

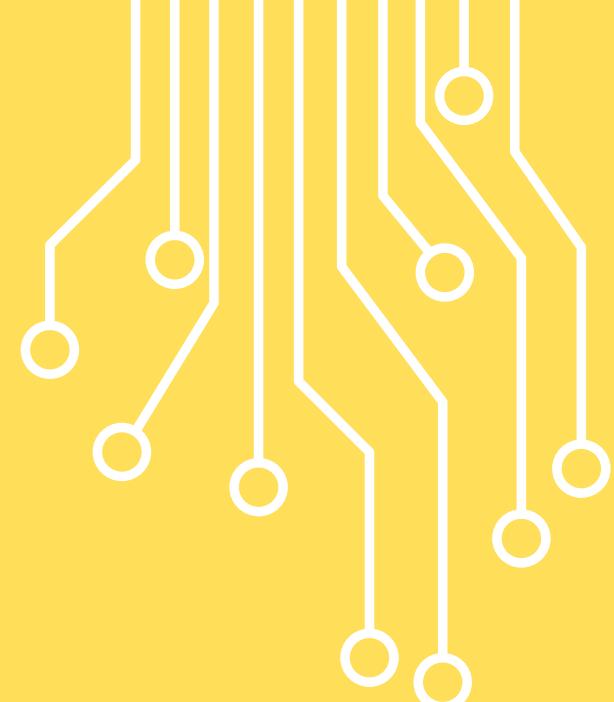
May 11, 2022

BREAKING THE "PATTERN"

Recommendations for addressing racial bias in
federal risk assessment algorithms

Presentation to National Artificial Intelligence Advisory Committee (NAIAC) members, U.S. Commerce Secretary Gina Raimondo (Chair), and Attorney General Merrick Garland

Policy Analysis Presented by Lucky 7 Strategies:
Cassandra Magdaleno Scott, Jessica Friedman, Maha Rizvi, Abhi Nemani



AGENDA

Problem Statement
Causes & Underlying Factors
Target Population
Harms & Costs of Inaction
Market & Government Failures
Legal & Regulatory Framework
Criteria/Alternative Matrix
Recommendations

The Problem

47%

black men falsely categorized
as high risk vs. 26% of white men.
(DOJ, 2021; Grawert, 2019; Stimson, 2020)

Racially-biased federal post-sentencing risk assessment algorithms, such as PATTERN, disproportionately predict that Black men will recidivate, resulting in extended prison terms, undermining the policy goals of rehabilitation and reinforcing the cycle of racially biased incarceration that leads to broader social inequities and government failure.

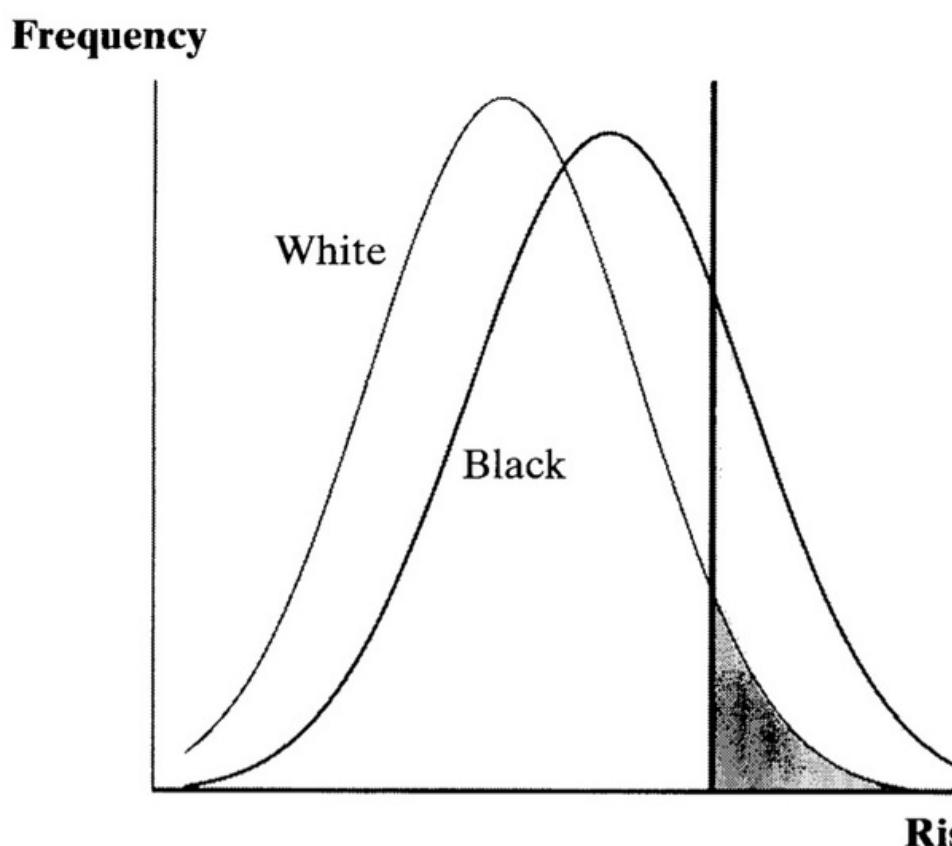


SOCIAL JUSTICE ISSUES WITH RISK ALGORITHMS

Post-sentencing risk assessment algorithms score prisoners on their recidivism likelihood, which informs early release (Hamilton et al., 2021).

