Usability Threats to Privacy Disclosures and Choice Interfaces

Lorrie Faith Cranor

How long would it take to read privacy policies at websites you visit?

2008 study estimated 244 hours/year

A. McDonald & L. Cranor, *The Cost of Reading Privacy Policies*, I/S: A Journal of Law and Policy for the Information Society, 2008.


Nutrition Facts
Serving Size oz.
Serving Per Container
Amount Per Serving:
Calories
Calories From Fat
% Daily value*
Total Fat %
Saturated Fat %
Trans Fat
Cholesterol %
Sodium %
Total Carbohydrate %
Dietary Fiber %
Sugars
Protein

RADER JOE'S®
HREDDED
BITE SIZE
WHEATS
Nutrition Facts
erving Size 1 cup (49 g)
ervings Per Container about 10
Amount Per Serving
alories 180 Calories from Fat 10
% Daily Value*
otal Fat 1g 2%
Saturated Fat 0g 0%
Trans Fat 0g
holesterol 0mg 0%
odium 0mg 0%
otassium 180mg 5%
otal Carbohydrate 36g 13%
Dietary Fiber 5g 20%
Sugars 0g
rotein 5g
Vitamin A 0% • Vitamin C 0%
Calcium 0% • Iron 8%
Thiamine 8% • Riboflavin 2%
Niacin 10% • Vitamin D 0%
* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:
Calories 2,000 2,500
Total Fat Less than 65g 80g
Sat Fat Less than 20g 25g
Cholesterol Less than 300mg 300mg
Sodium Less than 2,400mg 2,400mg
Potassium 3,500mg 3,500mg
Total Carbohydrate 300g 375g
Dietary Fiber 25g 30g
NGREDIENTS: Whole Wheat.
Vitamin E (to preserve freshness).
Dist. & Sold Exclusively By:
Trader Joe's,
Monrovia, CA 91016
This product is sold by weight not volume. Some settling of contents

BARBARA'S
BAKERY
Shredded Spoonfuls
Multigrain
Nutrition Facts
Serving Size 3/4 Cup (30g)
Servings Per Container About 21
Amount Per Serving
Cereal
With 1/2 Cup Vt. & 2% Fat/Free Skim Milk
Calories 120 160
Calories from Fat 15 15
% Daily Value**
Total Fat 1.5g* 2% 2%
Saturated Fat 0g 0% 0%
Trans Fat 0g
Cholesterol 0mg 0% 1%
Sodium 200mg 8% 11%
Potassium 125mg 4% 9%
Total Carbohydrate 24g 8% 10%
Dietary Fiber 4g 15% 15%
Soluble Fiber 1g
Insoluble Fiber 3g
Sugars 5g
Protein 4g
Vitamin A 0% 4%
Vitamin C 8% 10%
Calcium 2% 15%
Iron 4% 4%
Vitamin E 4% 4%
* Amount in cereal. One half cup skim milk contributes an additional 40 calories, 65mg sodium, 200mg potassium, 4g carbohydrate (6g sugars), and 4g protein.
** Percent daily values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:
Calories 2,000 2,500
Total Fat Less than 65g 80g
Sat Fat Less than 20g 25g
Cholesterol Less than 300mg 300mg
Sodium Less than 2,400mg 2,400mg
Potassium 3,500mg 3,500mg
Total Carbohydrate 300g 375g
Dietary Fiber 25g 30g
Calories per gram:
Fat 9 • Carbohydrate 4 • Protein 4
Ingredients: Whole Oat Flour (With Added Oat Bran), Yellow Corn Flour (With Added Corn Bran), Unsulphured Molasses, Whole Wheat Flour, Salt, Baking Soda, Natural Vitamin E

TRADER JOE'S®
Very Berry Clusters
CEREAL
Nutrition Facts
Serving Size 1 cup (55 g)
Servings Per Container about 7
Amount Per Serving
Calories 230 Calories from Fat 50
% Daily Value*
Total Fat 5g 8%
Saturated Fat 0.5g 3%
Trans Fat 0g
Cholesterol 0mg 0%
Sodium 140mg 6%
Total Carbohydrate 42g 14%
Dietary Fiber 3g 11%
Sugars 12g
Protein 5g
Vitamin A 0% • Vitamin C 2%
Calcium 2% • Iron 8%
* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:
Calories 2,000 2,500
Total Fat Less than 65g 80g
Sat Fat Less than 20g 25g
Cholesterol Less than 300mg 300mg
Sodium Less than 2,400mg 2,400mg
Total Carbohydrate 300g 375g
Dietary Fiber 25g 30g
Calories per gram:
Fat 9 • Carbohydrate 4 • Protein 4
INGREDIENTS: WHOLE ROLLED OATS, MILLED CANE SUGAR, CORN FLOUR, RICE FLOUR, VEGETABLE OIL (CANOLA AND/OR SAFFLOWER AND/OR SUNFLOWER OIL), WHOLE WHEAT FLOUR, BROWN RICE, CORNSTARCH, HONEY, SALT, BARLEY MALT SYRUP, FREEZE DRIED BLUEBERRIES, FREEZE DRIED RASPBERRIES, FREEZE DRIED STRAWBERRIES, NATURAL FLAVOR, ANNATTO (FOR COLOR), TURMERIC (FOR COLOR), PURPLE CARROT JUICE (FOR COLOR), CARDAMOM SEED, FENNEL

Nutrition Facts
Serving Size ¾ cup (30g)
Servings Per Container about 12
Amount Per Serving
Multi Grain Squares
with 1/2 cup skim milk
Calories 110 150
Calories from Fat 5 10
% Daily Value**
Total Fat 0.5g* 1% 1%
Saturated Fat 0g 0% 0%
Trans Fat 0g
Polyunsaturated Fat 0g
Monounsaturated Fat 0g
Cholesterol 0mg 0% 1%
Sodium 125mg 5% 8%
Potassium 85mg 2% 8%
Total Carbohydrate 25g 8% 10%
Dietary Fiber 2g 8% 8%
Sugars 4g
Other Carbohydrate 19g
Protein 3g
Vitamin A 0% 4%
Vitamin C 0% 0%
Calcium 0% 15%
Iron 25% 25%
Vitamin D 0% 15%
Thiamin 25% 30%
Niacin 25% 25%
Vitamin B6 25% 25%
Folic Acid 25% 25%
Phosphorus 8% 20%
Magnesium 6% 10%
Zinc 25% 30%
*Amount in cereal. A serving of cereal plus skim milk provides 1g total fat, less than 5mg cholesterol, 190mg sodium, 280mg potassium, 31g total carbohydrate (15g sugars) and 7g protein.
** Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:
Calories 2,000 2,500
Total Fat Less than 65g 80g
Sat Fat Less than 20g 25g
Cholesterol Less than 300mg 300mg
Sodium Less than 2,400mg 2,400mg
Total Carbohydrate 300g 375g
Dietary Fiber 25g 30g
INGREDIENTS: WHOLE GRAIN WHEAT*, RICE* MEAL*, NATURALLY MILLED SUGAR* SALT, MALT EXTRACT*, VITAMIN E (MIXED TOCOPHEROLS) ADDED TO PRESERVE FRESHNESS. *ORGANIC
VITAMINS AND MINERALS: IRON AND ZINC (MINERAL NUTRIENTS), A B VITAMINS (NIACINAMIDE), A E VITAMIN (FOLIC ACID), VITAMIN B1 (THIAMIN MONONITRATE), VITAMIN B6 (PYRIDOXINE HYDROCHLORIDE).
CONTAINS WHEAT INGREDIENTS.
MAY CONTAIN ALMOND, SOY AND MILK INGREDIENTS.
DISTRIBUTED BY SMALL PLANET FOODS, INC.
SEDRO-WOOLLEY, WA 98284 USA
PRODUCT OF CANADA
© 2008 Small Planet Foods, Inc.
CERTIFIED ORGANIC

Shredded Oats
Original
Nutrition Facts
Serving Size 1-1/4 Cup (2 oz/55g)
Servings Per Container About 12
Amount Per Serving
Cereal
With 1/2 Cup Vt. & 2% Fat/Free Skim Milk
Calories 220 260
Calories from Fat 25 25
% Daily Value**
Total Fat 2.5g* 4% 4%
Saturated Fat 0.5g 2% 2%
Trans Fat 0g
Cholesterol 0mg 0% 1%
Sodium 250mg 10% 12%
Potassium 180mg 5% 11%
Total Carbohydrate 42g 14% 16%
Dietary Fiber 5g 20% 20%
Soluble Fiber 2g
Insoluble Fiber 3g
Sugars 11g
Protein 6g
Vitamin A 0% 6%
Vitamin C 35% 35%
Calcium 2% 15%
Iron 10% 10%
Vitamin E 8% 8%
Thiamin 10% 15%
Riboflavin 4% 10%
Niacin 6% 6%
Phosphorus 15% 30%
Magnesium 15% 20%
Zinc 10% 15%
Copper 10% 10%
* Amount in cereal. One half cup skim milk contributes an additional 40 calories, 65mg sodium, 200mg potassium, 4g carbohydrate (6g sugars), and 4g protein.
** Percent daily values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:
Calories 2,000 2,500
Total Fat Less than 65g 80g
Sat Fat Less than 20g 25g
Cholesterol Less than 300mg 300mg
Sodium Less than 2,400mg 2,400mg
Potassium 3,500mg 3,500mg
Total Carbohydrate 300g 375g
Dietary Fiber 25g 30g
Calories per gram:
Fat 9 • Carbohydrate 4 • Protein 4
Ingredients: Whole Oat Flour, Whole Wheat Flour, Unsulphured Molasses, Malted Barley Extract, Baking Soda, Salt, Natural Vitamin E

