SYMBIOTIC RELATIONSHIPS BETWEEN TESTING AND ANALYTICS

KEYNOTE @

UNICOM NEXT GENERATION TESTING CONFERENCE

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SYMBIOSIS

A relationship between multiple entities

3 main types of symbiosis

- 1. Parasitism: one *benefits*, the other *suffers*
- 2. Commensalism: one *benefits*, the other is *unaffected*
- 3. Mutualism: *both benefit*

The Zebra has good **eyesight** and Wildebeest a good sense of **smell**

Between them they detect predators a early and protect one another







SOURCES OF FEEDBACK



• For the development

When do we get the feedback? And how good is it?

SYMBIOTIC RELATIONSHIPS BETWEEN TESTING AND ANALYTICS

ANALYTICS

WHAT IS ANALYTICS?

Statistics + Computer Science + Operational Research, leads to: *actionable insights*





http://www.google.com/analytics/

ANALYTICS

Commonplace in Web, Games^[1] & Mobile^[2] apps

- Developers add code to send extra data over the network
- Third-parties often provide the libraries
- May impact privacy
- May include crash-reporting

[1] http://www.wired.co.uk/magazine/archive/2012/01/features/test-test-test [2] A Study of Third-Party Tracking by Mobile Apps in the Wild, UW-CSE-12-03-01, <u>ftp://ftp.cs.washington.edu/tr/2012/.../UW-CSE-12-03-01.PDF</u>

THIRD PARTIES



What does the user get from this equation?







MY CODE CALLS THEIR CODE

```
/** Called when the activity is first created. */
@Override
public void onCreate(Bundle savedInstanceState) {
  super.onCreate(savedInstanceState);
  setContentView(R.layout.main);
  Countly.sharedInstance().init(this, "https://cloud.count.ly", "YOUR APP KEY");
Override
public void onStart() {
    super.onStart();
    Countly.sharedInstance().onStart();
}
myMethod() {
      // Do something...
```

THEIR CODE SENDS

```
http://your_domain/i?
app_key=AAA &
device_id=BBB &
sdk_version=CCC &
begin_session=1 &
metrics= {
    "_os": "DDD",
    "_os_version": "EEE",
    "_device": "FFF",
    "_resolution": "GGGG",
    "_carrier": "HHH",
    "_app_version": "III"
}
```

```
http://your_domain/i?
    app_key=AAA &
    device_id=BBB &
    session duration=30
```

ANALYTICS

Often linked to experiments, e.g.

- A/B Testing^{[1][3]}
- Multivariate Testing^[2]

Similar to:

[1] One Factor at A Time (OFAT)

[2] Multiple Factors at A Time (MFAT)

[3] http://www.wired.com/business/2012/05/the-ab-test-results-are-in/

ANATOMY OF A CONTROLLED EXPERIMENT

Diagram courtesy of Keith Stobie



Testing in Production -- Keith Stobie

http://www.pnsqc.org/past-conferences/



Testing in Production -- Keith Stobie

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WHAT SHOULD WE MEASURE?

Performance

- Time taken
- Resource consumption?
- Reliability
 - Mean Time Between Failure (MTBF)
 - Probability of Failure On Demand (POFOD)
- Usability
 - Task completion rate
 - Was the task completed successfully?

SYMBIOTIC RELATIONSHIPS BETWEEN TESTING AND ANALYTICS

CALIBRATION

CALIBRATING

- The tools
- Our understanding
- Our practices

IMPLEMENTATION OPTIONS

MOBILE & DESKTOP WEB CONTENT





Library lives inside our app First party

equal rights

Has an independent life

JavaScript / 1 pixel image Third-party

permission-based

WHAT'S INSIDE?



What does the analytics library do? What *else* does it do? How much should we trust & rely on it?

Quis custodiet ipsos custodes?

What about?

- Offline behaviour
- Access to sensitive data increases the potential for harm...
- Consumption of resources
- Ease of control
- Ease of implementation
- Explaining to users what's happening...

VALIDATION & VERIFICATION

Validation: is it useful to us? And to all concerned?

Verification: does it do what it claims to do?

