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Graphic File Carving Tool Testing

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National Institute of
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Outline

- Computer Forensic Tool Testing Program (CFTT)
- Why test carving tools?
- File Carving vs Deleted File Recovery
- Brainstorming before testing
- Testing Methodology
- Results Overview

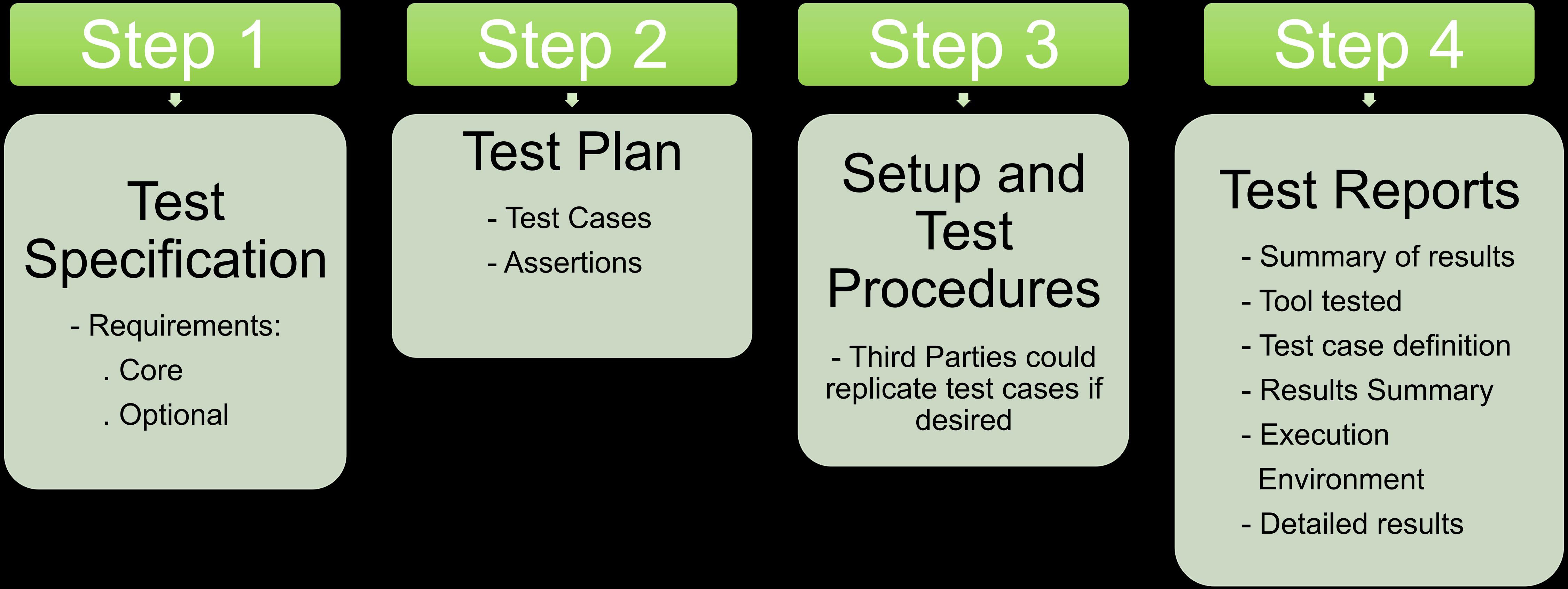
Computer Forensic Tool Testing Program (CFTT)

- Validate tools used in computer-based crime investigations

- Steering Committee

- Sponsors: Law Enforcement Standards Office, Department of Homeland Security, Federal Bureau of Investigations, National Institute of Justice, among other agencies

CFTT Methodology



Step 1

Test Specification

- Requirements:

. Core

. Optional

Step 2

Test Plan

- Test Cases

- Assertions

Step 3

Setup and Test Procedures

- Third Parties could replicate test cases if desired

Step 4

Test Reports

- Summary of results
- Tool tested
- Test case definition
- Results Summary
- Execution Environment
- Detailed results

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Why test file carving tools?

