# THE STATE OF BUG BOUNTY

Bug Bounty: A cooperative relationship between security researchers and organizations that allow the researchers to receive rewards for identifying application vulnerabilities without the risk of prosecution, thereby aiding companies to identify and resolve security problems that would otherwise go undetected.

JULY 2015

bugcrowd

# CONTENTS

# INTRODUCTION

This document presents the inaugural State of Bug Bounty Report, an annual effort from the team at Bugcrowd. In this report, Bugcrowd program data gathered between January 2013 and June 2015 is aggregated and analyzed to paint a picture of the emerging market. By surveying programs on Bugcrowd's platform we are able to identify emerging trends and patterns in the bug bounty market. With over 166 bounties run over two and a half years, Bugcrowd is uniquely positioned to observe these trends.

**During the period of January 1, 2013 to June 30, 2015, Bugcrowd clients:**

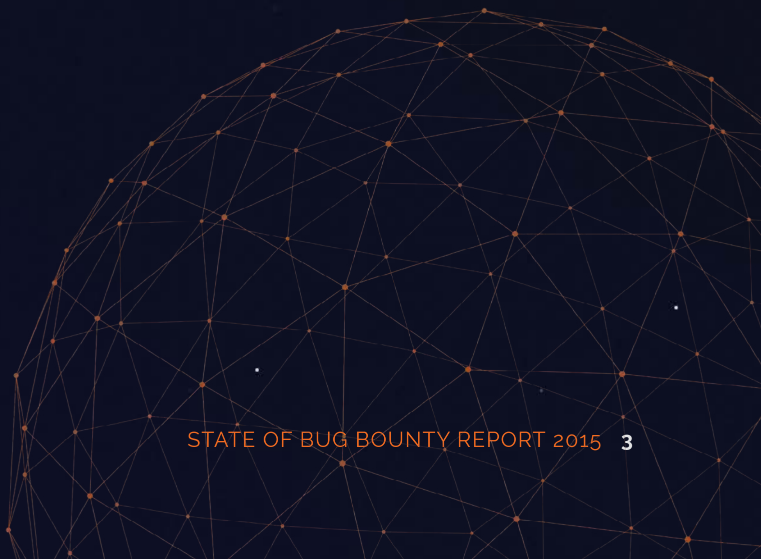
- Paid a total of $724,014 to 566 unique researchers
- Received a total of 37,227 submissions, of which 7,958 contained valid vulnerabilities
- Rewarded 3,621 submissions at an average of $200.81 each, with a top reward of $10,000
- Had, on average, 4.39 high- or critical-priority vulnerabilities per program

**While Bugcrowd researchers:**

- Discovered a total of 729 high-priority vulnerabilities across 166 programs, where 175 of those vulnerabilities were deemed "critical" by trained application security engineers
- Were paid for approximately 1 in every 5 submissions
- Took home an average annual paycheck of $1,279.18 collected from over 6.41 submissions annually
- Hailed primarily from India (31%), United States (18.2%), and United Kingdom (8.6%)

These numbers demonstrate the impressive economics behind bug bounty programs. As the bug bounty market continues to grow, it is important to us to maintain transparency into how vulnerabilities are reported, fixed and rewarded. Following, you will find an overview of Bugcrowd's dataset, details on researchers and the vulnerabilities that they are discovering, the money being rewarded, and finally, how best to extract business value from a bug bounty program.

**The Bugcrowd Team**



# BUG BOUNTY 101

## JUST WHAT IS A BUG BOUNTY PROGRAM?

In its most basic form, a bug bounty program is a rewards program offered by an organization to external parties, authorizing them to perform security assessments on the organization's assets.

A program uses a "**brief**" as a form of contract, detailing how much the company will pay for each reported bug. Commonly, only the first report of a valid (i.e. reproducible and fixable) vulnerability is rewarded; all others are considered duplicates and are not rewarded. Rewards scale according to the severity of each discovered issue and how hard it is to find.

## WHAT KINDS OF ORGANIZATIONS RUN BUG BOUNTIES?

Credit for the bug bounty concept is most commonly attributed to the Netscape team after their rewards program was initiated in 1995. Large consumer tech companies such as Facebook and Google have programs that are well known for their **high rewards** and **significant participation**.

Bug bounty programs are now commonly run on third-party platforms such as Bugcrowd. While this is a recent development (Bugcrowd was founded in 2012), today the benefits of running a program via a platform are significant versus setting up and running a program independently.

Bug bounty platforms manage the operational end of the programs, bringing the research community together and handling the payment process, opening up the opportunity for more companies to successfully run bug bounty programs.

To date, Bugcrowd's customers are currently comprised of mainly B2C (business to consumer) and B2B (business to business) technology companies.

Data from this report signals the growth of organizations outside of the high-tech industry that are beginning to running bug bounty programs. Companies such as **Western Union** (started 2014) that offers rewards ranging from $50 to $5000, **Tesla Motors** (started 2015) with rewards ranging from $25 - $1500, and **United Airlines**(started 2015) have all created programs.

## DO BUG BOUNTY PROGRAMS WORK?

On average, researchers find more than four high- or critical-priority vulnerabilities within a single program. The priority matrix below shows how Bugcrowd classifies high- and critical-priority vulnerabilities.

| Priority Level | Vulnerability | Details |
|---|---|---|
| Critical | Vulnerabilities that cause a privilege escalation on the platform, from unprivileged to admin or administrator. | • Remote code execution<br>• Vertical authentication bypass<br>• Exploitable SSRF<br>• XXE<br>• SQL injection<br>• User-authentication bypass |
| High | Vulnerabilities that severely affect multiple users or affect the security of the underlying platform. | • Lateral authentication bypass<br>• Stored XSS<br>• Exploitable CSRF with significant impact |

For a real-world example of how bug bounty results compare to traditional assessments, see **Instructure's public security assessment reports**. Instructure, which produces a learning management system, has posted their assessment results every year since 2011. Its 2014 assessment was conducted with Bugcrowd and kept to the same annual budget, yet produced more than three times as many valid findings as the previous three years combined.

There are a number of other important factors to consider when evaluating how well a program works for an organization. The marketing benefit of running a public program is substantial, and can indicate to an organization's customers and partners that security is a major priority for the organization.

