Requirements of Oppression

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Banksy

1992–1994

I discover code

I first discovered programming in my 7th grade pre-algebra class. My teacher required us to purchase TI-82 graphing calculators and taught us how to write simple formulas. My classmate shared a version of Tetris, after a summer of trying to make it fast enough to be playable and I was hooked.

At the time, requirements were **tacit** to me: software was supposed to support my creative expression, whatever that happened to be. I knew what I wanted and didn't need to write it down.

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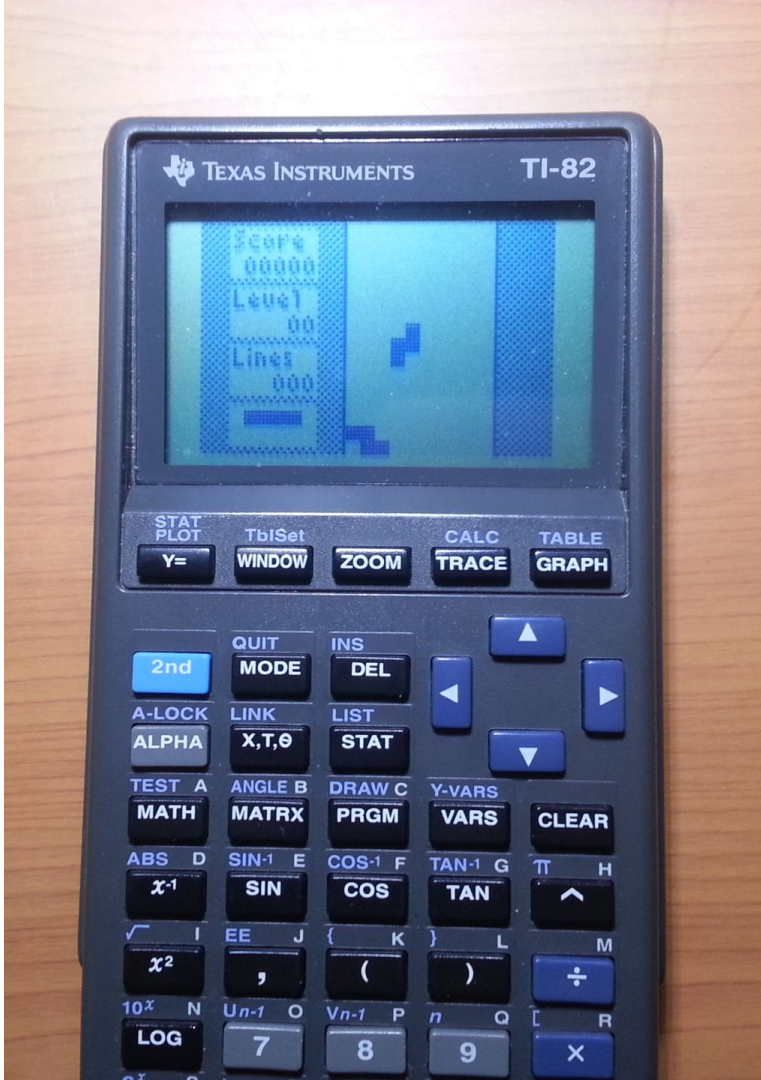

1994–1998

I discover requirements

After a few years of making software for myself, my friend and I decided to make a game. He was illustrator and sound engineer, I was developer. But we couldn't afford graphic design tools, so I set out to make a bitmap editor for tiled graphics. I didn't talk to him at all about what he needed—I just made something, and found out later he never used it because it didn't meet his needs, but he didn't want to my feelings.

By ignoring my friend's needs, I had discovered **requirements**, and the need to define them based on stakeholder needs.

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1998-2002

I discover CS research

Throughout college at my alma mater Oregon State University, I learned about programming languages, operating systems, software engineering, and more. But I used none of this in what I built by myself or with others, since requirements were always given to me. Disillusioned by the constraints I perceived in industry, I pursued research, where I could continue my creative expression.

I came to view requirements as something **imposed** by teachers, organizations, and markets: they were a constraint on my creativity.

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Oregon State University

2002–2012

I discover software engineering

While earning my Ph.D. at Carnegie Mellon, I learned that there's more to software engineering than I was taught: it was full of fascinating technical and social problems. I began to contribute technical solutions and social insights, and continued to do so throughout my first several years of faculty life.

Throughout this decade of research, I came to see HCI+design methods as key approaches to eliciting *draft* requirements, but requirements engineering as a necessary process of specifying them to ensure conceptual integrity.

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ICSE, Shanghai, 2006

2012-2016

I discover industry

Just prior to earning tenure, I took leave for 3 years to do a software startup as CTO. I designed and engineered our stack, made strategic business decisions, set requirements, managed a team of 9 engineers and designers, and directly engaged in sales. While I was always pretty sure that the hard parts of engineering were people, now I was convinced: everything hard was in sales, marketing, management, and requirements elicitation.

I began to view requirements not as purely technical but **sociotechnical** constraints.

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AnswerDash, 2015

2016-2019

I discover myself

Post-tenure, post-startup, I finally had some time to deal with with my gender dysphoria. But as I accepted myself as transgender, and then came out, it became immediately clear how often software was not designed for me, and was even designed *against* me, leading people to deadname me, misgender me, bully me, and even physically harm me through medical errors.

I came to realize that software requirements were more than sociotechnical—they were **value judgements** about how the world should be, and those judgements were often oppressive.

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Amy J. Ko

2020-present

Racial reckoning, COVID

As I learned to live oppressed by sexism and transphobia, I watched as those far more marginalized than me were even more disregarded and oppressed by software. People without internet access were excluded entirely from COVID tests and vaccines. Black people in the U.S. were surveilled, arrested, beaten, and killed, fueled by racially biased software and data.

I began to see requirements as not just value judgements, but as **instruments of dehumanization**, modeling people as *form-fillers*, *threats*, and *perpetrators* instead of people.