- To provide the law enforcement community valuable information so they can choose tools they can rely on.
- Help vendors to improve their tools
- Inform the users of the tools capabilities

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File Carving vs Deleted File Recovery

File Carving

- Reconstruct deleted files from unallocated storage based on file content, **absent file system meta-data**

Deleted File Recovery

- Reconstruct deleted files from unallocated storage **based on file system meta-data**

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Carving graphic files: things to consider

- Multiple graphic file types – test them all?
- File type specifics
  - header and footer
  - thumbnails (embedded files)
  - header only
- Testing multiple tools

Carving graphic files: more to consider

- Tools support different parameters
  - Smart Carving
- File systems behavior

Our focus

- Default settings
- Completion of the files
- Fragmentation
- Thumbnails
- Files landing in/out sector boundary

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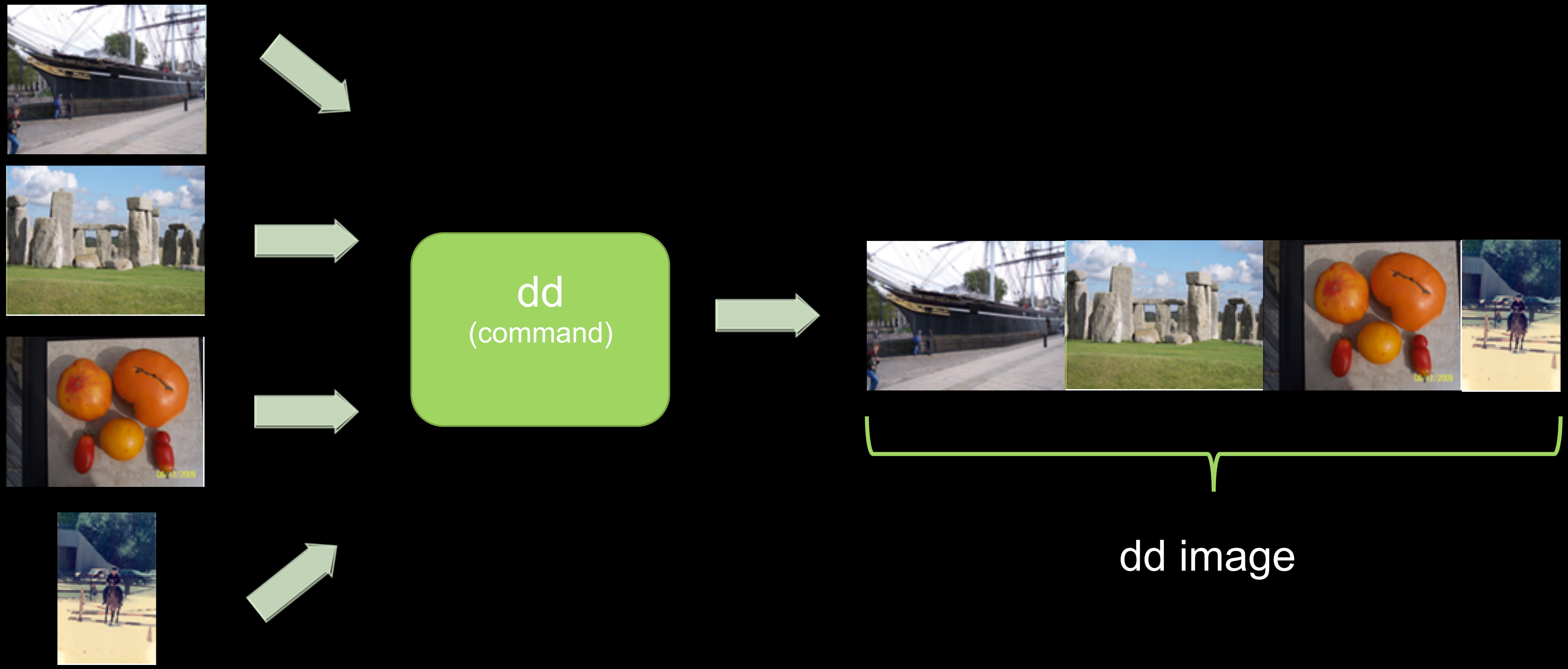
Data Sets (Test Cases) Creation

- Graphic files selection – most common
- File types used:
  - .gif .bmp .png
  - .jpg .tiff
- 8 files of each type were selected
  - 7 thumbnails (.jpg)

Data Sets (Test Cases) Creation



dd
(command)