# BUG BOUNTY DATA:
# Q1 2013 – Q2 2015 IN REVIEW

## A WORD ABOUT THE DATASET

The data analyzed in this report is gathered from programs run on the Bugcrowd platform and, where noted, from open public sources.

The dataset is specifically focused on Bugcrowd's bounties—which are primarily run against web applications, mobile applications and, in a small number of cases, hardware devices. The report does not focus on non-application-layer VRP programs such as Google's Chrome rewards program, HP's TippingPoint's ZDI, or Microsoft's Mitigation Bypass Bounty.

**Bugcrowd's bounty programs are comprised of two different types:**

- Ongoing bounties are long-running bounties that incentivize researchers per submission based on vulnerability severity. Programs may be public or invitation-only.
- Flex bounties are 2-4 week short term bug bounties that incentivize researchers with a placed reward model. These programs are typically invitation-only and have 25-100 researchers participating. In rare instances, a flex program may be publicly available.

Since its founding in early 2012, Bugcrowd has been through several data model iterations. The current data model has been in place since the beginning of 2013. Approximately 20 programs that were run before January 1, 2013 and fit outside of the current data model have been purposefully excluded.

## SUMMARIZING THE RESULTS

- Programs Run: 166
  - 95 Ongoing Programs
  - 71 Flex Programs
- Submissions received: 37,227
- Non-duplicate valid submissions: 7,958
- Paid submissions: 3,621
- High- and critical-priority submissions: 729
- High or critical priority vulnerabilities per program: 4.39
- Submitted the most from India (31%), United States (18.2%), and United Kingdom (8.6%)
- Most discovered vulnerability: XSS (17.8%)
- Range of minimum and maximum rewards: $0 - $10,000
- Top reward: $10,000
- Total paid: $724,839
- Average reward per submission: $200.81
- Average reward per researcher: $1,279.18 (collected over 6.41 submissions)
- Total unique researchers paid: 566
- Countries that were most highly paid:
  - Cyprus ($644 average reward)
  - Switzerland ($512 average reward)
  - Austria ($475 average reward)

# DIVING INTO THE DATA

## PROGRAM GROWTH BY QUARTER

Overall new program growth is up significantly quarter over quarter. In the chart below, you can see the combined total number of programs started over time, both public and invitation-only.

### Bounties Started: Public vs. Invitation-Only

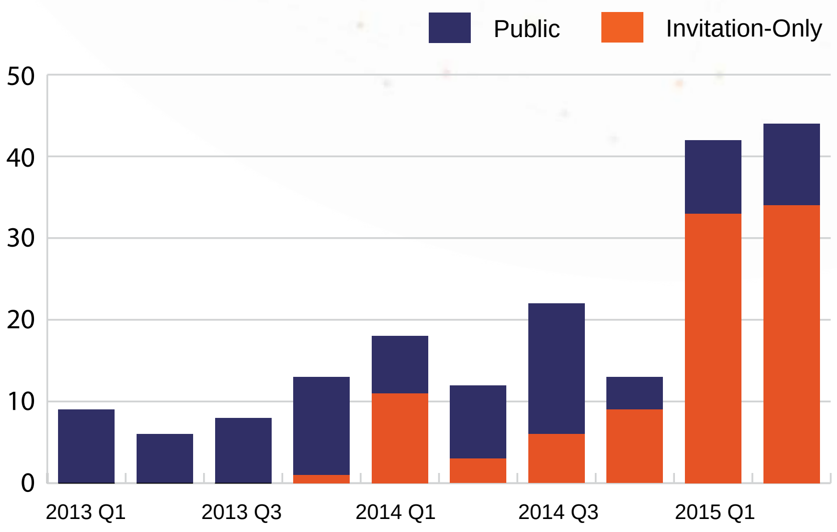


*Figure 1: The number of bounties started more than doubled in Q1'15 over the same quarter the previous year.*

## THE RISE OF INVITATION-ONLY PROGRAMS

In late 2014, the number of invitation-only programs exceeded the number of public programs on Bugcrowd's platform. This was driven by both an across-the-board trend of new bounties starting and staying private for a longer period.

### Bounties Running: Public vs. Invitation-Only

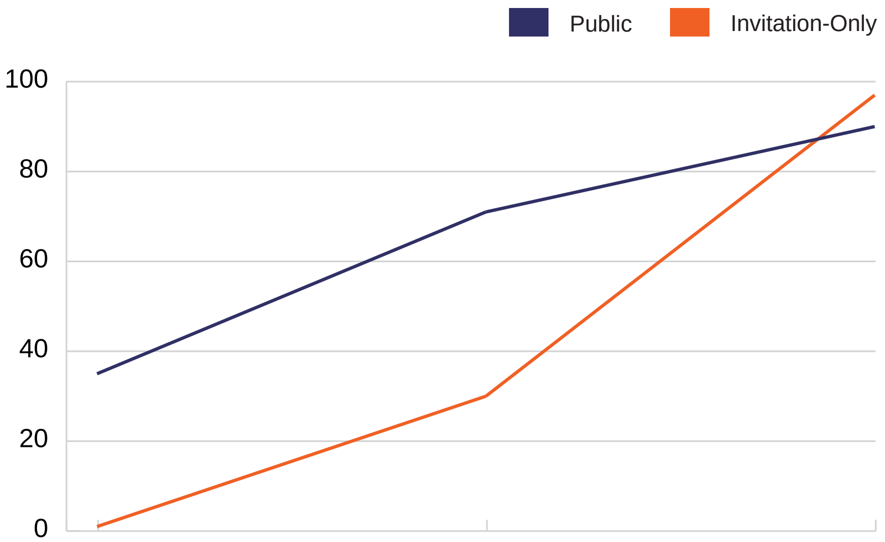


*Figure 2: Invitation-only programs are now launched more frequently than public programs.*

Public bug bounties bring both massive figures and tremendous benefits, but are not without their drawbacks. A public program can be costly and time-intensive to maintain, and thus the signal-to-noise ratio must be carefully measured and routinely tuned. The recent growth of invitation-only programs promises to further improve the signal-to-noise ratio and increase the efficiency of programs across the board.