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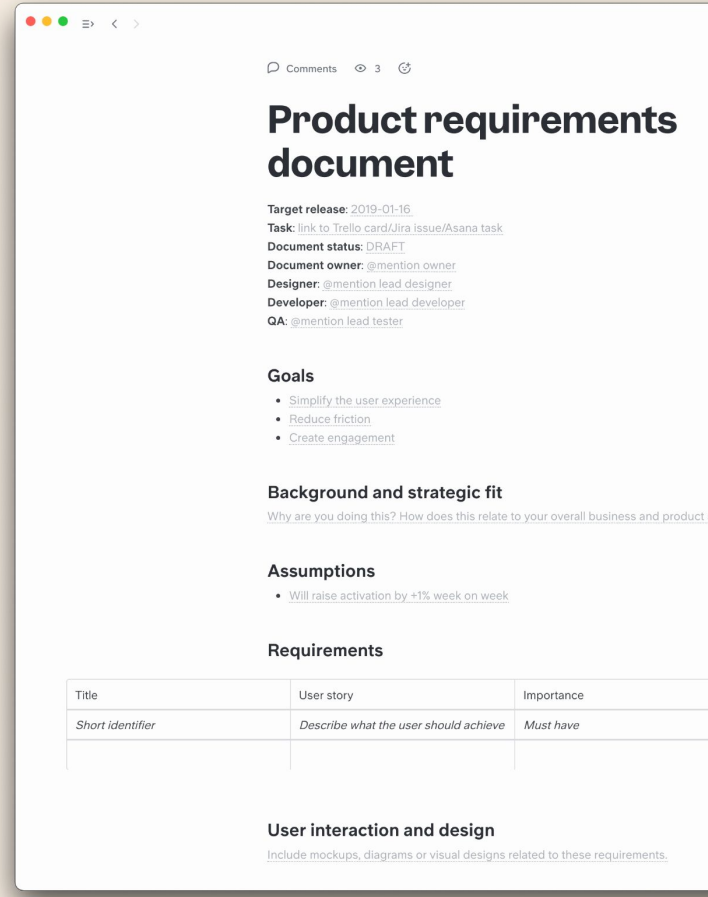
NYC 2020, NBC

Requirements are not contracts, constraints, or user needs. They are **social infrastructure** that reflect, reinforce, and amplify the matrix of oppression.

Patricia Hill Collins. *Black Feminist Thought: Knowledge, Consciousness, and the Politics of empowerment*. Routledge, 2002.

Our roadmap

- Three cases on requirements and oppression from history
  - *Gender*
  - *Ability*
  - *Race*
- Imagining anti-oppressive requirements engineering



The IEEE Digital Library

Background

I changed my name in 2019. I have what many trans people call a **deadname**. For many trans people—including me—when we read or hear our deadname, we feel pain, grief, regret, disrespect, and erasure, much like if someone called a cis person by a name that wasn't theirs. Seeing my deadname usually ruins my day.

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Morning Mix

Laverne Cox lambastes 'deadnaming.' What is it and why is it a problem?

Laverne Cox attends a screening of the documentary "Free CeCe!" during LGBTQ Pride Month on June 21. (Daniela Kirsch/NameFace/Sipa USA/AP)

By Allyson Chiu

August 14, 2018

Many years ago, Emmy-nominated actress and LGBT activist Laverne Cox said she thought about committing suicide.

In an emotional post shared Monday to Twitter and Instagram, Cox, a transgender woman, wrote that she had planned to leave behind notes — one in her pocket and several others placed around her home.

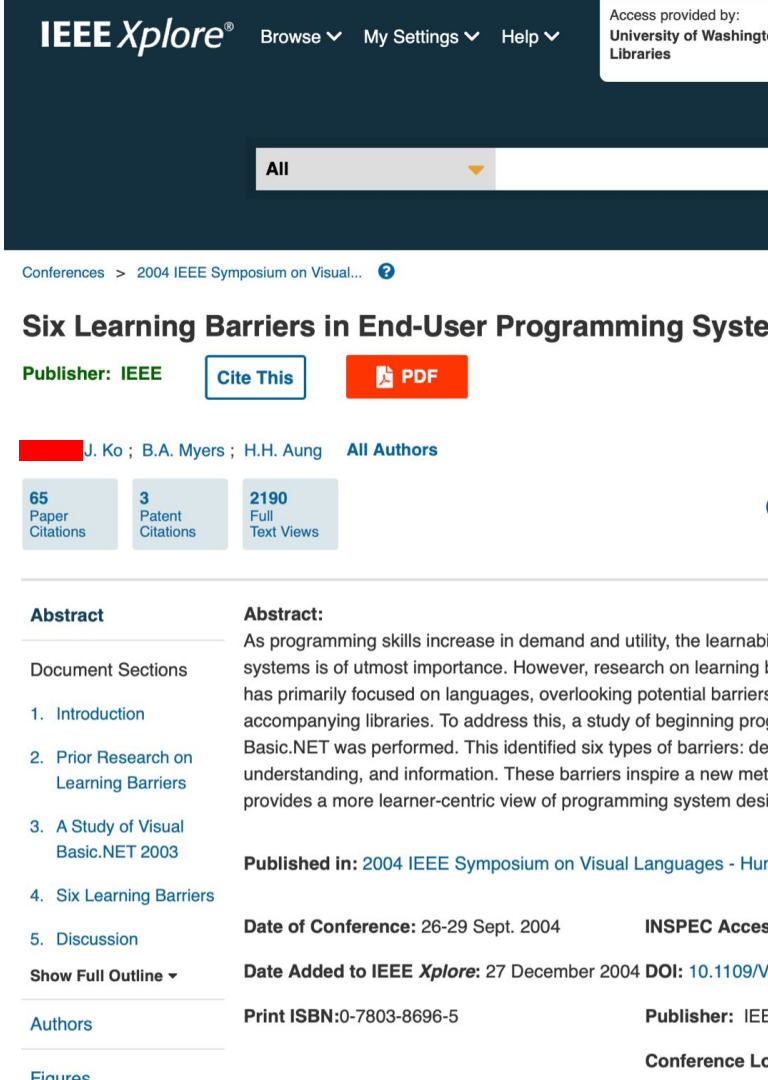
These notes had a special purpose, Cox wrote. They were intended to prevent her from being misgendered and deadnamed, experiences with which members of the transgender community are all too familiar.

