

# OPERANDO

Online Privacy Enforcement, Rights Assurance & Optimization

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# OPERANDO

- Funded under the Horizon 2020 Programme (H2020), as part of the DS-01-2014 - Privacy call (GA no. 653704)
- We implement and validate an innovative privacy enforcement framework that will enable: ***Privacy as a Service***
- The project is Open Source available in Github

# Consortium



# GDPR

- On 27 April 2016, the EU adopted new rules for the protection of personal data, via the ***General Data Protection Regulation (GDPR)***. The GDPR will become applicable on ***25 May 2018***, and its impact will be felt in many areas in the next few years that service providers will have to integrate it in their services.
- Will everyone do it?
- What happens till then?
- What happens with non-conforming services?

# Main concept of the project

- **Ground truth:** Users do **not** have control of their private data.
- They consume numerous services, sharing their private data with many entities many of which they do not know.
- Users do not have control of **who** accesses their private data, **when**, **which** data and **why**.
- Users are not able to revoke their **consent**.
- Common users do not have the knowledge and means to enforce their privacy preferences.
- Note that the project was submitted before **GDPR**.

# The OPERANDO approach

- “One size fits all” doesn’t actually work
- The project is split in G2C and B2C approaches to cater for the different needs.
- The research part of the project has several contributions that many of you are already using.

# The G2C case

# Current status

- Users browse the Internet sharing a lot of private information, without knowing what they share, when or being able to filter it.
- Big companies are monetizing this information as it enables them to efficiently profile users.
- Users have an “one-time” deal, ***“share data” or no-service.***
- Many of the data that companies are collecting are not needed for the service provision.



# How does it work? (User side)

- Users registered to a **Privacy Service Provider (PSP)** who provides them with a “vault” for their data
- Users then register to affiliated online service providers.
- The PSP provides an **easy-to-use dashboard** to manage all private data.
- The user can:
  - See which data each OSP requests,
  - Why they are requested,
  - When they are processed,
  - Who requests them
  - Revoke/grant access

# OSP side

- The **Online Service Provider (OSP)** is not always the bad guy, actually most OSPs are not, they just want to provide a service.
- How do they prove that they “don’t do evil”?
- How can they get certification of their services?
- How they can deploy easily services?