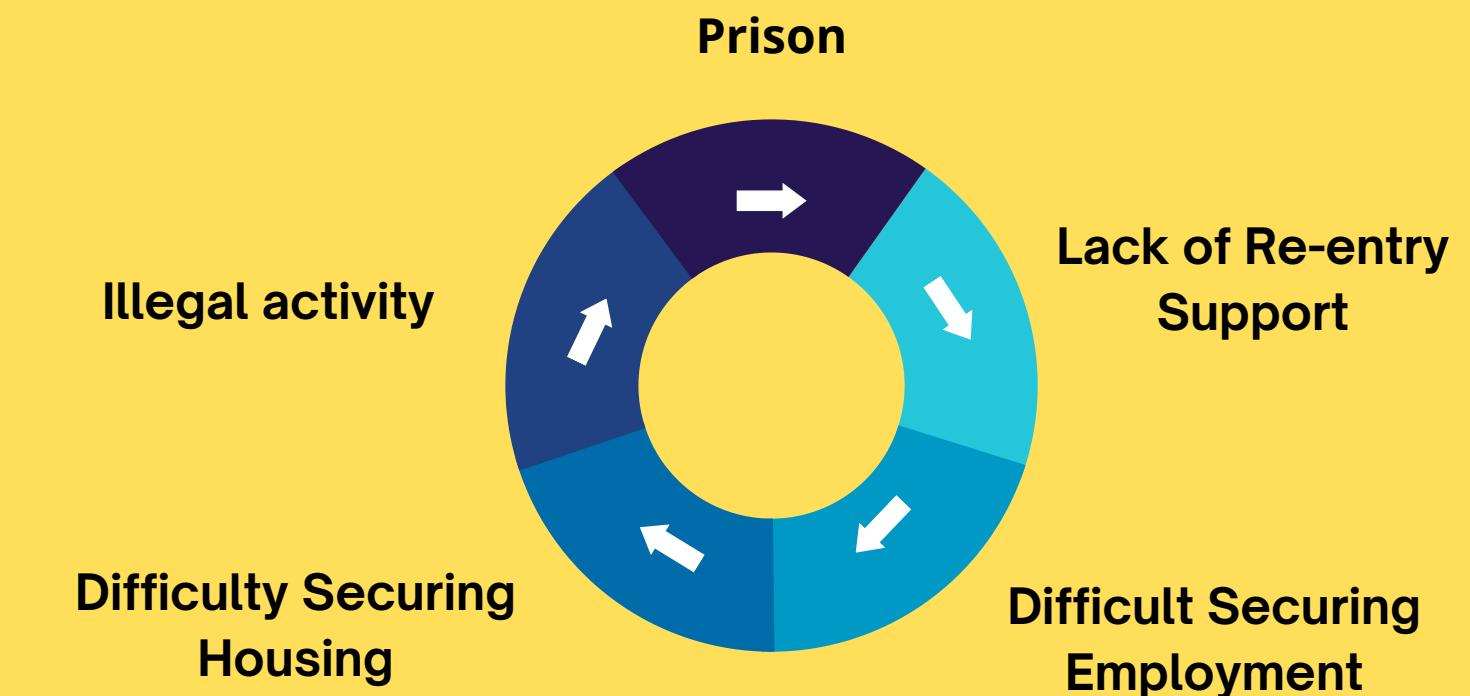
Hypothetical Probabilities for Risks Based on Race

(Yang & Dobbie, 2020)



Cycle of Incarceration and Injustice

(Barkow, 2019)



(Demeter Foundation, 2020)