Misgendering means referring to, or using language to describe a transgender person that doesn't align with their affirmed gender, for example calling a transgender woman "he" or "him." A transgender person is "deadnamed" when they are called by their

The requirements failure

IEEE **refuses** to fix my name in my publications, causing me emotional harm every time someone deadnames me in a citation, but also separating me from my professional history, robbing me of credit for my prior work, and putting me at risk of harassment.

For example, 300+/500+ papers cite this paper by my deadname.



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Let's play a root cause analysis game of "5 whys"...

Why won't IEEE fix the articles that deadname and misgender me?

“Digital libraries were designed to store immutable information for printing.”

Why immutable?

"Research libraries represent a history of knowledge and history cannot change."

Why include names + pronouns in this immutable history?

“Names and pronouns are also part of history”

Why would persisting obsolete names that refer to no one be valuable?

“Changing a name would violate a principle of historical accuracy”

Why is accuracy more important than respecting people’s names?

“Because the only people whose names are worth respecting are those whose don’t change.”

“*Author names can’t change*”

Underlying this central requirement was an oppressive idea: that names shouldn’t change, that those who changes their names shouldn’t have their names respected, and that any harm authors experience from having their name ignored—including violent transphobic threats—is less important than “historical accuracy”.


Alfons Morales

Was it a missing requirement?

No. It was a **value judgment**. Consider the 1990's, when IEEE started building its digital library: people changed their names for all kinds of reasons beyond gender, including marriage, divorce, religion, safety, adoption, immigration.

The IEEE requirements engineers ignored that obvious reality, and chose to prioritize a view of names as "history" over a view of names as mutable pointers. It was plainly exclusionary.

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Jide Alakija

How do we know?

I'm part of the *Name Change Policy Working Group*, which includes trans scholars who have been advocating for name change policies across academia.

Nearly every publisher resisted, arguing that it wasn't a missed requirement; they argued that respecting names was less important than preserving "history".

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Theresa Jean Tanenbaum ("Tess")

Theresa Tanenbaum is an Assistant Professor at the University of California in the Department of Informatics, where she is the founder of the Transformative Play Lab. Dr Tanenbaum's work is engaged with issues of gender, identity, and narrative. Dr Tanenbaum's work is playful, provocative, and interdisciplinary, frequently straddling the line between art, design, advocacy, and research. She helped draft the Association for Computing Machinery's (ACM) name change policy: the first such policy to be formally adopted by a major publisher. Her article in Nature advocating for more trans inclusive name change policies in academic publishing has been cited by multiple publishers who have adopted similar policies.

Irving Rettig

Irving D Rettig is a 5th year chemistry PhD candidate at Portland State University (PSU) researching light-to-chemical energy conversion, specifically singlet oxygen mediated aerobic oxidation photocatalysis in tellurium-containing rhodamine derivatives. In addition to working with name change policies, he has pushed for additional trans inclusive policies and practices within the American Chemical Society (ACS), co-created an antiracism workshop series within the chemistry department at PSU, and serves on the PSU Women in STEM organizing committee.

H Michael Schwartz

Change required activism

We eventually won the war: ACM, IEEE, and two dozen other publishers eventually announced policies, though most are implementing them slowly and poorly, and refusing to change citations.

This oppressive requirement, then, was a plain rejection of anyone who changes their name to be credited for their work. **This is the matrix of oppression, manifested as a software requirement.**

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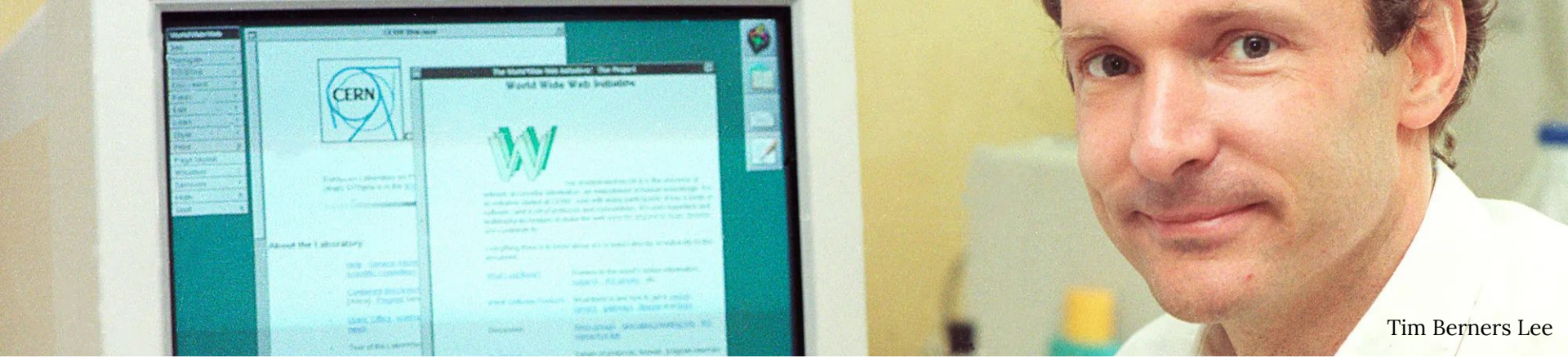
B. The IEEE Executive Director has designated that the Staff Executive – Publications shall assign the investigation and validation of requests, and removal of metadata access to staff within the IEEE Publications department. Staff shall establish criteria and guidelines for this process. Validation of requests shall include review and approval by the authoritative individual or body behind the publication record (such as the Editor-in-Chief, conference organizer, organizational unit, etc.). These criteria and guidelines, and changes thereto, shall be approved by PSPB before application. The final decision for removal,