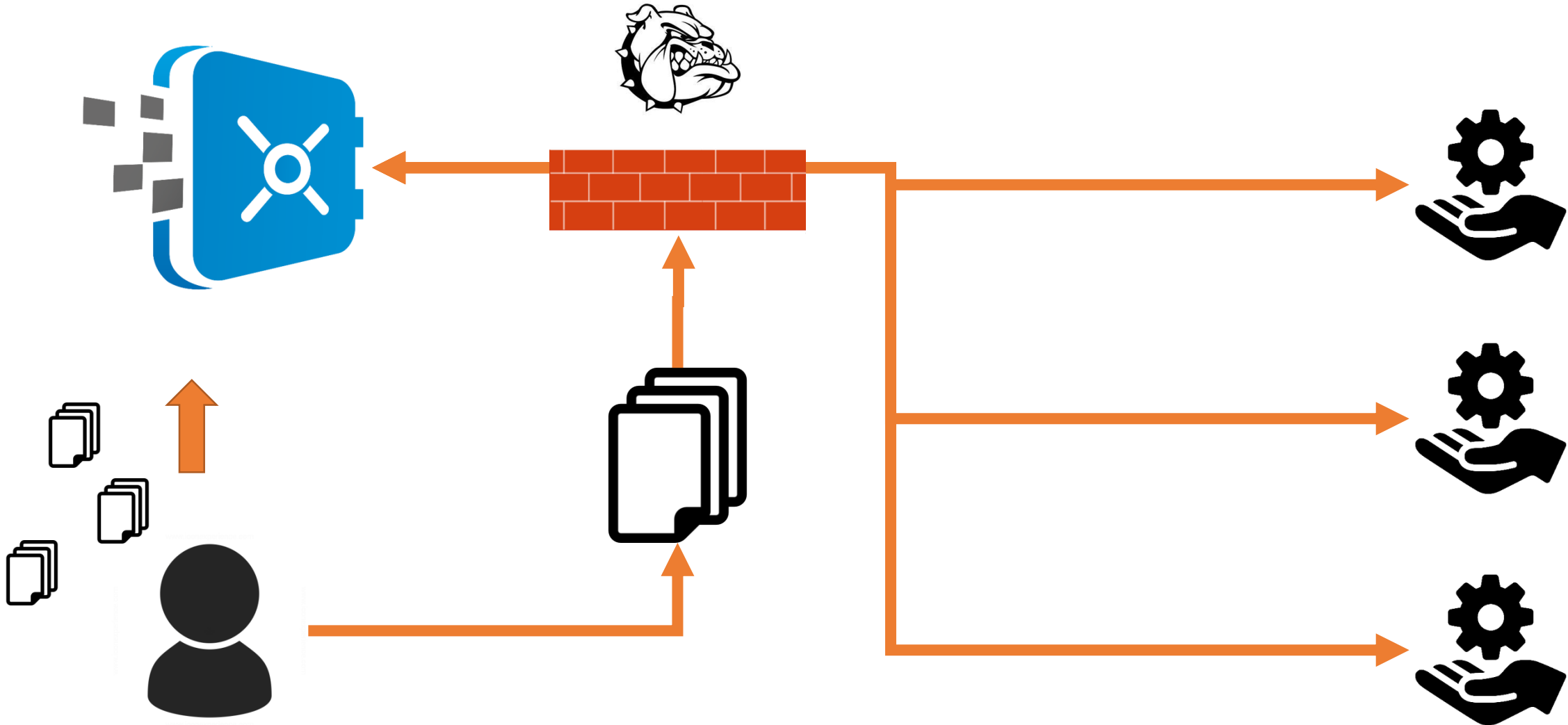
# OPERANDO PSP side

- OPERANDO provides the vault which is monitored by the PSP. All data coming, processed and leaving are continuously monitored and logged.
- To facilitate development all database transactions are made using a RESTful interface which allows developers to query the database using OData.
- Before executing any query, the role and permissions of each user are checked to determine whether he is authorized to perform the query. Then, the affected/returned rows are checked against the user preferences to determine whether user is allowed to perform this query in row level.

# OPERANDO PSP side

- The PSP logs all transactions and shows you what is done with your data.
- The PSP monitors any transactions and enforces your privacy policies.
- The OSP cannot arbitrarily access your data.
- The OSP can handle user policies without writing any code.
- Opting in and out is seamless.

# Basic concept of OPERANDO G2C



# The AMI use case

[Dashboard](#)[Notifications](#)[Access Preferences](#)[Data Access Log](#)[Privacy Policy](#)

## Access preferences

## PRIVACY SETTINGS FOR THE APP AMI

Your privacy preferences are shown here. You can see, and change, which organisations have access to your data and how it is used. These settings are enforced automatically for you by OPERANDO, an independent platform, to ensure that your data is only used in ways which you have agreed to.

Volunteer Link-Up should be able to access the following data:

- OData Metadata
- Id
- Availability
- Confidential Note
- Matches
- Preference
- Unsuccessful
- Volunteer Unsuccessful Reason
- Volunteer Checklist Items
- Email
- Title
- First Name
- Last Name
- Registration Date
- Address

Abingdon Good Neighbour Scheme should be able to access the following data:

- OData Metadata
- Id
- Availability
- Confidential Note
- Matches
- Preference
- Unsuccessful
- Volunteer Unsuccessful Reason
- Volunteer Checklist Items
- Email
- Title
- First Name
- Last Name
- Registration Date
- Address

[Update UPP \(User Privacy Policy\)](#)[Back to default values](#)

## Mr North

## Verification

- Registered
- Initial phone call
- Interview arranged
- Successful interview
- References requested
- References received
- DBS complete
- Successful initial meeting
- Successful match

[End recruitment process](#)

## S., T. Mr 60 y/o

[View profile](#)  
 26 George Street, Oxford,  
 Oxfordshire, OX1 2HJ (77 miles  
 away)

Registration date: 28/06/2016

## Needs

- Companionship (Top Need)
- GP appointment buddy

## Interests:

- History
- Music
- Sciences

[Edit match](#)

## Notes

These notes are confidential and cannot be seen by the subscribers.

