Engineering Gender-Inclusivity into Software: Ten Team's Tales from the Trenches

Claudia Hilderbrand, Christopher Perdriau, Lara Letaw, Jillian Emard, Zoe Steine-Hanson, Margaret Burnett, **Anita Sarma**
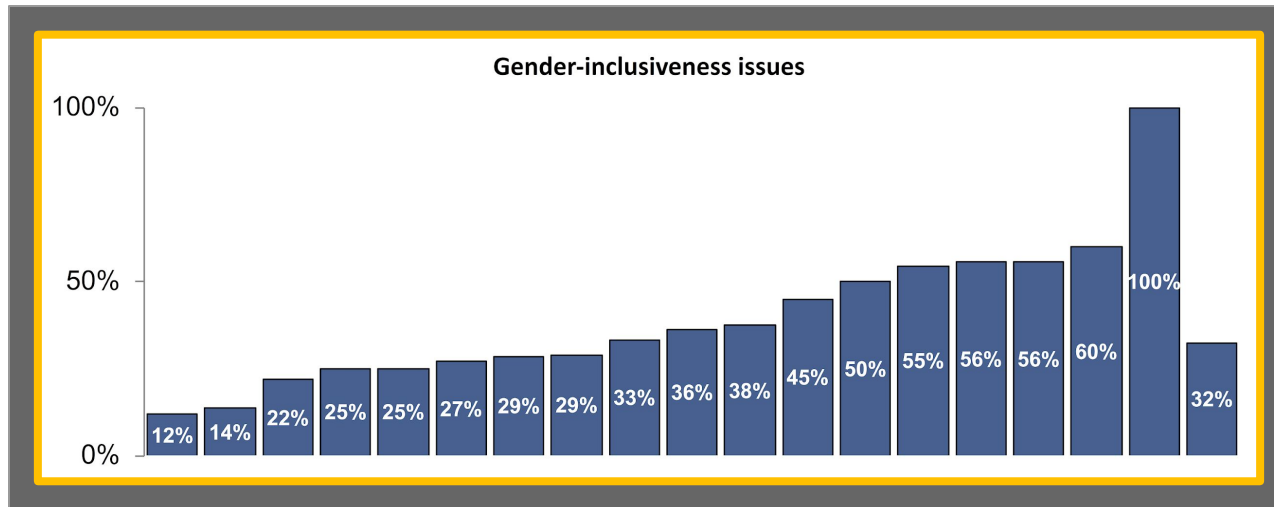
@gendermag

gendermag.org

gendermag.method

Gender & Software

- Most software has gender bias "bugs"
- Where?
  - In the software you create
  - in the tools you use to do it

Gender-inclusiveness issues

12% 14% 22% 25% 25% 27% 29% 29% 33% 36% 38% 45% 50% 55% 56% 56% 60% 100% 32%

Gender-Inclusive issues found by teams through GenderMag evaluation

- Does it matter?
  - Yes, a cognitive tax paid every time one faces a "bug"

What is GenderMag?