TRADER JOE'S®
Organic
HIGH FIBER O's
Nutrition Facts
Serving Size 1 1/4 cup (55g)
Servings per Container 8
Amount per Serving
Calories 190 Calories from Fat 10
% Daily Value*
Total Fat 1g 2%
Saturated Fat 0g 0%
Trans Fat 0g
Cholesterol 0mg 0%
Sodium 115mg 5%
Total Carbohydrate 44g 15%
Dietary Fiber 9g 36%
Soluble Fiber less than 1g
Insoluble Fiber 8g
Sugars 9g
Protein 6g 12%
Vitamin A 0% • Vitamin C 130%
Calcium 4% • Iron 30%
Thiamin 25% • Riboflavin 25%
Niacin 25% • Vitamin B6 25%
Folate 25% • Vitamin B12 25%
Zinc 15%
* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:
Calories 2,000 2,500
Total Fat Less than 65g 80g
Sat Fat Less than 20g 25g
Cholesterol Less than 300mg 300mg
Sodium Less than 2,400mg 2,400mg
Total Carbohydrate 300g 375g
Dietary Fiber 25g 30g
Protein 50g 60g
INGREDIENTS: Organic Whole Grain Wheat Flour, Organic Wheat Bran, Organic Evaporated Cane Juice, Organic Oat Fiber, Sea Salt, Organic Caramel Color, Natural Vitamin E.
NUTRITION BLEND: Niacinamide, Vitamin C, Niacin, Iron, Zinc, Vitamin B6, Riboflavin, Thiamin, Folate, Vitamin B12.
Our cereals follow Good Manufacturing Practices to segregate ingredients to avoid cross contact with allergens. Made on shared equipment with milk, tree nuts & soy. Facility processes eggs & peanuts.
Dist. & Sold Exclusively By:
Trader Joe's, Monrovia, CA 91016

TRADER JOE'S®
Organic
Corn Flakes
Nutrition Facts
Serving Size 1 Cup (30g)
Servings Per Container about 11
Amount Per Serving
Calories 110 Calories from Fat 0
% Daily Value*
Total Fat 0g 0%
Saturated Fat 0g 0%
Trans Fat 0g
Cholesterol 0mg 0%
Sodium 280mg 12%
Total Carbohydrate 26g 9%
Dietary Fiber less than 1g 3%
Sugars 2g
Protein 2g
Vitamin A 25% • Vitamin C 25%
Calcium 0% • Iron 45%
Vitamin D 25% • Thiamin 25%
Riboflavin 25% • Niacin 25%
Vitamin B6 25% • Folic Acid 50%
Vitamin B12 25% • Zinc 25%
* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:
Calories 2,000 2,500
Total Fat Less than 65g 80g
Sat Fat Less than 20g 25g
Cholesterol Less than 300mg 300mg
Sodium Less than 2,400mg 2,400mg
Total Carbohydrate 300g 375g
Dietary Fiber 25g 30g
Calories per gram:
Fat 9 • Carbohydrate 4 • Protein 4
INGREDIENTS: ORGANIC MILLED CORN, ORGANIC EVAPORATED CANE JUICE, SEA SALT, ORGANIC BARLEY MALT EXTRACT, SOY LECITHIN (AN EMULSIFIER), MIXED TOCOPHEROLS (VITAMIN E) ADDED TO PRESERVE FRESHNESS. VITAMINS & MINERALS: FERRIC ORTHOPHOSPHATE (IRON SOURCE), SODIUM ASCORBATE (VITAMIN C), VITAMIN A ACETATE, NIACINAMIDE (A B VITAMIN), ZINC OXIDE (ZINC SOURCE), FOLIC ACID (A B VITAMIN), CYANOCOBALAMIN (VITAMIN B12), CHOLECALCIFEROL (VITAMIN D), PYRIDOXINE HYDROCHLORIDE (VITAMIN B6), RIBOFLAVIN (VITAMIN B2), THIAMIN MONONITRATE (VITAMIN B1).
OUR VENDORS FOLLOW GOOD MANUFACTURING PRACTICES TO SEGREGATE INGREDIENTS TO AVOID CROSS CONTACT WITH ALLERGENS. MADE ON EQUIPMENT SHARED WITH WHEAT AND SOY. FACILITY PROCESSES PEANUTS AND TREE NUTS.
DIST. & SOLD EXCLUSIVELY BY:
TRADER JOE'S, MONROVIA, CA 91016

Nutrition labels

- Get a quick overview of how nutritious food is
- Check for specific (desired or objectionable) properties
- Compare food products
- Provide data for analysis by researchers, regulators, journalists

Will not on their own prevent obesity

Nutrition labels

- Get a quick overview of how nutritious food is
- Check for specific (desired or objectionable) properties
- Compare food products
- Provide data for analysis by researchers, regulators, journalists

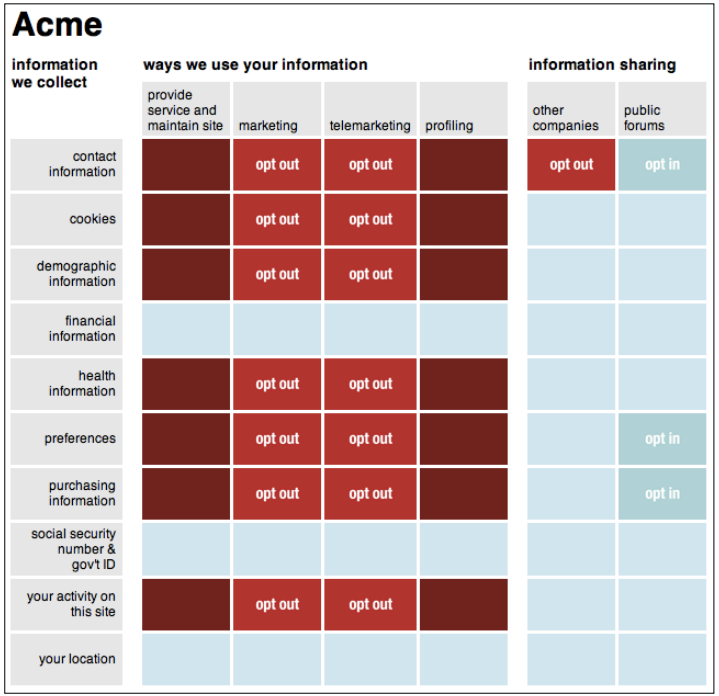
Will not on their own prevent obesity

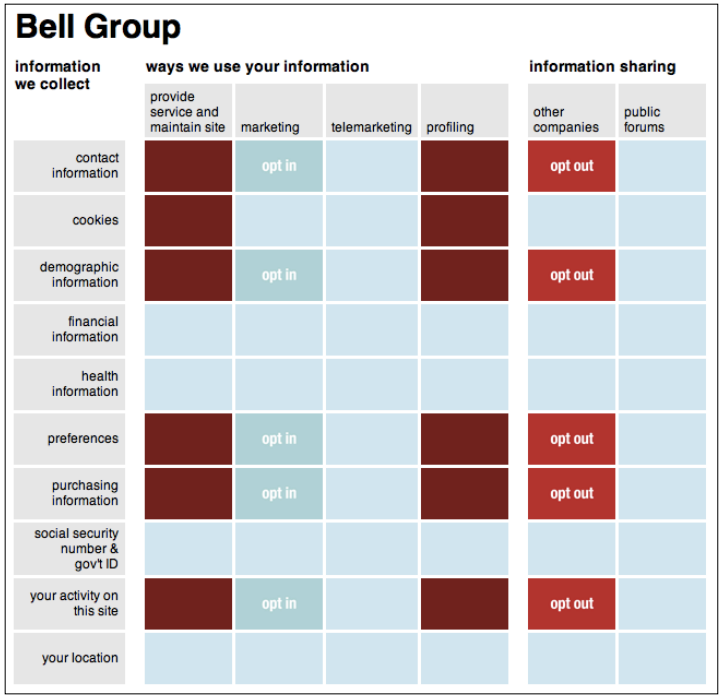
Privacy labels

- Get a quick overview of data practices
- Check for specific (desired or objectionable) practices
- Compare privacy practices
- Provide data for analysis by researchers, regulators, journalists

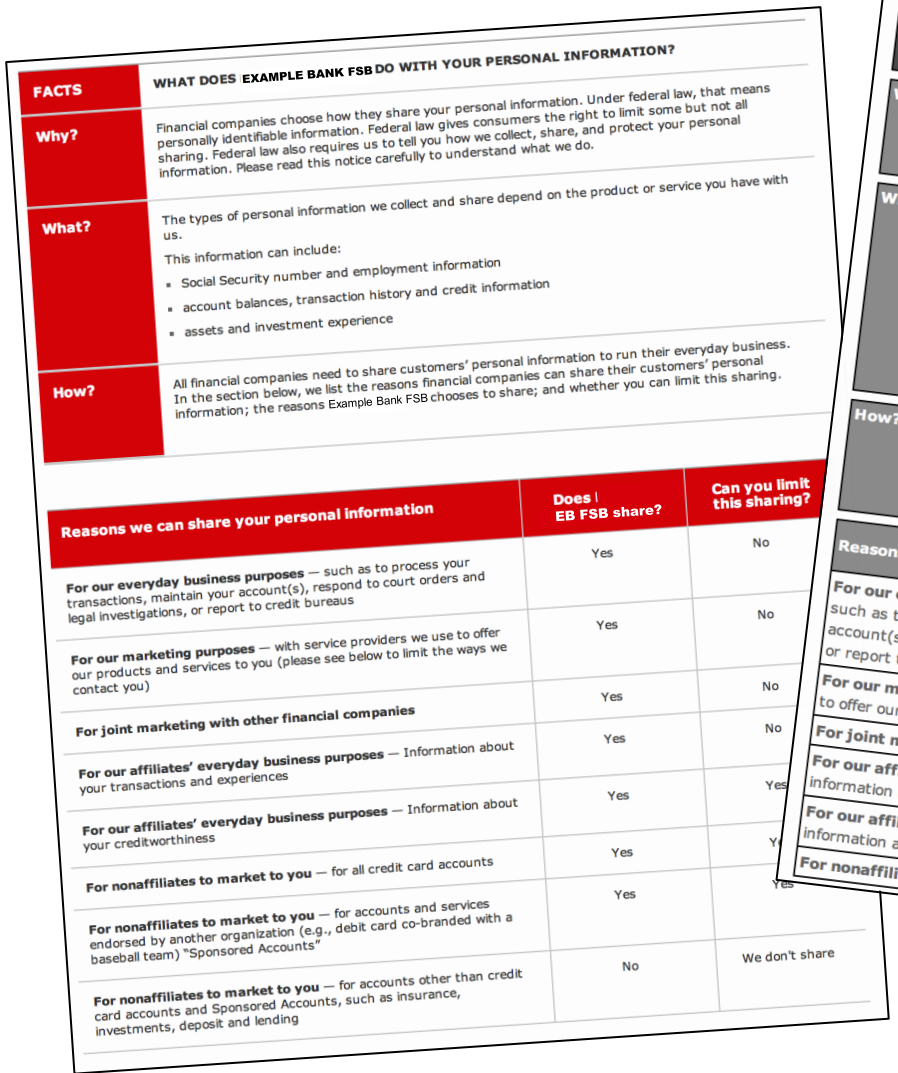
Will not on their own protect privacy

Standardized privacy “nutrition labels” make it easy to find info + compare web privacy policies