Reuters

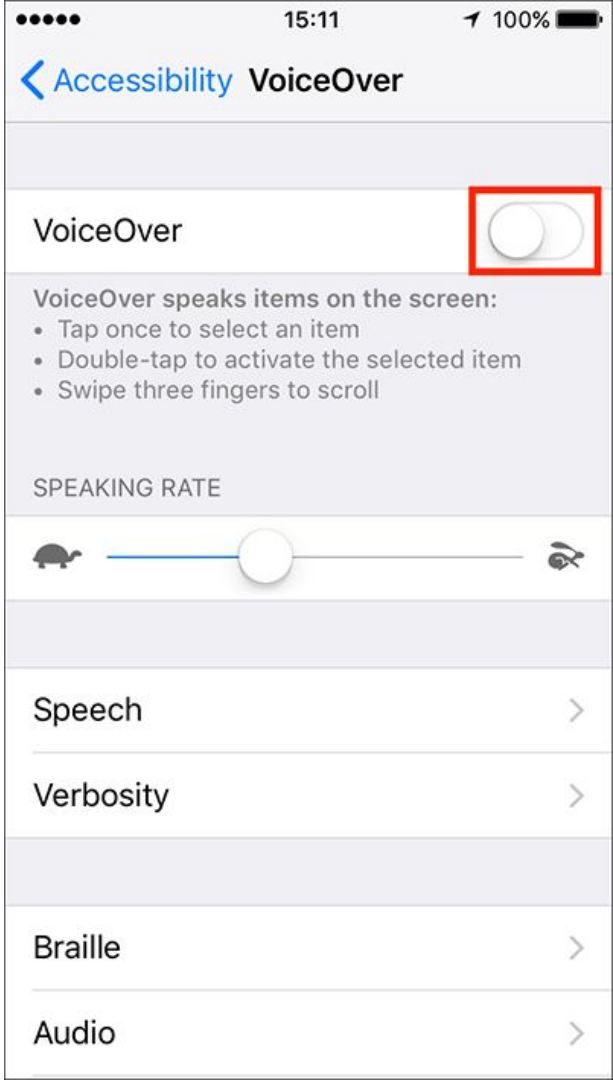


Tim Berners Lee

The HTML `alt` attribute

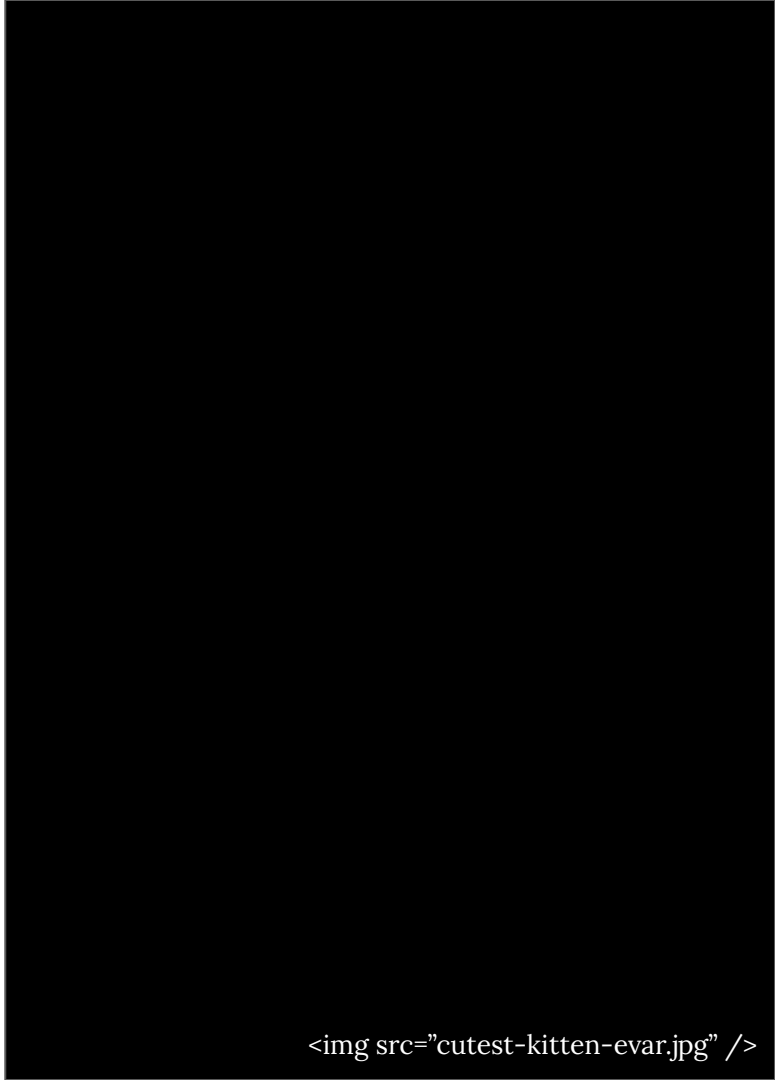
Background

Every day, ~30 million blind people globally use the internet to live their lives. They rely on an access technology called a **screen reader** to translate the textual and visual content of the web into synthesized speech.



The requirements failure

Most developers do not write HTML in a way that is compatible with screen readers. For example, one egregious example is not writing `alt` text on images, meaning that most of the <img> elements on the web are invisible to people who are blind, excluding them from most news, art, and culture.



Let’s play 5 whys again...

Why don’t developers write `alt` attribute text?

“Because they don’t have to; pages render regardless.”

Why don’t developers have to?

“Because the standard doesn’t require `alt` *attributes.”*

Why aren’t they required?

“Per HTML 2.0, `alt` was for ‘processing constraints or user preference.’”

Why “processing” and “preference”?

“The 90’s internet was slow, and browsers needed to show something while images downloaded.”

Why not require text?

According to W3C, the internet was getting faster, so `alt` *attributes solved a temporary performance problem.*

“*Descriptions are optional*”

In the 1990’s, Tim Berners Lee, browser vendors, and web developers viewed image descriptions as “nice to have” for people on slow connections, but ultimately a short term issue, because eventually everyone would be able to get images quickly.

Image: IMG

The *IMG* element refers to an image or icon via a hyperlink

HTML user agents may process the value of the *ALT* attrib

Attributes of the *IMG* element:

ALIGN
alignment of the image with respect to the text baseli

- `TOP' specifies that the top of the image aligns
- `MIDDLE' specifies that the center of the image
- `BOTTOM' specifies that the bottom of the imag

ALT
text to use in place of the referenced image resource,

ISMAP
indicates an image map (see section Image Maps).

SRC
specifies the URI of the image resource. (23)

Examples of use:

```
<IMG SRC="triangle.xbm" ALT="Warning:"> Be sure
to read these instructions.

<a href="http://machine/htbin/imagemap/sample">
<IMG SRC="sample.xbm" ISMAP>
</a>
```

Was it a missing requirement?