A brief overview

GenderMag

- A method to *find* and *fix* gender inclusivity bugs
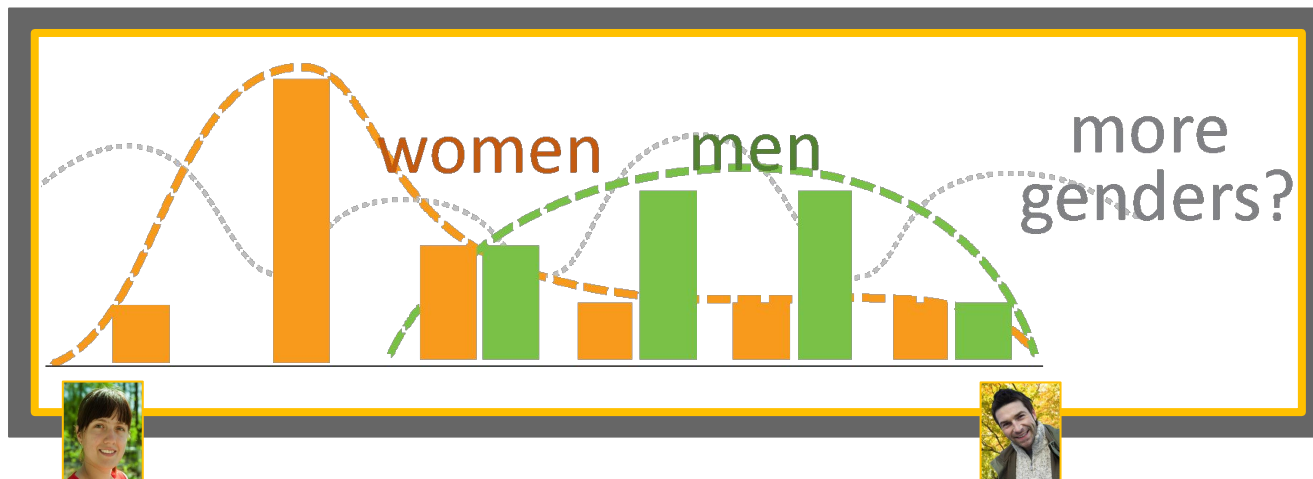 - GenderMag Personas: representative of range of users

GenderMag

- A method to *find* and *fix* gender inclusivity bugs
  - GenderMag Personas: representative of range of users
  - From the perspective of 5 cognitive facets
    - *Motivations, Computer self-efficacy, Risk averseness, Information processing style, Tech learning style (tinkering)*

women   men   more genders?

Distribution of Men and Women with Abi and Time characteristics in a user study at Microsoft. Left is Abi characteristics and right is Tim.

GenderMag

- A method to *find* and *fix* gender inclusivity bugs
  - GenderMag Personas: representative of range of users
  - From the perspective of 5 cognitive facets
    - *Motivations, Computer self-efficacy, Risk averseness, Information processing style, Tech learning style (tinkering)*
  - Teams walkthrough the user interface to see how these personas might carry out functionality

GenderMag Helps Improve Inclusivity

Failures

W   M

Original

Failure rates
before
and after the
Inclusivity bugs
were fixed.

An example from Microsoft (Chi 2019)

- Made it better for both Men and Women

- Removed the gap

Systematizing GenderMag in Software Teams

Practices from 10 Teams

Action Research Method

- Collaborated with 10 teams
  - 5 Academic IT
  - 5 industry
- Data collection
  - GenderMag session data
  - Interviews
  - Design meeting notes
  - Emails, follow-ups etc.

Team & Timespan	Applications
A: 1 yr	Info for instructors and students about academic tech
B: 5 mo.	Interface for an AI product
C: 9 mo.	Analytics for staff to gain insights into university trends
L: 1 yrs	Document tech
M: 9 mo.	Education platform for instructors
N: 3.5 yrs	An IT-support product for end users
O: 1 yrs	Search engine
P: 1 yrs	Web based interface for visual sorting
W: 1 yr	Web application for employees who manage web content
Y: 9 mo.	Application for customer communities