P.G. Kelley, L.J. Cesca, J. Bresee, and L.F. Cranor. **Standardizing Privacy Notices: An Online Study of the Nutrition Label Approach**. CHI 2010.
cups.cs.cmu.edu/privacyLabel/

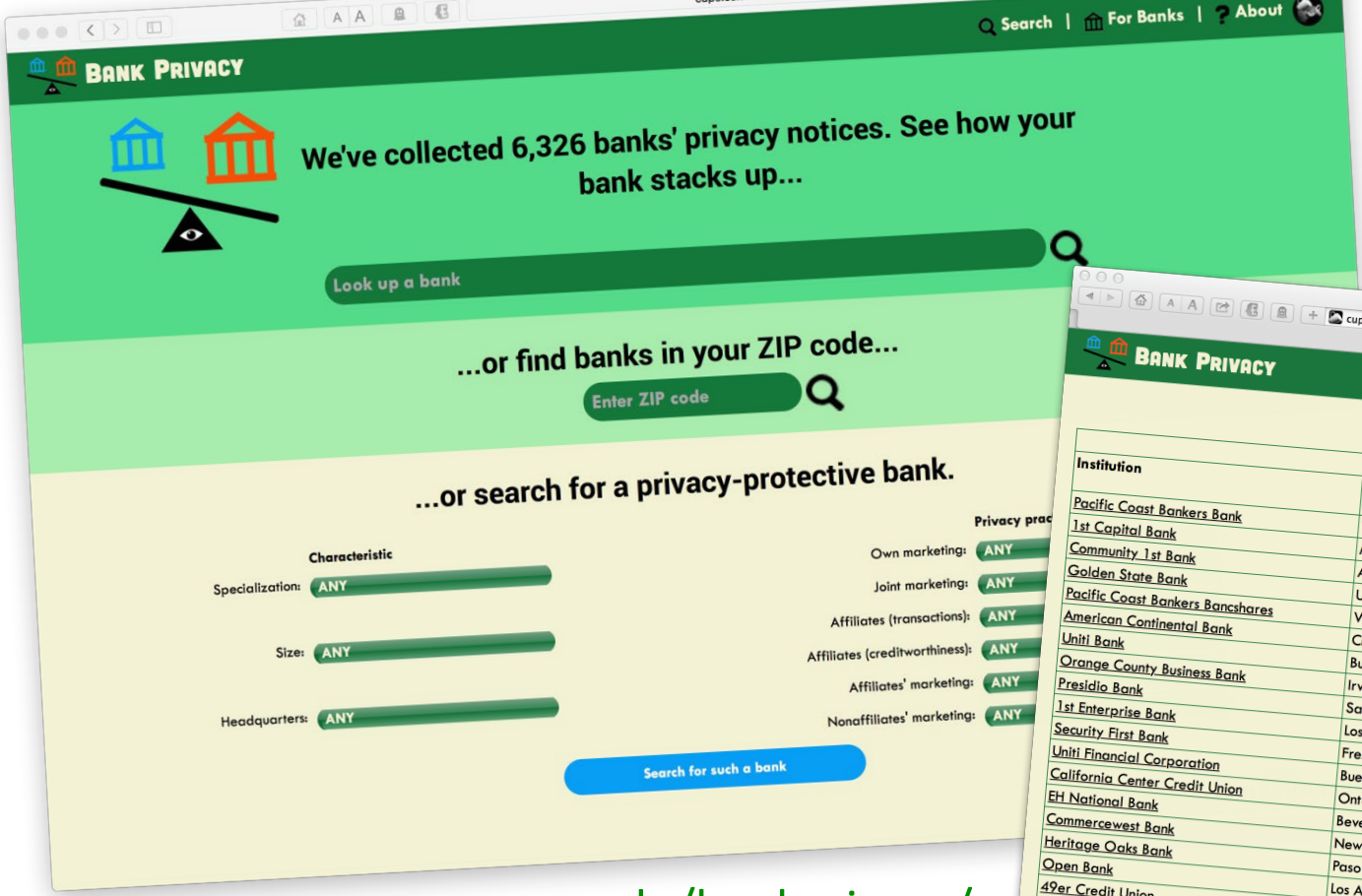


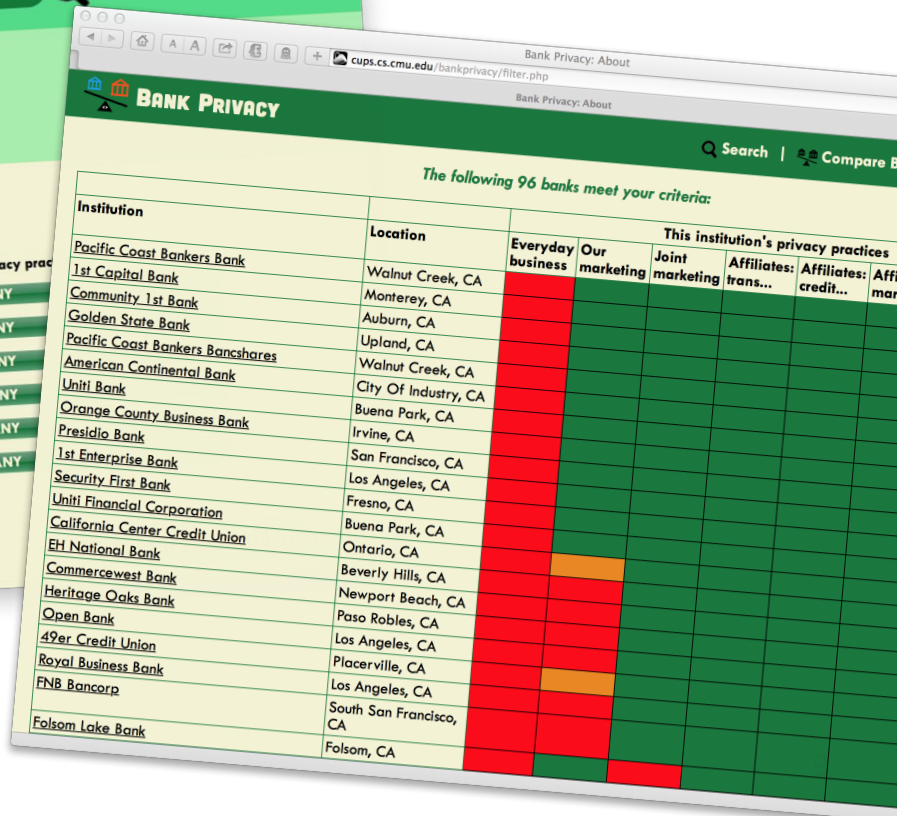
FACTS	WHAT DOES EXAMPLE BANK FSB DO WITH YOUR PERSONAL INFORMATION?
Why?	Financial companies choose how they share your personal information. Under federal law, that means personally identifiable information. Federal law gives consumers the right to limit some but not all sharing. Federal law also requires us to tell you how we collect, share, and protect your personal information. Please read this notice carefully to understand what we do.
What?	The types of personal information we collect and share depend on the product or service you have with us. This information can include: ▪ Social Security number and employment information ▪ account balances, transaction history and credit information ▪ assets and investment experience
How?	All financial companies need to share customers' personal information to run their everyday business. In the section below, we list the reasons financial companies can share their customers' personal information; the reasons Example Bank FSB chooses to share; and whether you can limit this sharing.

Reasons we can share your personal information	Does EB FSB share?	Can you limit this sharing?
For our everyday business purposes — such as to process your transactions, maintain your account(s), respond to court orders and legal investigations, or report to credit bureaus	Yes	No
For our marketing purposes — with service providers we use to offer our products and services to you (please see below to limit the ways we contact you)	Yes	No
For joint marketing with other financial companies	Yes	No
For our affiliates' everyday business purposes — Information about your transactions and experiences	Yes	Yes
For our affiliates' everyday business purposes — Information about your creditworthiness	Yes	Y
For nonaffiliates to market to you — for all credit card accounts	Yes	Yes
For nonaffiliates to market to you — for accounts and services endorsed by another organization (e.g., debit card co-branded with a baseball team) "Sponsored Accounts"	No	We don't share
For nonaffiliates to market to you — for accounts other than credit card accounts and Sponsored Accounts, such as insurance, investments, deposit and lending		

FACTS	WHAT DOES EXAMPLE BANK (EB) DO WITH YOUR PERSONAL INFORMATION?
Why?	Financial companies choose how they share your personal information. Federal law gives consumers the right to limit some but not all sharing. Federal law also requires us to tell you how we collect, share, and protect your personal information. Please read this notice carefully to understand what we do.
What?	The types of personal information we collect and share depends on the product or service you have with us. This information can include: • Social Security Number and income • account balances and transaction history • credit history and credit scores When you are no longer our customer, we continue to share your information as described in this notice.
How?	All financial companies need to share customers' personal information to run their everyday business. In the section below, we list the reasons financial companies can share their customers' personal information; the reasons EB chooses to share; and whether you can limit this sharing.