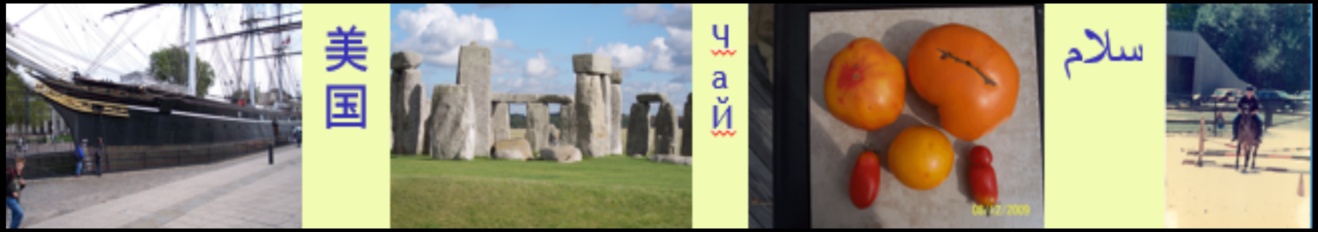
dd image

Test Cases: 1 & 2

- No Padding - no fill

Zero fill to end of last sector

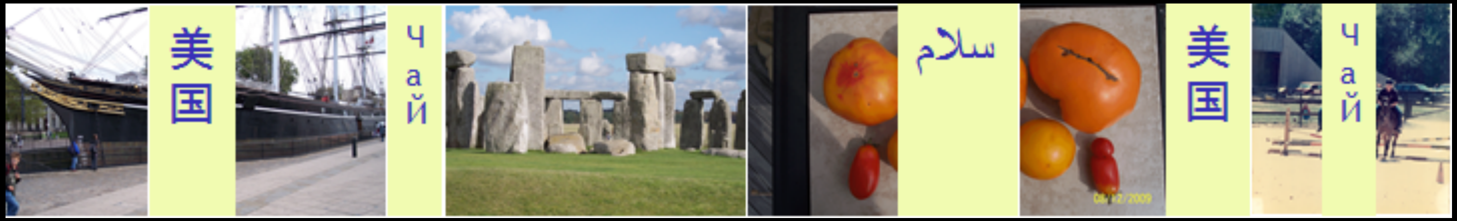
- Cluster Padded - basic



cluster sized blocks of text between pictures

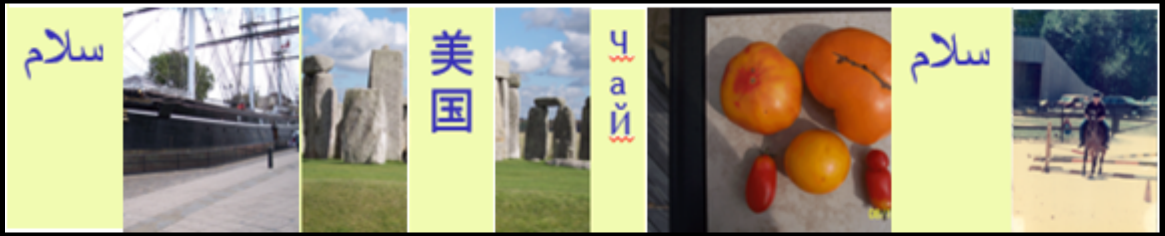
Test Cases: 3 & 4

- Fragmented in order



cluster sized blocks of text fragmenting pictures in order

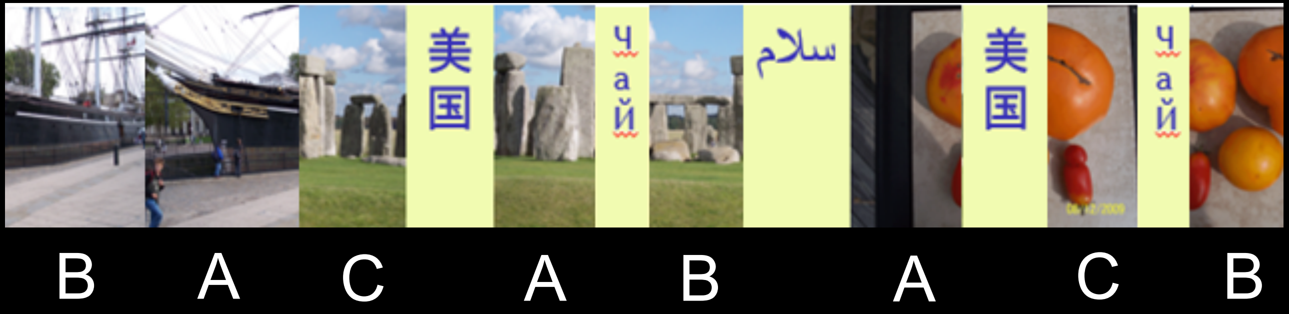
- Incomplete



cluster sized blocks of text between pictures with missing fragments

