The Good, The Bad, and The Ugly
Lessons from an MPC for Social Good Deployment

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Jen Benoit-Bryan (SMU)
Kinan Dak Albab (Brown)
Mia Locks (MMF)
Mayank Varia (BU)
- MMF: independent organization of art museum professionals devoted to envisioning and creating a more just museum sector

- Wanted to conduct a data study asking sensitive questions
  - Staff survey
  - Director Survey
  - HR Survey

- Required different outputs for different parties
Welcome!

Hello and welcome! We appreciate your participation in this survey. This survey is a part of Museums Moving Forward's (MMF) efforts to support greater equity and accountability in museum workplaces through research, advocacy, and coalition-building. Your museum is participating in this initiative and encouraging all staff to share their thoughts and experiences to provide a picture of the overall organizational culture. Your responses to this survey will be encrypted and kept completely anonymous, and all reporting to the leadership team of your museum will be done in aggregate. Every staff member who completes the survey will also be provided with a passcode to access the aggregate data for your institution. Your responses will also contribute to a fieldwide picture of workplace equity and organizational culture that will be publicly available in the Spring of 2023. Please check out this FAQ page to read more about the confidentiality of your responses and how this encrypted data will be used. Your participation and honest answers will help us get a complete picture of your experiences and insights. The survey takes an average of 7-10 minutes to fill out. Please complete this survey only once. Thank you for your time and willingness to share your experiences.
26. With which of the following racial and ethnic groups do you identify as? Please select all that apply. *

- [ ] Black or African American
- [ ] East Asian (including Chinese, Japanese, Korean, Mongolian, Tibetan, and Taiwanese)
- [ ] Hispanic, Latino, or Latina
- [ ] Middle Eastern or North African
- [ ] Native American/Alaska Native/First Nations
- [ ] Native Hawaiian or other Pacific Islander
- [ ] South Asian (including Bangladesh, Bhutanese, Indian, Nepali, Pakistani, and Sri Lankan)
- [ ] Southeast Asian (including Burmese, Cambodian, Filipino, Hmong, Indonesian, Lao, Malaysian, Thai, Singaporean, Vietnamese, or Vietnamese)
- [ ] White
- [ ] Another race of ethnicity
- [ ] Prefer not to answer

26. What is the highest level of education that you’ve completed? *

- [ ] Some high school
- [ ] High school graduate (high school diploma or the equivalent GED)
- [ ] Some college/Associates degree
- [ ] Bachelor's degree
- [ ] Master’s degree
- [ ] Professional or doctorate degree
- [ ] Prefer not to answer

27. Do you identify as a person with a disability and/or as neurotypical/neurodivergent? *

- [ ] Yes
- [ ] No
- [ ] Prefer not to answer

28. Final step: You must create a password to log back in to view results. DO NOT LOSE YOUR PASSWORD as there is no recovery mechanism! This is critical for the preservation of privacy. *

password123

Submit Answers
SecretShare data

$\text{Enc}_{pk_{MMF}}(s_{MMF}), \text{Enc}_{pk_{MMF}}(\text{KDF}(\text{password}))$
MUSEUMS MOVING FORWARD

\[ \text{Enc}_{pk_{MMF}}(s_{MMF}), \text{Enc}_{pk_{MMF}}(\text{KDF(password)}) \]

Semi-honest, gate-by-gate 2PC
Art museum are more dissatisfied than US workers overall.

60% of art museum workers are thinking about leaving their jobs.
68% are considering leaving the field altogether.

More than a quarter of art museum workers have experienced discrimination at their current workplaces.

Only half of workers report discrimination because they feel nothing will be done about them.
Types of Discrimination

Discrimination in art museums is most commonly based on gender, age, and race or ethnicity (see fig. 46). Workers facing discrimination experience an average of two types in their workplaces. The more senior a worker is in the organization, the fewer distinct types of discrimination they experience, with a low of 1.8 among executives up to a high of 2.7 types among entry-level workers.

Types of Discrimination

Which of the following forms of discrimination and/or harassment have you experienced in your current museum workplace? Select all that apply.

- Gender: 52%
- Age: 40%
- Race or ethnicity: 33%
- Social/economic circumstances: 29%
- Disability: 13%
- Sexual orientation: 11%
- Religion: 5%
- Another form: 21%
MUSEUMS MOVING FORWARD

- Be honest about what is and, importantly, what isn't possible for career trajectories within a particular institution.
- Communicate transparently about the rates of promotion at each level.
- Normalize alternative models for career growth beyond the traditional ladder climb, such as moving to other museums or taking on new functions within existing workplaces.

