

# TEAM 1140

“If you had a million dollars to spend on online marketing, what percentage of the NZ population could you persuade to sign a petition that you wanted championed?”

## Summary

Online Marketing is one of the main ways of advertising, whether it be a service, a product, or in our case, a petition. There are many different online platforms that can be used to advertise your product, through Google or other search engines, or social media platforms. Online marketing reaches many more people than a traditional marketing method would, as anyone can see your advertisement at any time, from anywhere.

To cover a wide range of demographics, we decided to focus on social media as well as Google AdWords as the platforms on which we advertised, as they can be accessed at any time and are used by most people. A large percentage of internet users in New Zealand have social media, which further justifies our thinking to get the maximum number of supporters for our petition.

## Introduction

### Assumptions

In order to begin approaching the problem, we had to define the question and make appropriate assumptions. First, since it was unspecified we decided that the petition was uncontroversial, as a controversial petition would have a smaller number of people willing to sign it, and may create more ‘buzz’ by outrage or discourse around it. This also means that we ruled out people sharing the petition through word of mouth as an advertising strategy, as this was difficult to quantify, and would not come from our budget. We also decided the million dollars was in New Zealand Dollars, as the question is entirely based within the country otherwise.

### New Zealanders Online

The percentage of the New Zealand population using the internet has remained relatively consistent since 2015, ranging from 92% to 89% last year. Taking the average this percentage is 90.25%, which is our current assumed internet users of New Zealand. This means that the absolute maximum number of New Zealanders we can reach would be 90.25% of the total population. In March 2019 Stats NZ estimated that the population of New Zealand was 4,957,400, meaning that the maximum number of New Zealanders it is possible to reach is 4,474,054.

### Petition Engagement

We also have assumed that once someone clicks on the petition ad, they are definitely going to sign it. This has been approximated due to the fact that, unlike advertising a product

where people may click on an advertisement to investigate a sale or compare prices, people who click on a petition are already interested in the topic. There could be some accidental clicks, but it is also likely that some people would sign more than once, so any differences caused by this would be negligible.

#### Advertisement Cost

For static photo advertising, it is likely that the production of this material would incur a small cost, however this is usually small, as artist commissions generally range between \$50-500 so we are not including it in our calculations. Additionally, we had more than this in excess from the advertising budget, so there would have been enough to produce the advertisements.

#### Platform Overlap

Despite overlap in the user base of our chosen advertising platforms, we are assuming that advertising on multiple platforms will not negatively affect the performance of that advertising method. This is because the clickthrough and cost per click statistics we found come from real life situations in which advertising was likely already taking place across multiple platforms.

#### Petition Platform

We have decided to use Change.org as it has minimal barriers to signing, only requiring a person's first and last name and their email address. It is projected that 90.9% of internet users in the United States will send an email in any given month in 2019, which is likely comparable to the New Zealand statistics, as in other regards the nations have similar internet behaviour. Additionally, all of the social media platforms we would be advertising on require an email account to register, so we can assume that everyone who accessed the page with the intention to sign would be able to do so.

#### Ad-Block

According to the IABNZ/Pureprofile ad blocking in New Zealand survey, up to 25% of desktop/laptop computers use ad block, whereas only 6% of mobile phones and 4% of tablets contain ad blocking software. This means that apps are less likely to have their ads blocked. Additionally, ad block is more likely to be used by younger people from 16 to 34 years of age, so this potentially makes apps one of the best ways to reach this demographic. This adds some level of uncertainty into our revenue from Google AdWords, as these ads are often the most intrusive and most commonly blocked, however, we found it difficult to find firm statistics in this regard.

## Advertising Platforms

#### Facebook

Facebook advertising has a 0.9% clickthrough rate. Assuming everyone who clicks on the ad signs the petition, we can expect 9 signatures for every 1000 views. At the average cost per click rate of \$1.72 USD, it would cost \$2.63 per signature.

Instagram advertising has a 0.8% clickthrough rate. Assuming everyone who clicks on the ad signs the petition, we can expect 8 signatures for every 1000 views. At the average cost of \$0.75USD per click, it would cost \$1.15 per signature.

### Youtube

According to Google, people who watch YouTube ads to completion are 23 times more likely to visit or subscribe to a brand channel, share a brand video, or watch more by the brand. Even those who don't watch to the end are 10 times more likely to do one of those things. However the median cost per click is 5.52 NZD, which is at least 100% higher than any other online marketing scheme. The median click through rate for youtube is 0.24% which is very low when compared to Facebook (0.9%) and Instagram (0.8%).