## SIGNAL VS NOISE

The term “signal vs noise” is a useful way to discuss program quality. Bugcrowd aims to help program owners maximize signal whilst reducing noise.

**Signal:** valid, fixable, high-priority submissions that can be reproduced.

**Noise:** invalid, ignored, not reproducible, duplicate or otherwise out-of-scope submissions.

This signal-to-noise ratio significantly affects the total cost of ownership of a program. The more time an organization spends on processing submissions that don’t produce a fix, the more overhead they experience in the program.

Public programs on the Bugcrowd platform currently have an 18% signal-to-noise ratio, with 39.5% submissions marked duplicate and 34.5% marked invalid. Contrast that with a whopping 36.1% of submissions marked valid in invitation-only programs. That’s double the ratio of public programs with a further 32.1% marked duplicate. Only 26.3% of submissions are marked invalid as out-of-scope or unreproducible in invitation-only programs.

## SUBMISSIONS OPENED BY QUARTER

Even with more invitation-only programs starting with vetted researchers, submission counts continued to climb due to an increased participation in popular public programs through the first half of 2014. It wasn’t until late 2014 that Bugcrowd’s overall submission counts dropped significantly.

### Quarterly Submissions Opened by Outcome

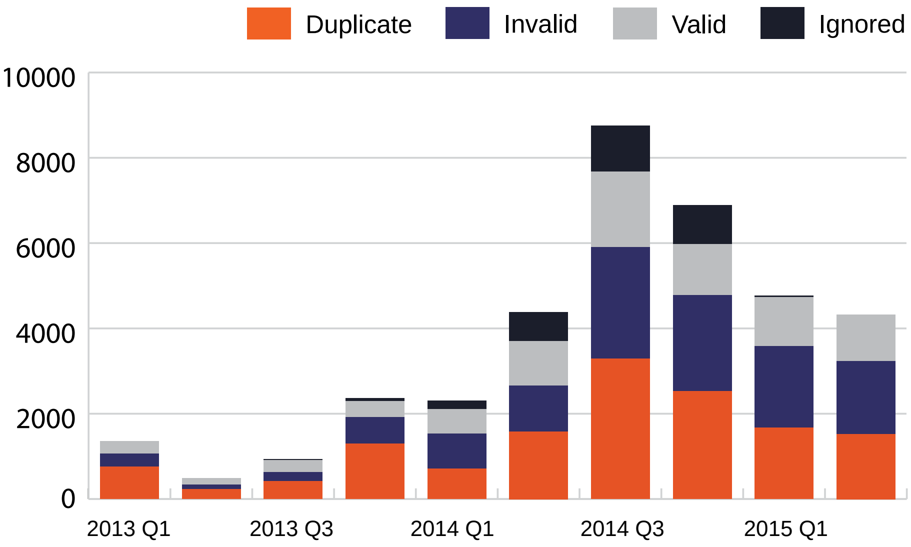


*Figure 3: Valid submissions grow as a percentage overall; indicating the signal-to-noise ratio is improving.*

This drop in submission count was due to more invitation-only programs being launched, with between 25-100 researchers taking part in each invitation-only program. Notice, however, that valid submission counts continued to grow as a percentage of overall incoming submissions, an indication that signal-to-noise ratio is improving overall.

## A PUBLIC PROGRAM LAUNCH

When an organization is ready for it, a public program is a great way to keep participation and activity high. A number of factors can influence the response from the research community. For instance, difficulty of assessing the targets (web vs. hardware, for example), the incentive level (unpaid vs monetary rewards), and the researchers invited (public vs invitation-only). While program participation can vary widely, there is always a large "bump" at any launch event as researchers jump in to find issues before others do.

### Sample Public Program

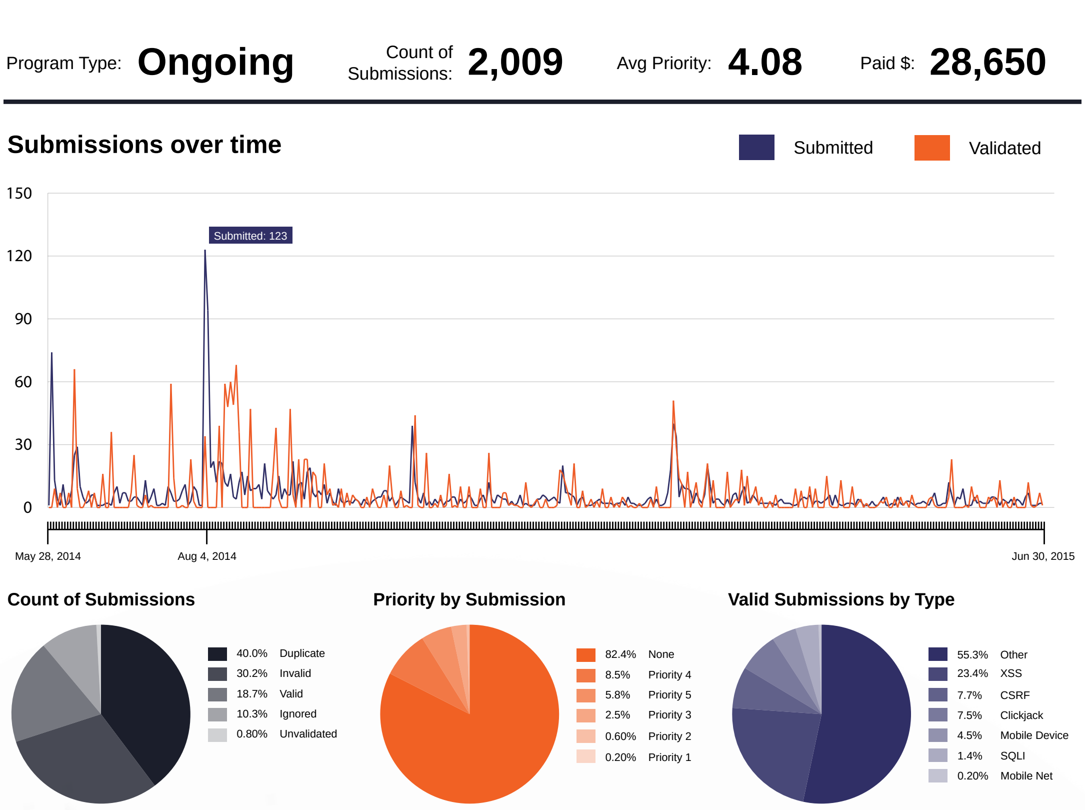


*Figure 4: Sample public program; validations follow closely behind submissions.*

Spikes in submission rates are indicative of a "launch" event, a raise in the reward range, or some public promotion that brings more researchers and submissions into the program. Notice the drop-off in activity over time; as the number of submissions increases, the difficulty of finding unique issues increases, so program owners should consider an increase in rewards to maintain the level of activity for the program desired.

