Aims

• Propensity for ICT sector in SA to contribute to economic growth and to social development
• Challenges of skills development for growth and poverty alleviation
• Skills formation
• Labour market absorption
• ICT domain
• Features and framework - as one point of departure for colloquium
Approach

- Features of the sector
  - Technology and market drivers
  - The ISETT SECTOR
  - The 'ICT industry'
  - Skills and technology literature
- Employment of 'ICT workers'
- Supply of skills
  - Schooling
  - FET Colleges
  - Private training
  - Learnerships
  - Internships
  - Workplace training
- What skills shortages?
  - Vacancies
  - Range of skills needs
  - Salaries
- Human Resources Development and HRM
  - Recruitment and retention
- Concluding comments

ICT market and technology drivers

THE CYCLE OF INTERACTION BETWEEN ICT SECTOR AND ICT USING ECONOMIC SECTOR ACTIVITIES

SECTORS IMPACTED
- Banking
- Education
- Finance
- Government
- Health
- Insurance
- Manufacturing
- Mining
- Media/Culture
- Retail
- Services

ICT TECHNOLOGICAL DYNAMICS
- Increased processing power
- Increased bandwidth
- Ubiquitous standards & protocols
- Improved software utility
- Convergence

COMPETITIVE EFFECTS
- Interactivity
- Productivity
- Efficiency
- Reach
- Time/space compression

DEMAND

SUPPLY
- R & D
- B2B
- B2C
- B2G
- G2C

SKILLS

R & D
Number of enterprises in ISETT sub-sectors

<table>
<thead>
<tr>
<th>Sub-sector</th>
<th>No of Organisations</th>
<th>Percentage of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT Sub-sector</td>
<td>5,597</td>
<td>87%</td>
</tr>
<tr>
<td>Electronics Sub-sector</td>
<td>165</td>
<td>3%</td>
</tr>
<tr>
<td>Telecommunications Sub-sector</td>
<td>612</td>
<td>10%</td>
</tr>
<tr>
<td>Total</td>
<td>6,374</td>
<td>100%</td>
</tr>
</tbody>
</table>

Total employees by ISETT SETA Chambers 2002

<table>
<thead>
<tr>
<th>Chamber</th>
<th>Total Employees</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT</td>
<td>133,700</td>
<td>63</td>
</tr>
<tr>
<td>Electronics</td>
<td>19,800</td>
<td>9</td>
</tr>
<tr>
<td>Telecommunications</td>
<td>58,700</td>
<td>28</td>
</tr>
<tr>
<td>Total</td>
<td>212,200</td>
<td>100</td>
</tr>
</tbody>
</table>

Enterprise size in the ISETT SETA

<table>
<thead>
<tr>
<th>Subsector</th>
<th>Small</th>
<th>Medium</th>
<th>Large</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1-4</td>
<td>5-9</td>
<td>10-49</td>
<td>50-99</td>
</tr>
<tr>
<td>IT</td>
<td>4,486</td>
<td>470</td>
<td>489</td>
<td>64</td>
</tr>
<tr>
<td>%</td>
<td>80.2</td>
<td>8.4</td>
<td>8.7</td>
<td>1.1</td>
</tr>
<tr>
<td>Electronics</td>
<td>111</td>
<td>23</td>
<td>19</td>
<td>1</td>
</tr>
<tr>
<td>%</td>
<td>67.3</td>
<td>13.9</td>
<td>11.5</td>
<td>0.6</td>
</tr>
<tr>
<td>Telecommunications</td>
<td>534</td>
<td>34</td>
<td>21</td>
<td>4</td>
</tr>
<tr>
<td>%</td>
<td>87.3</td>
<td>5.6</td>
<td>3.4</td>
<td>0.7</td>
</tr>
</tbody>
</table>

Source: ISETT SETA (2002,3); AMI (2002,14)
A bird's-eye view of the ‘ICT industry’

<table>
<thead>
<tr>
<th>ICT activities</th>
<th>Economic sectors in the economy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Involve creation and use of products and services eg:</td>
<td>ICT Producer sector</td>
</tr>
<tr>
<td>• Hardware</td>
<td>Electronics sub-sector</td>
</tr>
<tr>
<td>• Telecoms</td>
<td>Telecoms sub-sector</td>
</tr>
<tr>
<td>• Software</td>
<td>IT sub-sector</td>
</tr>
<tr>
<td>• Services</td>
<td></td>
</tr>
</tbody>
</table>

