover attacks and trigger preventative or corrective controls


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What Else Can You Do??

Put in place sophisticated SECURITY CONTROLS
- Intrusion detection systems
- Firewalls
- Anti virus software- updates
- Vulnerability Scanning and analysis tools
  - Provide automatic patching and updates
- Security policies and procedures
- Security logs = audits

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Defence In Depth solution – A Layered Strategy

Perimeter defences
- Routers
- firewalls

Access controls

Network defences
- IDS (intrusion detection systems)

Application protection

OCTAVE/CRAMM/COBRA

Risk management

Physical defences
- Policy definition and management
- Encryption
- Virus detection
- Vulnerability scanning

DEFEENCE IN DEPTH – PRIMARY AREAS

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Learning outcomes:
- Define e-commerce and describe the numerous terms that reflect an e-commerce perspective
- Discuss the implications to organisations that enter into an e-commerce initiative
- Describe the numerous risks to organisations and customers in relation to E-Commerce

E-COMMERCE

E-Commerce refers to all commercial activity conducted with the aid of electronic devices or via computers connected to each other using some medium – internet.

Computers also include:
- Hand held devices (PDAs)
- M-commerce (Quirk & Forder, 2003)
  - Mobile phones

Further definitions

Often referred to as simply e-commerce, business that is conducted over the Internet using any of the applications that rely on the Internet, such as e-mail, instant messaging, shopping carts, Web services, and EDI, among others.

Electronic commerce can be between two businesses transmitting funds, goods, services and/or data or between a business and a customer.

The Terms!!

Electronic Commerce

- E-banking: organising accounts and paying bills
- E-shopping: purchasing goods from a website
- E-tailing: selling goods to shoppers from a website
- B2B: Sending and receiving orders to and from business partners
- E-govt: lodging tax returns, business activity statement (BAS), conducting other transactions with other government agencies
- E-marketplace
- E-globalisation

EVERY SECOND THAT A CUSTOMER CANNOT REACH A WEB SITE IS A SECOND IN WHICH A SALE CANNOT BE MADE
Customer perspective:
But I Ordered it on the Web Months Ago

Problems Shipping Online
- 48% Experienced problems when ordering online
- 28% Ordered goods that never arrived
- 15% Ordered goods that never arrived but were billed
- 7% Ordered goods that never arrived and were never billed
- 6% Tried to contact supplier without success
- 5% Received order that did not meet specification
- 2% Received order that was processed more than once

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B2B Estimates
- The B2B market in the US is projected to grow to approximately $1.5 trillion in 2004.
- B2B is still in the early adopter phase.
- By 2004 20% of B2B sales in the chemical industry will be internet based.
- Asia is embracing eCommerce sooner than anticipated.
  - IDC predict B2B in Asia (excluding Japan) will grow to $32.6 billion in 2003.
  - B2B sales in Japan will reach $62 billion in same period

Source: Gartner Group, January 2000
Boston Group, Forrester Research
and Yankee Group, 1999

% of e-commerce via electronic marketplaces

- Marketplace based trade
- Direct trade between partners

Projected growth in E-commerce

Worlwide B2B Revenues (in billions $)

B2B Online Commerce (in billions $)

Industries as Early Adopters


Source: U.S. and Japan e-commerce commission
So is eCommerce Real?

Commercial use of the internet is only 5 years old

- Over half of Schwab’s transactions come over the Net
- In just 4 years Amazon became the USA’s 3rd largest bookseller
- Cisco takes 99%+ of their orders over the Net
- Over 50% of ALL new/secondhand car buyers do their research over the Net
- Sony Playstation

Who is using it?

- 40,000,000+ businesses worldwide
  - <10% have “active” websites
- The Fortune 1000
  - Most have web sites
  - >80% have functional intranets (beyond email)
  - <25% conduct REAL eCommerce (trading partners)
- < 10% Conducting Ecommerce
- Have Commerce Sites Integrated To Back Office Fulfillment Systems

WHY???