## Personal details

Email address

bob@ami.com

Name

Mr

First name

North

Registration date

17/10/2017

## Address

Address line 1

Address line 2

City or town

County

Postcode

Phone number

## Availability

Available hours per week

2

Availability

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
--	-----	-----	-----	-----	-----	-----	-----

Morning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
---------	--------------------------	--------------------------	--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

Afternoon	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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Evening	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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Distance prepared to travel

5

Other

## Preferences

Occupation

Construction

Employment status

Fulltime employment

Needs willing to fulfil

Companionship



You can choose as many as you want.

Hobbies and interests

DIY

You can choose as many as you want.



 Dashboard Notifications Privacy Policy User Policy Preferences Big Data Analytics Reports




## Privacy Policy

## AMI PRIVACY POLICY

Setting up your privacy policy will allow OPERANDO to enforce the statements within the policy. Since they are enforced, this information can be used to prove regulation compliance to regulators.

## Who can use data

User type of data user	User type of data subject	Type of information used	Reason for use	
<input type="text" value="Ami Administrator"/>	<input type="text" value="Volunteer"/>	<input type="text" value="Email"/>	<input type="text" value="Ami Newsletter"/>	<a href="#">Add +</a>
Volunteer Link-Up	Volunteer	Email	Arrange Interview	<a href="#">Edit</a> <a href="#">Delete</a>






 Dashboard Notifications Access Preferences Data Access Log Privacy Policy

## Notifications

Events relevant to you (e.g. pending data access requests, recommended/automatic changes to settings) are displayed in this section. Requests are shown with the most recent first, but you can filter (Pending, Approved, Requested) or search freely.

## NOTIFICATIONS

Show Search: 

Type	Message
 Ami Privacy Policy change	Ami changed their Privacy Policy. Take a look at their Privacy Policy for details.
 Ami Privacy Policy change	Ami changed their Privacy Policy. Take a look at their Privacy Policy for details.
 Privacy Settings updated	Your privacy settings were updated because of changes you made through the dashboard.
 Privacy Settings updated	Your privacy settings were updated because of changes you made through the dashboard.
 Privacy Settings updated	Your privacy settings were updated because of changes you made through the dashboard.

Showing 1 to 5 of 5 records



- Dashboard
- Notifications
- Access Preferences
- Data Access Log
- Privacy Policy**

## Privacy Policy

## AMI PRIVACY POLICY

From this page, you can see the privacy policies of the online services who can request your data. The policies are presented in a simple way (saying who using the service can view your data, what data they can see, and what it's used for), making the policy clear for everyone.

## Who can use data

User type of data user	User type of data subject	Type of information used	Reason for use
Volunteer Link-Up	Volunteer	Email	Arrange Interview
Ami Administrator	Volunteer	Email	Ami Newsletter



- Dashboard
- Notifications
- Privacy Policy
- User Policy Preferences
- Big Data Analytics
- Reports**

## Reports (subscription and download)

In this section you can manage your Reports: download available Reports, manage when reports are executed, or request a new Report definition is created:

- **Reports tab:** here you can find available Reports ordered with the most recently run first; click on a row to expand it and download. You can also search the Reports for certain words.
- **Schedules tab:** for each Report you can see the date of the last and next execution. Clicking on a row expands it, which allows you to view and manage the schedule for it. To add a new schedule, fill in the last row (with an orange background).