Practices & Pitfalls

- Results categorized into

  Minimizing costs

  Maximizing benefits

  Beyond the sessions

Minimizing Costs

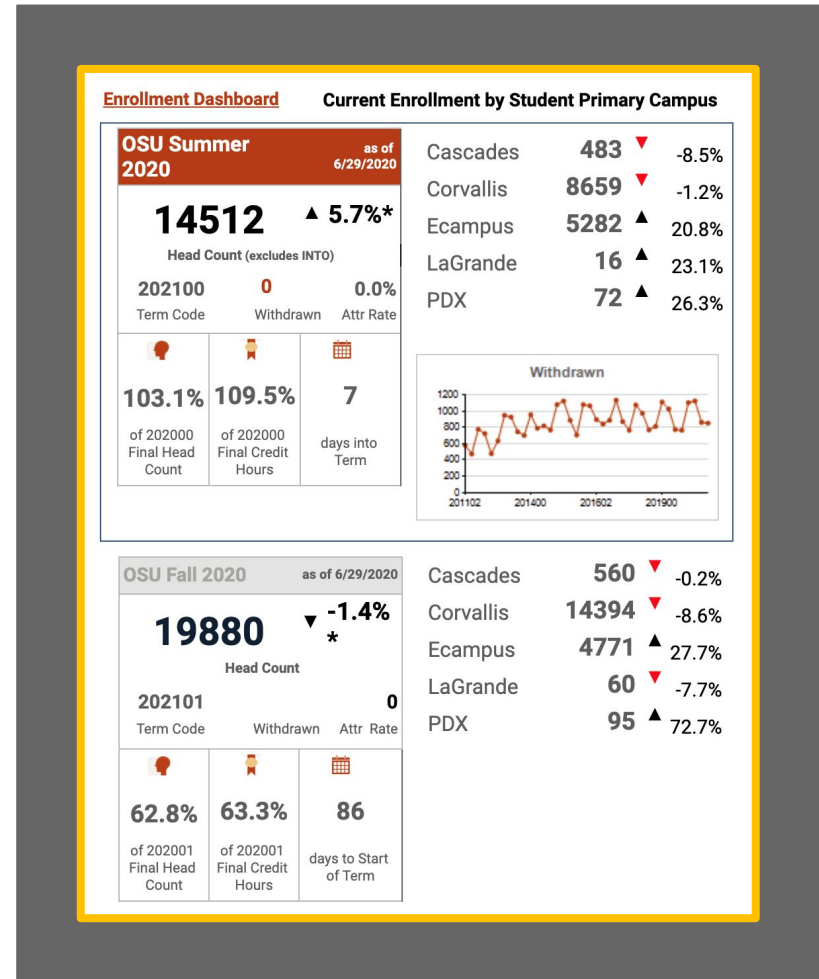|	Practices	Team
1	Learning GenderMag hands-on vs. doing GenderMag	A, M
2	Multi-path evals	A, C, L
3	Abstracting beyond	A, C
	Pitfalls	
1	Beyond our control	C, L, M
2	Evaluating a proxy	C, W

Abstracting Beyond

...one session to entire UI patterns, enabling reuse of findings and fixes.

TC-3: "...it's not just for one dashboard even though we tackled just one dashboard... It's a good starting point for all dashboards."

TC-6: "So some of the things we found in this session are definitely going to apply across the board..."

TC-15: "...in the real environment, there wouldn't be... these other tabs."

Maximizing Benefits

	Practices	Team
4	Abi first	A, B, C, L, M, N, O, P, W, Y
5	Speaking through Abi	C, M, N
6	Calculating bias	L, N, W

Calculating Bias

- ## Help see the big picture

  TC-523: "... <Abi> violates a lot of our assumptions around ... our tech."