HARMS AND COSTS OF INACTION



Baseline Societal Cost
\$14,043,875,438.70

SCOPE OF COSTS

Individual
Average Federal Prison Sentence
is ~14 years

Societal
FY2021 BOP Budget
\$7.85 billion

Communities

Cripples Economic
Development

Weakens Social
Connections

Family

Loss of Income
Median income of
\$21,440 in 2021

Prison
Expenditures
\$14,819 in Fees & Fines

Healthcare

Social Welfare

Education

Housing

Individual
Expenditures
2021 Pop. 155,826

Support &
Healthcare

Rehabilitation

Administration

FSA Implementation
\$75 million/year
through FY 2023

Unemployment
35% unemployment rate

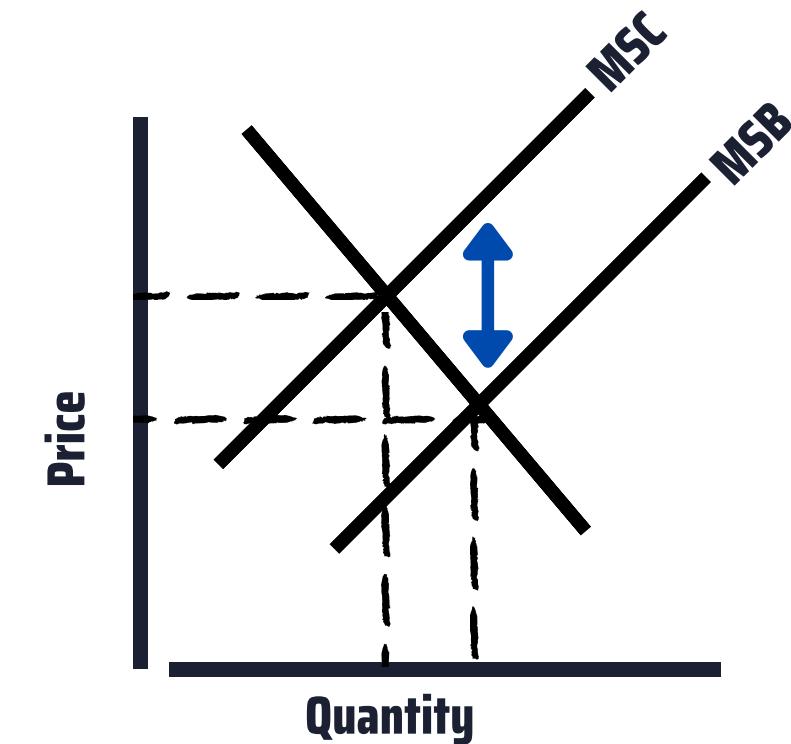
GOVERNMENT AND MARKET FAILURES

Government Failure: Current Risk Assessment Policy Undermines Rehabilitation Goals

While the government is focusing on equity in criminal justice, the failed policies have continued the racial disparities in prison, keeping the incarceration levels and recidivism high (Subramanian et al., 2020).

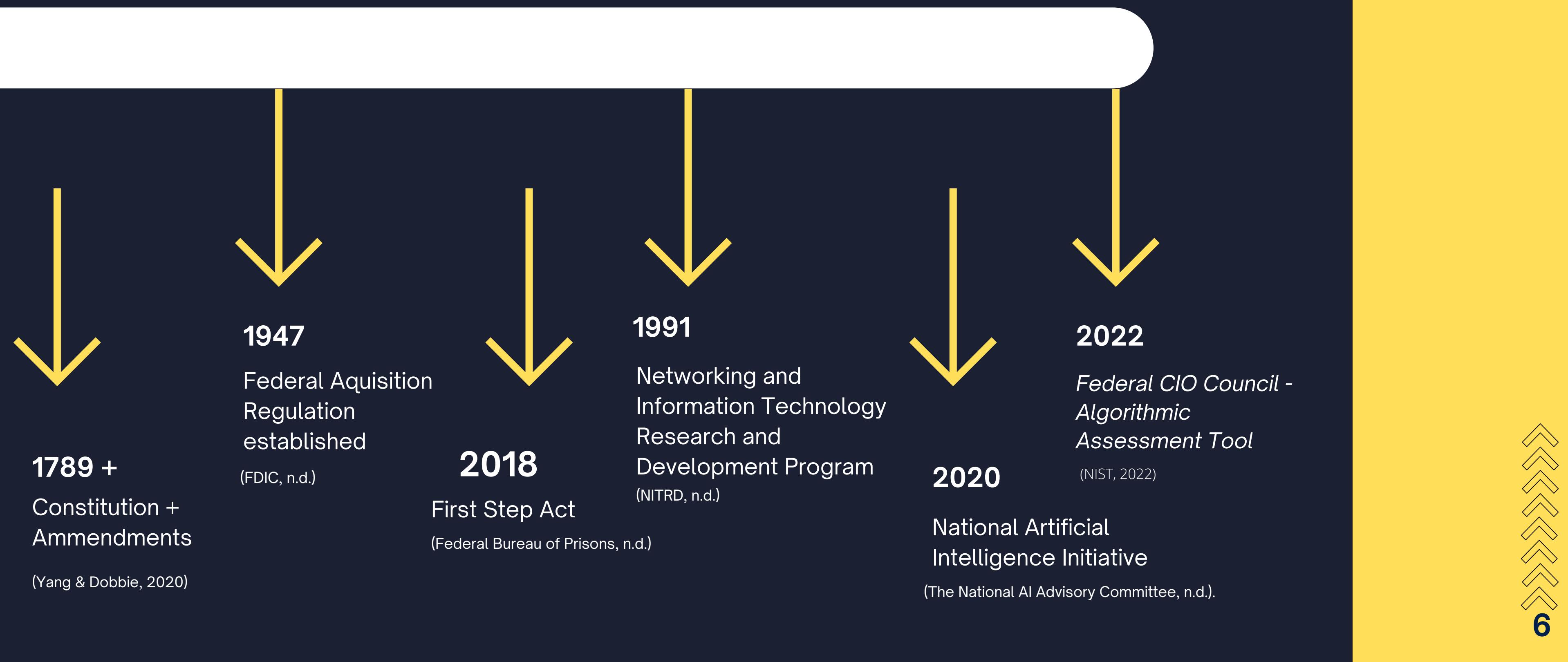


Market Failure: Negative Externality



PATTERN's false positive leads to higher marginal societal costs than marginal societal benefits, leading to negative externality (Krugman & Wells, 2018)