## REQUEST A NEW REPORT

Request Now

Reports Schedules

Show 5

Search: 

Date	Report	Description	Version
01/07/2017 23:00:00	Volunteer Breakdown Report	Breakdown of employment information and volunteering preferences	1.0

Showing 1 to 1 of 1 records

« < 1 > »

# The B2C case

# Consumer privacy is exposed to multiple dangers

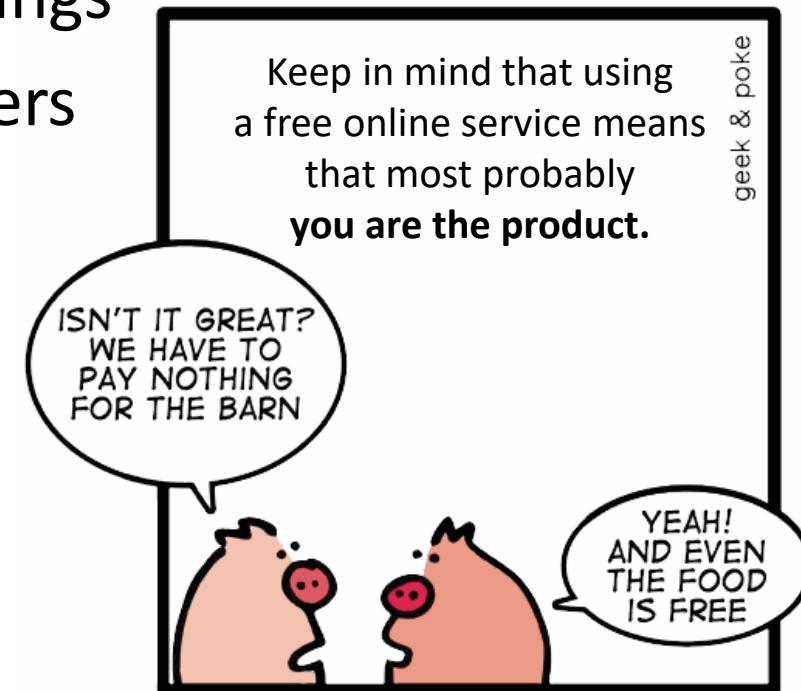
## De*Fault* Settings

- Times New Roman Syndrome – The default font for everything
- The users' assumption that Online Service Providers had given careful consideration on their default privacy settings
- Privacy Settings not easily accessible to novice users

## User Profiling

- Targeted Ads
- 3<sup>rd</sup> party trackers
- Social media buttons

**Unique identifiers to stalk users' behavior**



# Consumer privacy is exposed to multiple dangers

## Forgotten & Suspicious Apps

- Remember that FB app you used once 2 years ago?
  - It still has access to your social network data
- Excessive permissions granted to mobile and browser apps

## Email

- Spam emails after registration on websites
- Exposed after data breach of the Service Provider
  - e.g. Ashley Madison hack

## Malware

- Malware software lurking on the internet

# The complete guide to privacy

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Suspendisse bibendum augue id neque porttitor, quis semper tellus gravida. Nam aliquam augue eget elit convallis rutrum. Vivamus pharetra purus id metus volutpat, ac elementum magna posuere. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia Curae; Vestibulum condimentum dui nec Lorem ipsum dolor sit amet, consectetur adipiscing elit. Proin quis ultrices lorem, eu luctus mi. Praesent dapibus ligula ipsum, eget pretium felis semper quis. Nulla congue mauris eget felis ornare mattis. Cras sed augue sem. Etiam ac risus vulputate tellus fringilla placerat a id mauris. Vestibulum elementum tellus a lorem viverra ullamcorper. Curabitur sagittis metus lorem, ut consectetur urna dignissim nec. Mauris non bibendum lorem. Vestibulum posuere velit quis justo gravida gravida. Ut lacinia erat ut nisi volutpat sagittis. Interdum et malesuada fames ac ante ipsum primis in faucibus. Fusce et tristique nisi, ac luctus ex. Praesent sagittis quam et aliquet molestie. 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**T** **L** **;** **D** **R**  
**Too Long, Didn't Read**