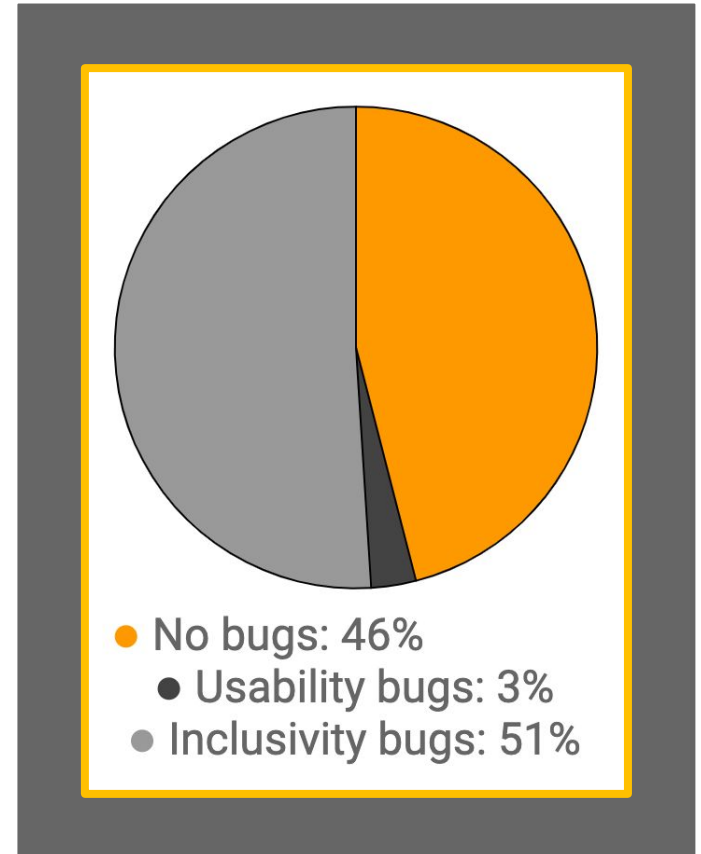- ## Generate thoughtful discussions

  TN-DebriefRecording: "My personality falls somewhere between Abi and Tim. I'm a read-the-manual kind of person

- ## Jump start fixes around facets

  TW-523 (not the same person as above): "... I think a lot of the failings were based on the fact that we assume users will explore the system ..."

- No bugs: 46%
- Usability bugs: 3%
- Inclusivity bugs: 51%

Beyond the Session

	Practices	Team
7	GenderMag'ing beyond products	A, B, C, N
8	Facet survey	B, N, O, Y
9	GenderMag Moments	A, B, C, N, O, P, W

Facet Survey

- Recruit participants for user studies
- Understand user populations
- Analyze lab study data,
- Measure the effectiveness of fixes, facet by facet.

Conclusions

- GenderMag improves inclusivity
- Ten teams' experiences reveal
  - 9 practices to help adoption
  - 2 Pitfalls to guard against
- Integrating a systematic process can make all the difference:

TC-3: "I thought it was very, very informative ... there are some things that we knew we had to change ... This ... gave us a process"
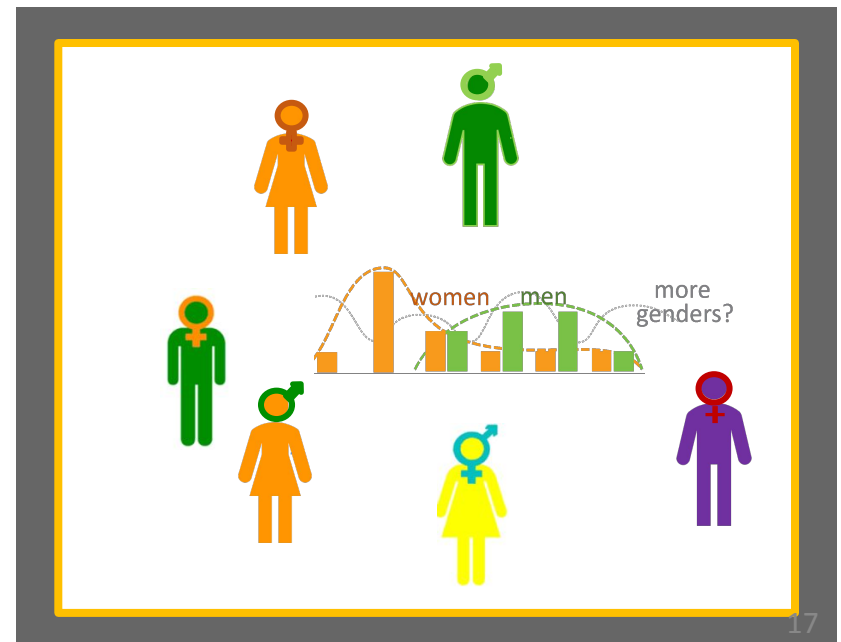
Follow-ups & Resources

- 🐦 @GenderMag, #GenderMag

- 📘 gendermag.method

- 🌐 http://gendermag.org
  - Video, papers, personas, foundations, …
  - Tool: on Open Source & at Google Chrome Store (free)
  - Download the kit!