付帯情報：

- Yes, and data is incredible to finally have. Thank you!
- Yes, omg yes!
- The numbers don’t lie. But at least this finally “proves” we haven’t been either.
- Thank you for this, Mia! Really helpful for context for using the data to move forward in our museums. I hope this section is in the written report too.
The “Instagram” Version of the Story
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Lesson 1: Collaborative development is iterative and error prone
Start of Collaboration

ENGAGE EXTERNALLY

PRIOR VISIBLE WORK ON MPC
Lesson 2: Spend time in non-CS spaces

ENGAGE EXTERNALLY

PRIOR VISIBLE WORK ON MPC
System Construction

Fall 2021: Initial conversations
System Construction

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Spring 2022: Hired undergraduates
System Construction

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- Summer 2022: Integrated Survey.js
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System Construction

Start of Collaboration

Data Collection

MPC Computation

Data Analysis

Data Release

Feedback

Fall 2021: Initial conversations

Spring 2022: Hired undergraduates

Summer 2022: Integrated Survey.js

Fall 2022: No circuit spec

Lesson 3: Distinction between circuit inputs and circuit structure in subtle

Lesson 4: Mismatch between the “hard” parts of the problems
Data Collection

```
{
  type: "text",
  name: "question10",
  title: "What is your approximate gross annual income (before taxes and deductions) from your current position in the museum? (If this changes from month to month, please provide an average). Report only your income from your museum job and round to the nearest multiple of 1000."
  isRequired: true,
  min: 0,
  step: 1000,
  max: 5000000,
  validators: [
    {
      type: "regex",
      regex: "^[0-9]+$",
      text: "Please enter a valid number. The response cannot include commas, currency symbols, or spaces (e.g. 50000)"
    }
  ],
}
```
Lesson 5: Testing MPC without circuits is hard. Tight design cycles lead to errors.
MPC Computation

\[ \text{Enc}_{\text{MMF}}(\text{password}), \text{Enc}_{\text{MMF}}(\text{KDF(password)}) \]

Semi-honest, gate-by-gate 2PC

\[ \{a\}, \{b\}, \{ab\} \]
MPC Computation

- Very much the WAN setting with consumer-grade internet connection

Start of Collaboration → System Construction → Data Collection → MPC Computation → Data Analysis → Data Release → Feedback
MPC Computation

- Very much the WAN setting with consumer-grade internet connection
- Highly non-linear circuits (data filtering, comparisons, etc...) with no “smart” preparations
MPC Computation

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- Highly non-linear circuits (data filtering, comparisons, etc...) with no “smart” preparations

- Runtimes 15-30 hours long with frequent crashes. Computations lasted up to a week
Lesson 6: Don’t defer choosing circuits.
Lesson 7: Academic WAN is still an idealized model

- Runtimes 15-30 hours long with frequent crashes. Computations lasted up to a week
Data Analysis

- Compute
- Analyze

[Diagram showing the flow between Compute and Analyze]
Data Analysis

- Request
- Analyze
- Compute

Start of Collaboration ➔ System Construction ➔ Data Collection ➔ MPC Computation ➔ Data Analysis ➔ Data Release ➔ Feedback
Data Analysis
Data Analysis

- Compute
- Analyze
- Implement
- Discuss
- Request

Flowchart: Start of Collaboration → System Construction → Data Collection → MPC Computation → Data Analysis → Data Release → Feedback
Lesson 8: MPC doesn’t provide language to discuss the extent to which any given computation is disclosive.

Lesson 9: MPC mandates discussion and coordination, preventing unilateral action.
Data Release

- Following norms in the social sciences, MMF wanted to release raw data as an appendix
Data Release

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Lesson 10: Norms around privacy and trust are field specific

Lesson 11: Norms are often implicit and only surface in moments of tension
Feedback

MUSEUMS MOVING FORWARD

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Lesson 12: With trust and honesty, there’s an opportunity to recover from mistakes and tension.
Most Important Lessons

Lesson 4: Mismatch between the “hard” parts of the problems

Lesson 8: MPC doesn’t provide language to discuss the extent to which any given computation is disclosive

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Thank you!

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Abigail Gualda

Shobhakumar Selvarhaj
Ingi Hong
Ananya Chakraborty
Aykerim Dussikenova
Thachathum Amornkasemwong
Emily Shen (Sharing Educational Resources)

Link to MMF’s Report