# {+P} PlusPrivacy

O{P}ERANDO | Consumer Privacy

## PlusPrivacy empowers users to



Control all of social network privacy settings



Control apps connected to their data



Ad blocking and anti-tracking capabilities



Hide their email identity



Control the browser's extensions permissions



Do their own privacy-for-benefit deals

**from a unified Dashboard**

## Chrome Extension



## iOS & Android Apps



# {+P} PlusPrivacy

O{P}ERANDO | Consumer Privacy



The users have to make only one choice.



Clicking the **Single click privacy** button will automatically change all the privacy options in your social network accounts to their most privacy-friendly settings.





# {+P} PlusPrivacy

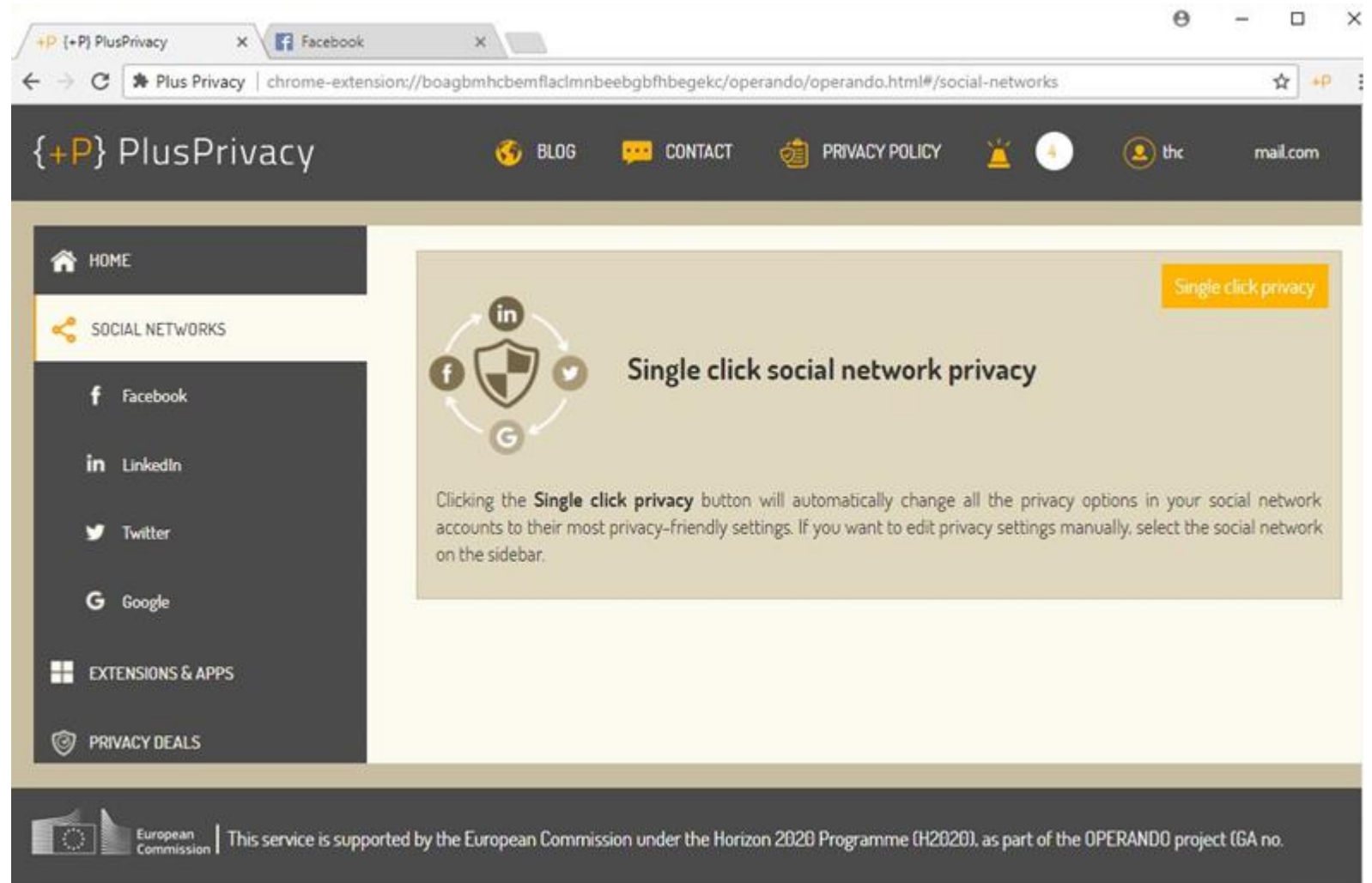
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Takes place on the browser,  
+P does not have access  
on users' data.