How GenderMag works

- 1. Pick a persona. eg: Abi
- 2. Pick a use case/scenario in your tool, eg:
  - in Augmented (Physical) Bookstore
  - "Find science fiction books"

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- 1. Pick a persona. eg: Abi
- 2. Pick a use case/scenario in your tool, eg:
  - in Augmented (Physical) Bookstore
  - "Find science fiction books"
- 3. Walk thru scenario via "intended" subgoals & actions
  - Like this…

GenderMag'ing with Abi: "Find Science Fiction Books"

- Subgoal #1: "See bookstore map":
Will **Abi** have formed this sub-goal…?

  - Yes/no**/maybe.** Why? Consider Abi's *Motivations…*

See map

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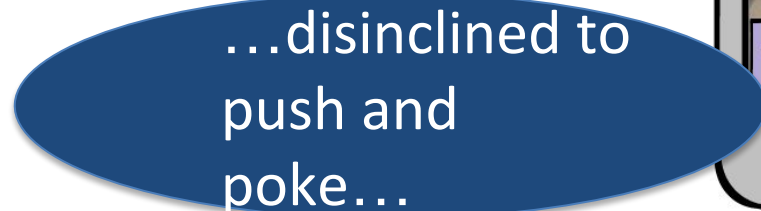
- Action #1: "Tap 'Browse Off'":
  - Q1. Will Abi <u>know what to do</u>?
    - Yes/no/maybe. Why? Consider Abi's , … *Tinkering*
  - Q2. If action … will Abi <u>see progress</u>?
    - Yes/no/maybe. Why? Consider Abi's …-*Efficacy & …*

…disinclined to push and poke…

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Abi (Abigail/Abishek)[1]

- 28 years old
- Employed as an Accountant
- Lives in Cardiff, Wale

Abi has always liked music. When Abi is on their way to work in the mornings, they listen to music that spans a wide variety of styles. But when they arrive at work, Abi turns it off, and begins the day by scanning all their emails first to get an overall picture before answering any of them. (This extra pass takes time but seems worth it.) Some nights Abi exercises or stretches, and sometimes plays computer puzzle games like Sudoku.

Background and skills

Abi works as an accountant. Abi is comfortable with the technologies she uses regularly, but she just moved to this employer 1 week ago, and their software systems are new to her.

Abi says she's a "numbers person", but she has never taken any computer programming or IT systems classes. She likes Math and knows how to think with numbers. She writes and edits spreadsheet formulas in her work.

In her free time, she also enjoys working with numbers and logic. She especially likes working out puzzles and puzzle games, either on paper or on the computer.

Motivations and Attitudes

- **Motivations**: Abi uses technologies to accomplish her tasks. She learns new technologies if and when she needs to, but prefers to use methods she is already familiar and comfortable with, to keep her focus on the tasks she cares about.

- **Computer Self-Efficacy**: Abi has lower self confidence than her peers about doing unfamiliar computing tasks. If problems arise with her technology, she often blames herself for these problems. This affects whether and how she will persevere with a task if technology problems have arisen.

- **Attitude toward Risk:** Abi's life is a little complicated and she rarely has spare time. So she is risk averse about using unfamiliar technologies that might need her to spend extra time on them, even if the new features might be relevant. She instead performs tasks using familiar features, because they're more predictable about what she will get from them and how much time they will take.

How Abi Works with Information and Learns:

- **Information Processing Style:** Abi tends towards a *comprehensive information processing style* when she needs to more information. So, instead of acting upon the first option that seems promising, she gathers information comprehensively to try to form a complete understanding of the problem before trying to solve it. Thus, her style is "burst-y"; first she reads a lot, then she acts on it in a batch of activity.