- Content

Literature relevant to technology impacts on skills needs

- De-skilling (Braverman, 1974)
- Skills biased technology change (SBTC)
  Technology independent variable (Krueger, 1973)
  - Technology endogenous effects -
  - “Skilled labour is complementary with a cluster of three distinct changes at the firm level: information technology, new work organization, and new products and services” (Bresnahan et al. 2000)
- General and specific skills in the labour market (Becker, 1964; Durbin, 2004)

Computer induced increased skills needs

- Computers may increase job **skills content** of jobs as follows
  - Operating the equipment may require scarce skills (computer-specific HC)
  - Computers in workplace > increased conceptual, abstract, problem solving (general HC - computer users)
  - Computers in organisation = wide changed practises even in non-users increased skills in organisation (general HC - computer users and non-users)
  - Computers may change the occupational composition of the enterprise of jobs


Employment in the ICT sector

Source: Moleke, Paterson, Roodt (2003); ISETT/DTI (2005); James et al (2006); Akoojee, Arends, Roodt (2007);
Computer professionals share of formal sector employment

Source: Paterson (2007)

Pathways in ICT skilling

Unemployed with or without prior qualifications

FET Colleges

GET

EMPLOYMENT BY AN ENTERPRISE (CONTRACT & PERMANENT)
- On-the-job and informal training
- Individual employees seek ICT skills upgrading, Career move into ICT
- In-house enterprise specific course paid by enterprise
- In-house vendor based courses paid by enterprise

In-house enterprise specific course paid by enterprise

Internships

PRIVATE TRAINING
- Vendor
- Vendor Neutral
- OSS
- Advanced
- Intermediate
- End-user

Learnerships

Post Graduates HIGHER EDUCATION
- Comp Sci
- Comp Eng
- Bus Data Sys
- Info Comms

Graduates HIGHER EDUCATION
- Non-ICT practicing graduates

Graduates HIGHER EDUCATION
- Post graduates

.Pathways in ICT skilling

LIMITED NUMBER WITH MATHEMATICS AND SCIENCE AND CS

PRIVATE TRAINING
- Vendor
- Vendor Neutral
- OSS
- Advanced
- Intermediate
- End-user

Learnerships

Post Graduates HIGHER EDUCATION
- Comp Sci
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Graduates HIGHER EDUCATION
- Post graduates
## SA Senior Cert ICT subjects 2004

**Candidates who passed Computer Science in the Senior Certificate, 2004 by Province**

<table>
<thead>
<tr>
<th>Province</th>
<th>HG</th>
<th>SG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eastern Cape</td>
<td>158</td>
<td>671</td>
</tr>
<tr>
<td>Free State</td>
<td>82</td>
<td>1 022</td>
</tr>
<tr>
<td>Gauteng</td>
<td>1 459</td>
<td>4 005</td>
</tr>
<tr>
<td>Kwazulu-Natal</td>
<td>1 353</td>
<td>2 063</td>
</tr>
<tr>
<td>Limpopo</td>
<td>184</td>
<td>725</td>
</tr>
<tr>
<td>Mpumalanga</td>
<td>188</td>
<td>569</td>
</tr>
<tr>
<td>North West</td>
<td>216</td>
<td>551</td>
</tr>
<tr>
<td>Northern Cape</td>
<td>51</td>
<td>228</td>
</tr>
<tr>
<td>Western Cape</td>
<td>507</td>
<td>2 851</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>4 198</td>
<td>12 685</td>
</tr>
</tbody>
</table>

