SCIENCE & ENGINEERING IN ICT EDUCATION

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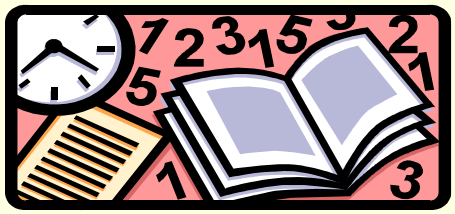
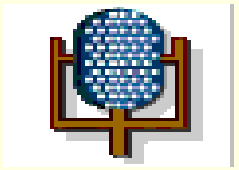
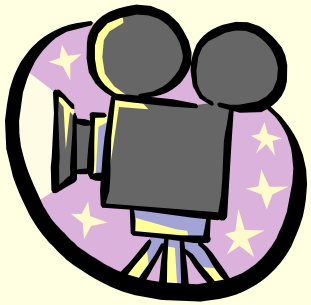
SPICTEX 20 – 23 July 2011

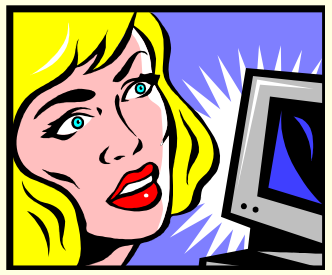
Agenda

- ICT Technical Background.
- Knowledge Economy Model.
- Developing ICT Professionals & Curricula.

What Does IT Stand For?

- Information and Technology:
  1. Information: TEXT, AUDIO, VIDEO.
  2. Technology: COMPUTERS, LAPTOPS, NOTEBOOKS, SMARTPHONES, PDAs.