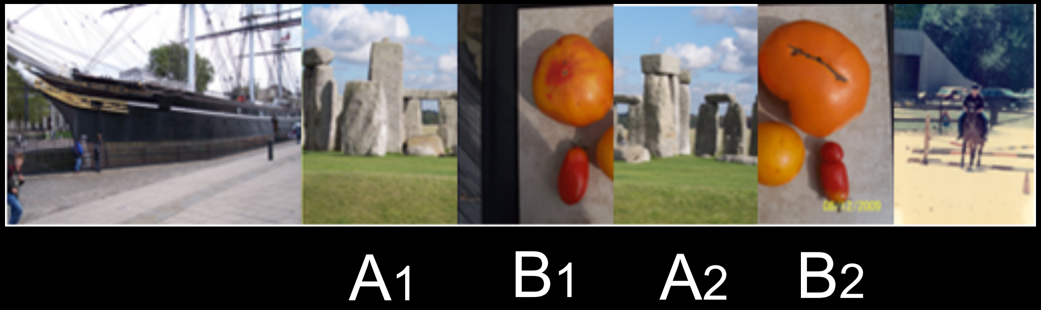
Test Cases: 5 & 6

- Fragmented out of order



cluster sized blocks of text fragmenting pictures in disorder

- Braided



Test Cases: 7

- Byte Shifted

dd image starts here

Tools Testing

- We had
  - 7 test cases
  - 11 tools to test

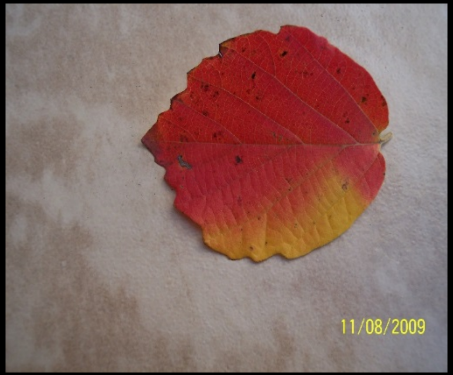
Measuring Methods

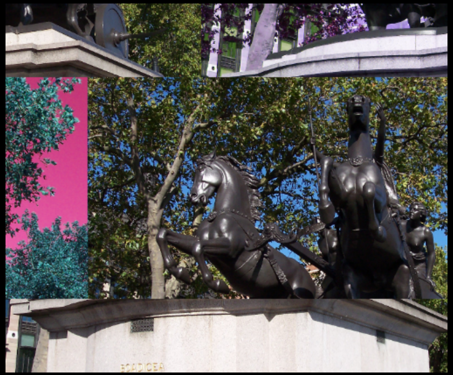
- Visibility of files carved
  - Is the data in a usable format? - viewable
- Data recovered analysis
  - Is the data a 100% match?