Passed with endorsement 245 600

Comp Sci HG 1.71%

- Computyping now to CAT

Source: Data supplied by the DoE

## SA Senior Cert ICT subjects 2005

**Candidates who passed Computer Science in the Senior Certificate, 2005 by Province**

<table>
<thead>
<tr>
<th>Province</th>
<th>HG</th>
<th>HG %</th>
<th>SG</th>
<th>SG %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gauteng</td>
<td>1 601</td>
<td>38.1</td>
<td>4 096</td>
<td>30.3</td>
</tr>
<tr>
<td>Kwazulu-Natal</td>
<td>1 202</td>
<td>28.6</td>
<td>2 300</td>
<td>17.0</td>
</tr>
<tr>
<td>Western Cape</td>
<td>525</td>
<td>12.5</td>
<td>2 820</td>
<td>20.9</td>
</tr>
<tr>
<td>Mpumalanga</td>
<td>230</td>
<td>5.5</td>
<td>696</td>
<td>5.2</td>
</tr>
<tr>
<td>North West</td>
<td>191</td>
<td>4.6</td>
<td>491</td>
<td>3.6</td>
</tr>
<tr>
<td>Limpopo</td>
<td>154</td>
<td>3.7</td>
<td>921</td>
<td>6.8</td>
</tr>
<tr>
<td>Eastern Cape</td>
<td>141</td>
<td>3.4</td>
<td>715</td>
<td>5.3</td>
</tr>
<tr>
<td>Free State</td>
<td>109</td>
<td>2.6</td>
<td>1 302</td>
<td>9.6</td>
</tr>
<tr>
<td>Northern Cape</td>
<td>44</td>
<td>1.0</td>
<td>171</td>
<td>1.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>4 197</td>
<td>100</td>
<td>13 512</td>
<td>100</td>
</tr>
</tbody>
</table>

Passed with endorsement 260 653

Comp Sci HG 1.61%

Source: Data supplied by the DoE
Distribution of computers in schools 2005

<table>
<thead>
<tr>
<th></th>
<th>Total Number of Schools</th>
<th>Schools with computers</th>
<th>Schools with computers for teaching and learning</th>
<th>% Schools with computers</th>
<th>% Schools with computers for teaching and learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eastern Cape</td>
<td>6 239</td>
<td>1 435</td>
<td>489</td>
<td>23.0</td>
<td>7.8</td>
</tr>
<tr>
<td>Free State</td>
<td>1 842</td>
<td>1 424</td>
<td>477</td>
<td>77.3</td>
<td>25.9</td>
</tr>
<tr>
<td>Gauteng</td>
<td>1 897</td>
<td>1 792</td>
<td>1 495</td>
<td>78.8</td>
<td>81.0</td>
</tr>
<tr>
<td>KwaZulu-Natal</td>
<td>5 653</td>
<td>2 463</td>
<td>677</td>
<td>12.0</td>
<td>32.0</td>
</tr>
<tr>
<td>Mpumalanga</td>
<td>1 863</td>
<td>985</td>
<td>304</td>
<td>16.3</td>
<td>16.3</td>
</tr>
<tr>
<td>Northern Cape</td>
<td>422</td>
<td>384</td>
<td>255</td>
<td>60.4</td>
<td>60.4</td>
</tr>
<tr>
<td>Limpopo</td>
<td>4 187</td>
<td>3 746</td>
<td>1 495</td>
<td>28.8</td>
<td>35.9</td>
</tr>
<tr>
<td>North West</td>
<td>2 025</td>
<td>1 369</td>
<td>603</td>
<td>29.7</td>
<td>29.7</td>
</tr>
<tr>
<td>Western Cape</td>
<td>1 454</td>
<td>1 410</td>
<td>1 113</td>
<td>76.6</td>
<td>76.6</td>
</tr>
<tr>
<td>National</td>
<td>25 582</td>
<td>13 011</td>
<td>5 772</td>
<td>50.9</td>
<td>22.6</td>
</tr>
</tbody>
</table>

Source: Data supplied by the DoE

FET Colleges and ICT qualifications

<table>
<thead>
<tr>
<th>ICT related course offerings passed in FET Colleges Engineering Programmes at N4 to N6 levels; 2001 and 2005</th>
<th>2001</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication N4</td>
<td>57</td>
<td>180</td>
</tr>
<tr>
<td>Communication-Electronics N4-N6</td>
<td>7 078</td>
<td>6 406</td>
</tr>
<tr>
<td>Computer Principles N4-N6</td>
<td>3 084</td>
<td>2 153</td>
</tr>
<tr>
<td>Control Systems N6</td>
<td>240</td>
<td>342</td>
</tr>
<tr>
<td>Logic Systems N6</td>
<td>1 444</td>
<td>4 200</td>
</tr>
<tr>
<td>Digital Electronics N4-N6</td>
<td>2 669</td>
<td>1 949</td>
</tr>
<tr>
<td>Aggregate change 2001-2005 %</td>
<td>14 572</td>
<td>15 230</td>
</tr>
</tbody>
</table>