- Inaccuracies & precision
- Performance testing
 - Latency
 - Accuracy
 - Volumes
- Triangulation: with other libraries

SYMBIOTIC RELATIONSHIPS BETWEEN TESTING AND ANALYTICS

POTENTIAL PITFALLS

POTENTIAL PITFALLS

No one shall be subjected to arbitrary interference with his **privacy**, family, home or correspondence, nor to attacks upon his honour and reputation. Everyone has the right to the protection of the law against such interference or attacks.

Article 12 The Universal Declaration of Human Rights

http://www.un.org/en/documents/udhr/index.shtml#a12

Why KISSmetrics?

Our actionable metrics tell you more than what happened. They also tell you *who* and *why*.

We help you get to know your people.

The basic unit in KISSmetrics is a person. When you view your KISSmetrics reports they show you people, not just aggregate data.

- Have a big customer that came to your site and is using your product? KISSmetrics will help you see everything they did *before* and *after* they signed up. Use this knowledge to give them the best service and learn how to get more people like them.
- Get engineering, product, sales, marketing and customer support working together to improve the metrics that matter for the life blood of your business: your people.

http://www.kissmetrics.com/why

| ▲ johnsmith@gmail.com | 1 | Configure Metr | |
|----------------------------------|------------------------|------------------------------|--|
| 880 visits | \$99 | 2 | |
| Total visits | Largest purchase amoun | t Number of Purchases | |
| March 13, 2013 to March 19, 2013 | | | |
| Tuesday March 19, 2013 | Did | events Viewed homepage, Page | |
| Monday March 18, 2013 | Did | events Viewed homepage, Sear | |
| | | | |

POTENTIAL PITFALLS

Fidelity

- Correlation
- Consistency
- Reliability

POTENTIAL PITFALLS

Messy separations

- Who owns the data & can you get it in a usable form?
- Changing the yardstick

A traditional tale tells the story of Henry I (1100-1135) who decreed that the yard should be "the distance from the tip of the King's nose to the end of his outstretched thumb".



http://www.npl.co.uk/educate-explore/posters/history-of-length-measurement/

SYMBIOTIC RELATIONSHIPS BETWEEN TESTING AND ANALYTICS

APPLYING THE CONCEPTS

GETTING STARTED

Start by designing the events







POSSIBLE ASSESSMENT CRITERIA

| Colour | Criteria |
|--------|------------------------------|
| Yellow | Benefits of using Analytics |
| White | Safety rating |
| Purple | Fidelity |
| Red | Feelings of the stakeholders |
| White | Safety / Trust rating |
| Green | Eco-rating |
| Black | Problems, Privacy, Risks |

c.f. Six Thinking Hats – six directions of thinking

ANALYTICAL QUESTIONS



http://research.microsoft.com/pubs/136974/foser-2010-buse.pdf

IMPROVE OUR APP WORKFLOW



REFINE OUR TESTING

Crashes

• Bugs we didn't find c.f. Defect Detection Percentage (DDP)^[1]

Usage patterns

- Personas
- Navigation and other functional test cases
- Localization Testing

Testing in production

• Greater use of experiments

[1] D. Graham, Measuring the effectiveness of testing using DDP http://www.dorothygraham.co.uk/downloads/generalPdfs/DDP_Tutorial.pdf



Quis custodiet ipsos custodes?

- Can we trust the Analytics software and reports?
- Who tests them?

Once we have confidence in the tools we can use Analytics to:

- Better understand our apps and how they are used
- Find problems sooner; and predict problems & their impact
- Better understand and improve our testing



CONCLUSIONS

"The truth, the whole truth and nothing but the truth, so help me God" ^[1]

Test and evaluate the libraries, the performance, the obligations, the ownership

If you are going to use Analytics, use them well, & to improve the quality

Consider the benefits for every stakeholder

"Quality is value to some person(s)" Gerald Weinberg

[1] English law since 1189, http://www.phrases.org.uk/bulletin_board/44/messages/562.html

SOME FURTHER READINGS



If you want to know more about software quality & mobile analytics, get in contact:

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