LEGAL FRAMEWORK: A TIMELINE



Criteria Alternatives Matrix

Four Alternatives:

1. Status Quo
2. Algorithmic Reform: Reweighting factors
3. Human Oversight: Review Board
4. Acquisition Reform: Bias Mitigation & Open Source Requirement

Equity

- Reduce racial disparities in risk scoring
- Social Welfare

Economic Development

- Economic Growth
- Government Costs/Savings

Political Feasibility

- Level of Institutional Support
- Legal Authority

Sustainability

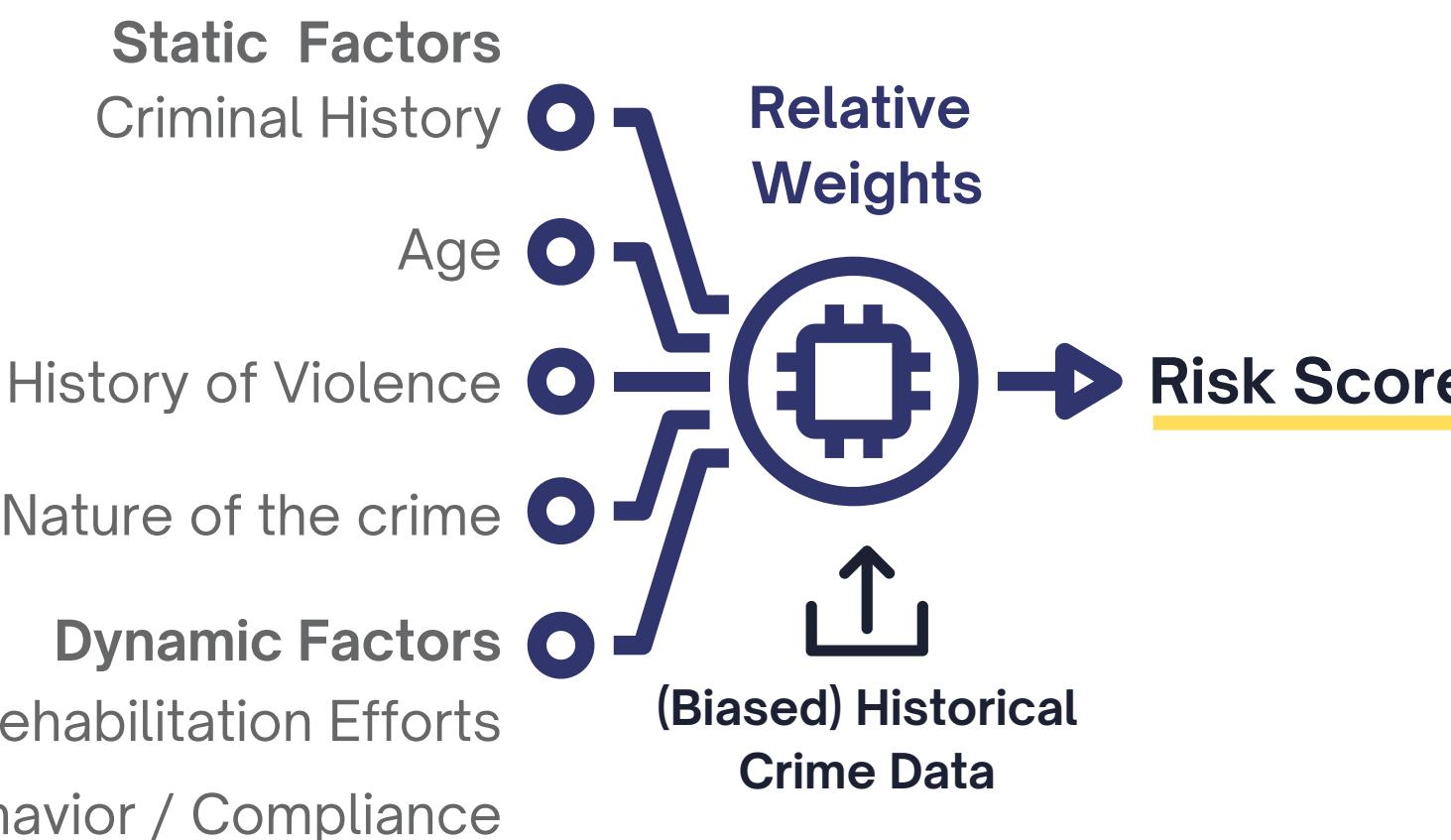
- Ongoing Funding
- Ongoing Accountability

ALTERNATIVE #1

ALGORITHMIC REFORM: REWEIGHING FACTORS

Increase the relative weight of dynamic factors to encourage rehabilitation, and decrease the weight of static factors, specifically criminal history, to correct for historical bias (Cyphert, 2020).