• 2001 limitation on post N3 studies – technician levels
• Does not refer to Information Processing

Source: Data supplied by the FET Directorate
## Higher education ICT graduate output

<table>
<thead>
<tr>
<th>Study field</th>
<th>Undergraduate</th>
<th>Honours</th>
<th>Masters</th>
<th>PhD</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer science</td>
<td>22 655</td>
<td>2 993</td>
<td>644</td>
<td>70</td>
<td>26 362</td>
</tr>
<tr>
<td>Business data systems</td>
<td>315</td>
<td>623</td>
<td>182</td>
<td>13</td>
<td>1 133</td>
</tr>
<tr>
<td>Information and communications</td>
<td>1 754</td>
<td>226</td>
<td>1 468</td>
<td>6</td>
<td>3 453</td>
</tr>
<tr>
<td>Computer engineering and technology</td>
<td>398</td>
<td>91</td>
<td>48</td>
<td>0</td>
<td>537</td>
</tr>
<tr>
<td>Total</td>
<td>25 121</td>
<td>3 933</td>
<td>2 342</td>
<td>89</td>
<td>31 485</td>
</tr>
</tbody>
</table>

Source: Data supplied by the DoE HEMS Directorate

## Higher education ICT graduates by qualification level

<table>
<thead>
<tr>
<th>Study field</th>
<th>Undergraduate</th>
<th>Honours</th>
<th>Masters</th>
<th>PhD</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer science</td>
<td>85.9</td>
<td>11.4</td>
<td>2.4</td>
<td>0.3</td>
<td>100.0</td>
</tr>
<tr>
<td>Business data systems</td>
<td>27.8</td>
<td>55.0</td>
<td>16.0</td>
<td>1.1</td>
<td>100.0</td>
</tr>
<tr>
<td>Information and communications</td>
<td>50.8</td>
<td>6.5</td>
<td>42.5</td>
<td>0.2</td>
<td>100.0</td>
</tr>
<tr>
<td>Computer engineering and technology</td>
<td>74.1</td>
<td>17.0</td>
<td>8.9</td>
<td>0.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>79.8</td>
<td>12.5</td>
<td>7.4</td>
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<td>100.0</td>
</tr>
</tbody>
</table>

Source: Data supplied by the DoE HEMS Directorate
Higher education ICT graduates by qualification level

<table>
<thead>
<tr>
<th>Study field</th>
<th>African</th>
<th>Coloured</th>
<th>Indian</th>
<th>White</th>
<th>Unknown</th>
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<tbody>
<tr>
<td>Computer science</td>
<td>41.4</td>
<td>5.8</td>
<td>14.5</td>
<td>38.1</td>
<td>0.1</td>
<td>100</td>
</tr>
<tr>
<td>Business data systems</td>
<td>24.6</td>
<td>2.1</td>
<td>9.8</td>
<td>63.5</td>
<td>0.0</td>
<td>100</td>
</tr>
<tr>
<td>Information and communications</td>
<td>46.5</td>
<td>4.7</td>
<td>8.1</td>
<td>40.7</td>
<td>0.0</td>
<td>100</td>
</tr>
<tr>
<td>Computer engineering and technology</td>
<td>13.9</td>
<td>1.5</td>
<td>12.1</td>
<td>72.5</td>
<td>0.0</td>
<td>100</td>
</tr>
<tr>
<td>Total</td>
<td>40.9</td>
<td>5.5</td>
<td>13.6</td>
<td>39.9</td>
<td>0.1</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Data supplied by the DoE HEMS Directorate