No, it was a **value judgement**. Blind people existed in the 1990's when the standards were being developed. HTML and the web could have required `alt` attributes, but it didn't. Berners Lee, browser vendors, and developers all simply disregarded the needs of the blind community, creating an internet ecosystem that made the visual web inaccessible.

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How do we know?

Because after a decade of advocacy by blind and low vision developers, the `alt` attribute became required in HTML 4.01 after blind developers demanded it! Image tags without one will not pass a validator. And yet still, browsers render images without them, IDEs warn about them at best, developers largely ignore these warnings, and <1% of images on the web contain a description.

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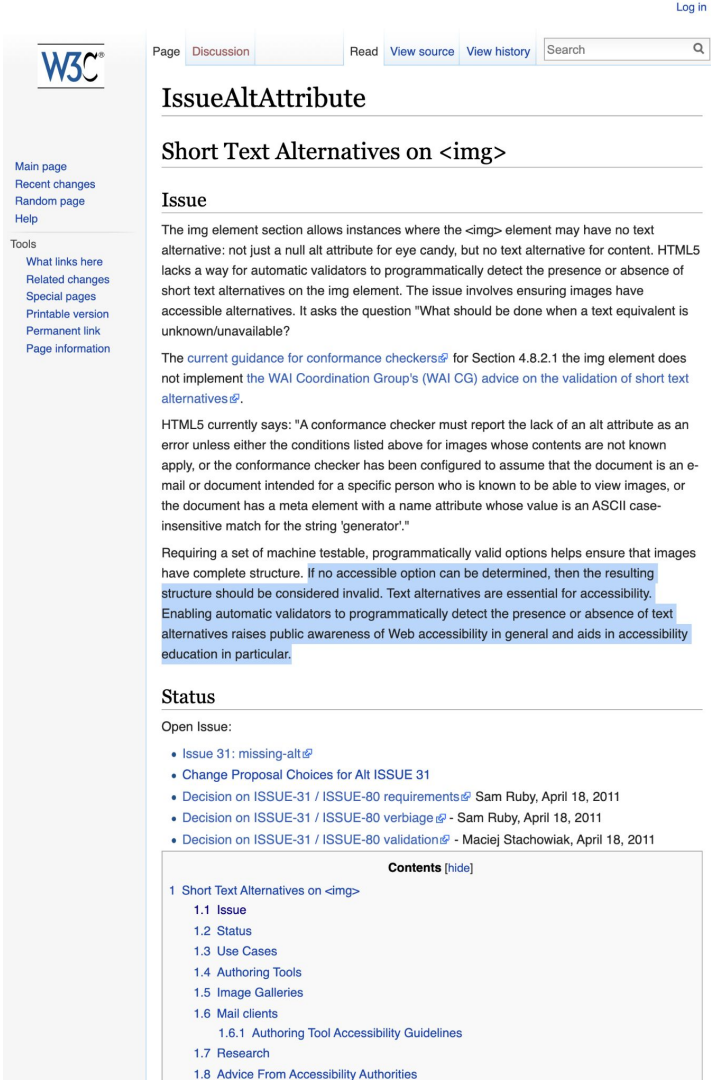

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IssueAltAttribute

Short Text Alternatives on <img>

Issue

The img element section allows instances where the <img> element may have no text alternative: not just a null alt attribute for eye candy, but no text alternative for content. HTML5 lacks a way for automatic validators to programmatically detect the presence or absence of short text alternatives on the img element. The issue involves ensuring images have accessible alternatives. It asks the question "What should be done when a text equivalent is unknown/unavailable?

The current guidance for conformance checkers for Section 4.8.2.1 the img element does not implement the WAI Coordination Group's (WAI CG) advice on the validation of short text alternatives.

HTML5 currently says: "A conformance checker must report the lack of an alt attribute as an error unless either the conditions listed above for images whose contents are not known apply, or the conformance checker has been configured to assume that the document is an e-mail or document intended for a specific person who is known to be able to view images, or the document has a meta element with a name attribute whose value is an ASCII case-insensitive match for the string 'generator'."

Requiring a set of machine testable, programmatically valid options helps ensure that images have complete structure. If no accessible option can be determined, then the resulting structure should be considered invalid. Text alternatives are essential for accessibility. Enabling automatic validators to programmatically detect the presence or absence of text alternatives raises public awareness of Web accessibility in general and aids in accessibility education in particular.

Status

Open Issue:

- Issue 31: missing-alt
- Change Proposal Choices for Alt ISSUE 31
- Decision on ISSUE-31 / ISSUE-80 requirements Sam Ruby, April 18, 2011
- Decision on ISSUE-31 / ISSUE-80 verbiage - Sam Ruby, April 18, 2011
- Decision on ISSUE-31 / ISSUE-80 validation - Maciej Stachowiak, April 18, 2011

Contents [hide]

1 Short Text Alternatives on <img>
  1.1 Issue
  1.2 Status
  1.3 Use Cases
  1.4 Authoring Tools
  1.5 Image Galleries
  1.6 Mail clients
    1.6.1 Authoring Tool Accessibility Guidelines
  1.7 Research
  1.8 Advice From Accessibility Authorities

Change required activism

This change in HTML's requirements required blind users of the web to organize and advocate, forcing W3C to include them. And yet, general disregard for people with disabilities—persist in every other layer of implementation of the HTML 4.01 specification, especially browsers.

Once again, the **matrix of oppression** was **manifested as a software requirement.**

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Change proposals for ISSUE-31 and ISSUE-80

From: Ian Hickson <ian@hixie.ch>
Date: Thu, 15 Jul 2010 17:57:07 +0000 (UTC)
To: public-html@w3.org
Message-ID: <Pine.LNX.4.64.1007151755460.24444@ps20323.dreamhostps.com>

ISSUE-31 AND ISSUE-80
=====================

SUMMARY

Require that authors include alternative text for images. Provide detailed instructions and examples for doing so to all readers of the HTML specification.

RATIONALE

1. REQUIREMENTS: The HTML specification should include a full and complete a description of the requirements that authors must fulfill to provide alternative text for images, because:

 * The HTML specification is the logical place to define the HTML language.