Reasons we can share your personal information	Does EB share?	Can you limit this sharing?
For our everyday business purposes – such as to process your transactions, maintain your account(s), respond to court orders and legal investigations, or report to credit bureaus	Yes	No
For our marketing purposes – to offer our products and services to you	Yes	No
For joint marketing with other financial companies	No	We don't share
For our affiliates' everyday business purposes – information about your transactions and experiences	Yes	No
For our affiliates' everyday business purposes – information about your creditworthiness	No	We don't share
For nonaffiliates to market to you	No	We don't share



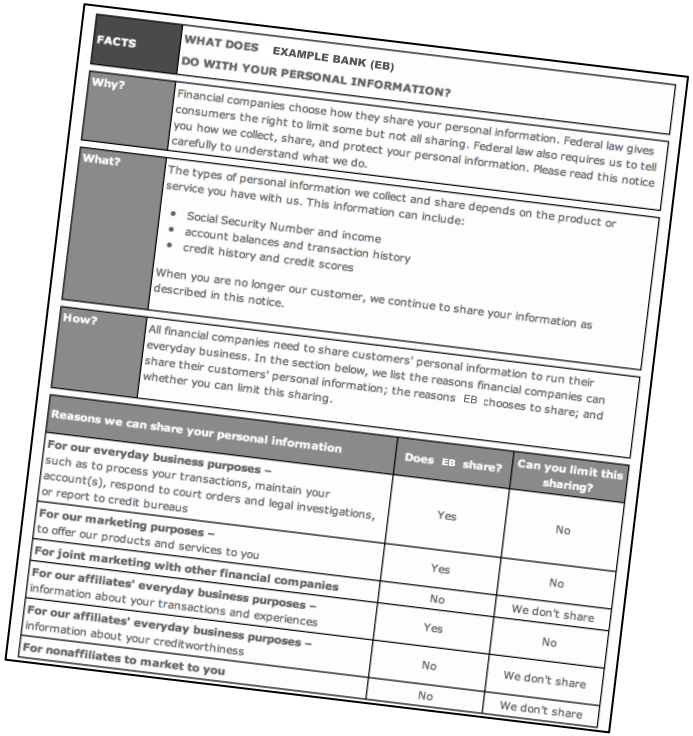


cups.cs.cmu.edu/bankprivacy/

L.F. Cranor, P.G. Leon, and B. Ur. 2016. **A Large-Scale Evaluation of U.S. Financial Institutions' Standardized Privacy Notices.** ACM Trans. Web 10, 3, Article 17. DOI:https://doi.org/10.1145/2911988

Making privacy disclosures useful

- **Labels** help make sure a standard set of information is available in a standard format and in a standard location



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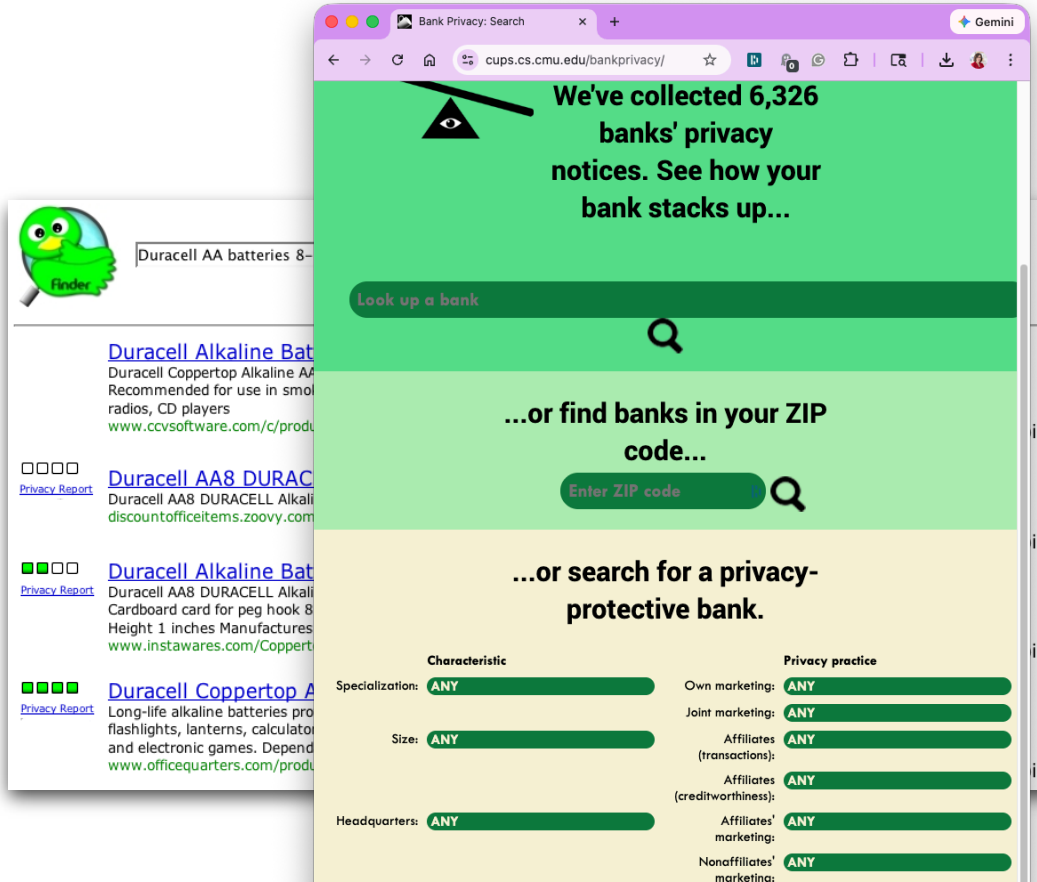
For our marketing purposes – to offer our products and services to you	Yes	No
For joint marketing with other financial companies	No	We don't share
For our affiliates' everyday business purposes – information about your transactions and experiences	Yes	No
For our affiliates' everyday business purposes – information about your creditworthiness	No	We don't share
For nonaffiliates to market to you	No	We don't share

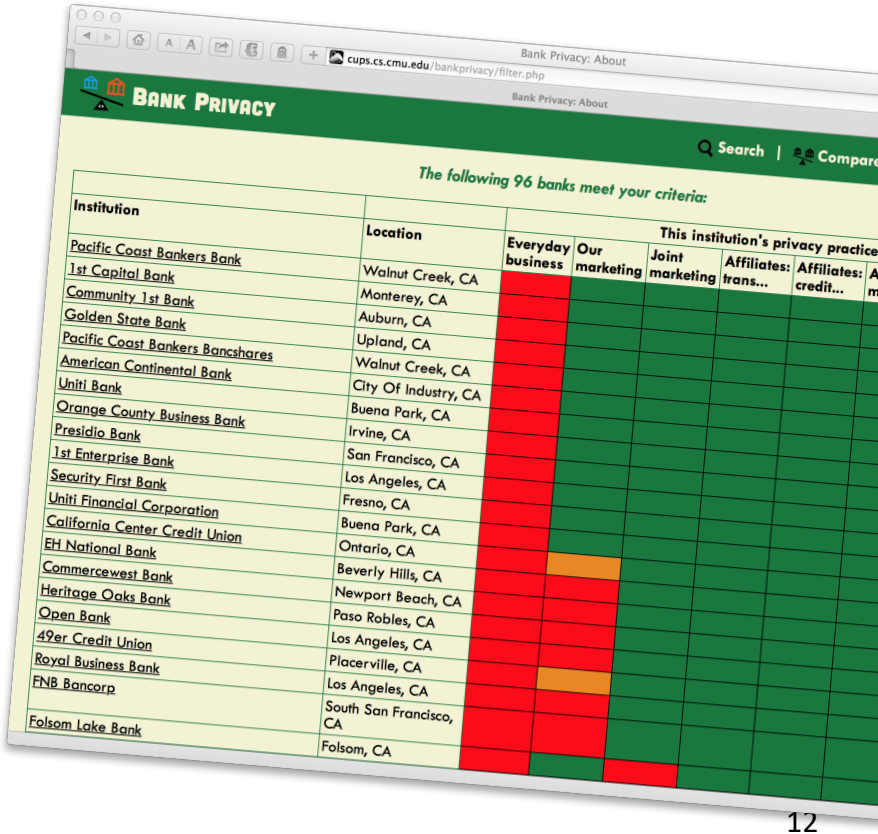
Making privacy disclosures useful

- **Labels** help make sure a standard set of information is available in a standard format and in a standard location
- **Search engines** help users find labels that match their preferences



Making privacy disclosures useful

- **Labels** help make sure a standard set of information is available in a standard format and in a standard location
- **Search engines** help users find labels that match their preferences
- **Comparison tools** highlight differences between labels and attributes of interest

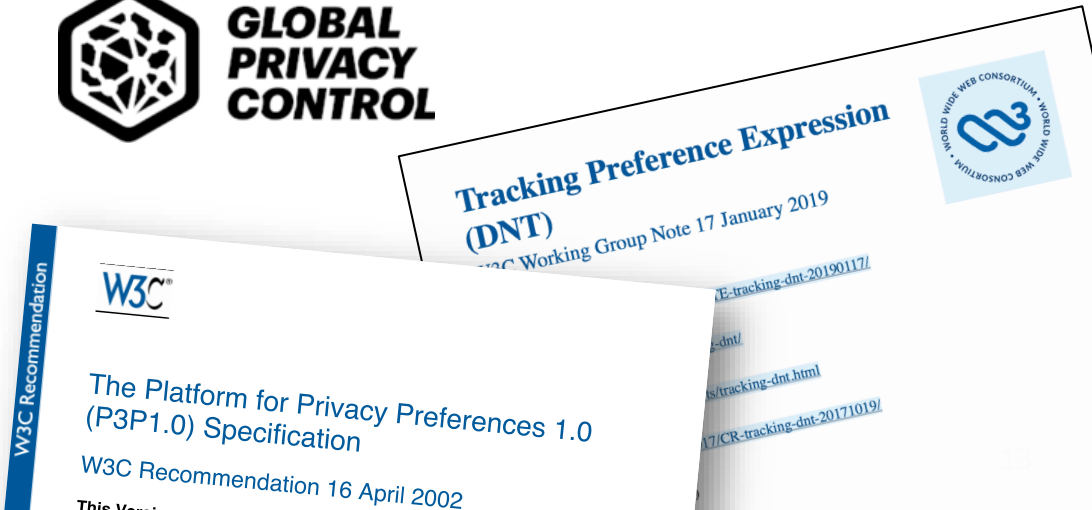


Making privacy disclosures useful

- **Labels** help make sure a standard set of information is available in a standard format and in a standard location
- **Search engines** help users find labels that match their preferences
- **Comparison tools** highlight differences between labels and attributes of interest