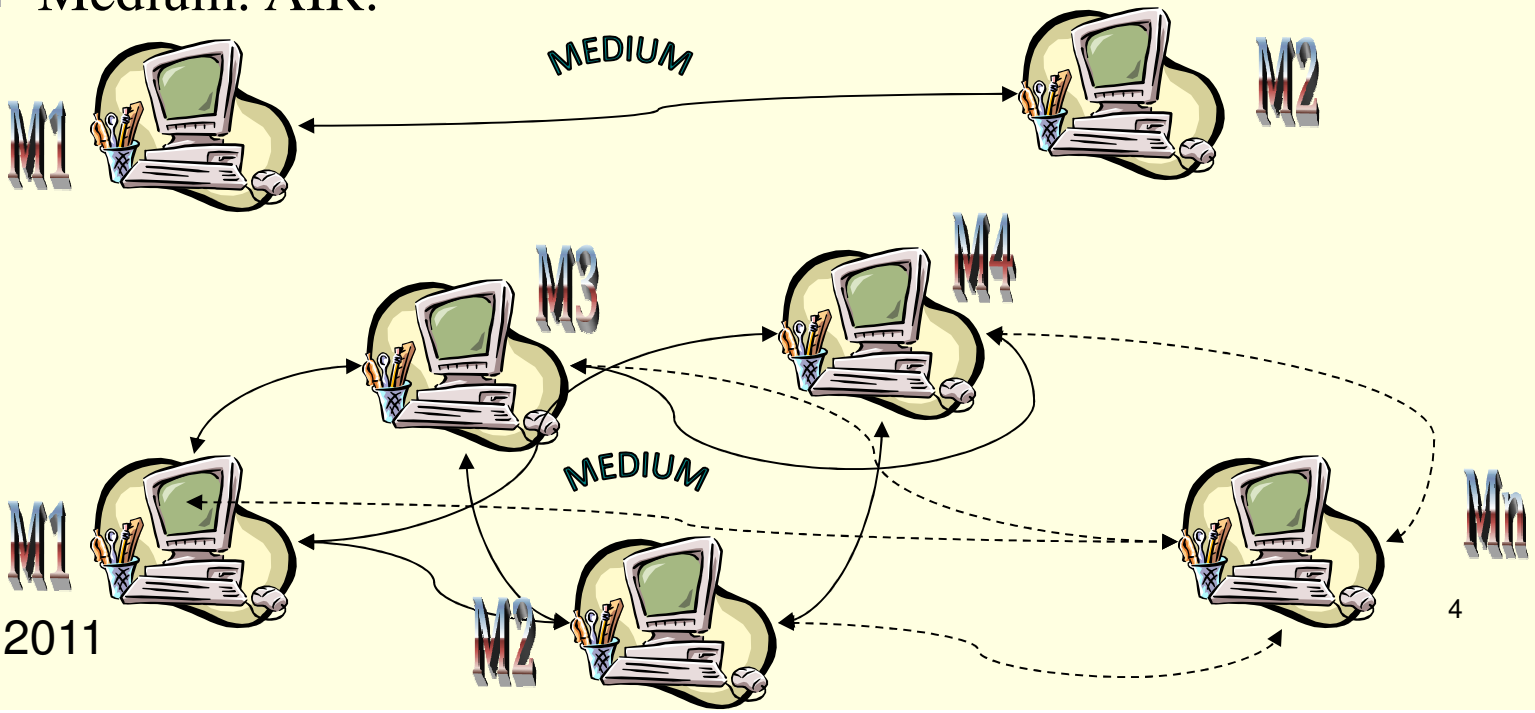



HOW DATA IS TRANSMITTED?

- Exchange of Data Between Two or More Machines.

1. Wired Connections: CABLES, FIBEROPTICS.
   - Medium: COPPER, GLASS.

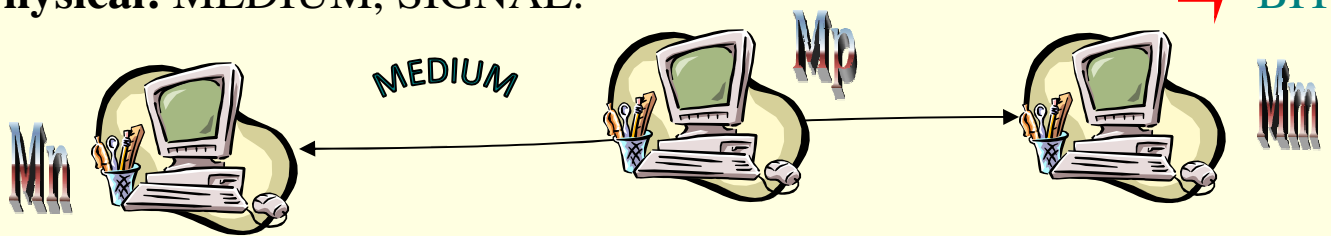
2. Wireless Connections: SATELLITES, ANTENNAS.
   - Medium: AIR.



HOW DO MACHINES TALK WITH EACH OTHER?

- Machines Must Speak the same Understandable Language by Others.
- Messages and Data are BROADCASTED Over a Medium.
- Information is Transmitted and Exchanged Between Computers Using Communication Protocols.
  - The Open Systems Interconnection (OSI) Model: STANDARD

1. **Application:** DATA PROCESSING, WEB-BROWSER. → MESSAGES
2. **Presentation:** DATA REPRESENTATION, **ENCRYPTION**. → MESSAGES
3. **Session:** INTERHOST COMMUNICATION. → MESSAGES
4. **Transport:** END-TO-END CONNECTIONS, RELIABILITY. → SEGMENTS
5. **Network:** LOGICAL ADDRESSING (IP). → PACKETS
6. **Data Link:** PHYSICAL ADDRESSING (MAC). → FRAMES
7. **Physical:** MEDIUM, SIGNAL. → BITS

