Old Method of Fix (1988) - Example Scenario

Visit #1
- GE notified of broken machine
- FE goes to site, diagnoses machine. Realizes part needed.

Visit #2
- FE goes back to field office. Either has part or orders it.
- FE goes back to site, replaces part. Machine still broken.

Visit #3
- FE goes back to field office. Gets different part.
- FE goes back to site, replaces part. Machine fixed.

On Average over 3 visits per fix and over 2 days

Current Method with CBR

Visit #1
- GE realizes machine has malfunctioned or is about to
- Machine fixed remotely

On Average < 0.5 visit per fix
Figure 1 ELSI Diagnostic Process

Learning System

Fast Failures: logs & fixes

Build Cases
Compare Cases

"Diagnostic Directory"

Diagnostic System

New Failure: log only

esli-diag
Build Case (w/o fix)
Find Similar Cases

Supposed Fixes & Similar Past Cases

Log and Confirmed Fix

Figure 2 Pre-Processing Examples

Raw CTEX Log

RESLUE: XNUMX 5  21/01/93 15:36:48
No unexpected Failure at Abode: 900 status: 0
RESLUE: XNUMX 6  21/01/93 15:36:50
user specified abort (jstat contains abort code).
No user specified abort code: 9001 from version 2.2?

Parsed and Columnized

<table>
<thead>
<tr>
<th>CODE</th>
<th>VALUE</th>
<th>DEC</th>
<th>hex</th>
<th>BIN</th>
<th>HEX</th>
</tr>
</thead>
<tbody>
<tr>
<td>XNUMX</td>
<td>3200</td>
<td>8400</td>
<td>1010</td>
<td>0100</td>
<td>5555</td>
</tr>
<tr>
<td>XNUMX</td>
<td>3200</td>
<td>8400</td>
<td>1010</td>
<td>0100</td>
<td>5555</td>
</tr>
</tbody>
</table>

pp2 Version

RESLUE: XNUMX 5  21/01/93 15:36:48
No unexpected Failure at Abode: 9001 status: 0
RESLUE: XNUMX 9  21/01/93 15:36:50
user specified abort (jstat contains abort code).
No user specified abort code: 9001 from version 2.2?
### Figure 3  Block-Finding Example

<table>
<thead>
<tr>
<th>Block</th>
<th>Code</th>
<th>Size</th>
<th>Block Action</th>
<th>Size</th>
<th>Block Action</th>
<th>Size</th>
<th>Block Action</th>
<th>Size</th>
<th>Block Action</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1</td>
<td>2</td>
<td>B</td>
<td>3</td>
<td>C</td>
<td>4</td>
<td>D</td>
<td>5</td>
<td>E</td>
<td>6</td>
</tr>
<tr>
<td>B</td>
<td>7</td>
<td>8</td>
<td>B</td>
<td>9</td>
<td>C</td>
<td>10</td>
<td>D</td>
<td>11</td>
<td>E</td>
<td>12</td>
</tr>
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<td>C</td>
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<td>C</td>
<td>16</td>
<td>D</td>
<td>17</td>
<td>E</td>
<td>18</td>
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<tr>
<td>D</td>
<td>19</td>
<td>20</td>
<td>B</td>
<td>21</td>
<td>C</td>
<td>22</td>
<td>D</td>
<td>23</td>
<td>E</td>
<td>24</td>
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<tr>
<td>E</td>
<td>25</td>
<td>26</td>
<td>B</td>
<td>27</td>
<td>C</td>
<td>28</td>
<td>D</td>
<td>29</td>
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</table>

### Figure 5  Similarity Index Example

<table>
<thead>
<tr>
<th>Block Name</th>
<th>Weight</th>
<th>Board I</th>
<th>Board II</th>
<th>Board III</th>
<th>Board IV</th>
<th>New Cases</th>
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<tbody>
<tr>
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<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<tr>
<td>Block B</td>
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<td>Block C</td>
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<td>C</td>
<td>C</td>
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<td>C</td>
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<tr>
<td>Block D</td>
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<td>D</td>
<td>D</td>
<td>D</td>
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<tr>
<td>Block E</td>
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<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
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<td>Block F</td>
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<td>F</td>
<td>F</td>
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<td>G</td>
<td>G</td>
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<td>Block H</td>
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<td>H</td>
<td>H</td>
<td>H</td>
<td>H</td>
</tr>
</tbody>
</table>

- **Total Weight**: 10 10 10 10 10 10 10 10 10 10
- **Similarity Index**: 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000

*Similar Cases: Case 10 (Board IV, mm=1000) Case 11 (Board II, mm=500)*
Results

- ELSI diagnoses GE X-ray machines and those of our competitors
- GE has fixed price contract for servicing entire over 1000 hospitals
- Cost to service has gone down dramatically (our competitors can not do this)
- 90% of GE Medical Systems profit is from Services