Computer science graduates and race, 2000-2003

<table>
<thead>
<tr>
<th>Year</th>
<th>African</th>
<th>Coloured</th>
<th>Indian</th>
<th>White</th>
<th>Unknown</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>UG</td>
<td>45.2</td>
<td>6.4</td>
<td>12.6</td>
<td>35.6</td>
<td>0.1</td>
<td>100.0</td>
</tr>
<tr>
<td>PGHons</td>
<td>20.3</td>
<td>5.9</td>
<td>13.6</td>
<td>60.2</td>
<td>0.0</td>
<td>100.0</td>
</tr>
<tr>
<td>PGM</td>
<td>16.2</td>
<td>2.9</td>
<td>6.3</td>
<td>74.7</td>
<td>0.0</td>
<td>100.0</td>
</tr>
<tr>
<td>PGPhD</td>
<td>14.1</td>
<td>0.0</td>
<td>10.6</td>
<td>75.3</td>
<td>0.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: Paterson (2007)
## Computer Science graduates: Gender

Computer science students graduated in universities and technikons by gender, 2000 - 2003

<table>
<thead>
<tr>
<th>Year</th>
<th>Count</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>M</td>
</tr>
<tr>
<td>UG</td>
<td>5450.1</td>
<td>7949.4</td>
</tr>
<tr>
<td>PGHons</td>
<td>866.8</td>
<td>1757.2</td>
</tr>
<tr>
<td>PGM</td>
<td>115.5</td>
<td>256.9</td>
</tr>
<tr>
<td>PGPhD</td>
<td>15.0</td>
<td>27.5</td>
</tr>
</tbody>
</table>

Source: Paterson (2007)

## Computer Science graduates 1994-2005

<table>
<thead>
<tr>
<th>Year</th>
<th>Undergrad</th>
<th>Hons</th>
<th>Masters</th>
<th>PhD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
<td>908</td>
<td>168</td>
<td>77</td>
<td>24</td>
</tr>
<tr>
<td>1995</td>
<td>1207</td>
<td>241</td>
<td>46</td>
<td>8</td>
</tr>
<tr>
<td>1996</td>
<td>1318</td>
<td>238</td>
<td>59</td>
<td>7</td>
</tr>
<tr>
<td>1997</td>
<td>1885</td>
<td>308</td>
<td>38</td>
<td>13</td>
</tr>
<tr>
<td>1998</td>
<td>1634</td>
<td>368</td>
<td>49</td>
<td>14</td>
</tr>
<tr>
<td>1999</td>
<td>2725</td>
<td>432</td>
<td>38</td>
<td>15</td>
</tr>
<tr>
<td>2000</td>
<td>2949</td>
<td>435</td>
<td>41</td>
<td>9</td>
</tr>
<tr>
<td>2001</td>
<td>2817</td>
<td>550</td>
<td>92</td>
<td>13</td>
</tr>
<tr>
<td>2002</td>
<td>3672</td>
<td>753</td>
<td>85</td>
<td>6</td>
</tr>
<tr>
<td>2003</td>
<td>3961</td>
<td>885</td>
<td>154</td>
<td>15</td>
</tr>
<tr>
<td>2004</td>
<td>4729</td>
<td>626</td>
<td>144</td>
<td>14</td>
</tr>
<tr>
<td>2005</td>
<td>3489</td>
<td>564</td>
<td>125</td>
<td>9</td>
</tr>
</tbody>
</table>

Source: HEMIS
Computer Science graduates by sub-field

<table>
<thead>
<tr>
<th>CESM</th>
<th>Field</th>
<th>UG</th>
<th>PGHons</th>
<th>PGM</th>
<th>PGPhD</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0601</td>
<td>Applications in Computer Science and Data Processing</td>
<td>18.5</td>
<td>34.5</td>
<td>34.3</td>
<td>40.0</td>
<td>21.5</td>
</tr>
<tr>
<td>0602</td>
<td>Computer Operations and Operations Control</td>
<td>7.8</td>
<td>3.7</td>
<td>0.5</td>
<td>0.0</td>
<td>6.9</td>
</tr>
<tr>
<td>0603</td>
<td>Computer Hardware Systems</td>
<td>2.0</td>
<td>2.1</td>
<td>0.9</td>
<td>0.0</td>
<td>2.0</td>
</tr>
<tr>
<td>0604</td>
<td>Computer Hardware</td>
<td>0.5</td>
<td>0.1</td>
<td>1.1</td>
<td>0.0</td>
<td>0.5</td>
</tr>
<tr>
<td>0605</td>
<td>Information and Data Base Systems</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>0606</td>
<td>Numerical Computations</td>
<td>6.1</td>
<td>0.8</td>
<td>0.0</td>
<td>0.0</td>
<td>5.9</td>
</tr>
<tr>
<td>0607</td>
<td>Programming Languages</td>
<td>10.7</td>
<td>6.9</td>
<td>4.4</td>
<td>0.0</td>
<td>19.1</td>
</tr>
<tr>
<td>0608</td>
<td>Programming Systems</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>0609</td>
<td>Software Methodology</td>
<td>0.9</td>
<td>0.4</td>
<td>0.0</td>
<td>0.0</td>
<td>0.9</td>
</tr>
<tr>
<td>0610</td>
<td>Theory of Computation</td>
<td>0.7</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.7</td>
</tr>
<tr>
<td>0611</td>
<td>Educational Societal and Cultural Considerations</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>0699</td>
<td>Other Computer Science and Data Processing</td>
<td>12.9</td>
<td>24.7</td>
<td>45.9</td>
<td>52.9</td>
<td>15.6</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: Paterson (2007)