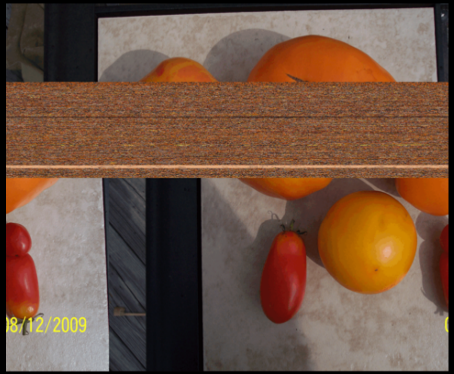
Visibility Categories and Definitions

❖ Viewable Complete – minor alteration

Files Recovered



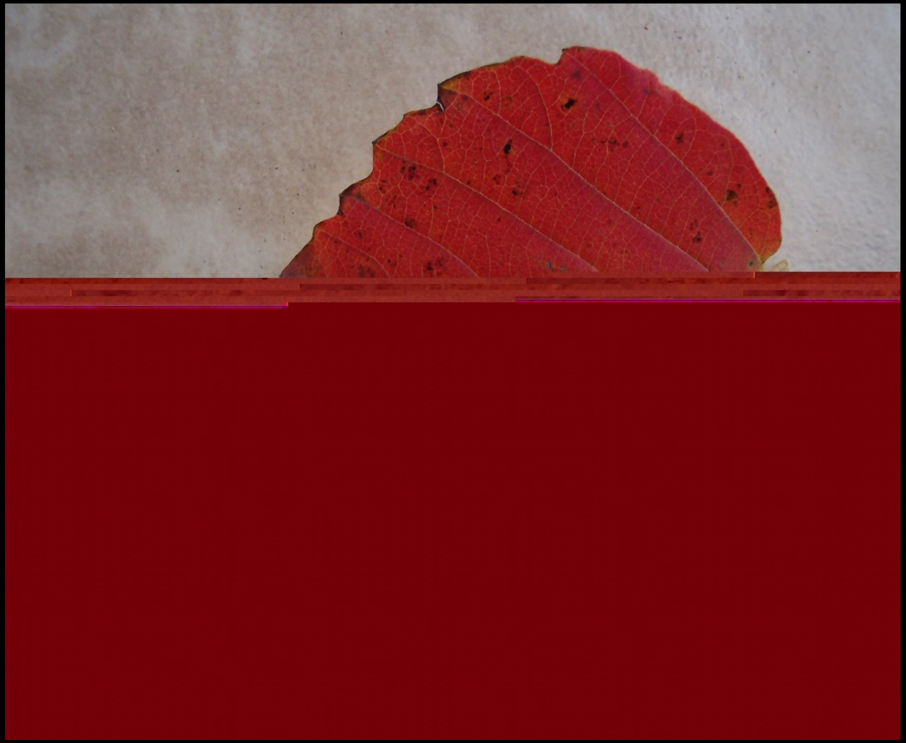




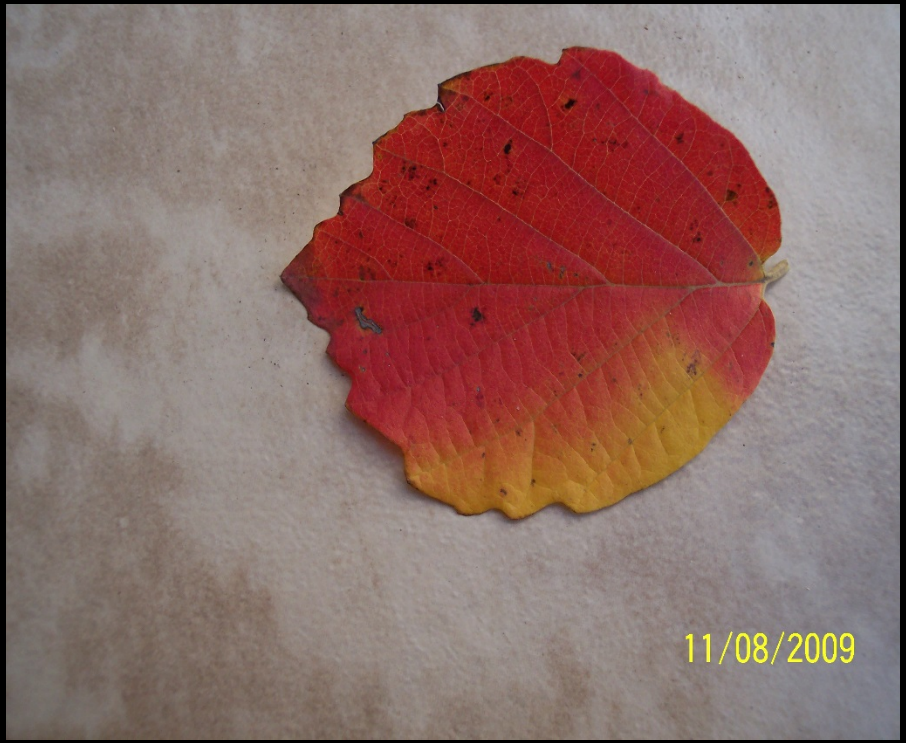