 * The HTML specification is where one finds all the other descriptions of requirements that apply to authors of HTML documents.

 * Defining the requirements that apply to HTML's <img> element's alt="" attribute in the same specification as the requirements for the <img> element's src="" attribute makes it more likely that authors reading the requirements for src="" will see the requirements for alt="".

 * Having the information in the HTML specification will lead to the most usable and most fully expanded text possible for this topic.

 * Having the requirements for alt="" attributes inline right at the definition of the <img> element and the alt="" attribute will most effectively reflect the importance of the the provision of text alternatives.

The requirements should be the most rigorous set of requirements we can provide to ensure the most accessible results are achieved if they are followed. Naturally such requirements are not machine-checkable with the state of the art; as with any constraints placed on correct usage of semantic markup, we have to rely on interpretation. This is not new, however; it has long been established, for instance, that presentational images that are not relevant in a non-visual medium should have the empty string as alternative text, but requiring this is not machine-checkable -- there's no way for a machine to know that the image really is presentational. Nonetheless, we should require this so that users get the most accessible results when the author follows the specification.

Finally, we should ensure that we provide the most robust, creditable, usable and useful set of text alternative requirements possible. We can only do this by providing detailed requirements to cover every eventuality, from describing how to handle groups of images that work together to form a single picture, to how to provide alt="" text in special cases like CAPTCHAs or how photo upload sites like Flickr can write conforming documents even in cases that can't be fully accessible (such as when the site is unaware of an image's contents), to how to handle simple icons or logos, with everything in between

The HTML specification should also include detailed examples of these requirements, because including examples near the text they are illustrating is the most optimal way of explaining those requirements.

2. EQUALITY: There are certain edge cases where a page producer must reference an image without knowing what the image is. Such a producer cannot, by definition, provide a textual alternative to the image:


"INJUSTICE ANYWHERE IS A THREAT
TO JUSTICE EVERYWHERE."
Martin Luther King, Jr.

U.S. police use of facial recognition

Background

For the past 25+ years, police in the U.S. state of Florida have submitted images to a federally-funded state database that links faces to crime data. This software is used to identify people who have potentially violated laws.

The requirements failure

However, the data and algorithms used, while relatively accurate for the faces of White people, are highly inaccurate for Black people. The result is that **every 3 days**, someone in Florida is falsely identified, arrested, and jailed, are never told how they were identified. Many cannot afford bail or lawyers, and so stay in jail. Most are Black.

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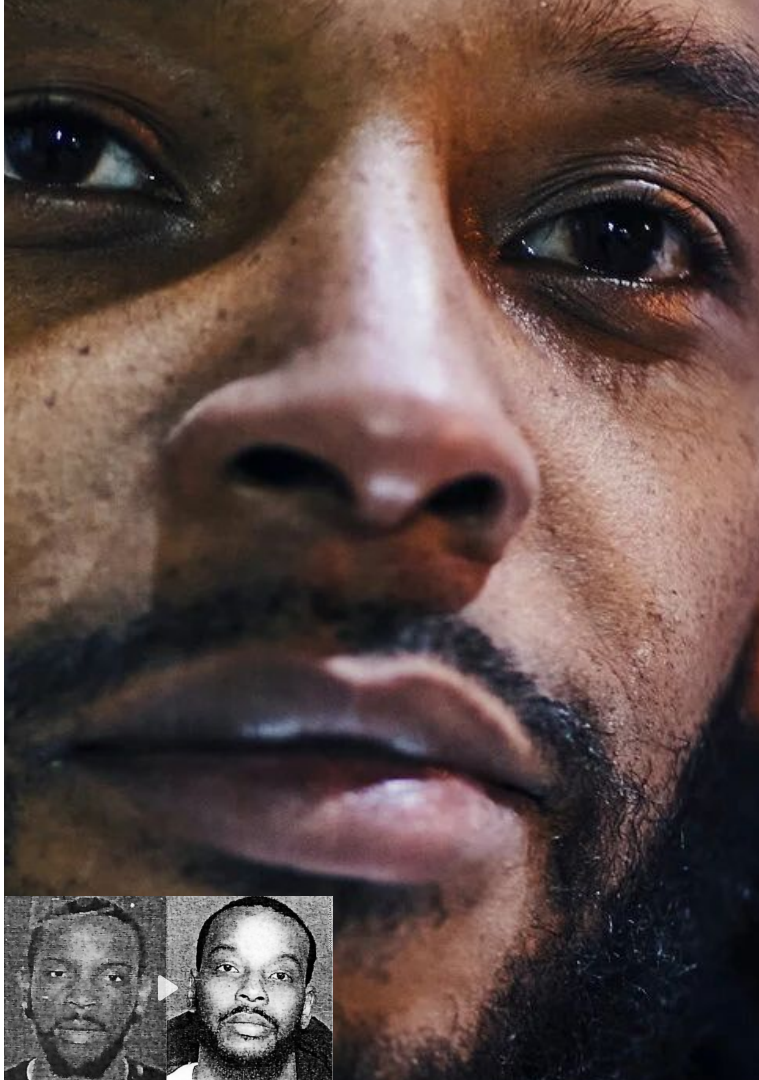

Let's play 5 whys again...

Why is Florida's recognition algorithm less accurate for Black faces?

“The training data lacked a sufficient number of Black faces.”

Why is the training data lacking?

“The private company who makes it didn’t gather data on Black faces.”

Why not?

“The police and state bought the software independent of its accuracy on Black faces.”

Why wasn’t this a factor?

“The state was convinced by aggregate accuracy measures, which hid any systematic bias.”

Why wasn’t bias a factor?

“Policing in Florida isn’t about justice, it’s about arrests, politics, and white fear of Black people.”

“Accuracy must exceed [n]%”

Accuracy, especially in the 1990’s, and even today throughout machine learning, is seen as an aggregate measure, not a disaggregate measure. The company sold on that metric, and Florida bought on that metric. This requirement assumed that accuracy would be comparable across all groups, independent of their race, gender, or ability. This wasn’t true at all.

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Was it a missing requirement?

No, it was a **value judgement**. When Florida built the system, the goal was not equal treatment, but police funding, which was tied to closing cases by making arrests.