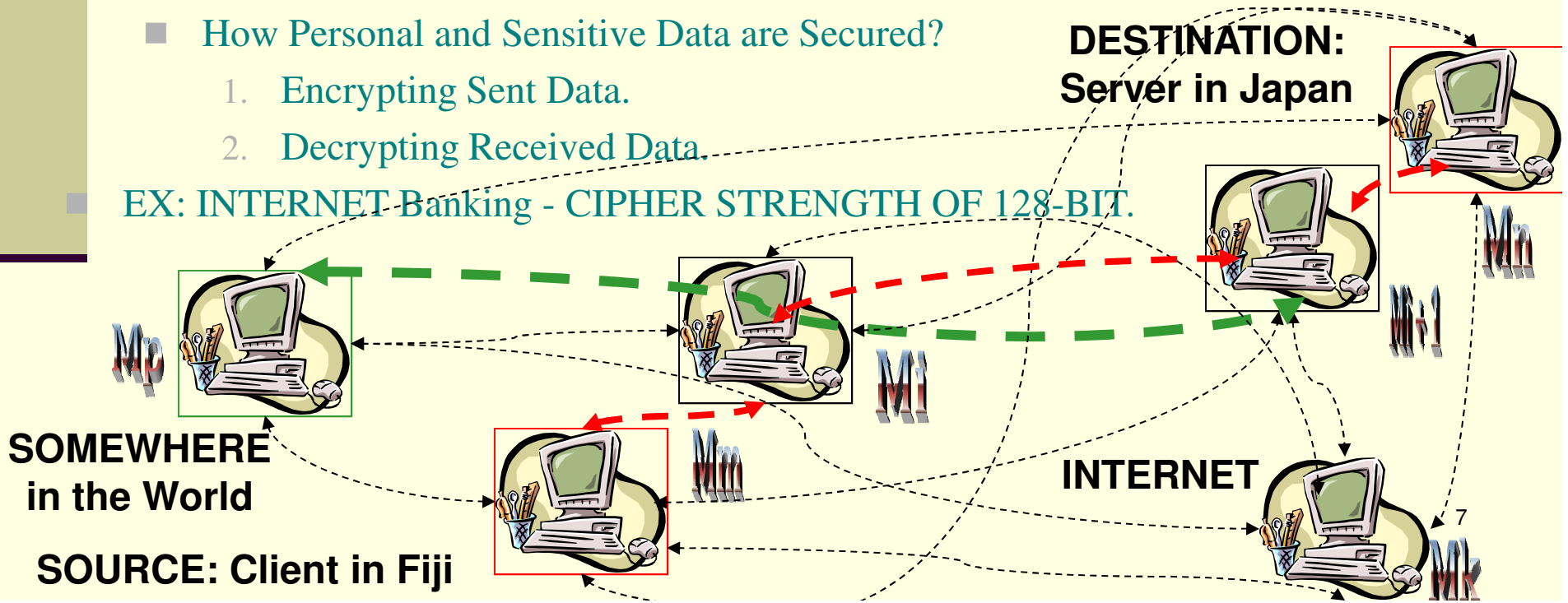


INFORMATION, TECHNOLOGY, AND COMMUNICATION NTEWORKS ARE USED?

- Information and Communications Technology (ICT).
- Are Transmitted Data and Communication Networks Secure?
  - To a Certain Point 'YES' Depending on:
    - Type of Networks:
      1. PRIVATE NETWORKS (INTRANET).
      2. PUBLIC NETWORK (INTERNET).
    - Transmitted Data is Encrypted or NOT:
      1. COMPLEXITY OF ENCRYPTION ALGORITHMS.
      2. ENCRYPTION/DECRYPTION KEYS.

HOW DATA/MESSAGES ARE SECURELY EXCHANGED OVER THE INTERNET?

- INTERNET is a Public Network.
- Data Sent From a Source (Machine m) to Destination (Machine n):
  - Travels From one Node or Router (Machine i) to the Next (Machine i+1).
  - Follows an 'Optimized Routing Path' Until it Reaches Destination (Machine n).
  - Random Machine (Machine p) can Read Transmitted Data.
  - How Personal and Sensitive Data are Secured?
    1. Encrypting Sent Data.
    2. Decrypting Received Data.
- EX: INTERNET Banking - CIPHER STRENGTH OF 128-BIT.