LinkedIn



# {+P} PlusPrivacy

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**Tweak your privacy settings from the dashboard**

The screenshot displays the PlusPrivacy dashboard interface. On the left is a dark sidebar with navigation options: HOME, SOCIAL NETWORKS, Facebook, LinkedIn, Twitter, Google, EXTENSIONS & APPS, and PRIVACY DEALS. The main content area is titled 'Facebook privacy settings' and includes three yellow buttons: 'Update Facebook settings', 'Next', and 'Done'. Below the title, there are three sections of settings, each with radio button options:

- Who can see your future posts?**
  - Public
  - Friends (Recommended)
  - Only Me
- Who can see your friends list?**
  - Public
  - Friends
  - Friends except Acquaintances
  - Only Me (Recommended)
- Who can contact you/send you friend requests?**

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**Ad Blocking**

**Anti-Tracking**

**Block Malware  
Domains**

HOME

SOCIAL NETWORKS

EXTENSIONS & APPS

PRIVACY DEALS

MY IDENTITIES

AD BLOCKING & ANTI-TRACKING

FEEDBACK

**Protect against tracking**  
Prevent web sites and and advertisers from tracking you. **ON**

**Remove social media buttons**  
Automatically remove buttons such as Facebook Like – these are used to track your behavior. **ON**

**Block malware**  
Make your browsing more secure by blocking known malware domains. **ON**

Filter settings

# {+P} PlusPrivacy

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▲ Extension/App name	Intrusiveness	
Docs	1/10	<input checked="" type="checkbox"/> Enable
Gmail	6/10	<input checked="" type="checkbox"/> Enable
Google Docs Offline	5/10	
Google Drive	5/10	
{+P} Plus Privacy	7/10	
Sheets	1/10	
Slides	1/10	
YouTube	1/10	

**Enable/Disable  
or  
Delete**

### Google Docs Offline permissions

- alarms
- clipboardRead
- clipboardWrite
- identity
- power
- storage
- unlimitedStorage
- webConnectable

#### Permission Warnings

- Communicate with cooperating websites
- Read and modify data you copy and paste

Close

**Inspect the Permissions  
of Extensions**

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f Apps connected to your Facebook account

Logo	App name	Visibility	Permissions	Actions
	Developer	Friends	Public profile (required) Friends list	
	MeetMe	Friends	Public profile (required) Friends list Date of birth Email address Post on your behalf	
	OpenChat Chat	Friends	Public profile (required) Friends list	
	Scribd	Friends	Public profile (required) Friends list	

Just a click away  
from getting rid  
of redundant  
or  
privacy-polluting  
apps

Inspect Apps  
connected to









# {+P} PlusPrivacy

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## ***Up to 20 alternative email identities***

Remailed to your email address, and your reply will be mailed back to the original sender, without disclosing your real email address

***+P does not keep any data***

Alternative identities		
<input type="radio"/>	4ut9fj0sbk@plusprivacy.com	 
<input type="radio"/>	z7bu5msf4g@plusprivacy.com	 

The selected identity will be automatically suggested as your email address when you register at web sites. Emails sent to any of your alternative identities will be relayed to your real email address. If you delete an alternative identity, emails sent to it will bounce.