ICT graduate’s knowledge and skills

- Core domains
  - Technology strategic
  - Technology applications
  - Theory
- Soft skills (including management)
- Knowledge fields and technological convergence – impact on curriculum and qualification structure
- Articulation with industry needs or commodification?

Source: Paterson (2007)
Private ICT training in South Africa

- Providers estimated - nationally 193\(^2\) (2002); nationally 257\(^3\) (2004); and in the Western Cape 120 (2003)\(^4\)
- Completed ICT courses in 2001 estimated to be 16 792 (75% private 25% public)\(^1\)
- Concentration in Gauteng, WC then KZN
- Characteristics:
  - 84% < 5 days duration highly focused and specific
  - 1% applied compulsory pre-test
  - 24% required post matric qualification
  - <1% aimed to achieve HE equivalence formally
  - Range of levels (entry/intermed/advanced etc.)


Workplace training in the ISETT SETA

<table>
<thead>
<tr>
<th>SETA</th>
<th>Small (11-50)</th>
<th>Medium (51-100)</th>
<th>Large (100+)</th>
<th>Group total</th>
</tr>
</thead>
<tbody>
<tr>
<td>FASSET</td>
<td>47</td>
<td>39</td>
<td>19</td>
<td>36</td>
</tr>
<tr>
<td>BANKSETA</td>
<td>22</td>
<td>24</td>
<td>21</td>
<td>22</td>
</tr>
<tr>
<td>ISETT</td>
<td>26</td>
<td>30</td>
<td>17</td>
<td>22</td>
</tr>
<tr>
<td>SERVICES</td>
<td>26</td>
<td>31</td>
<td>51</td>
<td>41</td>
</tr>
<tr>
<td><strong>GROUP TOTAL</strong></td>
<td><strong>23</strong></td>
<td><strong>24</strong></td>
<td><strong>25</strong></td>
<td><strong>24</strong></td>
</tr>
</tbody>
</table>

Source: Paterson and Du Toit (2005:59)
Training expenditure in the ISETT SETA

<table>
<thead>
<tr>
<th>Training expenditure per employee in 2003</th>
<th>A</th>
<th>B</th>
<th>Ratio of B/A (%)</th>
<th>Training expenditure as a % of payroll</th>
</tr>
</thead>
<tbody>
<tr>
<td>FASSET</td>
<td>7 635</td>
<td>4 199</td>
<td>55</td>
<td>1.2</td>
</tr>
<tr>
<td>BANKSETA</td>
<td>4 568</td>
<td>2 441</td>
<td>53</td>
<td>1.9</td>
</tr>
<tr>
<td>ISETT</td>
<td>7 248</td>
<td>2 761</td>
<td>38</td>
<td>1.6</td>
</tr>
<tr>
<td>SERVICES</td>
<td>2 243</td>
<td>1 472</td>
<td>66</td>
<td>2.0</td>
</tr>
<tr>
<td>Average</td>
<td>3 691</td>
<td>1 613</td>
<td>44</td>
<td>2.0</td>
</tr>
</tbody>
</table>

Source: Paterson and Du Toit (2005:68 Table 28)