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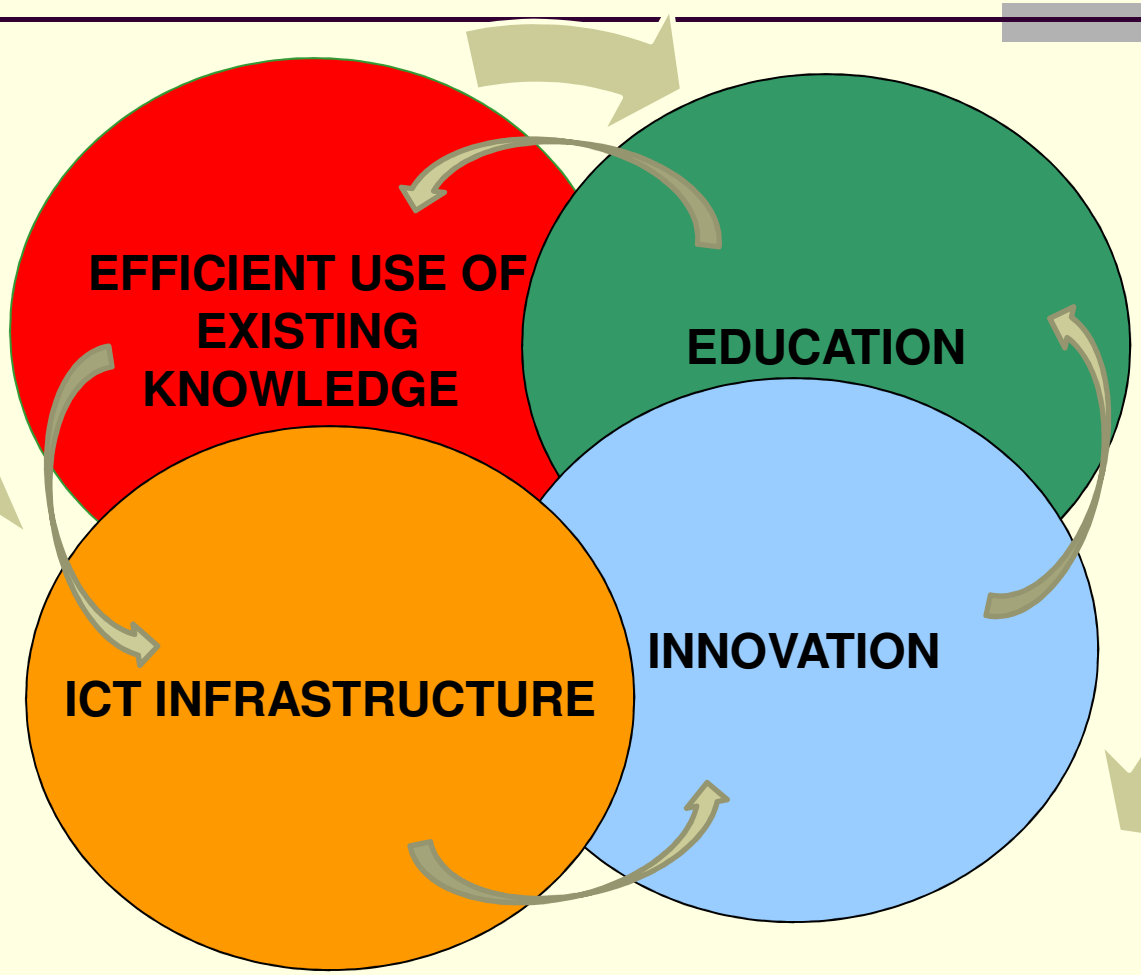
KNOWLEDGE ECONOMY

INTERCONNECTED



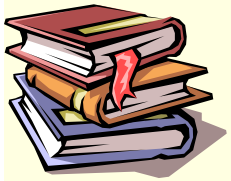
INTERDEPENDENT

Collaboration, Support, and Commitment from Academic and Research Institutions, Government, and Industry.

SPECIALISTS ARE NEEDED TO DESIGN, MANAGE, AND SUPPORT ICT INFRASTRUCTURE?

- Demand for ICT graduates by:
  - IT Industry.
  - Telecommunications Sector.
- Universities are Responding by Using:
  - Real Market Data Analysis.
  - Locale and Regional Demand.
  - Students Career Perceptions.

- Universities Need to Develop Specialized ICT Degree Programmes:
  - Bachelor (B) in:
    - Software Engineering (SE).
    - Electronic Engineering (EE).
    - Information System (IS).
    - Communications Engineering (ComE).
    - Computer Science(CS).
    - Computer Engineering (CE).