[Add identity](#) 

# {+P} PlusPrivacy

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**Privacy-for-Benefit**

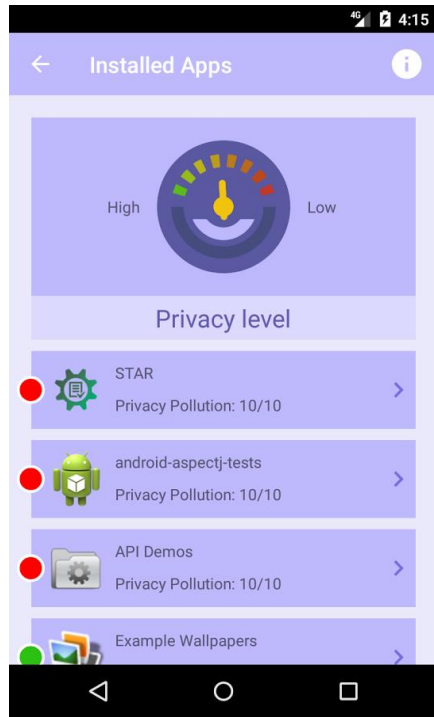
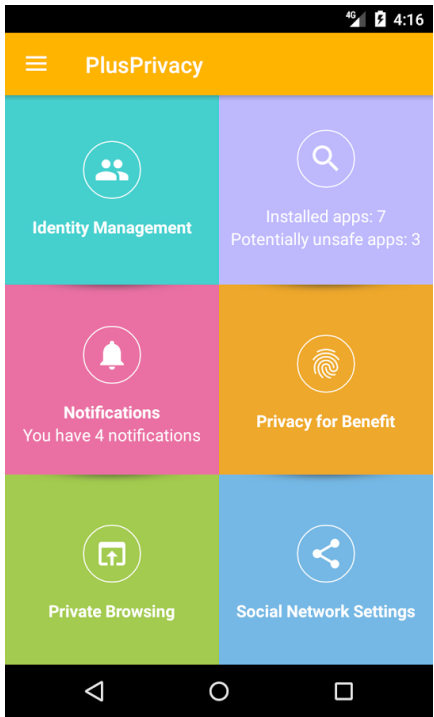
	Service provider	Deal	Reward		
	<a href="http://www.rafa.ro">www.rafa.ro</a>	Valentine's day	Get a 20% discount coupon		<input checked="" type="checkbox"/> Subscribe
	<a href="http://www.rafa.ro">www.rafa.ro</a>	Offer1	lorem ipsum		<input checked="" type="checkbox"/> Subscribe
	<a href="http://www.rafa.ro">www.rafa.ro</a>	2017 papers	Get 50% voucher when buying 2 papers and 30% for buying one paper		<input checked="" type="checkbox"/> Subscribe
	<a href="http://www.rafa.ro">www.rafa.ro</a>	Pigeon free	Discount for buying pigeons		<input type="checkbox"/> Subscribe
	<a href="http://www.rafa.ro">www.rafa.ro</a>	Music Festival	Free access		<input checked="" type="checkbox"/> Subscribe

**Allows users to get economic benefits in exchange for access to their private data (that today they provide for free!)**