### Google AdWords

There are two options for online advertising with Google, the search network and the display network. The search network displays your website as an ad at the top of a google search. The display network displays your advertisement on a website. We have decided that only the display network would be relevant to this petition as it would be unlikely for people to search for the petition. The clickthrough rate for display ads is 0.35%, meaning we could expect 35 signatures for every 10000 views.

The two pricing options are cost per click pricing (CPC) and cost per thousand (CPM) impressions pricing. CPC pricing is generally better value when the goal is to drive people to the website, so this is the method we would use. The average CPC is \$0.58 USD, so we could expect each signature to cost \$0.89 NZD.

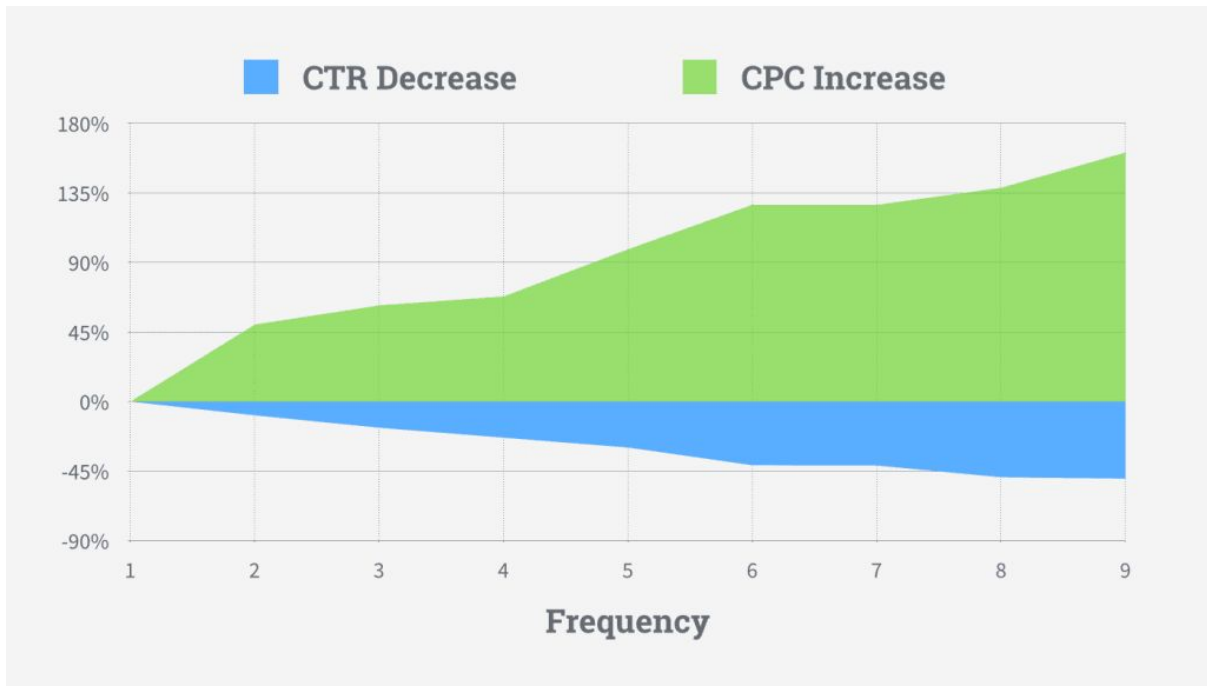
Google has 95.68% of the market share for search engines. Of the approximate 4,474,054 internet users in New Zealand, approximately 4,280,775 (rounded to the nearest person) use Google as their primary search engine. This means that ads using this platform would reach the vast majority of internet users, regardless of demographics. This meant that we decided to forego other search engines due to the convenience of Google, and its much wider user base.

Platform	Clickthrough rate (average)	Cost per click/signature
Facebook	0.9%	\$2.63
Instagram	0.8%	\$1.15
Youtube	0.24%	\$5.52
Google AdWords	0.25%	\$0.89

### Changes in Clickthrough Rate and Cost per Click

The Clickthrough Rate is a ratio showing how often people that see an advertisement actually click on it. This varies between platforms and also depends on how long your ad has been running.