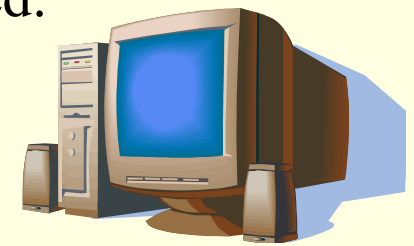
Professional Accreditation of ICT degrees by international professional bodies:

1. **Institute of Electrical and Electronics Engineers (IEEE).**
2. **Association for Computing Machinery (ACM).**

WHAT ICT DEGREE PROGRAMME TO OFFTER?

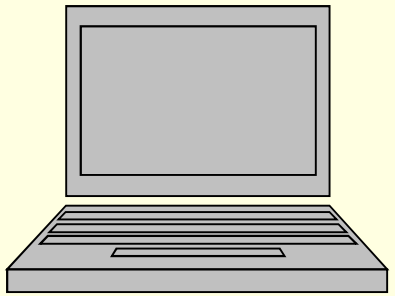
- Physical & Data Link Layers of the OSI Model:
  - Processing Hardware.
  - Pipelining Architectures.
  - ISDN/ADSL Technologies.
  - Mobile/Wireless Communication Techniques.

- Electronic Engineering, Communications Engineering & Computer Engineering Cover the First Two OSI Layers.
  - Specialized Laboratories are Required.
  - Specialized Academic Staff Members are Required.
  - Industry-University Partnerships are Essential.



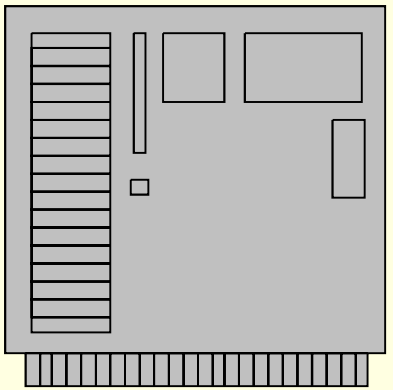
WHAT ICT DEGREE PROGRAMME TO OFFER?

- Network & Transport Layers of the OSI Model:
  - TCP/IP Protocol.
  - Network Management.
  - VoD Communication Protocol.
  - VoIP Services.



- Computer Science, Communications Engineering & Computer Engineering are Necessary.
  - CISCO Certification is Necessary.
  - Specialized Laboratories are Needed.
  - Specialized Academic Staff Members are Required.
  - Industry-University Partnerships are Essential.

WHAT ICT DEGREE PROGRAMME TO OFFER?



- Session & Presentation Layers of the OSI Model:
  - Network Security.
  - Encryption Algorithms.
  - Distributed Processing Environment.
  - Grid/Cloud Computing.
- Computer Science, Communications Engineering, Software Engineering, & Information System Degree Programmes are Essential.
  - Advanced Programming Techniques and Environments are Required.
  - Specialized Academic Staff Members are Required.
  - Industry-University Partnerships are Essential.

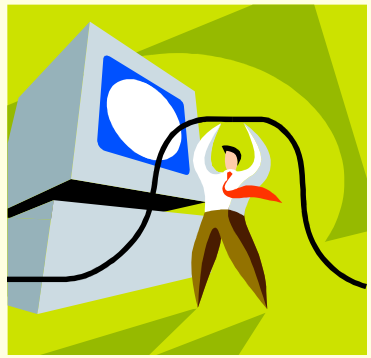
WHAT ICT DEGREE PROGRAMME TO OFFER?

- Application Layer of the OSI Model:
  - Networked Applications.
  - Mobile Applications.
  - Wireless Applications.
  - E-government Applications.
  - E-commerce Applications.
  - E-learning Applications.

- Represents Great Opportunity for Fiji Graduates.
- Computer Science, Communications Engineering, Software Engineering, & Information System Degree Programmes Graduates are Needed.
  - Certification of Software Developers is Required.
  - **Incubate** Software Development Start-up Companies.
  - Certification of Software Houses.

ICT DEGREE PROGRAMMES GRADUATE EXIT REQUIREMENTS?

- **Management Skills**:
  - Economics.
  - Accounting.
  - Business Planning.
  - Ethical Practices.
  - Engineering Law.
- **Communications Skills**:
  - Oral/Written.
  - Technical Presentations.
  - Technical Reports.
- **Project Management Skills**:
  - Design and Development.
  - Implementation and Verification.
  - Team Building.



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THANK YOU!