Original Files

Visibility Categories and Definitions

- Viewable Incomplete – major alteration



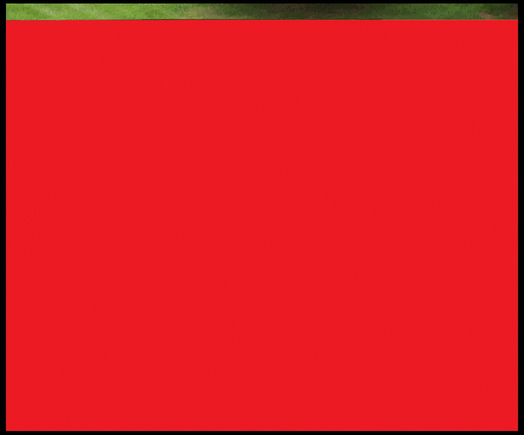
File Recovered



Original File

Visibility Categories and Definitions

- Not Viewable



File Recovered

Original File

- False Positive

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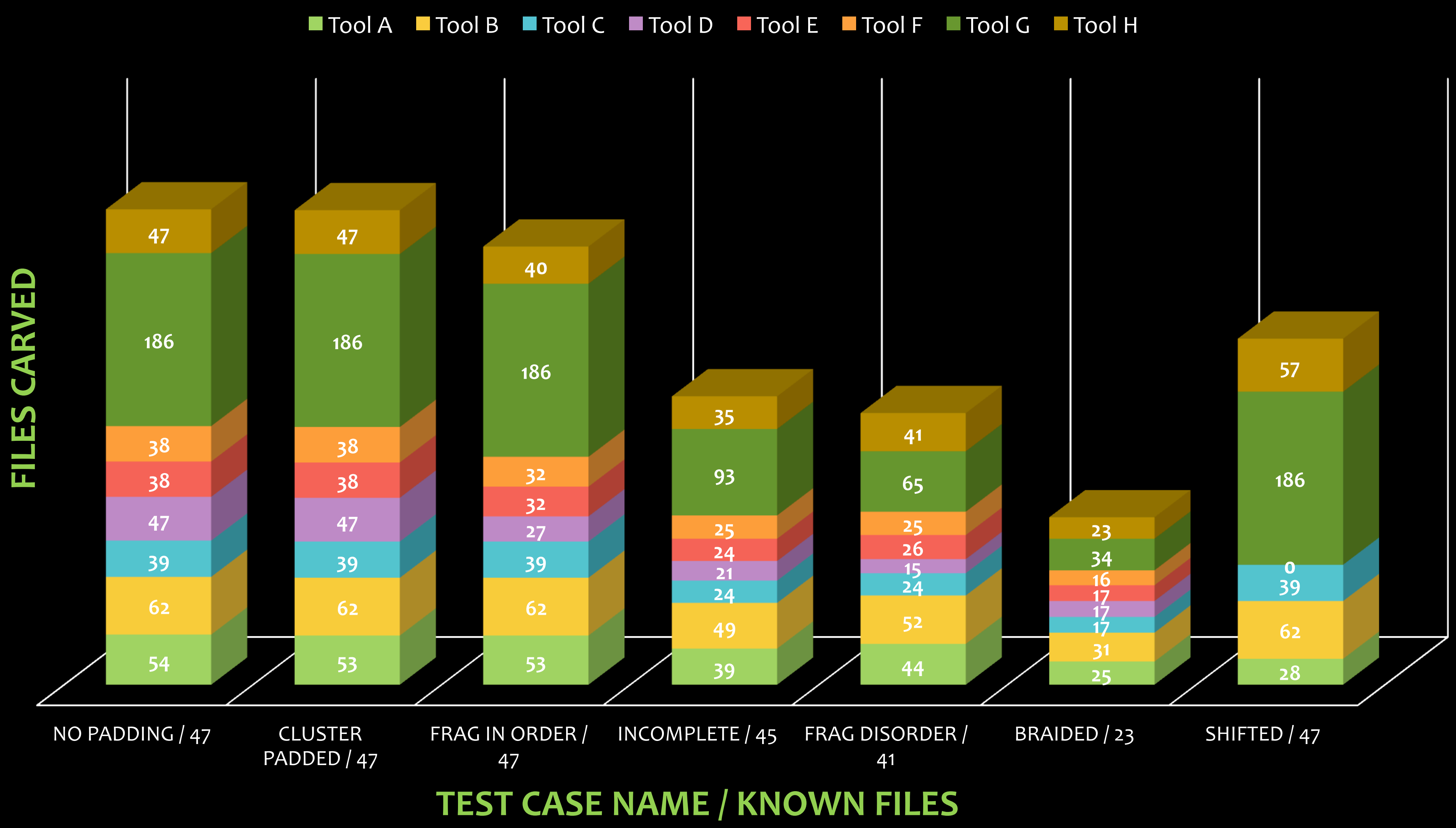
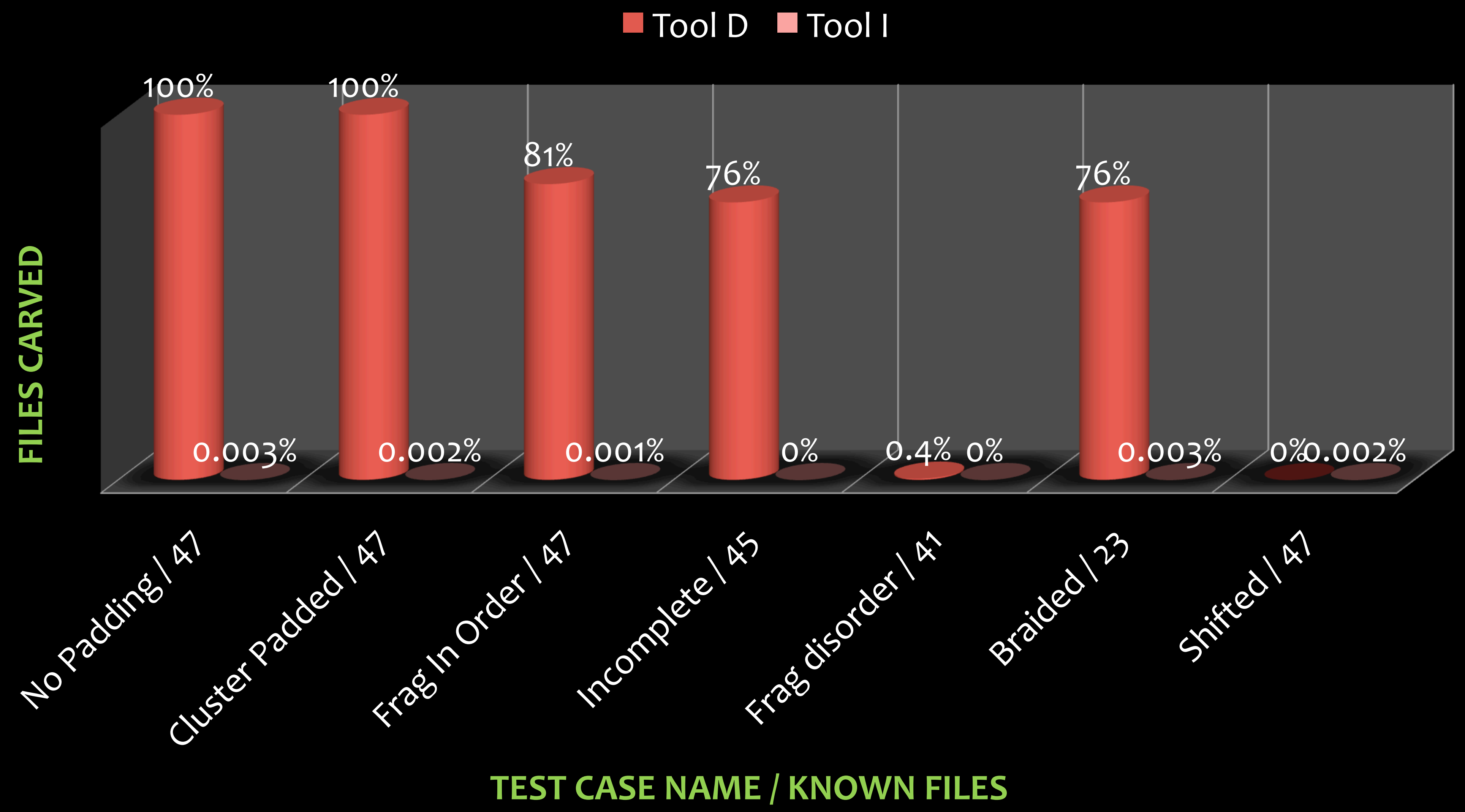
Files Recovered per Tool