# RESEARCHERS: WHO ARE THEY?

With nearly 18,000 researchers signed up, the researcher base has grown tremendously during the 2.5 years covered in this report. Researchers come from all over the world, with 147 countries represented in this dataset.

As revealed in the image below, more than half (59%) of the signed-up researchers come from two countries: The U.S. (33%) and India (26%). There's a significant jump down to 5% represented by United Kingdom. Australia represents 3.1% of the researchers and Pakistan, Singapore, Germany, Philippines, and Canada each account for between 1% and 2% of the total research population. This leaves the rest of the world's countries with sub-single-digit percentages, making up the remainder of the researchers at a collective 26%.

## Count of Researchers by Geography

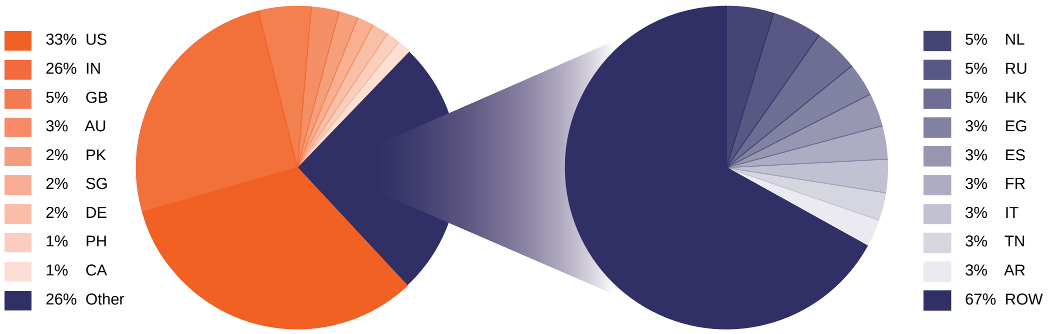


*Figure 5: US and India top the charts with the most submissions.*

However, researcher sign-ups are only part of the story. When it comes to actual participation, India was the most prolific with 31%, followed by the United States (18.2%), and the United Kingdom (8.6%).

## Quarterly Submissions by Geography

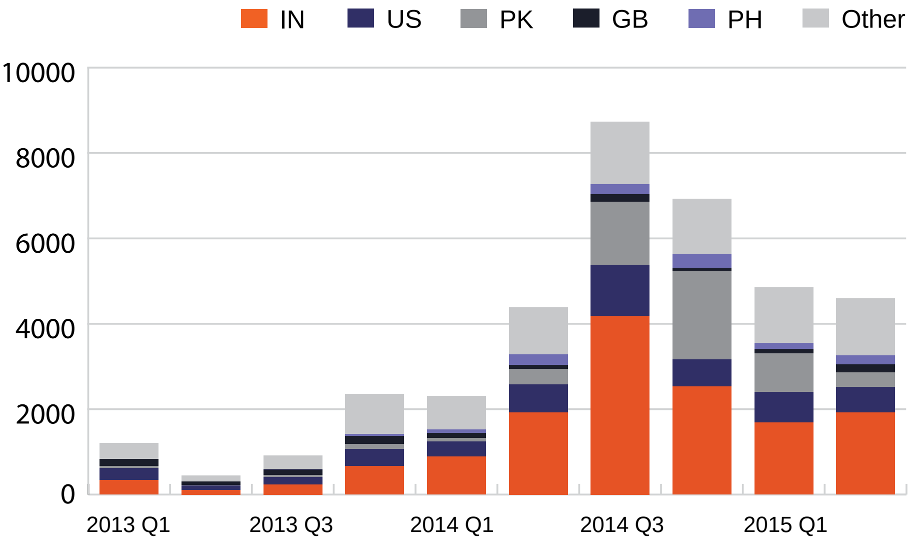


*Figure 6: India's submission growth outpaced the other countries through 2014.*

## COMMUNITY GROWTH

As of June 30, 2015, the Bugcrowd research community was home to 17,994 unique researchers who, collectively, were responsible for a total of 37,227 submissions. As you can see, in mid-2014, the submission rate per researcher began to grow significantly.

### Quarterly Submissions vs. Signups

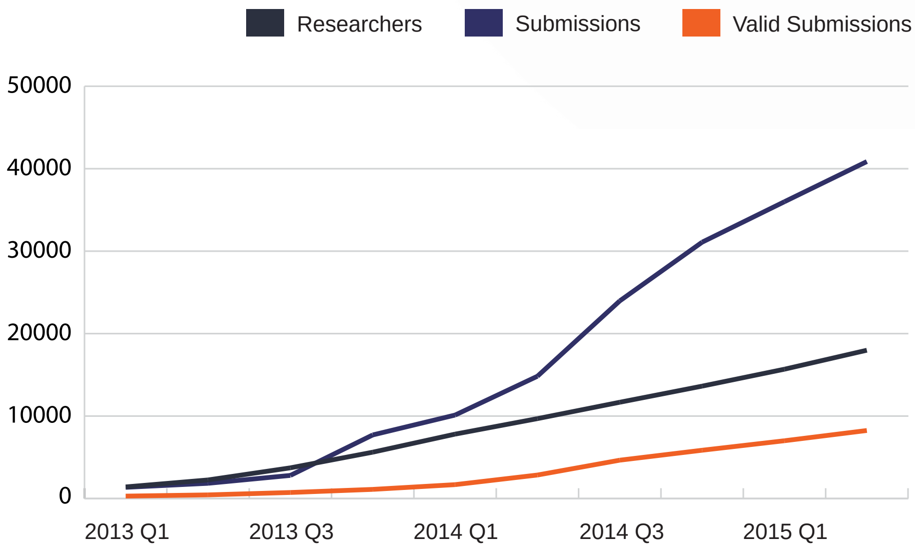


*Figure 7: Submission rates per researcher grow beginning mid-2014.*

In order to counter this flow of increasing submissions per researcher, which was leading to increased duplicate reports and, therefore, frustration for researchers, Bugcrowd started guiding customers to begin their bounty with an invitation-only program.