PATTERN Risk Assessment Algorithm

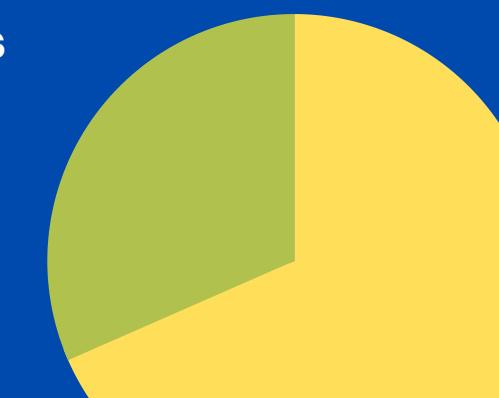


Based off of Hamilton et al., (2021)

Dynamic Factors
31.6%

Current Weighting

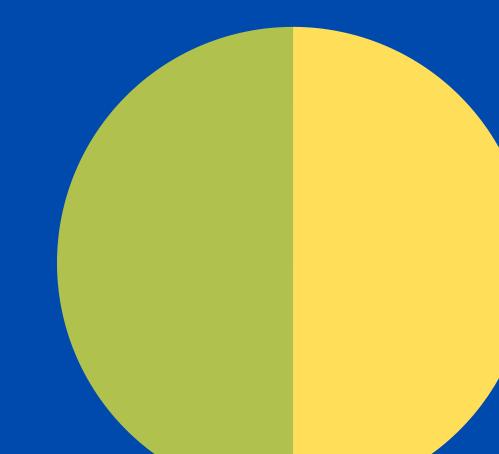
Dynamic Factors
50%



Based off of Hamilton et al., (2021)

Static Factors
68.4%

Proposed Weighting



ALTERNATIVE #2: HUMAN OVERSIGHT: PRISONER APPEAL PROCESS



Risk Assessment Review Task Force, to review case by case



Analysis of nuances that assessments miss



Training for individuals tasked with review

“

The current plan appears to simply apply the current prisoner grievance system.

This is insufficient and inapplicable, algorithmic risk assessment practices require their own process to challenge.

- Professor Melissa Hamilton,
lead creator of PATTERN



ACQUISITION REFORM: REQUIRE OPEN SOURCE & OPEN DATA

Given the high-stakes nature of DOJ systems, the department should set the bar for equitable and accountable algorithms by updating acquisition rules to require open source, open data, bias mitigation, and accountability (Bloch-Wehba, 2021).

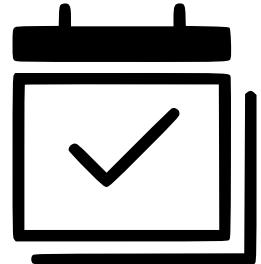
The screenshot shows the homepage of the 'Sharing America's Code' website. At the top, there's a dark header with 'AGENCIES' and 'GUIDANCE' tabs. Below it, a teal banner reads 'Sharing America's Code' and 'Unlock the tremendous potential of the Federal Government's software.' The main content area features the DOJ logo and the text: 'Agency policy is consistent with the Federal Source Code Policy.' followed by two other items: 'Agency has not updated acquisition language.' and 'Agency has not completed inventory.' Each item has a small colored square (green for the first, red for the others) to its left.

- Work with the CIO Council and GSA to update DOJ's acquisition rules & the **Federal Acquisition Regulation (FAR)**
- Require bias mitigation, open source, and open data in new algorithms
- Mandate for **regular independent audits** of all systems (Ng, 2021).

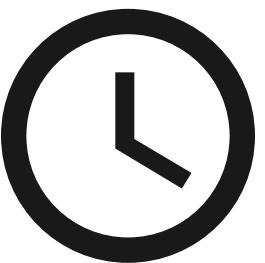
Criteria Alternatives Matrix

		Status Quo	Algorithm Change	Appeal Process	Acquisition Reform	Weight
		2 2	5 4	2.5 4	2 2	40%
Equity	<ul style="list-style-type: none"> • Disparity Reduction • Social welfare 	2 2	●	●	●	●
Economic Development	<ul style="list-style-type: none"> • Economic Growth • Government Costs/Savings 	1 1	●	●	●	●
Political Feasibility	<ul style="list-style-type: none"> • Institutional support • Legal Authority 	5 5	●	●	●	●
Sustainability	<ul style="list-style-type: none"> • Funding • Accountability 	3 4	●	●	●	●
Total	(out of 10)	4.9	7.7	6.3	5.5	100%