The 2000 Executive View: Drivers of E-Business

<table>
<thead>
<tr>
<th>Driver</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Increase productivity</td>
<td>20%</td>
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<tr>
<td>Improve customer relations</td>
<td>13%</td>
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<tr>
<td>Improve supplier relations</td>
<td>7%</td>
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<tr>
<td>Real-time needs</td>
<td>6%</td>
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<tr>
<td>Regulatory and taxation issues</td>
<td>5%</td>
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<tr>
<td>Improve/improve business process</td>
<td>4%</td>
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<td>Improve business efficiencies</td>
<td>3%</td>
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<td>Improve supply chain</td>
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<tr>
<td>Improve customer management</td>
<td>2%</td>
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<tr>
<td>Increase company revenue/market share</td>
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<td>Gain competitive edge</td>
<td>1%</td>
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<tr>
<td>Improve business</td>
<td>1%</td>
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<td>Other</td>
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eCommerce Savings Potential

- 50% reduction in processing time
  - Fisher Scientific, 3M
- Reduction in purchasing costs from $45 to $1.50 per order
  - GE and 3Com
- 50% reduction in the time taken to order parts and therefore a saving of $2 mil. In stored value
  - Alaska Airlines

eCommerce Drivers

- Increasing adoption of internet technologies
- Business Intelligence
- Collaborative applications (e.g. Planning)
- Consolidation of industry standards
- Simplification of application technologies

Artificial intelligence

Business Drivers

- Emergence of Digital Marketplaces
- Customer driven portals
- ASP and application hosting
- Dis-intermediation/De-intermediation
- New Business Models
- Increased stickiness of B2B solutions

Technological Drivers

- Increasing adoption of internet technologies
- Business Intelligence
- Collaborative applications (e.g. Planning)
- Consolidation of industry standards
- Simplification of application technologies
Opportunities and Challenges

Opportunities
- New Business Models
  - Improved accessibility
- New business partners
- Worldwide presence
  - 24/7
- New sales channels
- Saving Potential

Employees
- More responsibility
- Less administration
- Less training
- Efficient Enterprise Processes

Oppportunities and Challenges

Economic implications of e-commerce

Market Freedom
(competition)

Stakeholder Protection
(secuirty of transactions and issues of availability)

Information Transparency

Business Ethics and Compliance
(issues of privacy)

Cost Effectiveness

Technology Neutrality

E-business Risks and Snapshots

<table>
<thead>
<tr>
<th>Strategic Direction</th>
<th>Value Chain Integration</th>
<th>Industry Transformation</th>
<th>Convergence</th>
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Opportunities
- Increasing Global Competition
  - Greater price transparency
  - Better product comparability
- Purchaser
  - To be better informed
  - To have higher expectations

Challenges
- Success factors
  - Customer service
  - 1 to 1 marketing
  - Logistics organisation
- Consequences for existing logistical processes and partnerships

Risks Within e-Business

Risks: Strategic Direction

- Success of e-business initiative is directly linked to the company’s ability to develop and implement a strategic plan.
- This plan can help in:
  - Identifying major e-business growth initiatives
  - Identify gaps
  - Reducing channel conflicts
  - Benchmarking against best practices

- Channel Enhancement
  - Failure to realize strategic implications for sell side
  - Buy side risks are relatively low
- Value Chain Integration
  - Increased exposure to failure as partners involved.
- Industry Transformation
  - Risk associated with discarding traditional business models
- Convergence
  - Risk associated with investment and direction

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As more companies exploit e-business the competition in stable markets increases. Implementation delays pose risk to ‘first mover’ advantage. Ability for companies to match other company’s offerings. Barriers for establishing business partnerships are reduced. Increasing global competition. Increase in customer expectations Price and product transparency.

- Competitive Environment
  - Channel Enhancement
  - Value Chain Integration
  - Industry Transformation
  - Convergence

Security
- Trust cannot be established without effective security
- Information Technology Infrastructure must support:
  - Confidentiality - Privacy
  - Integrity
  - Availability
  - Authentication – Identification, authorisation
  - Nonrepudiation
  - Accountability
- Automated channel connection to partners increases risk

Risks: Reputation
- Competitors without walls can quickly establish reputations.
- Managing customer expectations.
- Web page becomes the face of the company
  - Appearance
  - Navigation
  - Learning
  - Content
  - Speed
  - Errors

Risks: Culture
- E-business brings it with cultural change at the highest level.
- Employees maybe acting on behalf of other partners.
- Global languages and customs must be understood.
- Change management issues
- Executive leadership

Risks: Dependence on Others.
- New partnerships cause a shift in the balance of power.
- Previously guarded processes could be handled by outside partners.
- Which Processes and what Risks?
  - Proprietary information
- Joint problem solving and strategic development

Risks: Security
- Threats:
  - Information Security
  - Data Security
  - Confidentiality, availability, integrity, authentication
- Controls:
  - Vulnerabilities
  - Information system

- Business Risk from E-Commerce
  - Channel Enhancement
  - Value Chain Integration
  - Industry Transformation
  - Convergence

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Risks: Technology
- Solution selection
- Poor performance and lack of reliability
- User Training of new systems
- Speed at which the system becomes obsolete
- E-business integration
  - Internally
  - Externally

Risks: Governance (management)
- Appropriate organisational structure to support e-business initiatives:
  - Central leadership Vs cross functional
- Auditing personnel need to understand e-business legal and security requirements
- Partners need to be involved in decisions.
- Thorough and open documentation required to prevent misinterpretation.
- Protection of intellectual property.