## RESEARCHER SUBMISSIONS

On average, researchers submitted 15.77 submissions, with eight of those marked valid by program owners, and 6.42 of them paid. That said, researcher activity varied wildly with the most prolific submitter making 1,092 submissions.

### Submission Count by Researcher

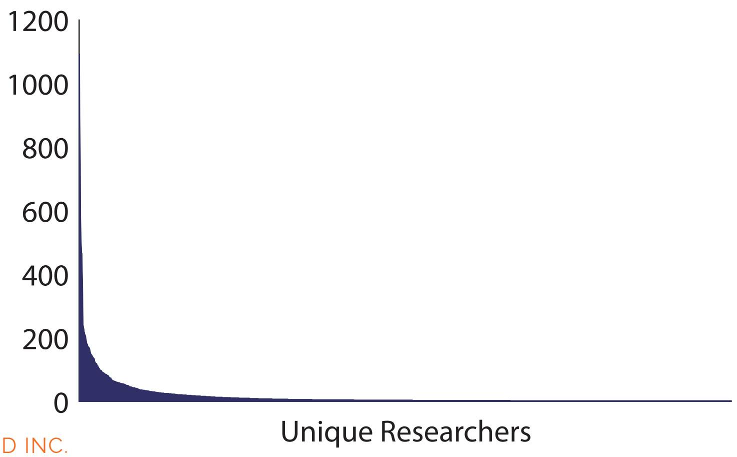


*Figure 8: Submission activity per user followed a long-tail curve.*

## RESEARCHER BACKGROUND AND EXPERTISE

Researchers are driven by different motives and have experience in different areas, with expertise across numerous technologies, both software and hardware. A word graph of researcher biographies paints a clear image of a deeply focused application security team.

web
researcher
Engineer
Software
Application
Developer
Computer
applications
Penetration
test
software
engineer
Tester
student
Student
developer
development
application
Analyst
hacker
Hacker
tester
hack
Test
Consultant
penetration
Science
Hack
learn
Technology
University
Linux
Google
Programmer
Microsoft
Windows
computer
Systems
systems
Security
script
http
website
mobile
technology
Automation
Development
Cyber
QA
bug
bugs
Vulnerability
vulnerability
vulnerabilities
research
start
Net
Apple
Python
Java
PHP
Bug
Facebook
interest
geek
net
code
system
Quality
Pentester
services
analyst
al
help
tools
develop
one
Android
SQL
websites
programmer
programm
automation
Yahoo
break
functional
Technical
science
Servers
know
lead
Twitter
CSS
reverse
technical
Manual
internet
cyber
pen
Senior
Geek
Mobile
System
Student
found
Back
tech
management
analysis
Research
Forensics
Designer
Hunter
CEO
business
Project
consultant
Management
Malware
Bugcrowd
Bounty
computers
degree
Reverse
Nokia
solutions
App
https
gh
relat
Digital
Manager
critical
design
support
got
focus
school
Blogger
Lead
Grade
study
play
xss
College
project
cases
manual
Functional
Pen
member
train
hard
first
look
pentester
understand
Analysis
Mobile
Social
around
list
access
day
user
HTML
level
Tech
person

## HOW ARE RESEARCHERS MEASURED?

**Today, Bugcrowd researchers are measured on four key elements, each of which intersects with, and builds upon, the others:**

- **Trust:** First and foremost in researcher measurement is trust. Researchers are scored based on their track record of staying inside the terms of the bounty brief, which includes following the scope and honoring any non-disclosure requirements.
- **Acceptance rate and overall submission quality:** Acceptance rate is a measure of how often a researcher’s submissions are accepted as “valid” by a program owner. The minimum acceptance rate on invitation-only bounties is 50%.
- **Finding Severity:** Submission priority rate is measured between 1.0 (critical) and 3.99 (low). Researchers must have a priority rate of better than 3.99 in order to qualify for invitations.
- **Activity:** Researchers must have submitted in the last 90 days to qualify as active.

These items are factored into researchers overall scores, which directly influence invitations to invitation-only programs. For new researchers, the best thing they can do is participate in a public program and show activity.

## TOP RESEARCHERS

Researchers come from all walks of life and possess different backgrounds and skillsets. Below are the profiles of some of the top researchers participating in Bugcrowd client bounty programs.

### Top Points

The current points leader researcher hails from Malaysia and has submitted 431 submissions since his first entry on January 21, 2013. While this researcher is very prolific in his research activity, he remains selective when it comes to submissions, especially when compared to the top submitter who sported nearly 1,100 submissions since his first entry on February 18, 2014.

What gives the leaderboard position its value is its combination of count, acceptance rate, and priority. The current points leader has an average bug priority rating of 3.76 (lower is better).

### Top Rewards

Not far behind the points leader in submission count is the top paid researcher with 292 submissions since their first submission on February 28, 2013—presumably made from his hometown in the United Kingdom. Compared to the research points leader, the top paid researcher is even more selective on the bugs he submits. This can be seen in his 3.3 average priority rating (one of the best on the platform). This researcher averages $306 per submission, nearly 50% more than the average. Simply put, this researcher's submissions are high quality.

### Top Submitter

A self-employed "security researcher" based in Pakistan was the most prolific submitter overall with a submission count of 1,094—nearly three times that of the points leader and nearly four times that of the top paid researcher. This is especially noteworthy given his first submission wasn't until February 18, 2014—roughly a year later than the points and rewards leaders.

While his 1,094 submissions make him the top submitter out of the entire research community, a well-below-average priority rating of 4.42 and a very low total average reward per valid submission of $20.54 make this researcher very noisy. These figures suggest that this researcher uses a shotgun approach for finding and submitting bugs, even if the issues found end up being flagged as invalid bugs. Further proving this hypothesis is the fact that this researcher possesses an extremely low 4% acceptance rate for his submissions.