Training to international standards in the ISETT SETA

<table>
<thead>
<tr>
<th>Permanent employees participating in training in accordance with training standards by SETA in 2003</th>
<th>SAQA/NQF</th>
<th>Other nationally recognised standards</th>
<th>ISO 9000</th>
<th>Other internationally recognised standards</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>FASSET</td>
<td>70.8</td>
<td>56.5</td>
<td>14.3</td>
<td>21.3</td>
<td>7.8</td>
</tr>
<tr>
<td>BANKSETA</td>
<td>13.7</td>
<td>30.1</td>
<td>14.8</td>
<td>0</td>
<td>55.1</td>
</tr>
<tr>
<td>ISETT</td>
<td>40.2</td>
<td>6.4</td>
<td>22.4</td>
<td>25.9</td>
<td>45.2</td>
</tr>
<tr>
<td>SERVICES</td>
<td>11.2</td>
<td>44.7</td>
<td>15.8</td>
<td>10.7</td>
<td>28.8</td>
</tr>
<tr>
<td>Average</td>
<td>25.1</td>
<td>30.4</td>
<td>35.1</td>
<td>18.2</td>
<td>16.3</td>
</tr>
</tbody>
</table>

Source: Paterson and Du Toit (2005:92 Table 19)
Number of Learnerships registered with ISETT SETA

<table>
<thead>
<tr>
<th>Learnership title</th>
<th>NQF Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>GUI-Based Applications for End-User Computing</td>
<td>3</td>
</tr>
<tr>
<td>Technical Support</td>
<td>4</td>
</tr>
<tr>
<td>Systems Development</td>
<td>4</td>
</tr>
<tr>
<td>Telecommunications Practitioner</td>
<td>4</td>
</tr>
<tr>
<td>Procedural Programming</td>
<td>5</td>
</tr>
<tr>
<td>Multi-Media Development</td>
<td>5</td>
</tr>
<tr>
<td>Website Development</td>
<td>5</td>
</tr>
<tr>
<td>Fourth Generation Language Programming</td>
<td>5</td>
</tr>
<tr>
<td>Commerce Development</td>
<td>5</td>
</tr>
<tr>
<td>Object Oriented Programming</td>
<td>5</td>
</tr>
<tr>
<td>Solutions Development / Programming</td>
<td>5</td>
</tr>
<tr>
<td>Systems Support (Desktop)</td>
<td>5</td>
</tr>
<tr>
<td>Systems Support Engineer</td>
<td>5</td>
</tr>
<tr>
<td>Telecommunications Technician</td>
<td>5</td>
</tr>
<tr>
<td>Masters in Information Engineering</td>
<td>7</td>
</tr>
<tr>
<td>Masters in Telecommunications Engineering</td>
<td>7</td>
</tr>
</tbody>
</table>

- Cumulative number of Learnerships registered by 2004 – 2 935 (DoL, State of Skills, 2005)
- No recorded use of National Skills Funds SMME initiatives


Internships

- Youth Internship Programme (SAITIS) 2001 research
- DTI launch in 2002 government-private sector partnerships
- Internships in private sector (ISETT SETA support R40 000/trainee) (2005)
- Size groups: <10 to 150+ firm size impact
- Variety
  - Recruit (Gr12-Post-G) Evaluations
  - N5 level includes: MS Project/A+/N+/projects/softskills & mentorship
  - Mix of theory to practise 50/50 to 11/12 practical
  - Period – 6months to 12 months
IT training in SA

• Skills critical to IT staff development

• Addressing the problem

ICT skills shortages

• The debate about ICT skills shortages
• How to measure shortages
• Concepts
  a) Scarce skills  (Hard to fill vacancies)
  b) Critical skills  (Skills gaps of incumbent)
• Contributors to the above
  • Technology change
  • Change in enterprise product market strategy
  • Change in service quality expectations
• How do enterprises respond?
Vacancies among ICT professionals

- Database 104 000 vacancies 11 quarters Apr 04 to Dec 06
- Professionals 46% of vacancies
- IT Professionals with range of 1.8%-2.2% of all vacancies over 33 months
- Note: print vacancies undercount – higher advertising counts on the internet (duplicate overcount)

Vacancies among ICT professionals: OFO coded (6 month intervals)

