

# Test your tests with R metaprogramming

Tom Taverner, Chris Campbell

Mango Solutions

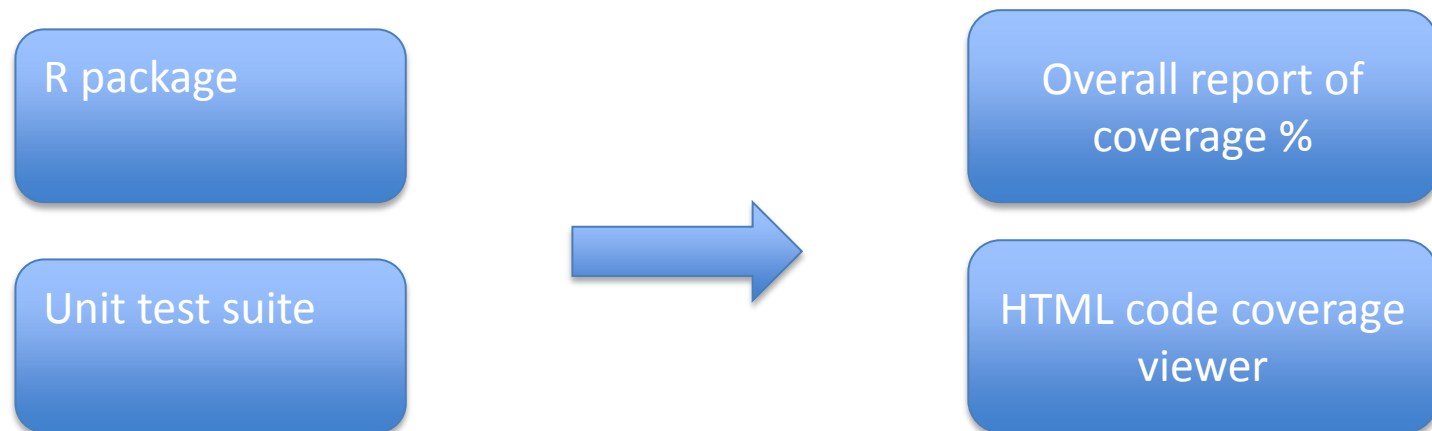
# Two ideas for testing software



- Black box testing (JUnit and testthat) shows broken code
- Clear box testing shows faulty/dead/unreachable code

# R based test coverage

- Code coverage is the degree to which code is tested by a particular test suite
- Want to find which code is not executed
- We developed a code coverage testing tool



# Example

- Function 'trapezium' is read in but not called by the unit test suite

```
trapezium <- function(x, y)
{
  # xIndex : integer vector of indices
  xIndex <- 2:length(x)
  as.double(((x[xIndex] - x[xIndex - 1]) %*% (y[xIndex ] + y[xIndex -1])) / 2)
}
```

- In practise we found 90-100% coverage in production code
- Error handling code is especially hard to test

# The instrumentation algorithm

- Rewrites code to put trace calls everywhere
- Uses R 3.0's alternate parser

```
y <- x + 10
```

```
`_1` <- `_2` + 10
```

```
`_1` <-  
{trace(); `_2` + 10}
```

```
y <-  
{trace(2); x + 10}
```

1. Get parse table  
mapping symbols to  
unique ID

2. Replace  
symbols by UIDs

3. Insert trace  
calls

4. Instrument  
trace calls and  
replace UIDs by  
symbols

```
y  1  
x  2
```

# Aims for the near future

- Put on Github
- Integrate with CI tools
- Take inspiration from Java tools (clover)
- Other types of coverage?