Given these figures, one might come to the conclusion that this researcher puts a higher value on submission count notoriety over rewards—with 120 Hall of Fame entries, it would be hard to argue this point. So, while very proactive and active, simply put, this researcher submits things that aren't as valuable as other researchers' submissions. The top, in this case, is far noisier than signal desired.

# VULNERABILITIES: WHAT ARE RESEARCHERS FINDING?

The top six vulnerabilities found in all programs (public and invitation-only) represent 32.3% of the vulnerability types uncovered:

## Top Vulnerability Types: Public and Invitation-Only

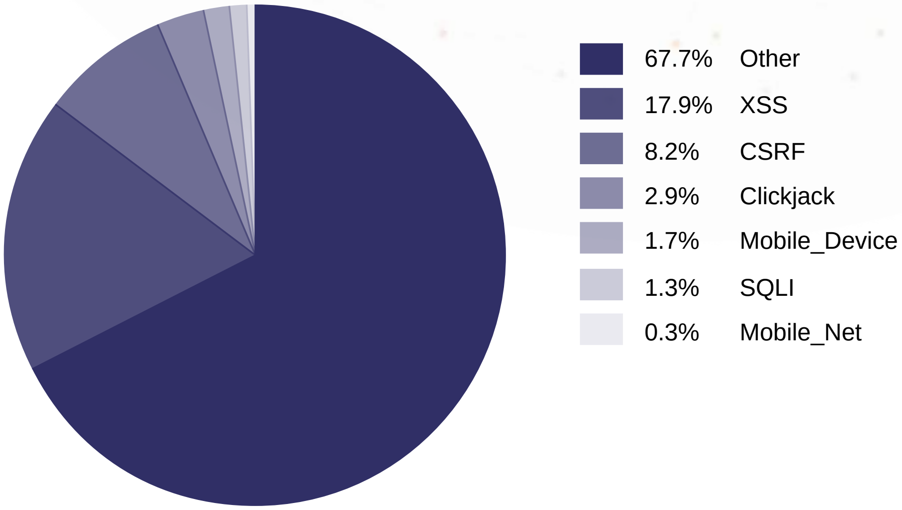


*Figure 9: XSS and CSRF continue to top the vulnerability charts.*

XSS, CSRF and SQL injection are still driving top vulnerability submissions—which is consistent across other publicly available bug bounty data from Google's and Facebook's programs. The 67.7% of "other" vulnerabilities can be broken down into the following categories:

## Other Vulnerability Types: Public and Invitation-Only

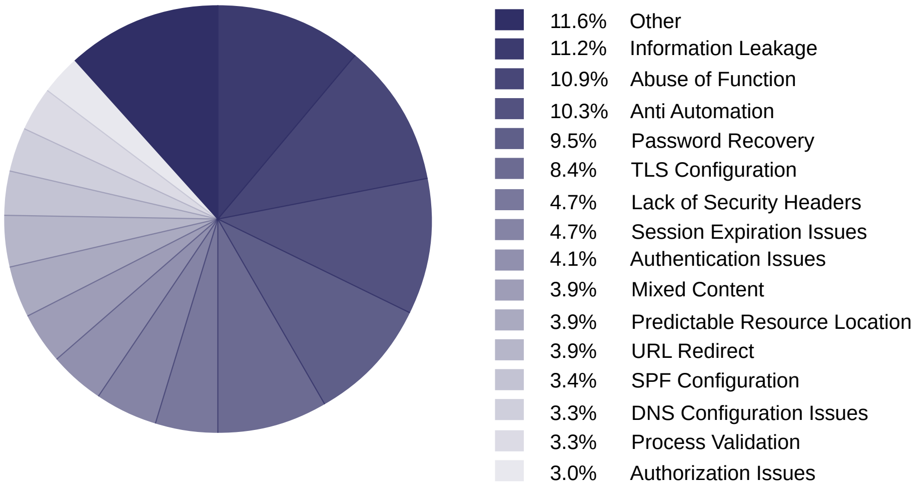


*Figure 10: There is a wide distribution of vulnerabilities identified by the researchers.*

Generated from submission titles, the word graph below demonstrates an interesting view of the common vulnerability types being found in both the public and invitation-only programs. Items that pop out in the resulting word cloud are the two primary vulnerability types: XSS and CSRF. Vulnerability terms associated with access control also stand out in this image: passwords, logins, authentication, session, and tokens.

XSS
password
CSRF
Password
Vulnerability
account
Session
page
Stored
Email
disclosure
token
Insecure
vulnerability
Site
Server
Flash
Information
via
login
header
Reflected
Scripting
reset
xss
HTTP
bug
enumeration
form
session
without
Open
Cookie
application
bypass
SPF
Content
injection
URL
using
link
Cross
Login
Account
Authentication
change
name
file
user
information
Missing
Disclosure
email
attack
issue
Enumeration
missing
error
Injection
Weak
Bypass
Redirect
User
stored
Security
Header
File
Android
Access
Application
Policy
Path
search
Cross-site
Reset
app
used
verification
domain
iOS
csrf
sensitive
data
access
enabled
Page
Token
security
parameter
secure
content
redirect
users
Host
new
Management
Username
scripting
Sensitive
Denial

## SUBMISSIONS BY PRIORITY

When evaluating the priorities associated to the submissions, it's clear that the signal-to-noise ratio appears to follow the common 80/20 rule. Across all programs the signal value is a collective 20%. The other 80% of submissions were marked invalid or duplicate.