- **Learning: by Process vs. by Tinkering**: When learning new technology, Abi leans toward process-oriented learning, e.g., tutorials, step-by-step processes, wizards, online how-to videos, etc. She doesn't particularly like learning by tinkering with software (i.e., just trying out new features or commands to see what they do), but when she does tinker, it has positive effects on her understanding of the software.

[1] For distribution data on users similar to and different from Abi, see http://gendermag.org/ . Also includes customizable versions including customizable pronouns.

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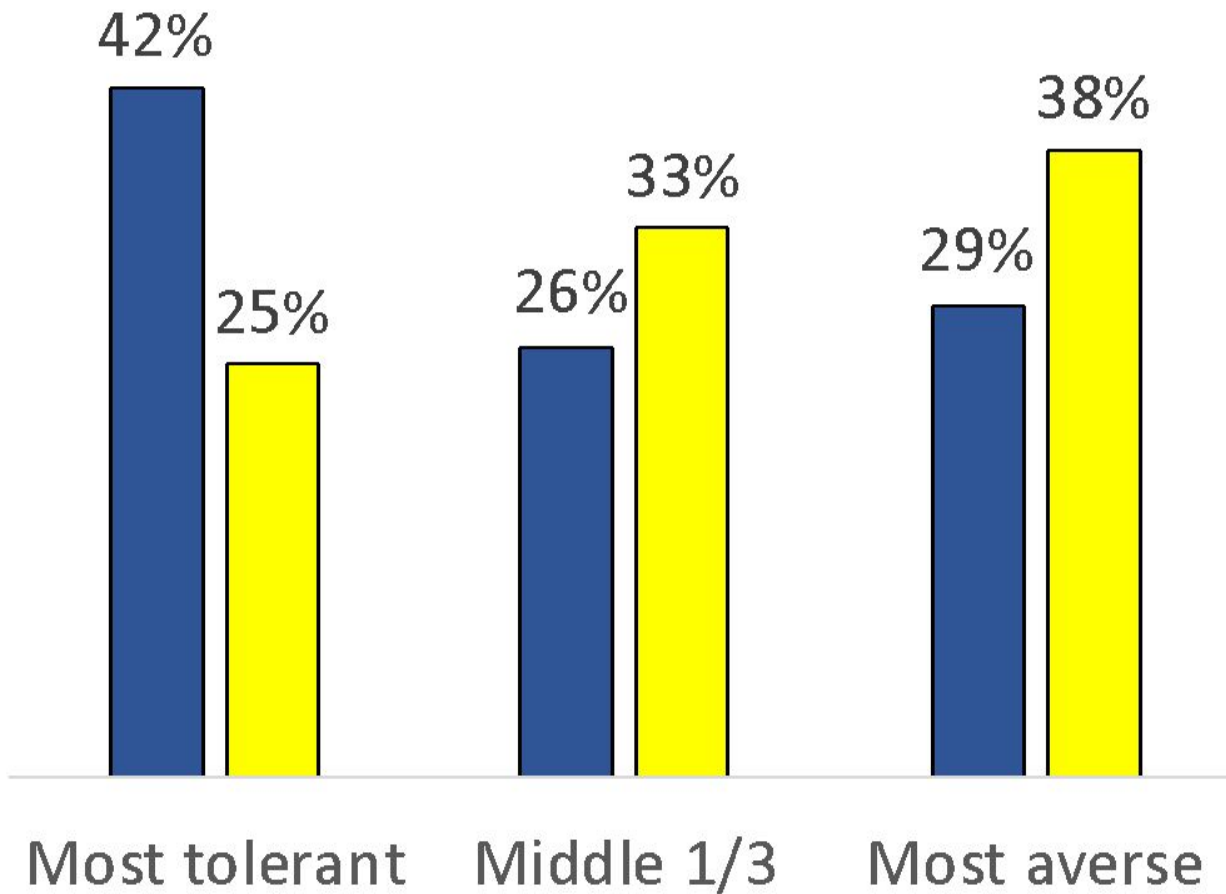
Facet #1