Source: DoL-HSRC database of vacancies
Vacancies in ISETT SETA by qualification

ICT salaries

- Salary as a proxy for demand
- Does the distribution of wage premia tell us anything?
Salaries and experience

• Salary as a proxy for demand
• What does the distribution of salaries tell us about...
• Where wage premia are located

Source: ITWeb IT Skills Survey 2006

### Monthly salary per technology/product field in 2006

<table>
<thead>
<tr>
<th>Technology/Product</th>
<th>Permanent</th>
<th>Contract</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM DB2</td>
<td>21 423</td>
<td>43 125</td>
</tr>
<tr>
<td>IBM WebSphere</td>
<td>25 831</td>
<td>31 083</td>
</tr>
<tr>
<td>Symantec</td>
<td>13 657</td>
<td>30 861</td>
</tr>
<tr>
<td>SAP R/3</td>
<td>22 052</td>
<td>29 794</td>
</tr>
<tr>
<td>IBM OS/390</td>
<td>20 358</td>
<td>29 375</td>
</tr>
<tr>
<td>Object oriented platforms (eg: C++ / UML etc)</td>
<td>20 996</td>
<td>26 960</td>
</tr>
<tr>
<td>Sun Solaris</td>
<td>22 951</td>
<td>26 667</td>
</tr>
<tr>
<td>Unix</td>
<td>19 226</td>
<td>25 786</td>
</tr>
<tr>
<td>MySAP</td>
<td>21 261</td>
<td>25 569</td>
</tr>
<tr>
<td>Business Objects</td>
<td>16 422</td>
<td>25 448</td>
</tr>
</tbody>
</table>

Source: ITWeb IT Skills Survey 2006
## Primary area of expertise and salary in ICT workers in SA in 2006

<table>
<thead>
<tr>
<th>Rank</th>
<th>Primary area of expertise</th>
<th>Average monthly salary permanent staff ZAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Supply chain management</td>
<td>27 833</td>
</tr>
<tr>
<td>2</td>
<td>IP telephony / VOIP</td>
<td>27 247</td>
</tr>
<tr>
<td>3</td>
<td>Risk management</td>
<td>25 454</td>
</tr>
<tr>
<td>4</td>
<td>Knowledge management</td>
<td>24 886</td>
</tr>
<tr>
<td>5</td>
<td>ERP</td>
<td>23 518</td>
</tr>
<tr>
<td>6</td>
<td>Business development / Sales</td>
<td>22 643</td>
</tr>
<tr>
<td>7</td>
<td>Enterprise architecture / SOA</td>
<td>22 640</td>
</tr>
<tr>
<td>8</td>
<td>Systems Integration / Consulting</td>
<td>22 119</td>
</tr>
<tr>
<td>9</td>
<td>Enterprise application integration (EAI)</td>
<td>21 351</td>
</tr>
<tr>
<td>10</td>
<td>Data centers</td>
<td>20 331</td>
</tr>
<tr>
<td>11</td>
<td>Outsourcing / SLA management</td>
<td>19 979</td>
</tr>
<tr>
<td>12</td>
<td>Storage / SAN / Backup / Storage management</td>
<td>19 848</td>
</tr>
<tr>
<td>13</td>
<td>Wireless networks</td>
<td>19 511</td>
</tr>
<tr>
<td>14</td>
<td>Telecommunications equipment / services</td>
<td>18 839</td>
</tr>
<tr>
<td>15</td>
<td>Security</td>
<td>18 564</td>
</tr>
</tbody>
</table>

Source: ITWeb IT Skills Survey 2006

## Recruitment and retention

- ICT careers – attractiveness
- Turnover rates
- Churn
- Enterprises in recruitment and retention
Strategy on demand side

• South African Information Technology Industry Strategy (SAITIS) 1995
• SAITIS development framework 2000
• E-Strategy Task Force (Electronic Communications and Transactions Act (2002)
• Cabinet Micro-economic reform strategy 2002
• DoL – ISETT SETA
• DTI –
  • Integrated Manufacturing Strategy (IT & Logistics)
  • National Industrial Participation Programme
• JIPSA (BPO and commitment to ICT infrastructure)

Source: SA ICT sector Development Framework, (SAITIS,2000,54)

Thank you