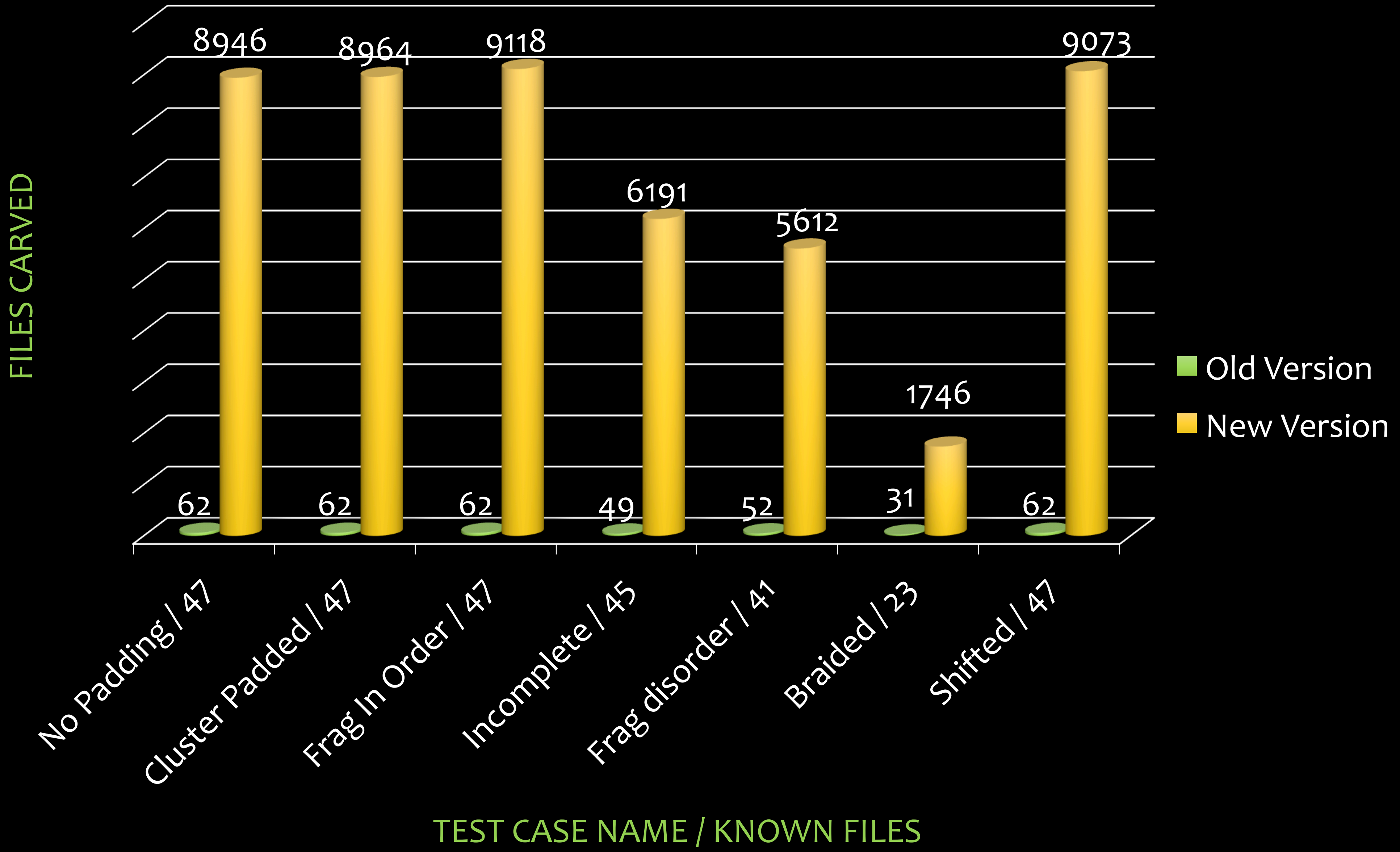
Percentage of usable data



Results Overview

- 10 reports published at http://www.cyberfetch.org/
- Interesting findings
  - multiple files but only one file is viewable
  - same tool, 2 different versions = close results?

Files recovered by same tool



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