Uses of facial recognition could be less biased, but it's not, because police departments and white majorities in the US do not see fairness to Black people as a requirement in criminal justice.

How do we know this?

For years, Black communities across the United States, as well as the UK, have been fighting legal battles over the use of facial recognition by police. And in a few cities, it has been banned. But in most, there is fierce resistance from technologists and white majorities, who want to prioritize a sense of safety over racial justice.

The Algorithmic Justice League (ajl.org) helps communities organize against oppressive algorithms and data.

Change requires activism

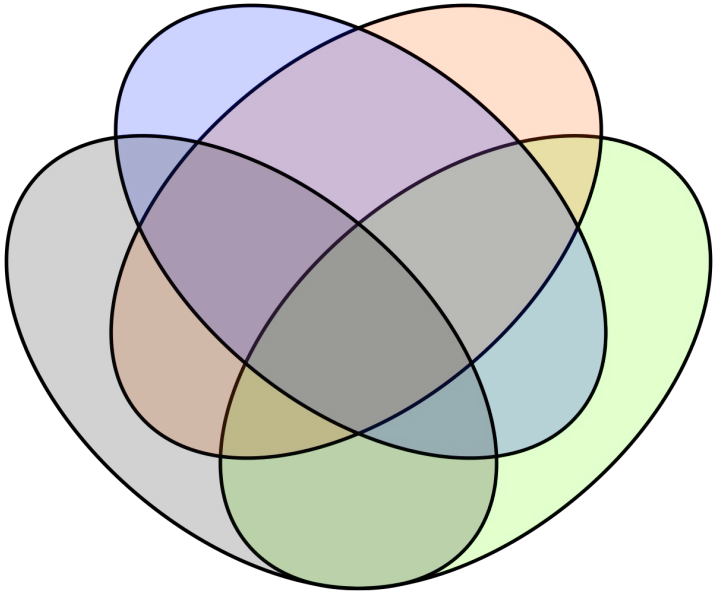
This underlying culture of racism therefore embeds itself in the requirements of facial recognition software, reinforcing and amplifying racist criminal justice outcomes, leading thousands of innocent people to be trapped in broken criminal justice systems, all because of a flawed application of machine vision.


BLACK
LIVES
MATTER.
BLACK LIVES MATTER

Requirements are not contracts, constraints, or user needs. They are **social infrastructure** that reflect, reinforce, and amplify the matrix of oppression.

Requirements reflect and reinforce oppression

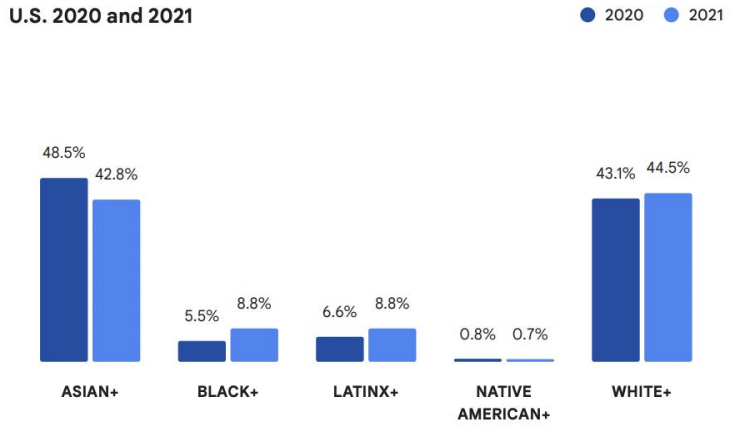
What these cases show is that software oppression derives from the broader systems of oppression in which we live: *sexism*, *transphobia*, *ableism*, *racism*, *nationalism*, *xenophobia*, and *capitalism* all find their ways into the concepts and visions that shape software requirements, resulting in software that serves majority groups at the expense of the marginalized.



Oppression is intersectional.
Credit: Rupert Millard.

Requirements engineering by and for majorities

If it's largely cis heterosexual non-disabled White and Asian men developing, designing, negotiating, selling, and marketing software— *and they are largely eliciting requirements and data from that same demographic following capitalist goals*—it is inevitable that software is going to reflect their values.



Google U.S. hiring demographics

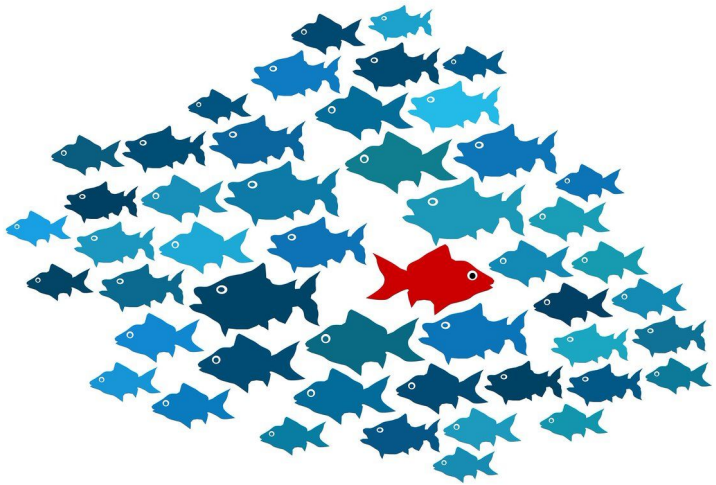
The result is software that works for those who hold power, and often harms, excludes, and oppresses everyone else.

Principles for anti-oppressive requirements engineering

1. Center the margins

Requirements engineering should focus its research, activities, and outputs on people marginalized in society, and *not* the majority.

This means understanding the *full* diversity of experiences, needs, and contexts in which people live, not just average cases.