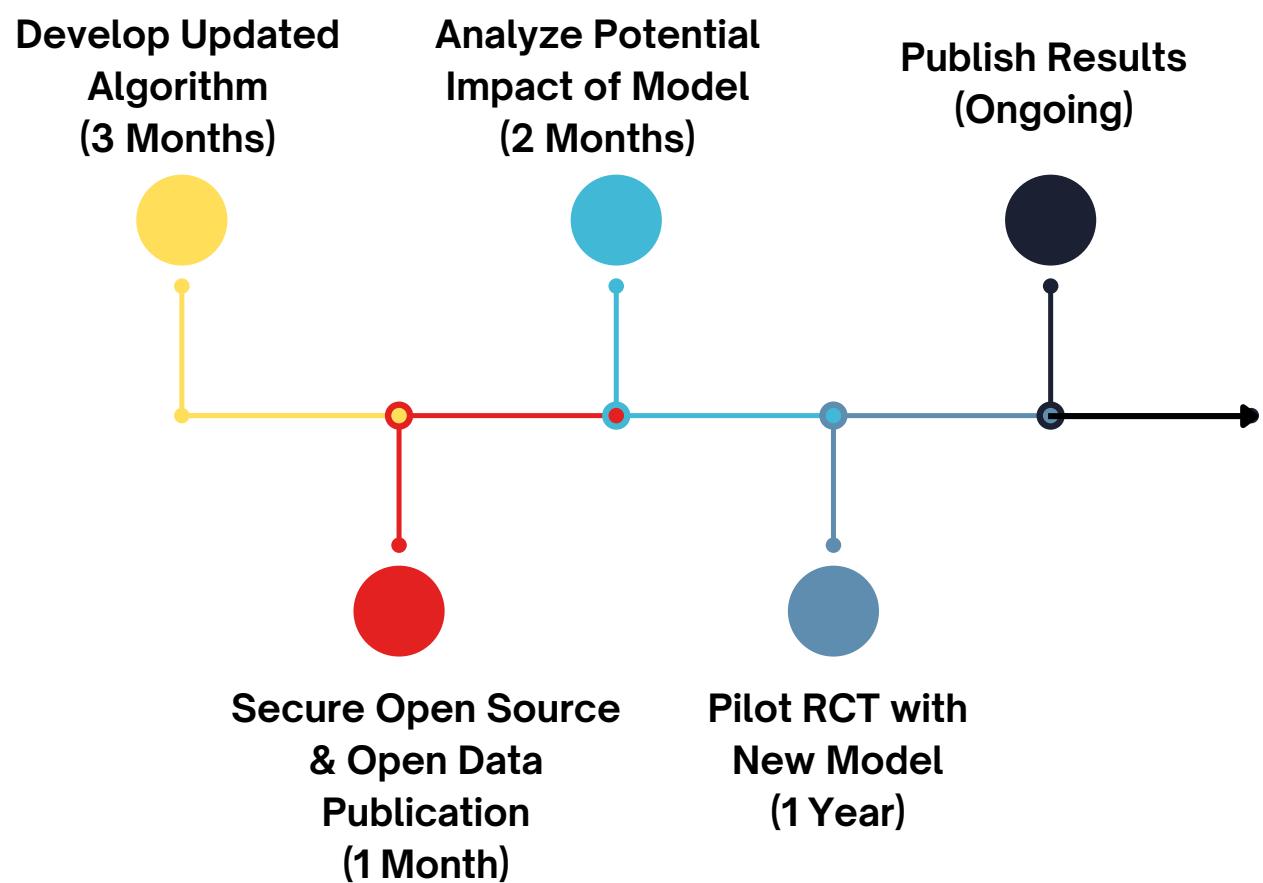
RECOMMENDATION & NEXT STEPS



Plan



Timeline



PROJECTED OUTCOMES

Current Benchmarks

- 47% False Positive for Black Men vs. 26% for White Men (NIJ, 2022)
- 1.42:1 Ratio White Men to Black Men Categorized as "Low Risk" and eligible for early release. (NIJ, 2022)

Performance Metrics

- # of False Positives for Black Men
- # of Prisoners Participating in Rehab Programs
- Change in risk scores in aggregate for Black men

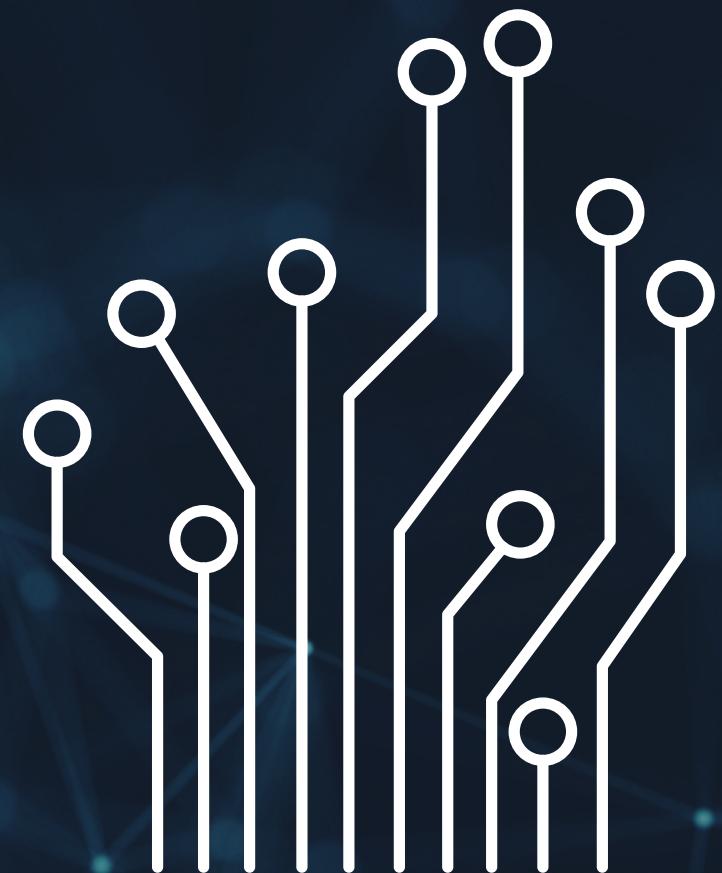
Outcomes

- Fewer disparities in access to re-entry programs for Black Men
- New benchmarks for assessing racial disparities
- Model for new algorithm development