### Priority per Submission Across All Submissions

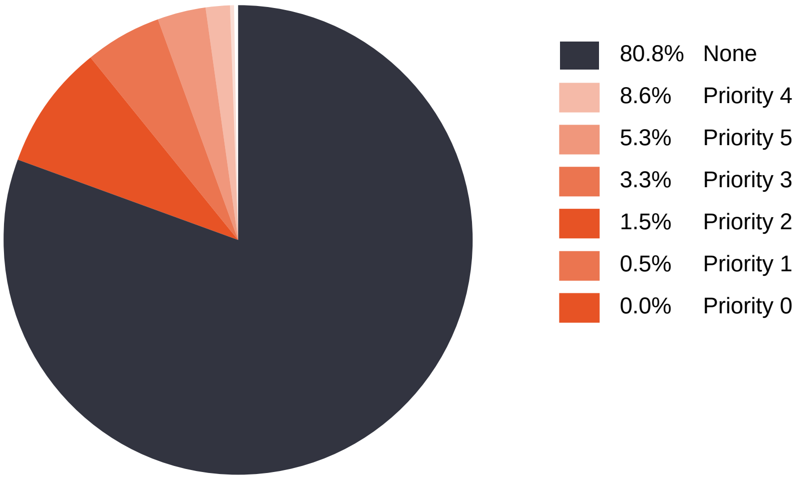


*Figure 11: The 80/20 rule applies to invalid/duplicate submissions vs valid.*

Diving into the submissions that possessed an assigned priority, we find critical submissions at 5%, high priority at 8% and moderate at 17%—collectively, 30%.

## Bug Priority by Count of Submissions - All Programs

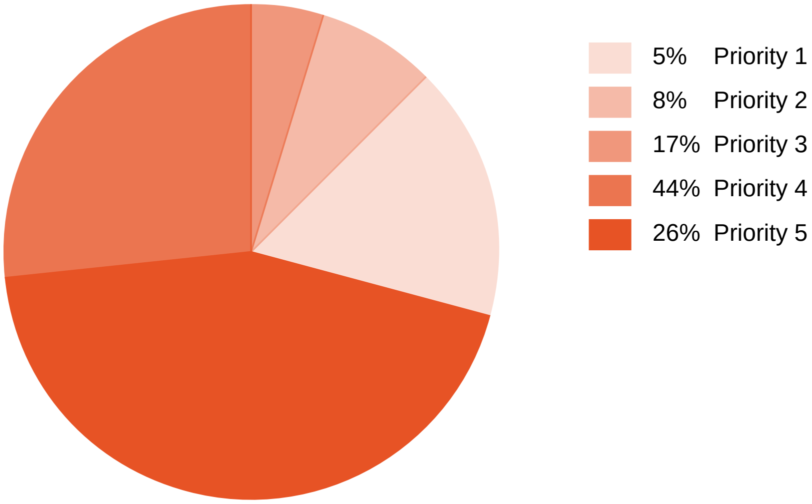


*Figure 12: 30% of submissions possess a severity level of 3 or higher.*

# REWARDS: WHAT'S A BUG WORTH?

Year over year, the average payment is increasing, which is a factor of each program's growth and the overall competition for every researcher's time. As program owners begin to see submissions taper off, they are encouraged to raise rewards to compensate for the increased time investment. Higher paying bugs imply better security!

The average reward is growing each year, having started at approximately $180 in 2013 and reaching an average reward level of just above $200.

### Average Reward by Year

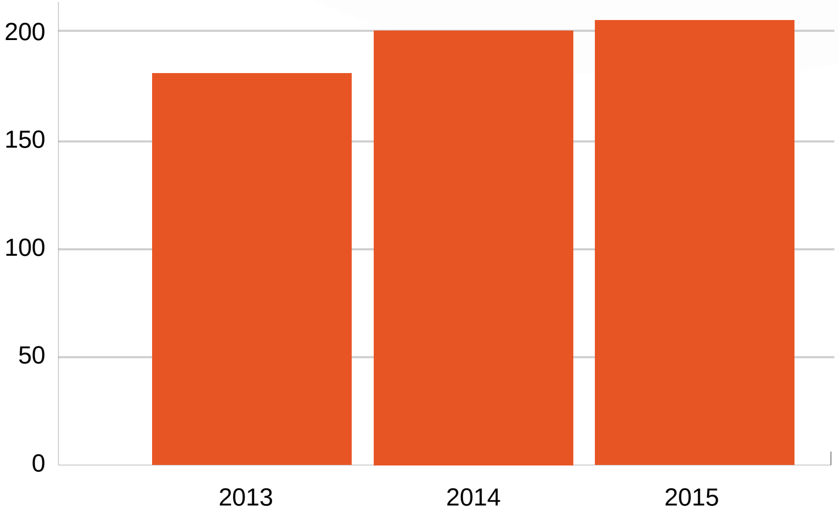


*Figure 13: Average reward climbs from $180 in 2013 to over $200 in 2015.*

The chart below shows how the reward count and total amount is increasing quarter over quarter—which translates to more bugs being found over time, along with the total payment increasing rapidly.

## Total Reward vs. Number of Payouts

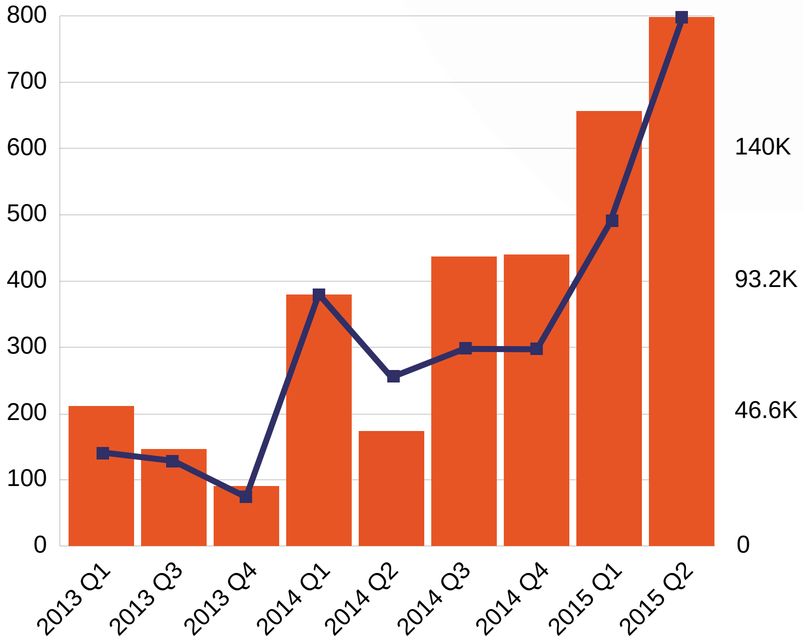
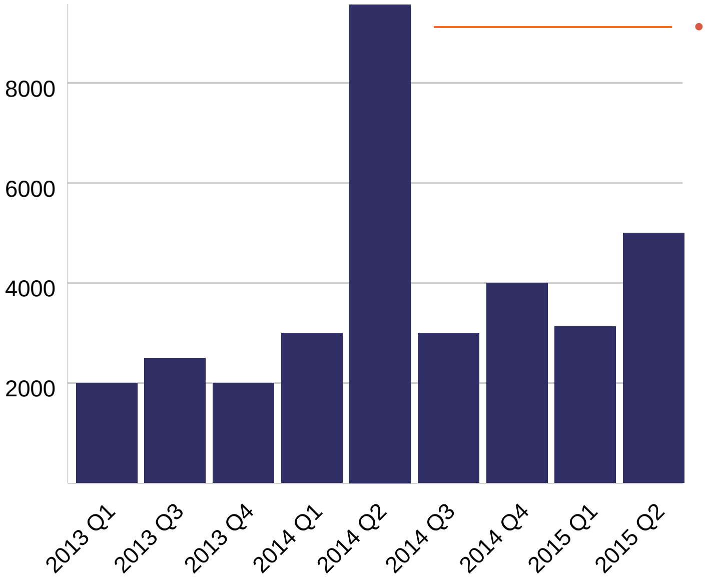