- **Automation** can make seamless privacy choices for users that match their individual preferences

GLOBAL PRIVACY CONTROL

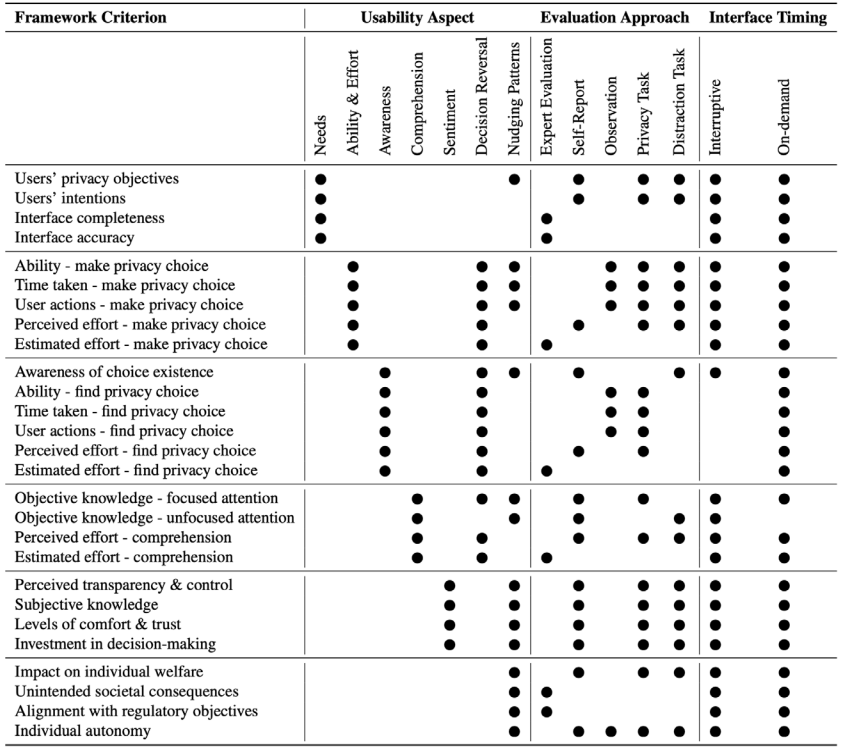


Making privacy disclosures useful

- **Labels** help make sure a standard set of information is available in a standard format and in a standard location
- **Search engines** help users find labels that match their preferences
- **Comparison tools** highlight differences between labels and attributes of interest
- **Automation** can make seamless privacy choices for users that match their individual preferences
- **Laws** are needed to ensure a safe, fair, and private baseline for everyone

Requirements for a usable consent interface

1. Address user needs
2. Require minimal user effort
3. Make users aware of what choices exist and where to find them
4. Convey choices and their implications so users understand them easily
5. Satisfy users and engender trust
6. Allow users to change their decision due to errors or changing their mind
7. Avoid nudging users towards less privacy-protective options



Framework Criterion	Usability Aspect							Evaluation Approach					Interface Timing	
	Needs	Ability & Effort	Awareness	Comprehension	Sentiment	Decision Reversal	Nudging Patterns	Expert Evaluation	Self-Report	Observation	Privacy Task	Distraction Task	Interruptive	On-demand
Users' privacy objectives	●						●		●		●	●	●	●
Users' intentions	●								●		●	●	●	●
Interface completeness	●							●					●	●
Interface accuracy	●							●					●	●
Ability - make privacy choice		●				●	●			●	●	●	●	●
Time taken - make privacy choice		●				●	●			●	●	●	●	●
User actions - make privacy choice		●				●	●			●	●	●	●	●
Perceived effort - make privacy choice		●				●			●		●	●	●	●
Estimated effort - make privacy choice		●				●		●					●	●
Awareness of choice existence			●			●	●		●			●	●	●
Ability - find privacy choice			●			●				●	●			●
Time taken - find privacy choice			●			●				●	●			●
User actions - find privacy choice			●			●				●	●			●
Perceived effort - find privacy choice			●			●			●		●			●
Estimated effort - find privacy choice			●			●		●						●
Objective knowledge - focused attention				●		●	●		●		●		●	●
Objective knowledge - unfocused attention				●			●		●			●	●	
Perceived effort - comprehension				●		●			●		●	●	●	●
Estimated effort - comprehension				●		●		●					●	●
Perceived transparency & control					●		●		●		●	●	●	●
Subjective knowledge					●		●		●		●	●	●	●
Levels of comfort & trust					●		●		●		●	●	●	●
Investment in decision-making					●		●		●		●	●	●	●
Impact on individual welfare							●		●		●	●	●	●
Unintended societal consequences							●	●					●	●
Alignment with regulatory objectives							●	●					●	●
Individual autonomy							●		●	●	●	●	●	●

Hana Habib and Lorrie Faith Cranor. **Evaluating the Usability of Privacy Choice Mechanisms**. SOUPS 2022.

A usable consent interface should

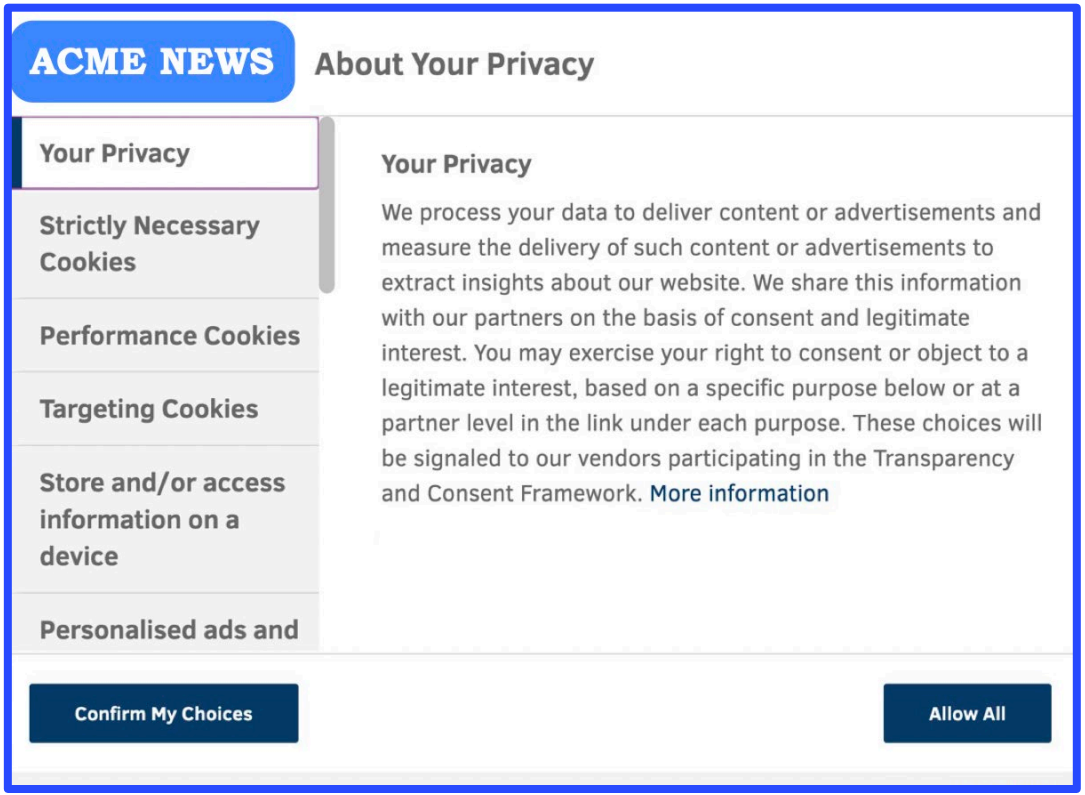
1. Address user needs

I am not fine with this. What should I do?

A usable consent interface should

1. Address user needs
2. Require minimal user effort

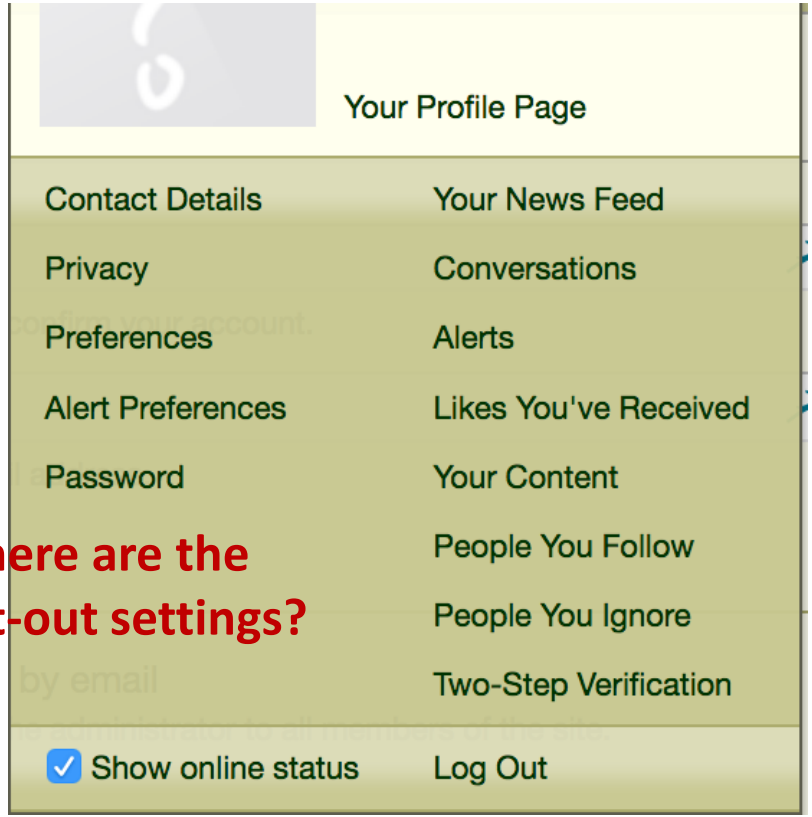
I can’t see what choices I am confirming until I click on each tab and check it individually