Appendix

7

STRATEGIES



Appendix A

Logic Model

INPUTS

- First Step Act of 2018 Requirements (James, 2019)
- Risk Assessment Algorithm best practices (Hamilton et al., 2021)
- \$375 million over five fiscal years (James, 2019)

ACTIVITIES (HAMILTON ET AL., 2021)

- NIJ Listening Sessions
- PATTERN Development

OUTPUTS (HAMILTON ET AL., 2021; JAMES, 2019)

- PATTERN Algorithm
- Risk levels assigned to federal inmates
- More intelligent decision-making capabilities
- Appropriate allocation of federal resources to reduce recidivism

OUTCOMES (JAMES, 2019)

- Reduced recidivism among federal inmates
- Reduced federal prison populations
- Reduced federal prison expenditures

IMPACT

- Improved mental health
- Increased and strengthened familial ties
- Improved communities

Appendix B

LONG TERM COSTS OF INACTION

	Cost of Excess Prisoners	Loss of Black Male Householder Income	Baseline Long-Term Societal Costs
Future Value	\$ 14,791,400,301.70	\$ 911,582,008.65	\$ 15,702,982,310.34
NPV	\$9,464,534,255.02	\$4,579,341,183.68	\$ 14,043,875,438.70
Discount Rate	3.23%		

Note: Extrapolated from federal racial disparity in sentencing data from Rehavi and Starr (2014) showing there are 8,000 additional Black male federal prisoners per year, Black male householder median income data from the U.S. Census Bureau (n.d.), the cost of incarcerating one person from the Bureau of Prisons (2021), and the Black male lifetime earnings loss from being incarcerated detailed in Gordon & Neelakantan (2021). Link to spreadsheet: https://uscedu-my.sharepoint.com/:x/g/personal/bdjacob_usc_edu/EXsFCD4_T-hNji7TDXBBi_sBXIYg8VVerGhA6mFTjNQtxA?e=IDg8km



WHY IS IT A BIG DEAL?



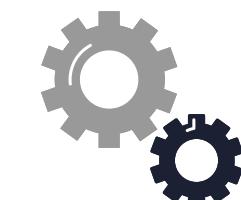
Black men are about 13 percent of the male population, but about 35 percent of those incarcerated (Hinton, 2018)



Black males are incarcerated five times more than White males (Jones, 2020)



1,501 black prisoners for every 100,000 black adults (Gramlich, 2020)



By the age of 35, 50% of unemployed Black males have been arrested, and 25% have been incarcerated (Bushway et al., 2022)



7% of Black people classified as a minimum level risk compared to 21% of white people (Johnson, 2022)