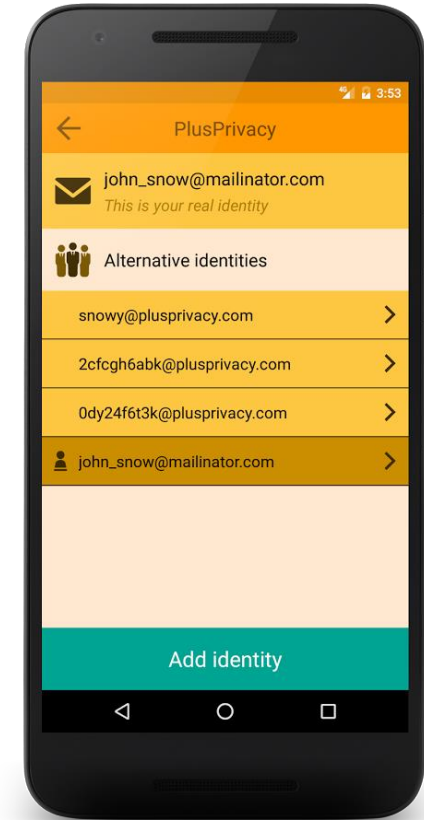
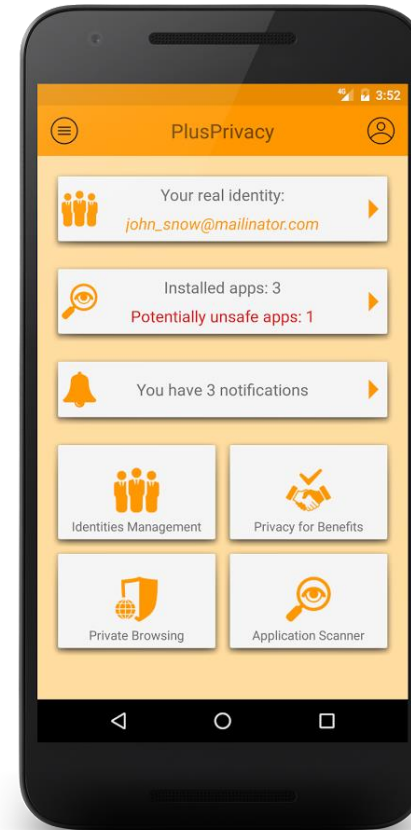


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**Easy to Use  
User Interface  
on Mobile Platforms**





# Research

# You are already using our results

- A big part of our research is focused on improving S&P of Android and fixes have been already pushed.
- Android OS:
  - CVEs: 2017-0807 & 2016-6715
  - Unauthorized access to user's location and user files.
- Apps:
  - Skype
  - Reported vulnerabilities to 20 of the most widely used medical apps

## VULNERABILITIES

 CVE-2017-0807 Detail

## MODIFIED

This vulnerability has been modified since it was last analyzed by the NVD. It is awaiting reanalysis which may result in further changes to the information provided.

## Current Description

An elevation of privilege vulnerability in the Android framework (ui framework). Product: Android. Versions: 4.4.4, 5.0.2, 5.1.1, 6.0, 6.0.1, 7.0, 7.1.1, 7.1.2. Android ID: A-35056974.

Source: MITRE Last Modified: 10/03/2017 [+View Analysis Description](#)

## QUICK INFO

**CVE Dictionary Entry:** CVE-2017-0807

**Original release date:** 10/03/2017

**Last revised:** 12/12/2017

**Source:** US-CERT/NIST

## Impact

## CVSS Severity (version 3.0):

**CVSS v3 Base Score:** 9.8 Critical

**Vector:** CVSS:3.0/AV:N/AC:L/PR:N/UI:N/S:U/C:H/I:H/A:H (legend)

**Impact Score:** 5.9

**Exploitability Score:** 3.9

## CVSS Severity (version 2.0):

**CVSS v2 Base Score:** 10.0 HIGH

**Vector:** (AV:N/AC:L/Au:N/C/I:C/A:C) (legend)

**Impact Subscore:** 10.0

**Exploitability Subscore:** 10.0

# Contact us

Project webpage: <https://www.operando.eu/>

+Privacy has a dedicated web page: <https://plusprivacy.com/>



We share all our code on Github: <https://github.com/OPERANDOH2020/>

## Social:



<https://www.operando.eu/>



<https://twitter.com/OperandoH2020>



<https://www.facebook.com/OperandoH2020/>



**Constantinos Patsakis, University of Piraeus**

**Email:** [kpatsak@unipi.gr](mailto:kpatsak@unipi.gr)

<http://cs.unipi.gr/kpatsak/>