Cost per click (CPC) is the amount of money it costs on average to get someone to click on your ad. This varies between platforms and also depends on how long your ad has been running.



We found that clickthrough rate and cost per click change throughout the time your ad is live. This meant we had to do some calculations to extrapolate usable data from the click through rates and cost per click values we found for each platform of ad revenue.

#### Clickthrough Rate

We could only find data on the average clickthrough rate and the rate of decrease of the clickthrough rate, so in order to find the clickthrough rate for the first viewing of an ad, we had to combine these two data sets.

$$\frac{\sum(\text{the decreasing CTR values}) * x}{9} = CTR_{\text{average}}$$

Where x equals the initial CTR value for each online marketing platform.

This created “x values,” or an initial clickthrough rate for different companies when researched clickthrough rates were substituted in. The initial CTR of each platform is given below.

Facebook = 1.264%

Instagram = 1.124%

Youtube = 0.337%

Google = 3.512%

### Cost per Click

To calculate initial CPC values from the information we had, (average CPC values and a rate of increase of CPC values we used a very similar formula to finding the initial CTR values

$$\frac{\sum(\text{the increasing CPC values}) * x}{9} = CPC$$

Where x = initial cost per click value for each online platform.

This sums the increasing CPC values then divides them to find an average CPC increase we then cancel the average CPCs of each to find an initial CPC for each platform. The initial CPC of each platform is given below.

Facebook = 1.366 \$/click

Instagram = 0.597 \$/click

Youtube = 2.867 \$/click

Google = 0.462 \$/click

Frequency	CTR Decrease	CPC Increase
1	0	0
2	-8.91%	+49.82%
3	-16.92%	+62.20%
4	-23.34%	+68.02%
5	-29.72%	+98.51%
6	-41.19%	+127.32%
7	-41.38%	+127.26%
8	-48.97%	+138.31%
9	-49.87%	+161.15%

### User Number and Demographics

#### Number of Users per Platform in NZ

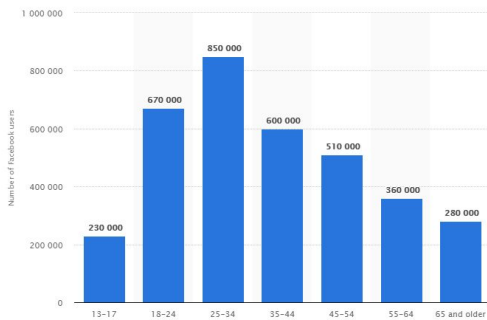
Facebook has 3,500,000 NZ users as of January 2018, making it the most popular social media. Advertising using the platform means we will reach a large number of New Zealanders, spread across a wide demographic.

Instagram has 1,570,000 NZ users, making it less useful for our cause when compared to Facebook. However it is cheaper per click at \$1.15NZD when compared to Facebook at \$2.63NZD per click.

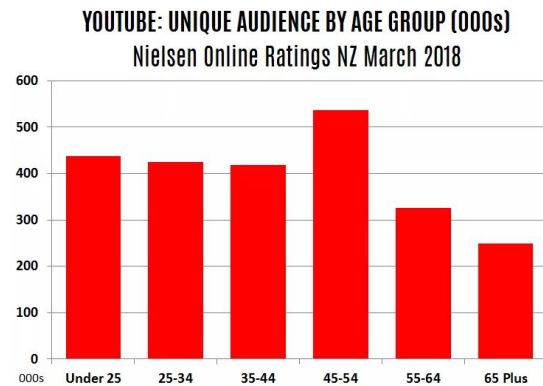
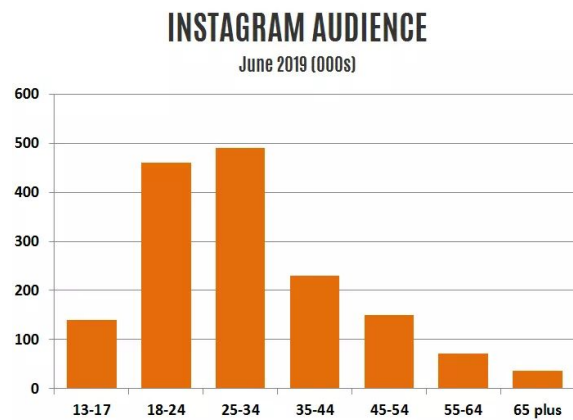
Youtube has 3,668,500 NZ users, which gives it more access to the population. Youtube also covers a wider demographic than Facebook or Instagram, however the average click through rate is low at 0.24% when compared to Instagram's 0.8% and Facebook's 0.9%.

User Demographic for each Platform

Facebook Users by Age as of January 2018



Instagram Users by Age as of June 2019, Youtube Users by Age as of March 2018



Projection Programming

Using the equations above we wrote a program which projected our signatures with respect to our assumptions and calculated costs above. Each round indicates the number of times the ad has been viewed by an individual. We could then modify our ad choices based off of cost and people reached, as it was easier to visualise after seeing the numerical data.

```

-----
Facebook
Number of signatures = 45500.0, remaining pop = 3454500.0, current cost = 62153.00000000001, round 1
Number of signatures = 86407.15265, remaining pop = 3413592.84735, current cost = 145871.1732729142, round 2
Number of signatures = 123275.32083851894, remaining pop = 3376724.679161481, current cost = 227558.2038561426, round 3
Number of signatures = 156927.08364610642, remaining pop = 3343072.9163538935, current cost = 304794.154949618, round 4
Number of signatures = 187470.73503908212, remaining pop = 3312529.2649609176, current cost = 387617.7434009658, round 5
Number of signatures = 212796.01502848783, remaining pop = 3287203.984971512, current cost = 466257.5799616045, round 6
Number of signatures = 237846.48171636174, remaining pop = 3262153.518283638, current cost = 544023.5373141863, round 7
Number of signatures = 259487.28194130358, remaining pop = 3240512.7180586965, current cost = 614471.1502421227, round 8
Number of signatures = 280605.3792736203, remaining pop = 3219394.6207263796, current cost = 689805.9289185721, round 9
-----
Instagram
Number of signatures = 17646.8, remaining pop = 1552353.2, current cost = 10535.139599999999, round 1
Number of signatures = 33540.5930758512, remaining pop = 1536459.4069241488, current cost = 24750.951829385438, round 2
Number of signatures = 47888.34601791503, remaining pop = 1522111.653982085, current cost = 38644.368826785874, round 3
Number of signatures = 61003.7489418306, remaining pop = 1508996.2510581694, current cost = 51800.15932246535, round 4
Number of signatures = 72924.02257516958, remaining pop = 1497075.9774248304, current cost = 65926.93163062145, round 5
Number of signatures = 82820.0600724862, remaining pop = 1487179.9399275137, current cost = 79356.84807664483, round 6
Number of signatures = 92618.92213251532, remaining pop = 1477381.0778674847, current cost = 92651.37774546527, round 7
Number of signatures = 101092.84315227746, remaining pop = 1468907.1568477226, current cost = 104707.31585123578, round 8
Number of signatures = 109369.56504513753, remaining pop = 1460630.4349548626, current cost = 117611.26740748859, round 9
-----
Youtube
Number of signatures = 12362.845000000001, remaining pop = 3656137.155, current cost = 35444.276615, round 1
Number of signatures = 23586.209877229616, remaining pop = 3644913.7901227702, current cost = 83652.43797274053, round 2
Number of signatures = 33791.22492716019, remaining pop = 3634708.7750728396, current cost = 131108.55412904138, round 3
Number of signatures = 43181.284234451916, remaining pop = 3625318.715765548, current cost = 176341.7224461772, round 4
Number of signatures = 51767.61959234481, remaining pop = 3616732.380407655, current cost = 225208.975738616, round 5
Number of signatures = 58935.6106468776, remaining pop = 3609564.3893531226, current cost = 271924.668657841, round 6
Number of signatures = 66066.28344065836, remaining pop = 3602433.7165593416, current cost = 318384.88242145703, round 7
Number of signatures = 72261.42832979634, remaining pop = 3596238.5716702035, current cost = 360712.2663559257, round 8
Number of signatures = 78336.84544424312, remaining pop = 3590163.1545557566, current cost = 406199.95015040674, round 9
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Google
Number of signatures = 150340.818, remaining pop = 4130434.182, current cost = 69457.457916, round 1
Number of signatures = 282476.744872999, remaining pop = 3998298.255127001, current cost = 160917.77100220078, round 2
Number of signatures = 399137.8758784251, remaining pop = 3881637.124121575, current cost = 248339.4227769509, round 3
Number of signatures = 503643.16111805325, remaining pop = 377131.838881947, current cost = 329461.90125689685, round 4
Number of signatures = 596871.5982816353, remaining pop = 3683903.401718365, current cost = 414963.21128030005, round 5
Number of signatures = 672959.2043817714, remaining pop = 3607815.795618229, current cost = 494871.8152186152, round 6
Number of signatures = 747234.5492547975, remaining pop = 3533540.450745203, current cost = 572856.5599450141, round 7
Number of signatures = 810561.728358374, remaining pop = 3470213.2716416265, current cost = 642579.2901860548, round 8
Number of signatures = 871657.109465531, remaining pop = 3409117.8905344694, current cost = 716291.6617317941, round 9
-----