A usable consent interface should

1. Address user needs
2. Require minimal user effort
3. Make users aware of what choices exist and where to find them

Your privacy choices



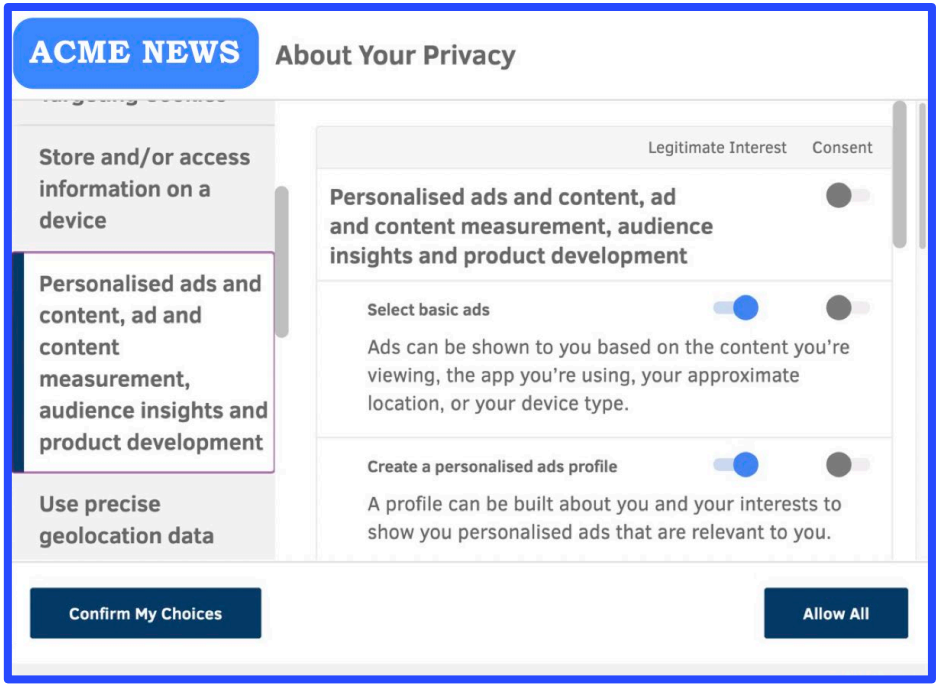
Where are the opt-out settings?

H. Habib, S. Pearman, J. Wang, Y. Zou, A. Acquisti, L.f. Cranor, N. Sadeh, and F. Schaub. 2020. **"It's a scavenger hunt": Usability of Websites' Opt-Out and Data Deletion Choices**. CHI 2020. https://doi.org/10.1145/3313831.3376511

A usable consent interface should

1. Address user needs
2. Require minimal user effort
3. Make users aware of what choices exist and where to find them
4. Convey choices and their implications so users understand them easily

What is legitimate interest? How is that different from consent?
What does it mean when the toggles are on the left vs. the right?



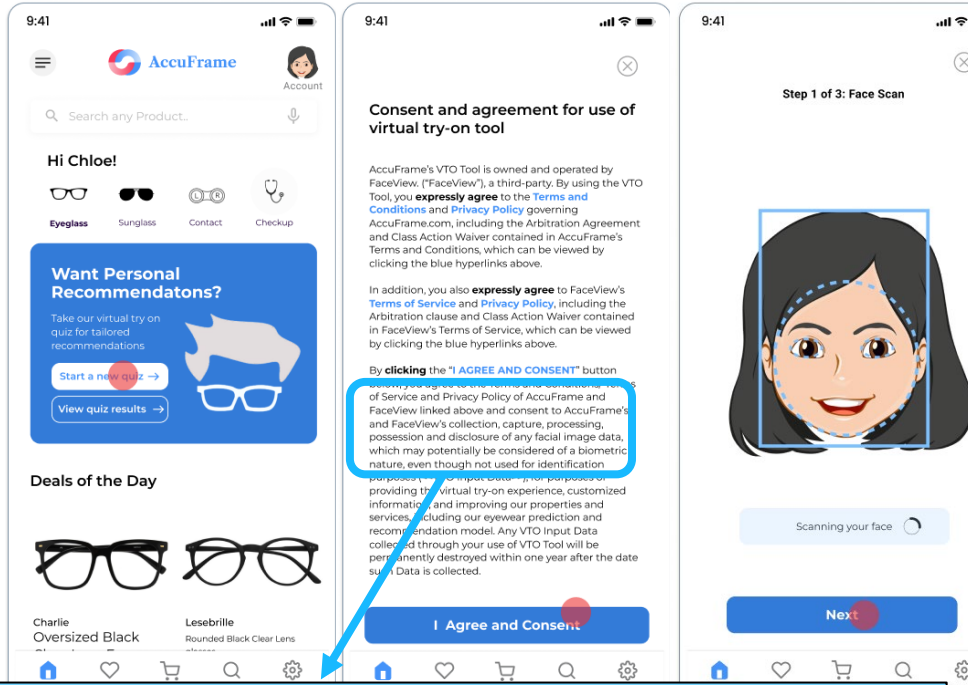
A usable consent interface should

1. Address user needs
2. Require minimal user effort
3. Make users aware of what choices exist and where to find them
4. Convey choices and their implications so users understand them easily
5. Satisfy users and engender trust

Often users find privacy settings frustrating and question whether they actually do anything

A usable consent interface should

1. Address user needs
2. Require minimal user effort
3. Make users aware of what choices exist and where to find them
4. Convey choices and their implications so users understand them easily
5. Satisfy users and engender trust
6. Allow users to change their decision due to errors or changing their mind

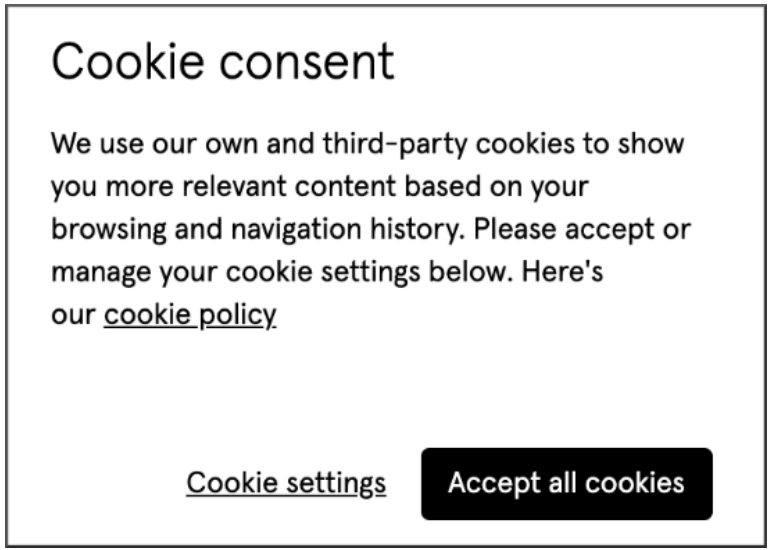


… consent to AccuFrame's and FaceView's collection, capture, processing, possession and disclosure of any facial image data….

No way to withdraw consent!

A usable consent interface should

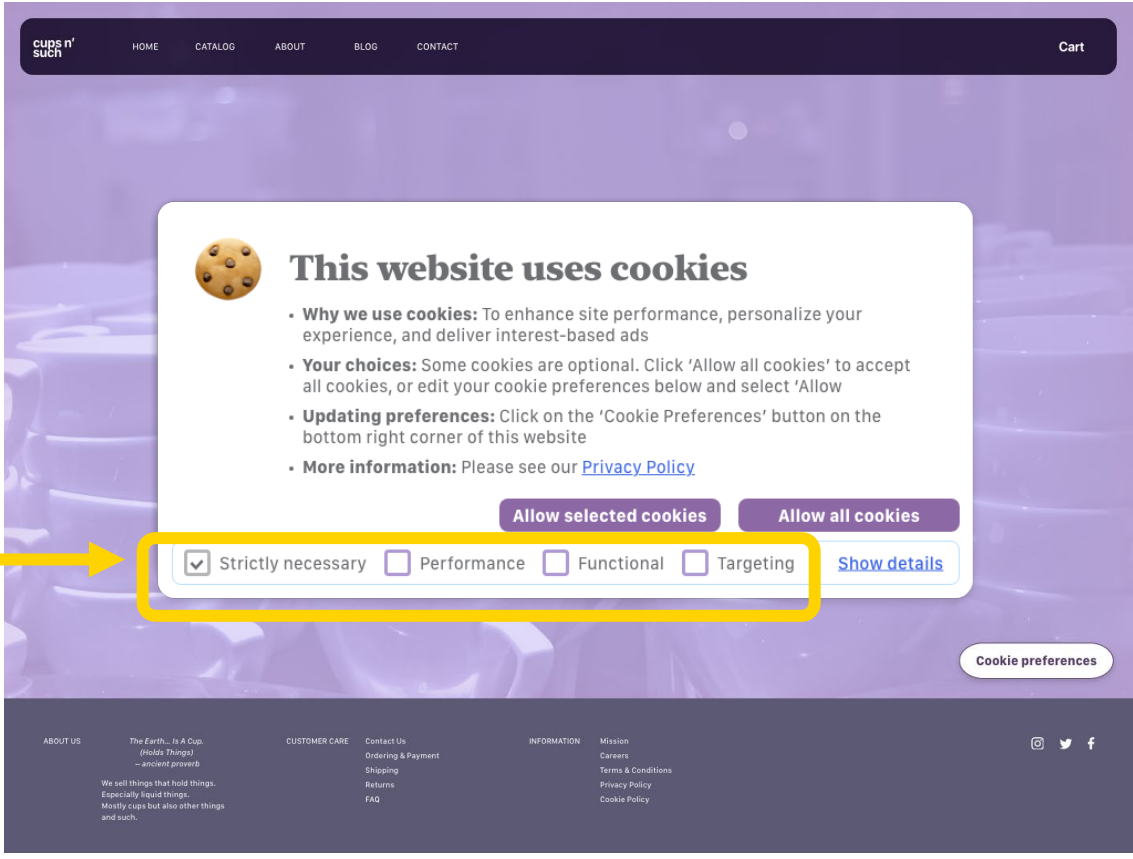
1. Address user needs
2. Require minimal user effort
3. Make users aware of what choices exist and where to find them
4. Convey choices and their implications so users understand them easily
5. Satisfy users and engender trust
6. Allow users to change their decision due to errors or changing their mind
7. Avoid nudging users towards less privacy-protective options



If I click “accept all” I’m done. I don’t know what they’ve hidden behind that ”cookie settings” link.

Cookie banner interface influences user choices

- Tested 12 variations of the same cookie banner with 1,109 crowd workers tasked with testing a new ecommerce website
- When shown cookie option in the banner, participants less likely to accept all cookies



But users didn’t understand cookie options

Performance cookies

- Cookies that help measure and improve website features
- Only 48% of participants selected correct definition

Functional cookies

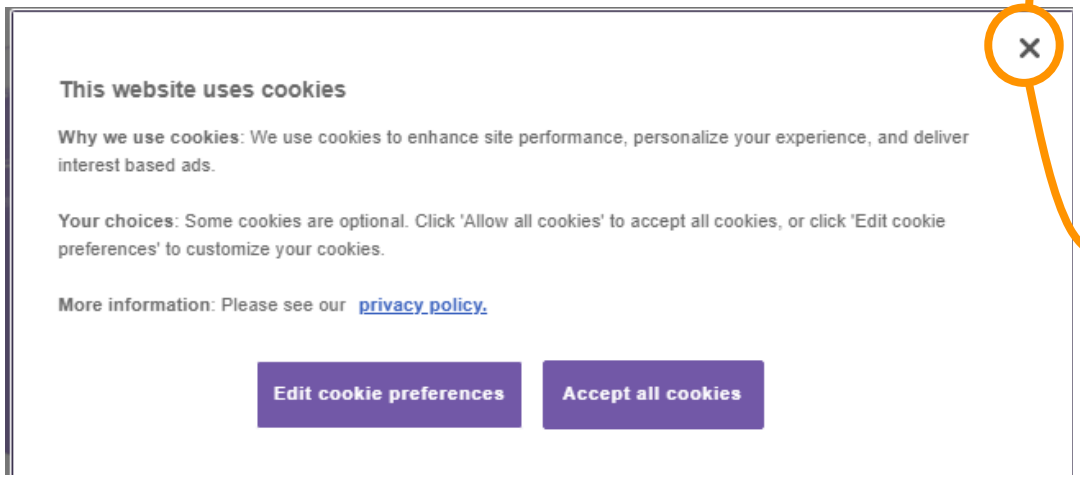
- Cookies that help personalize the website’s services for you
- Only 16% of participants selected correct definition

In subsequent work we tested alternative category names and recommend combining and renaming some cookie categories

- Functional → Extra functionality
- Performance → Anonymous analytics
- Recommend examining distinction between strictly necessary and functional

S. Jiwani, R. Sasheendran, A. Abhyankar, E. Bouma-Sims, and L. Cranor. **Crumbling Cookie Categories: Deconstructing Common Cookie Categories to Create Categories that People Understand.** Proceedings on Privacy Enhancing Technologies, 2024 (3) 561-588. DOI https://doi.org/10.56553/popets-2024-0093

Close button is confusing

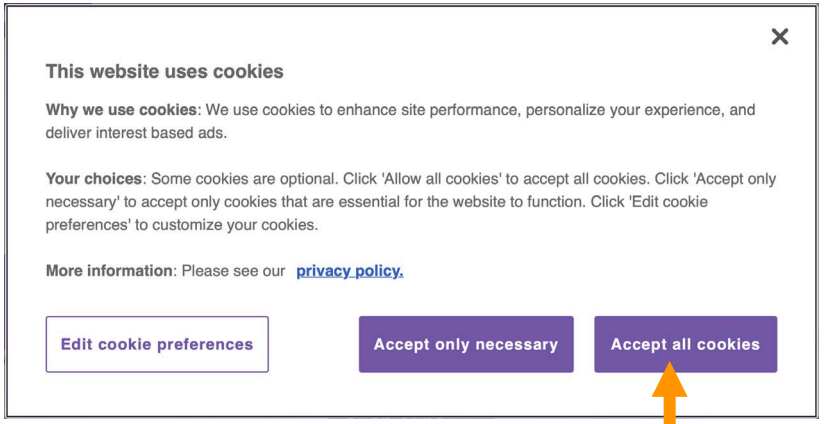


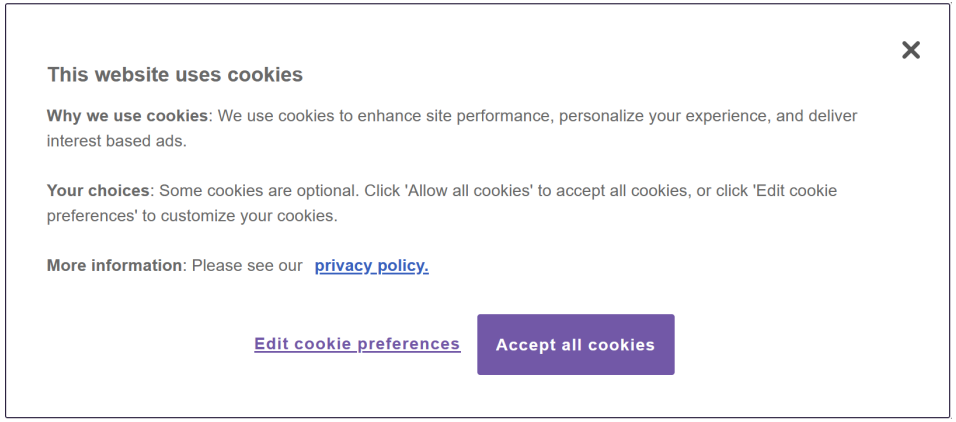
"I expect that selecting the 'x' means I do not accept all cookies…"

"[I expect for] cookies to be collected…. I rather just exit out and pretend i'm not being tracked, but I know I am."

E. Bouma-Sims , Y. Lin , A. Sakura-Lemessy, A. Nisenoff, E. Young, E. Birrell, L.F. Cranor, H. Habib. **A US-UK Usability Evaluation of Consent Management Platform Cookie Consent Interface Design on Desktop and Mobile.** CHI 2023.

Users less likely to accept all when accept only necessary button is present





Less likely to accept all

UsersFirst

- A user-centric threat modeling framework for privacy notice and choice
- Designed to help privacy engineers and designers systematically assess and refine notice and choice interfaces
- Goal is to improve usability and complying with relevant regulations

https://www.usersfirst.io/

Alexandra Xinran Li, Tian Wang, Yu-Ju Yang, Miguel Rivera-Lanas, Debeshi Ghosh, Hana Habib, Lorrie Cranor, and Norman Sadeh. **UsersFirst in Practice: Evaluationg a user-entric threat modeling taxonomy for privacy notice and choice**. USEC 2026.

UsersFirst Threat taxonomy

Discovery & Use

[DU.1] Nonexistent or difficult to locate or access

[DU.2] Ineffective timing

[DU.3] Scattered presentation

[DU.4] Poor organization, formatting, or presentation

[DU.5] Dysfunctional components

Comprehension

[C.1] Contradictory statement(s)

[C.2] Inconsistent terminology

[C.3] Difficult to understand

[C.4] Consequences not adequately explained

[C.5*] Inadequate feedback

[C.6*] Confusing buttons/toggles/boxes

Appropriate choices

[AC.1*] Limited choice

[AC.2*] Excessive or redundant choice options

[AC.3*] Difficult to modify previous choices

Manipulative Elements

[ME.1] Manipulative statements

[ME.2] Visually manipulative design

[ME.3*] Asymmetric effort required for different privacy protection levels

[ME.4*] Non-privacy protective defaults

[ME.5*] Unexpected choice alteration

Threat taxonomy tables

Discovery and Use

Threat Names	Evaluation Process and Questions
[DU.1] Nonexistent or Difficult to Locate or Access **[DU.1.1]** Non-existent notice/choice **[DU.1.2]** Notice/choice difficult to locate **[DU.1.3]** Notice/choice difficult to access, ineffective interaction channel	Consider eac relevant to th and easy to l
[DU.2] Ineffective Timing	Consider eac relevant to th access/be ex benefit from
[DU.3] Scattered Presentation **[DU.3.1]** Lack of Centralized Management **[DU.3.2]** Decoupled Notice and Choice	Is there a cer notices (e.g., privacy policy of data practi to these prac taking a glob multiple notic
[DU.4] Poor Organization, Formatting, or Presentation **[DU.4.1]** Lengthy Text that Lacks Structure or Effective Navigation Aids **[DU.4.2]** Too Much Effort to Access Necessary Information (links or layered policy) **[DU.4.3]** Poorly Formatted Notices and Choices **[DU.4.4]** Distracting Presentation Elements	Consider eac relevant to th choices easy through multi choices poor distracting pr or audio elen
[DU.5] Dysfunctional components (links, buttons, switches, etc.)	Consider eac implemented as intended.