Risks: Project Management
- Top level commitment
- Change management risks
- E-business integration
- Data standards
- Lack of coordination across the company and partners

Risks: Operations
- Lack of E-skills
  - Development
  - Maintenance
- Business Continuity Plans
- Scalability

Risks: Legal and Regulatory
- Business practices must match latest legislation.
- Lack of clarity
- Clash of laws and culture
- Conflicting jurisdictions
- Intellectual property
- Piracy of web page content
  - Recourse?

Risks: Business Process Controls
- Typical risks
  - Backup/recovery procedures.
  - Problems affect the entire enterprise.
  - New business rules
  - Support
Main Trends (1)

- **The E-Conomy goes main street**
  Online consumers with high expectations in terms of information quality, transaction usability and speed of delivery appear

- **The wired workforce arises**
  More information will be given to employees - direct involvement of nearly all employees in business processes through intranet technology and specific applications (virtual work community)

- **Companies tear down information boundaries**
  Joint business processes with partners are established by sharing information - B2B e-commerce takes off

Main Trends (2)

- **Products become commodities**
  The value of an offer (and the difference to others) will not be primarily the product itself - dynamic and individual presentation (incl. prices etc) will be key

- **Behaviour & Interaction becomes valuable data**
  Analysis of customer behaviour and dynamic reactions in real time lead to customer centric applications

- **Virtual Communities are formed**
  Specific knowledge / content will be exchanged in communities

- **Networks allow new forms of learning**
  Knowledge management and continuous learning on a self-service basis to "create" the empowered employee

Legally Speaking!!

- E-commerce is replacing a global marketplace tradition of signed writings as the ultimate best evidence of the law of contract to one of electronic intangible records
- There is little evidence that an electronic record will be considered conclusive legal proof
- The value of an electronic record often depends on the effectiveness of the security controls that have been instituted to protect the authenticity and integrity of the record

E-commerce the issues

- **Vendor issues**
- **Legality**
- **Privacy**
- **Confidentiality**
- **Availability**
- **Integrity**
- **Auditability**
- **Non-repudiation**
- **Financial**
- **Non-repudiation**
- **Stakeholder trust and confidence**
- **Accountability**
- **Auditability**
- **Financial**
- **Non-repudiation**

Legal Implications

- E-commerce is replacing a global marketplace tradition of signed writings as the ultimate best evidence of the law of contract to one of electronic intangible records
- There is little evidence that an electronic record will be considered conclusive legal proof
- The value of an electronic record often depends on the effectiveness of the security controls that have been instituted to protect the authenticity and integrity of the record

Non-Repudiation

- to reject with denial
- refuse to acknowledge and not pay

particularly an issue in e-commerce where users may repudiate or deny transactions

Issues: accountability, reliability, authentication
Non Repudiation

- In business it is necessary to ensure the other party cannot later deny they are bound by the contract
  - The goal of non repudiation
    - Forged signature
    - Signed under duress
- In a manual arrangement reduce the chance of this happening
  - All parties sign written documents
  - Use clear straight forward language
- In an ecommerce agreement?

Trust And Confidence

Factors that affect trust:
- Business is becoming more international
  - Entailing problems associated with cross border transactions
  - Online businesses
- Forgery
- Contracts
- Forged
- In a manual arrangement reduce the chance of this happening
  - All parties sign written documents
  - Use clear straight forward language
- In an ecommerce agreement?

Conclusion

The lecture today has only briefly touched on some of the many issues that impact on organisations that have developed or are thinking of developing an e-business initiative.

Some of the organisations who jumped into e-business fairly early, without first considering the implications did not survive – simply because they were unprepared for the influx of online orders.

Now organisations and customers have the added uncertainty of the security of transactions when conducting business on line.

Revision Questions

- What are the main risks to organisations conducting e-commerce?
- What main types of security controls would you put in place to support an e-commerce initiative?
- Link those security controls to the control relational model and a defence in depth strategy.

References

- Survivability protecting your critical systems located at:
- Please look at this power point slide:
  - http://www.cert.org/top20/top20paller03.pdf
- Internet security issues for small business located at: