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privacy-tech-lab

PrivacyFlash Pro: Automating Privacy Policy Generation for Mobile Apps

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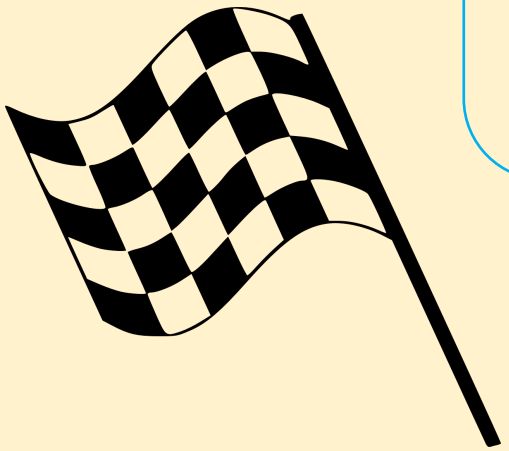
Hmm, I wonder if I need a **privacy policy** for my app. Also, what should I write in there? I am lost …



Privacy Policy

Questionnaire Wizard

```
var currentLoc : CLLocationCoordinate2D!
let healthKitStore = HKHealthStore()


override func viewDidLoad() {
    super.viewDidLoad()

    workoutTable.backgroundColor = UIColor.lightGray
    workoutTable.separatorColor = UIColor.blue

    // Ask for Authorization from the User.
    self.locationManager.requestAlwaysAuthorization()

    // For use in foreground
    self.locationManager.requestWhenInUseAuthorization()

    if CLLocationManager.locationServicesEnabled() {
        locationManager.delegate = self
        locationManager.desiredAccuracy = kCLLocationAccuracyNearestTenMeters
        locationManager.startUpdatingLocation()
    }
```

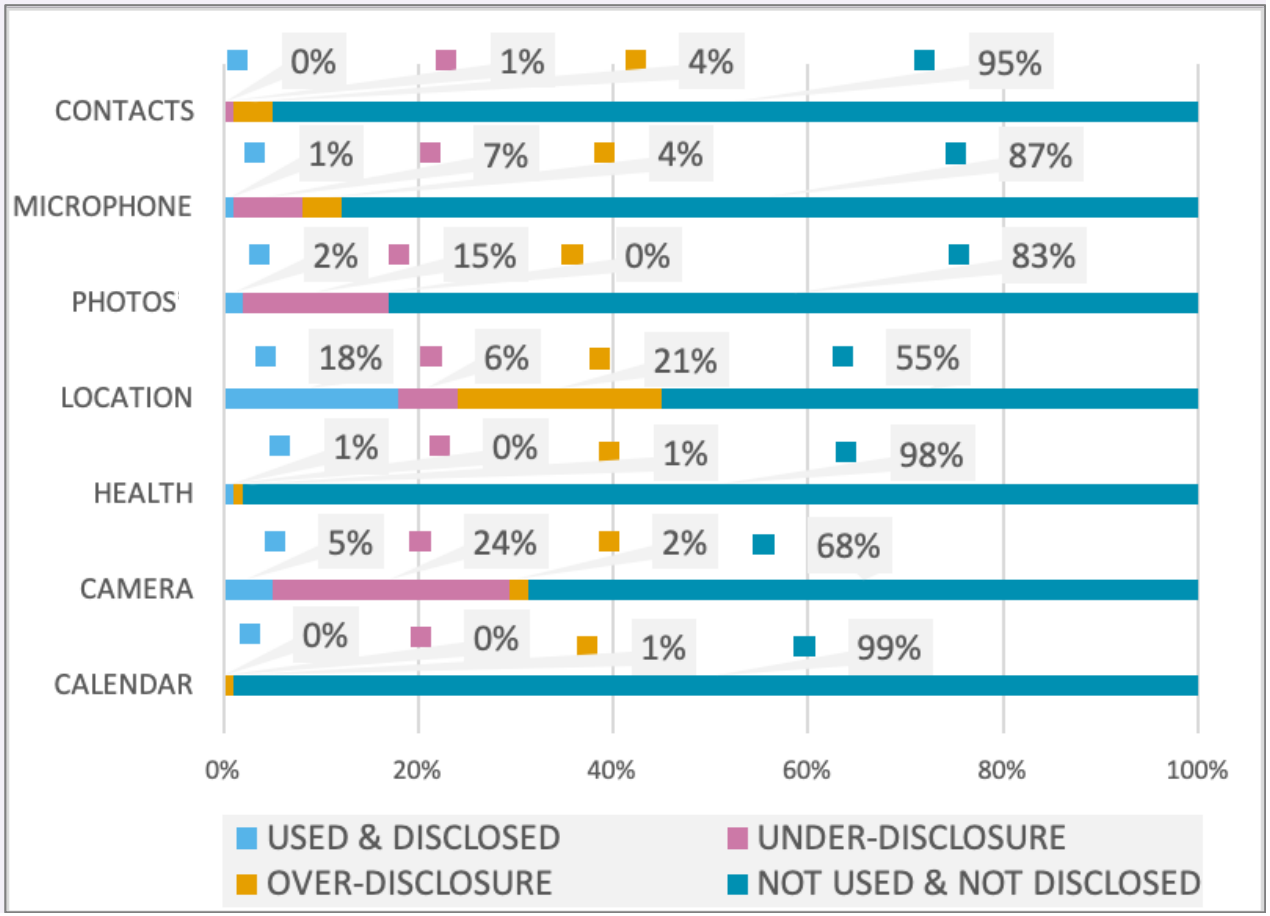
Code Analysis

Don’t worry! I got you covered. Here is the privacy analysis of your app.

PrivacyFlash PRO

Current Policy Generators Could Do Better

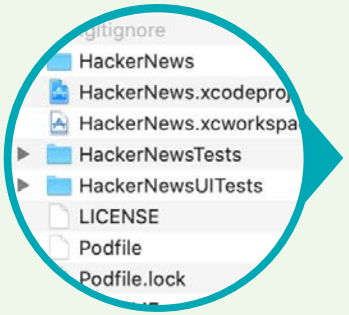
- Iubenda, TermsFeed, Termly …
- Completely questionnaire-based
- Generators' compliance with laws sometimes problematic
- Permission use not 👉 accurately reflected
- Library use not accurately reflected



PrivacyFlash Pro (PFP) Automates Policy Creation

PrivacyFlash Pro

- Browser-based desktop app
- Python, JS, …
- https://github.com/privacy-tech-lab/privacyflash-pro

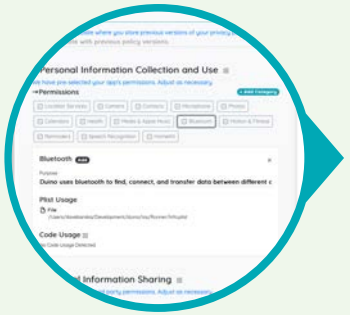


Static Code Analysis

- Analyze Swift source code and (un)compiled third party libraries
- Data is processed locally

API Identification

- Identifies privacy practices using PLIST permission strings and other evidence contained in spec



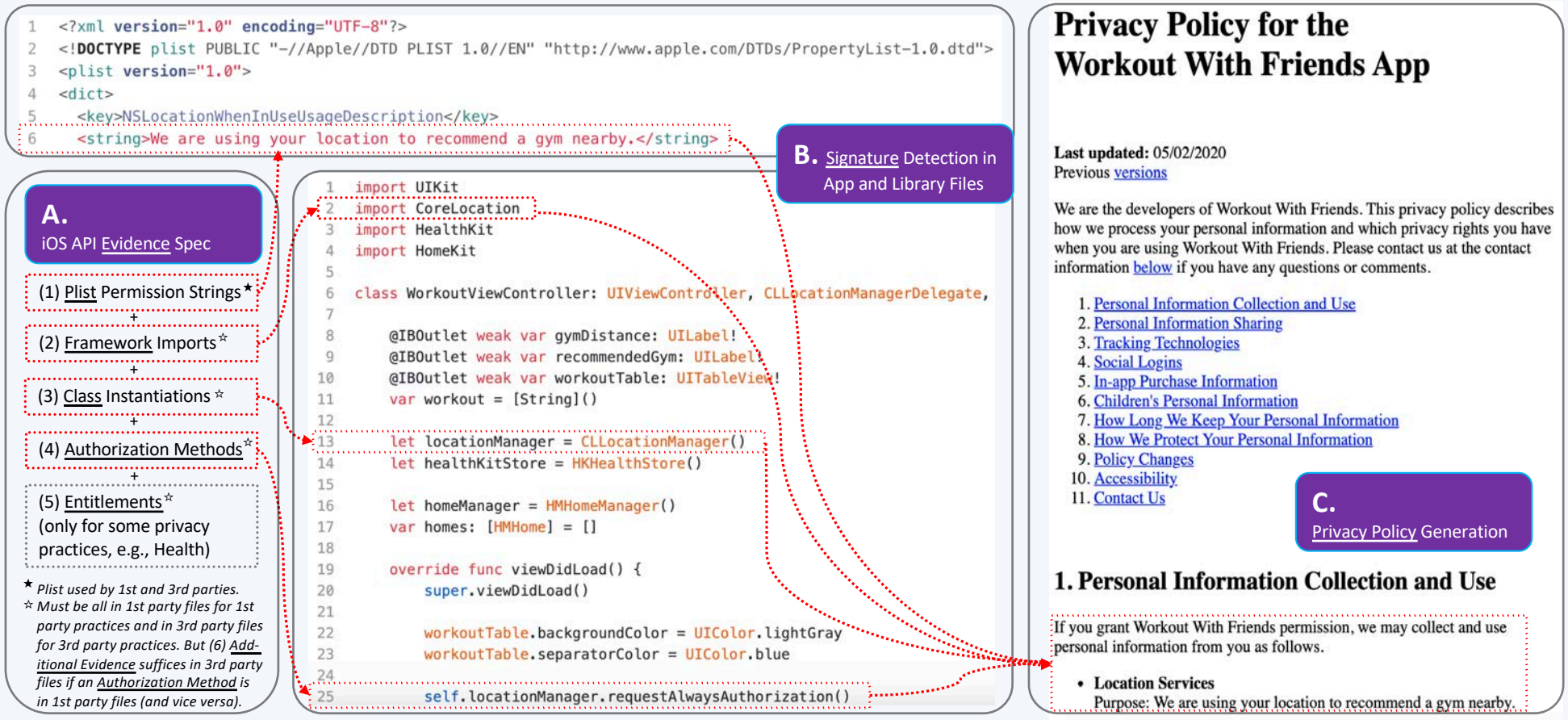
Questionnaire Wizard

- Fine tune results in a guided wizard that automatically live updates policy as changes are made

Privacy Policy

- Generates a privacy policy as html file adhering to accessibility requirements

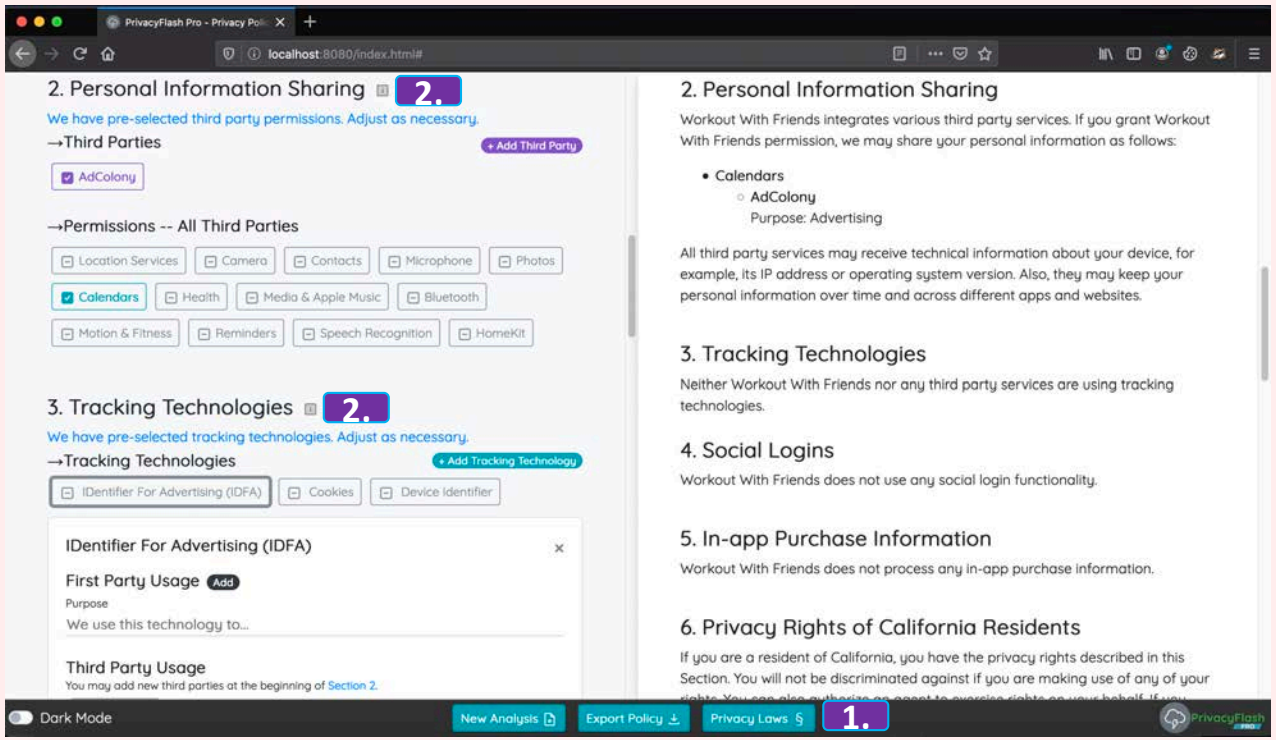
How Does PFP Work?




```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE plist PUBLIC "-//Apple//DTD PLIST 1.0//EN" "http://www.apple.com/DTDs/PropertyList-1.0.dtd">
<plist version="1.0">
<dict>
  <key>NSLocationWhenInUseUsageDescription</key>
  <string>We are using your location to recommend a gym nearby.</string>
```

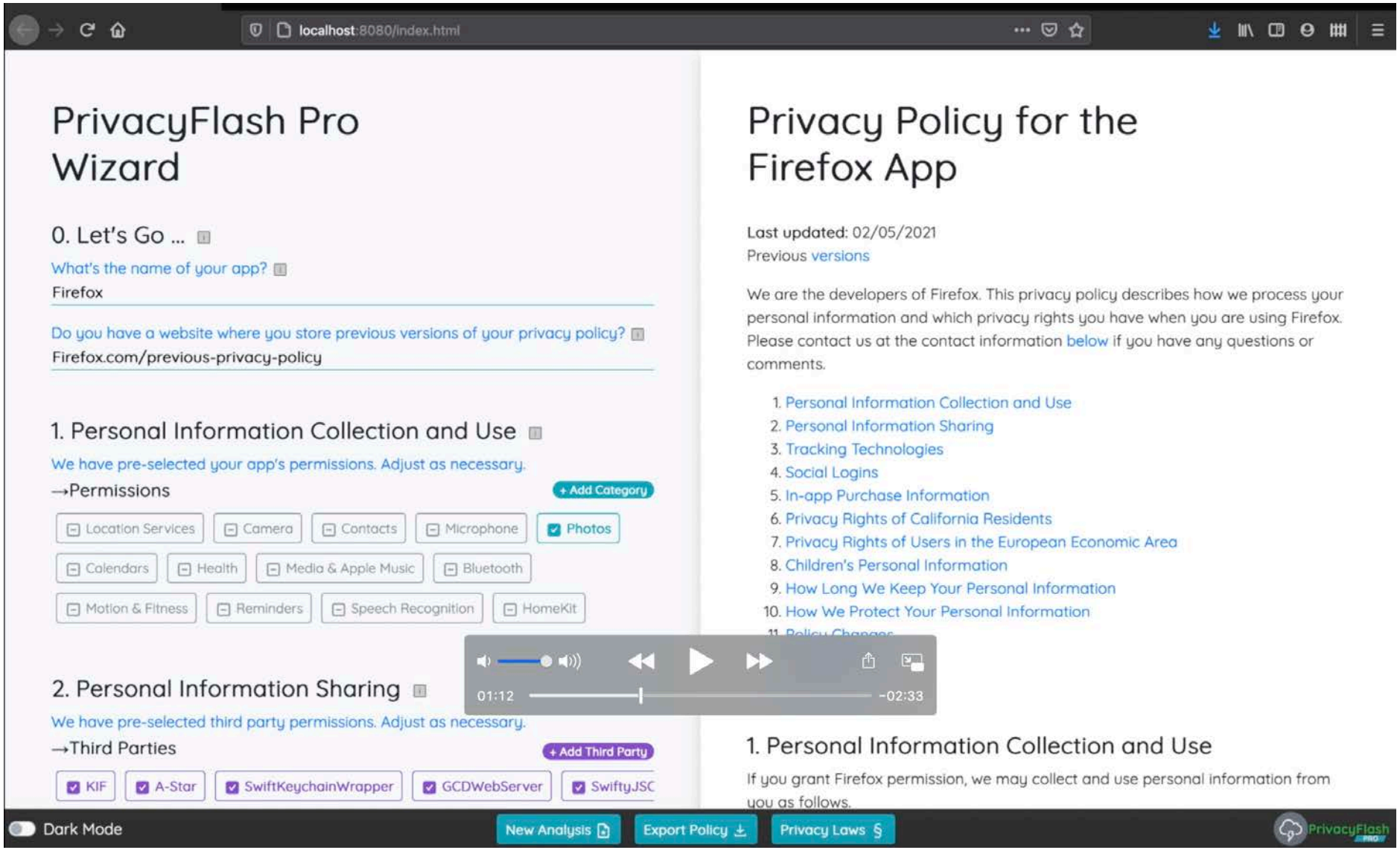
```
import UIKit
import CoreLocation
import HealthKit
import HomeKit

class WorkoutViewController: UIViewController, CLLocationManagerDelegate,

    @IBOutlet weak var gymDistance: UILabel!
    @IBOutlet weak var recommendedGym: UILabel!
    @IBOutlet weak var workoutTable: UITableView!
    var workout = [String]()

    let locationManager = CLLocationManager()
    let healthKitStore = HKHealthStore()

    let homeManager = HMHomeManager()
    var homes: [HMHome] = []

    override func viewDidLoad() {
        super.viewDidLoad()

        workoutTable.backgroundColor = UIColor.lightGray
        workoutTable.separatorColor = UIColor.blue

        self.locationManager.requestAlwaysAuthorization()
```

PFP is ”awesome“



PrivacyFlash PRO

DEMO-TIME


localhost:8080/index.html
PrivacyFlash Pro Wizard
0. Let's Go ...
What's the name of your app?
Firefox
Do you have a website where you store previous versions of your privacy policy?
Firefox.com/previous-privacy-policy
1. Personal Information Collection and Use
We have pre-selected your app's permissions. Adjust as necessary.
→Permissions
+ Add Category
Location Services
Camera
Contacts
Microphone
Photos
Calendars
Health
Media & Apple Music
Bluetooth
Motion & Fitness
Reminders
Speech Recognition
HomeKit
2. Personal Information Sharing
We have pre-selected third party permissions. Adjust as necessary.
→Third Parties
+ Add Third Party
KIF
A-Star
SwiftKeychainWrapper
GCDWebServer
SwiftyJSC
01:12
-02:33
Privacy Policy for the Firefox App
Last updated: 02/05/2021
Previous versions
We are the developers of Firefox. This privacy policy describes how we process your personal information and which privacy rights you have when you are using Firefox. Please contact us at the contact information below if you have any questions or comments.
1. Personal Information Collection and Use
2. Personal Information Sharing
3. Tracking Technologies
4. Social Logins
5. In-app Purchase Information
6. Privacy Rights of California Residents
7. Privacy Rights of Users in the European Economic Area
8. Children's Personal Information
9. How Long We Keep Your Personal Information
10. How We Protect Your Personal Information
1. Personal Information Collection and Use
If you grant Firefox permission, we may collect and use personal information from you as follows.
Dark Mode
New Analysis
Export Policy
Privacy Laws §
PrivacyFlash

How Well Does PFP Work?

Permission Category	True Positives	False Positives	False Negatives
Bluetooth	2	0	0
Calendars	4	0	0
Camera	15	0	2
Contacts	3	0	1
Health	0	0	0
HomeKit	0	0	0
Location	21	0	0
Microphone	1	0	0
Motion & Fitness	0	0	0
Media & Apple Music	2	0	1
Photos	14	0	1
Reminders	0	0	1
Speech Recognition	0	0	0
Sum	**62**	**0**	**6**

TABLE V: Detection of permission uses for the 40 apps analyzed by the participants in our usability study (first and third party uses combined). With 62 true positives and 6 false negatives the analysis achieves a precision of 1 and recall of 0.91 for an F-1 score of 0.95.

Tested on:

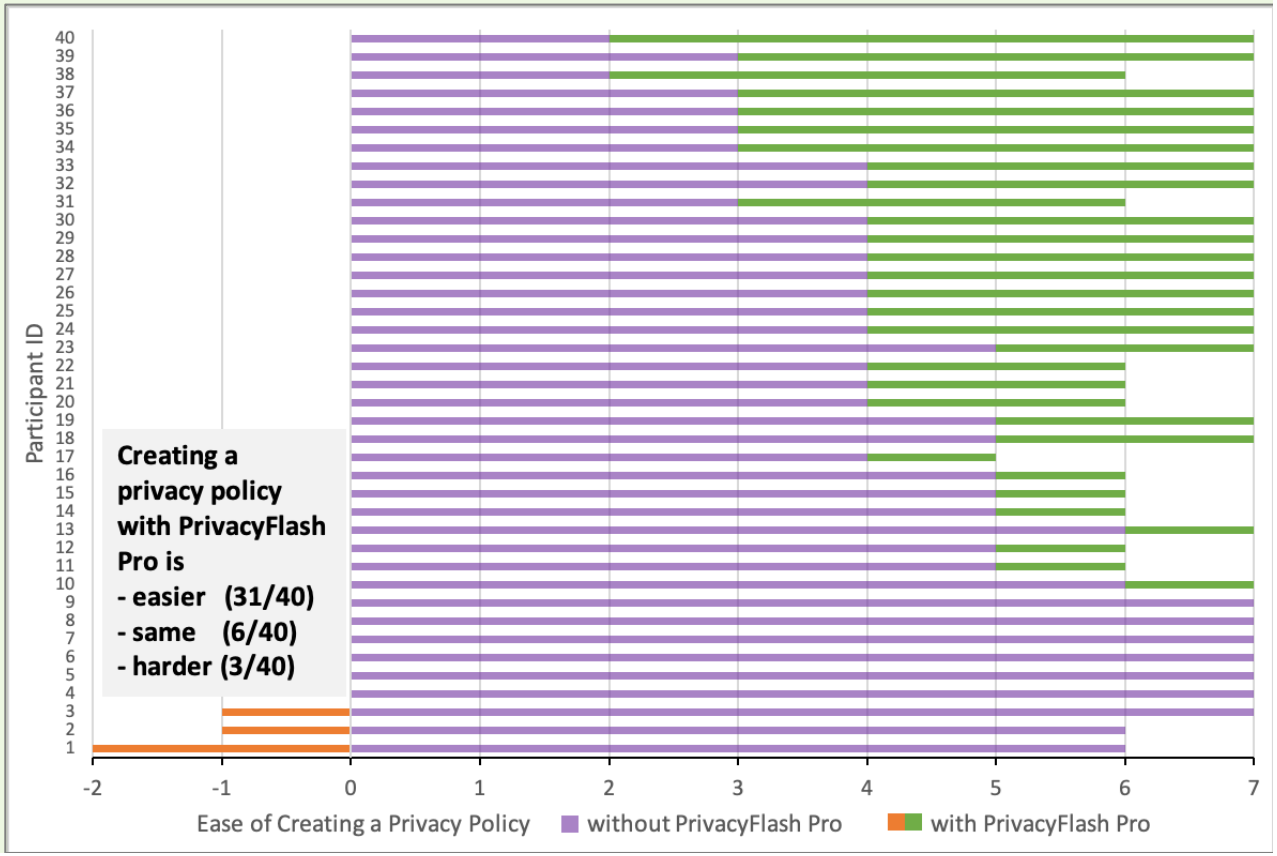
- Our own app
- 10 open source apps
- 40 apps from iOS developers who reported results to us (Tables V and VI)

Third Party Code	True Positives	False Positives	False Negatives
Libraries	525	0	**1**
Facebook Login	9	0	**2**
Google Login	6	0	**3**

TABLE VI: Detection of third party libraries, Facebook Login, and Google Login.

Use by Developers

- Usability study with 40 iOS developers
- Most developers find creating a policy with PFP is easier compared to their previous method of creating a policy 👉
- Net Promoter Score: “How likely is it that you would recommend PrivacyFlash Pro to a friend or colleague?” → 42.5



The Big Picture

- The behavior of software has an impact in the real world → privacy policies for transparency and as a legal safeguard
- How can developers become better at creating privacy policies? → establish policy generation as a native extension of the software development process

Main Takeaways

- Automate privacy policy generation for iOS apps with PrivacyFlash Pro
- Extension to other platforms beyond iOS and ”nutrition labels”
- Integrate privacy policy creation into software development

- Thank you! Questions?

- Our code: https://github.com/privacy-tech-lab/privacyflash-pro
- Our lab: https://www.privacytechlab.org/

Wesleyan University

PrivacyFlash PRO

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