Comprehension

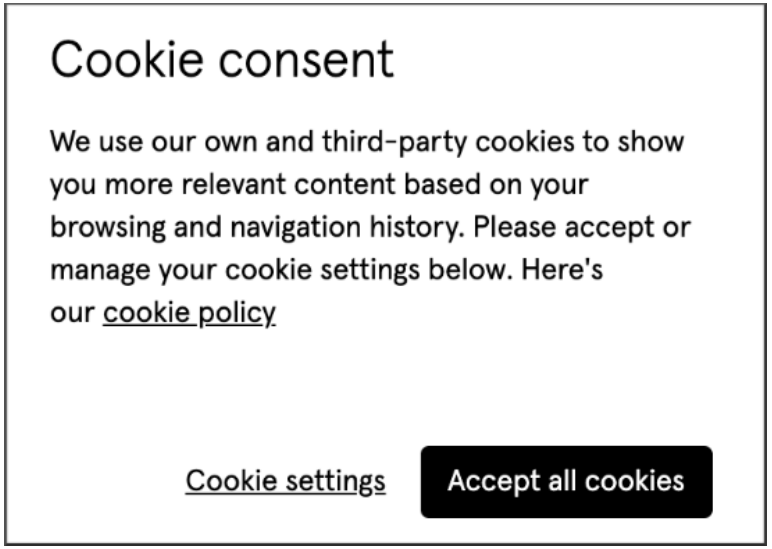
Threat Names	Evaluation Process and Questions
[C.1] Contradictory Statement(s) or Implementation(s) **[C.1.1]** Conflicting Statement(s) **[C.1.2]** Mismatched Notice Statement and Choice Implementation	Consider statements made across the e (global perspective) and determine whe any contradictions or ambiguities that m resolved. This could include conflicting well as mismatches between statement notices and related choices presented t
[C.2] Inconsistent Terminology	Consider statements made across the e (global perspective) and look for possible inconsistencies in terminology (e.g., a no term and a corresponding choice using a
[C.3] Difficult to Understand **[C.3.1]** Unclear Terms/Statements **[C.3.2]** Use of Legal or Technical Jargon **[C.3.3]** Use of Complex Language	Consider each context and each notice/c implemented/designed for that context, a whether it includes terms or statements t overly technical, or language that is overt
[C.4] Consequences not adequately explained	Consider each context and each notice/ determine whether it does a good enoug explaining the implications associated wi practices it discusses and the choices av when it comes to allowing or restricting th
[C.5*] Inadequate Feedback	Consider each context and each choice context, and ensure that the user is given information to determine whether the opt recently selected has been recorded and currently active (including in situations wh has not modified the initial default).
[C.6*] Confusing Buttons/Toggles/Checkboxes	For each context and each choice in that consider each button/toggle/checkbox and verify that it is intuitive and easy to use.

Appropriate Choices

Threat Names	Evaluation Process and Questions
[AC.1*] Limited Choice	Consider each context and each choice and ask whether options users are likely to want in that context are actually available. This includes looking at the granularity of available options.
[AC.2*] Excessive or Redundant Choice Options	Consider each context and each choice in that context and ask whether each choice option is actually useful in that context, or whether some options might be superfluous or redundant. This includes looking at the granularity of available options.
[AC.3*] Difficult to Modify Previous Choices	Consider each context and each choice in that context and make sure that the user can easily modify any selection they have made.

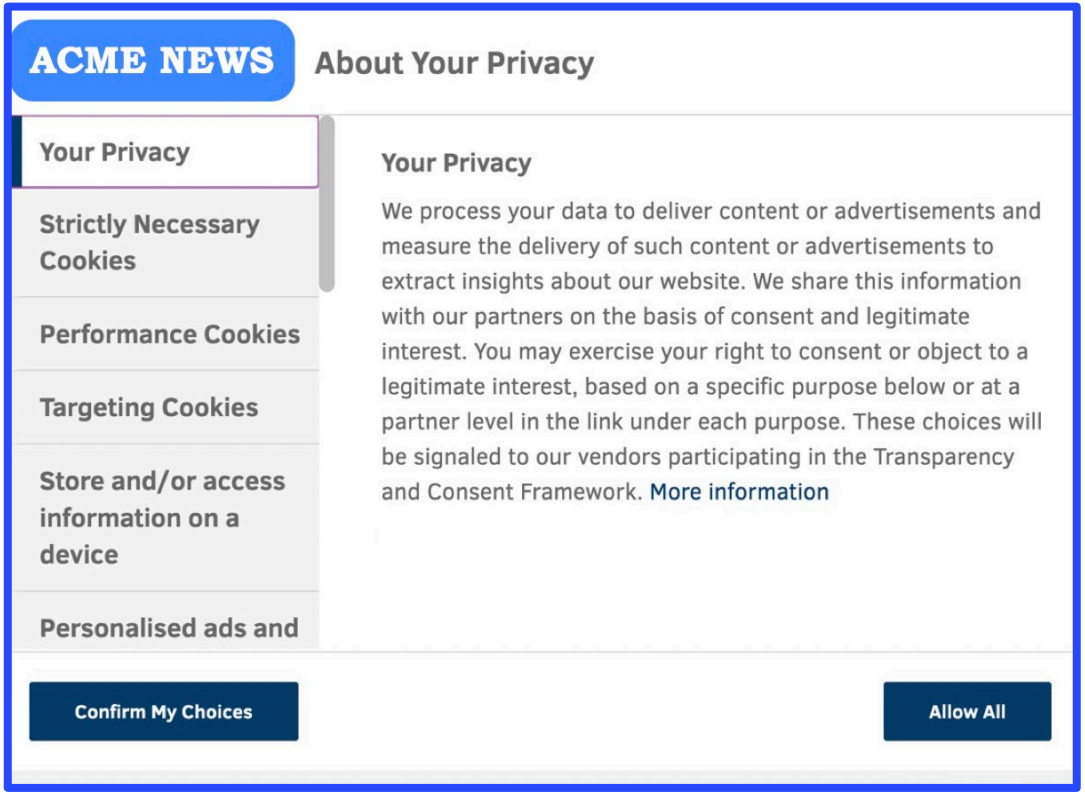
Manipulative Elements

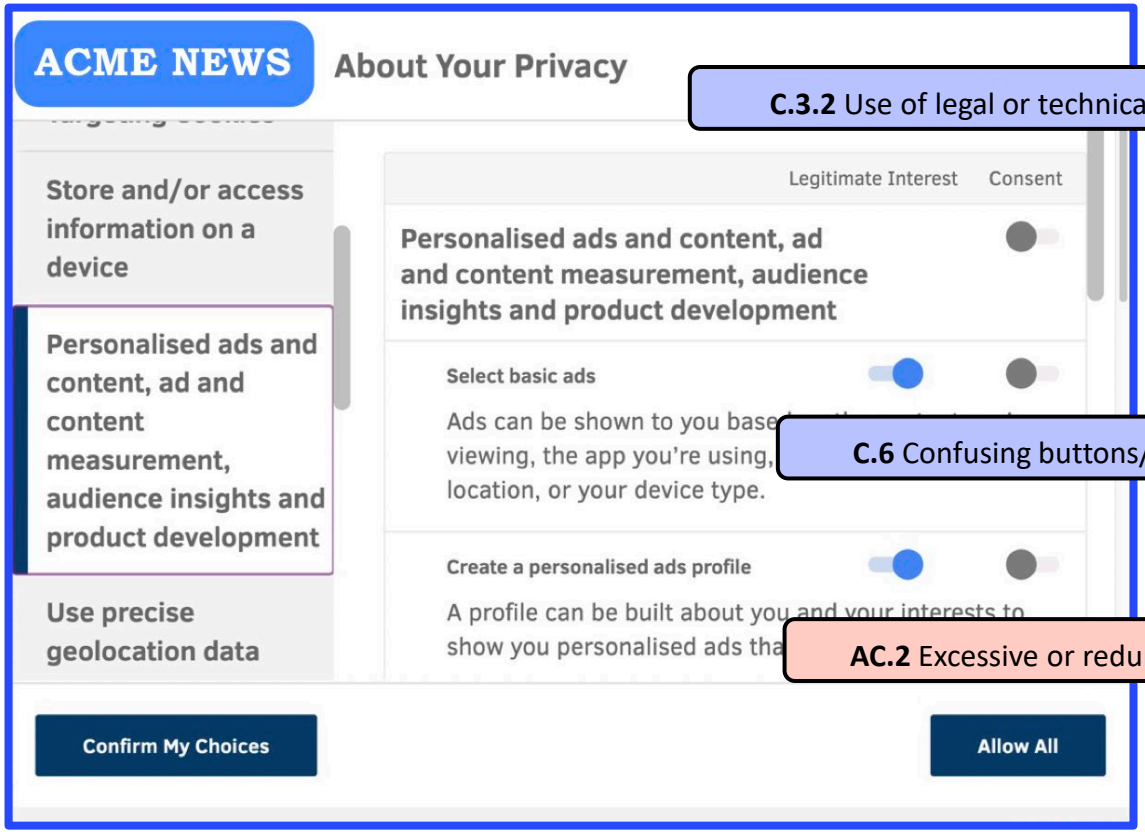
Threat Names	Evaluation Process and Questions
[ME.1] Manipulative Statements	Consider each context and each notice/choice in that context, and ask whether it contains manipulative statements.
[ME.2] Visually Manipulative Design	Consider each context and each notice/choice in that context, and ask whether it contains manipulative visual elements.
[ME.3*] Asymmetric Effort Required for Different Privacy Protection Levels	Consider each context and each choice in that context, and check whether some options are artificially more complex to select than others - with the likely effect of manipulating the user's decisions.
[ME.4*] Non-Privacy Protective Defaults	Consider each context and each choice in that context and check whether defaults are privacy protective.
[ME.5*] Unexpected Choice Alteration	Consider each context and each choice in that context, and determine whether selecting some options might automatically impact other choices without the user's awareness or consent.



ME.3 Asymmetric effort required for different privacy protection levels

DU.4.2 Too much effort to access necessary information





C.3.2 Use of legal or technical jargon

C.6 Confusing buttons/toggles/checkboxes

AC.2 Excessive or redundant choice options

Reducing the burden of user consent

- Considerable cost to reading consent interfaces, comprehending available options, and making decisions at large numbers of websites
- Need to reduce user burden
  - Standardized interfaces
  - Search and comparison tools
  - Automated user agents – including browser-based consent management