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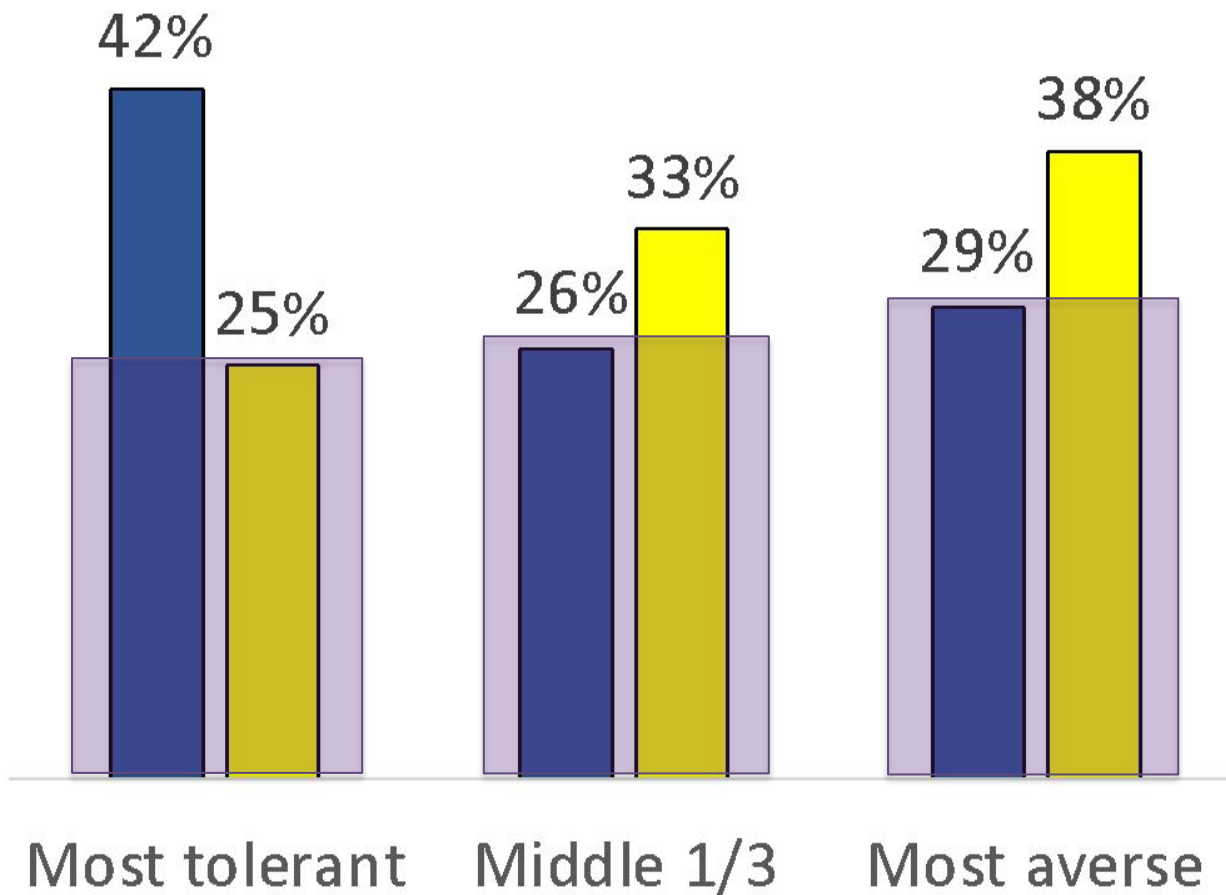
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- …

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Facet #1: Risk

42% 25% 26% 33% 29% 38%

Most tolerant   Middle 1/3   Most averse

Facet #1: Risk

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