```

	Facebook	Instagram	Youtube	Google AdWords
% of signatures	21%	8.2%	5.8%	65%
% of cost	36%	6%	21%	37%

As a group, we decided to not use Youtube as an advertising provider. This was because in our nine projected views of each ad from the simulation, YouTube accounted for 5.8% of signatures and 21.04% of cost, which were hugely disproportionate. This wasn't cost effective and put us well over the \$1,000,000 budget provided, with minimal gain.

Google AdWords reaches the most people across multiple demographics and garners the most signatures. As a group we decided that keeping it for the maximum of 9 rounds was the best option, as our projections showed that it would be the most effective marketing strategy.

We also used Instagram and Facebook to advertise, but for less view 'rounds', as they were not quite as cost effective as google. Rather than just using instagram, the more cost effective of the two, we used them both, as they have very different user bases, and the objective of the investigation was to attract notice of all New Zealanders.

One thing we could not account for was the fact that particular users may have seen the ads on multiple platforms, although as mentioned in our assumptions earlier, this effect may have even been beneficial to gaining signatures as users were seeing the messages in multiple places.

Our final decisions for advertising usage were all nine rounds of Google AdWords, as this reached the largest amount of internet users, including many demographics which were unlikely to be on social media. This came to a final projected cost of \$716,292. We also wanted to specifically target social media users, which means the posts can be shared and have more interactivity than just a regular banner ad. We decided to use 3 rounds of Facebook advertising (\$227,558), and four rounds of Instagram advertising (\$518,001), which was more cost effective, as shown in the table above.

Overall, our marketing budget came to \$995,651, which left just under \$5000 excess. Practically, this would have likely been used for advertising design costs, or hiring human workers, although if not this could always have been invested into some other way to market the petition.

Our predicted reach from the advertising, assuming there were no duplicate clicks from the same person, indicates that we could have reached approximately 1,055,938 New Zealanders, which from our population statement earlier means our total percentage of the population was 21.3%

## Appendix

The program written to project our advertising growth.

```

1 # -*- coding: utf-8 -*-
2 """
3 Created on Sat Aug 3 14:48:54 2019
4
5 @author: leahalbrow
6 """
7
8 def chances(initial_ctr):
9     x = initial_ctr
10    return [x, 0.9109 * x, 0.8308 * x, 0.7666 * x, 0.7028 * x, 0.5881 * x, 0.5862 * x, 0.5103 * x, 0.5013 * x]
11
12 def cpc(initial_cpc):
13     x = initial_cpc
14     return [x, 1.4982 * x, 1.6220 * x, 1.6802 * x, 1.9851 * x, 2.2732 * x, 2.2726 * x, 2.3831 * x, 2.6115 * x]
15
16 def projection(pop_size, initial_ctr, initial_cpc):
17     chance = chances(initial_ctr)
18     cpcs = cpc(initial_cpc)
19     k = 0
20     signatures = []
21     cost = 0
22     while k < len(chance) and pop_size > 0:
23         new_signatures = pop_size * chance[k]
24         signatures.append(new_signatures)
25         pop_size -= new_signatures
26         cost += cpcs[k] * new_signatures
27         print('Number of signatures = {}, remaining pop = {}, current cost = {}, round {}'.format(sum(signatures), pop_size, cost, k + 1))
28         k += 1
29
30 print('-' * 100)
31 print('Facebook')
32 projection(3500000, 0.013, 1.366)
33 print('-' * 100)
34 print('Instagram')
35 projection(1570000, 0.01124, 0.597)
36 print('-' * 100)
37 print('Youtube')
38 projection(3668500, 0.00337, 2.867)
39 print('-' * 100)
40 print('Google')
41 projection(4280775, 0.03512, 0.462)

```



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