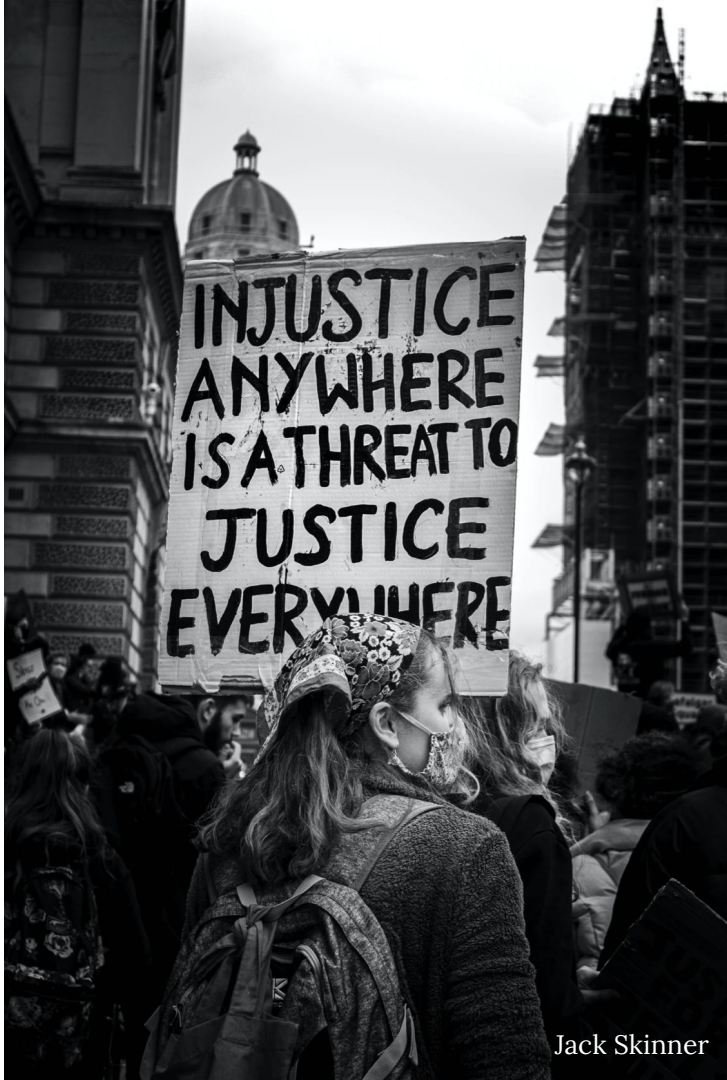


Outliers are normal, natural, expected, and necessary.

2. Center resistance

Software requirements engineering has to be a site of resistance. It's the responsibility of requirements analysts and developers to *reject* oppressive requirements, and accept responsibility for harm if they don't.

This means engaging in social conflict with majorities, demanding change, and deprioritizing profit.



Jack Skinner

3. Center humanity

Requirements engineering has to be a discipline about people first.

This means that the software being made is secondary. In fact, anti-oppressive requirements engineering may mean *refusing* to engineer software that poses harm to marginalized groups, or actively advocating for the *dismantling* of oppressive software.

Does this sound scary?

I can say from experience, it is. My transition from bystander to activist continues to be frightening. It has thrust me into social conflict, which requires resilience, patience, and community. This talk is *designed* to create conflict. I suspect some of you in the audience, (especially our closing keynote speaker), is itching for conflict.

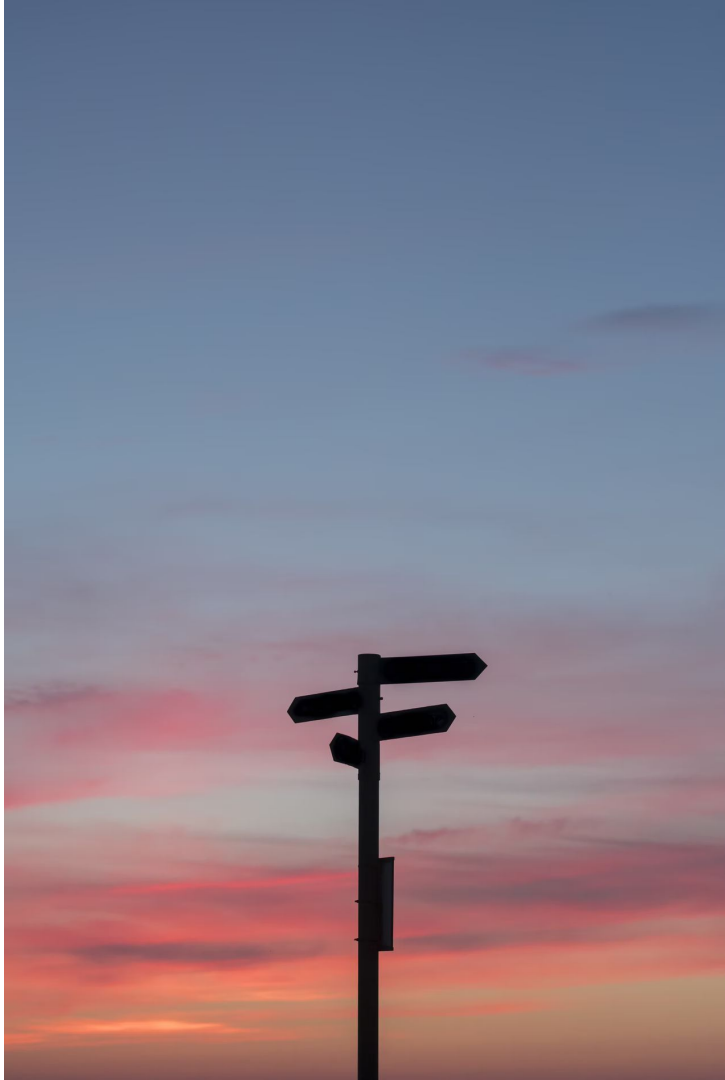
Silence is a privilege

But as a trans person, I unfortunately have no choice in this matter. And neither do the disabled people in our community, or the Black people, or the women, or the other groups that CS often disregards. If we aren't anti-oppressive in our work and life, we aren't free to be. We don't have the privilege of silence and inaction, as majorities do.

What will you choose?

Will you continue to study and teach requirements engineering as a neutral practice, at the expense of people's inclusion, safety, and freedom?

Or will you center the margins, resistance, and humanity in how you imagine software requirements, demanding software that works for everyone and hurts no one?



Let's talk.

- Requirements are **social infrastructure** that reflect, reinforce, and amplify the matrix of oppression.
- To dismantle requirements of oppression, we must to 1) center the **margins**, 2) center **resistance**, and 3) center **humanity**.

Thank you to the students in the Code & Cognition lab for their feedback on this talk.

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