*Figure 14: Number of rewards increasing with the total amount paid.*

## Top Reward by Quarter



- THE TOP PRIZE, A $10,000 REWARD, WAS PAID TO A RESEARCHER AFTER HE DEMONSTRATED A PROOF-OF-CONCEPT EXPLOIT FOR A CROSS-SITE REQUEST FORGERY (CSRF) VULNERABILITY, ALLOWING A USER TO RESET AN ADMIN ACCOUNT PASSWORD ON A WELL-KNOWN E-COMMERCE PLATFORM.

*Figure 15: Top reward in Q4 2014 was $10,000—double that of any other quarter thus far.*

# CONSIDERATIONS FOR STARTING YOUR OWN PROGRAM

It's important to realize that bug bounty programs involve a journey that may span your entire software development lifecycle. This section discusses these and other considerations that should be taken into account when preparing your own bug bounty program.

## BUDGETING REWARDS

In 2014, Bugcrowd started guiding its customers to launch their program as invitation-only with a reward range of $50-$500. Today, customers are guided to start with a reward range of $100-$1000, and to plan to increase these amounts over time to maintain desired activity levels.

Depending on their security maturity level, the upper reward may be increased significantly to aim for higher average rewards. For instance, security-mature financial customers are guided to increase their rewards to obtain an average reward of $500-600, where most customers are guided toward obtaining an average reward of $300.

It is useful to consider a maturity model when discussing how to budget for rewards. In the model below, four maturity levels are determined from the spectrum.

**Maturity: Blocking and Tackling:** In most reactive organizations, bug bounties are a good way to build awareness among stakeholders in organizational security, but there is not much budget available. Organizations with this level of maturity should aim for an average reward of $100-200.

**Maturity: Compliance Driven:** In organizations with a primarily compliance-driven approach to security, many controls may be in place, but there is not an organization-wide focus on security. A bug bounty can bring belief in the threat of malicious actors and help propel a security program forward. Organizations with this level of maturity should aim for an average reward of $200-500.

**Maturity: Risk-based approach:** As organizations implement an SDLC and advanced controls such as code review, ongoing assessments, and a dedicated security focus, the average reward should increase. Organizations with this level of maturity should aim for an average reward of $500-1,500

**Maturity: Security Mature:** In the most security mature organizations, where there are dedicated internal testing teams in combination with an advanced SDLC, an average reward of $1,500 or more is appropriate.

It's important to note that the market is still evolving and this guidance is subject to change based on new information. Organizations should start with smaller amounts, and increase them over time in order to obtain the desired level of activity.

These numbers above note the average reward, not suggested payment ranges, but ranges are important for setting expectations.  The current starting range for Bugcrowd programs is $100-1,000, and customers are urged to increase the top reward amount as their program grows.

## DETERMINE THE TOTAL COST OF OWNERSHIP

Rewards budgeting is only part of the total cost of ownership. Organizations must also consider that there's a cost associated with staffing and running a program that should be factored into the overall cost.

With market-level rewards, organizations running public programs should plan to spend as much as they do in rewards as they do on processing the submissions and managing incoming flow.

A public program will have a much higher noise ratio than invite-only programs. For invitation-only programs, plan to spend 50% of your rewards budget on processing incoming issues.

Either way, be sure to have adequate staffing in place when launching a program, and consider starting with an invitation-only program.

**Key items to consider when thinking about the time required to run a successful program:**

- Time invested organizing and launching the program
- Top and total reward amounts for the program
- Business hours spent looking at submissions and coordinating with the researchers
- Addressing the issues identified
- Communicating the results to the business

It's important to consider and compare these TCO elements to the alternatives such as the cost of a consultants, pen testers, and testing tools used in traditional security testing programs. There are a number of other important factors to consider when evaluating how well a program works for an organization. The marketing benefit of running a public program is significant, even if difficult to measure. It can signal to an organization's customers that security is a major priority for the organization.

# GETTING STARTED

Bug bounty programs are emerging as a way to give organizations the talented workforce required to make their applications and hardware secure. This approach enables a small team to easily create and manage a full-featured application security assessment program. As part of the process, you will also need to determine how much time and money to invest and how quickly you'd like the program to grow. For many organizations that want to launch an ongoing program, an invitation-only program with increasing rewards over time is a great way to get started. For organizations that want to replace their penetration testing budget, Flex is a great way to try out the economics of bug bounty.

# bugcrowd

An innovator in crowdsourced security testing for the enterprise, Bugcrowd harnesses the power of more than 18,000 security researchers to surface critical software vulnerabilities and level the playing field in cybersecurity. Bugcrowd also provides a range of responsible disclosure and managed service options that allow companies to commission a customized security testing program that fits their specific requirements. Bugcrowd's proprietary vulnerability disclosure platform is deployed by Western Union, Pinterest, Drupal and many others. Based in San Francisco, CA, Bugcrowd is backed by Costanoa Venture Capital, Rally Ventures, Paladin Capital Group and Blackbird Ventures.

For more information visit **www.bugcrowd.com.**