Appendix C

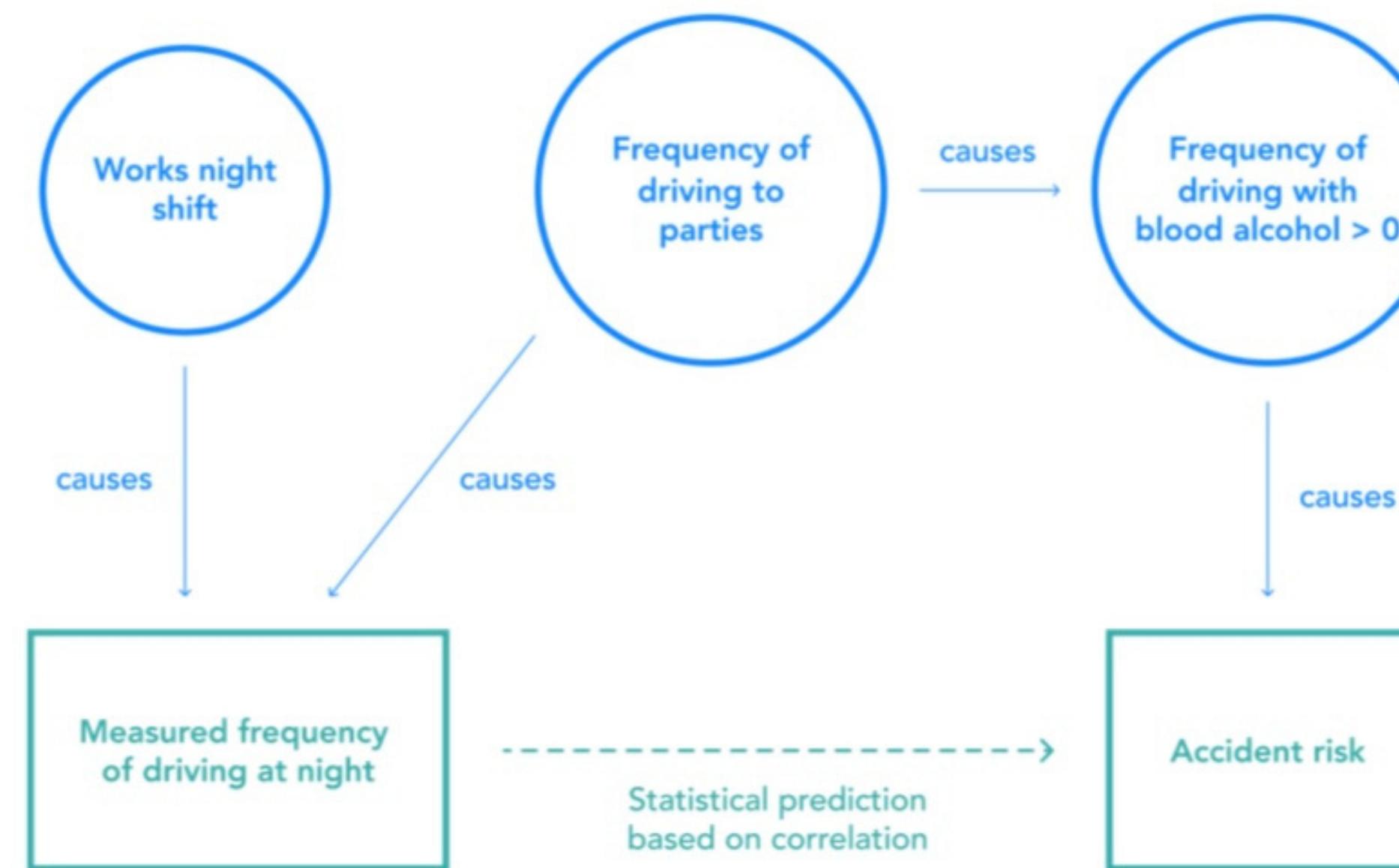
WHO IS AFFECTED? TARGET POPULATION

Appendix D

“The Missing Variable Problem”

(Partnership for AI, 2019)

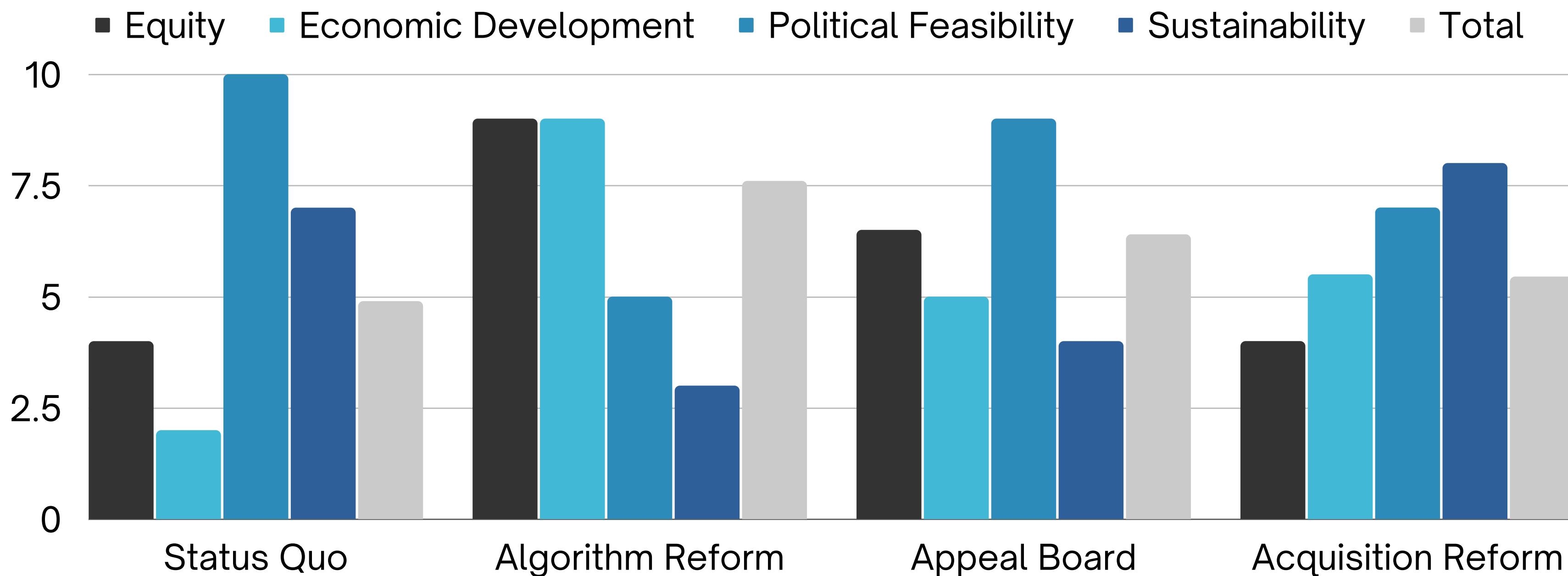
Figure 4: Omitted Variable Bias in a Simple Insurance Model



Solid lines indicate causal variables, boxes indicate variables that are measured in the training dataset, ellipses indicate variables that were not measured, and the dotted line indicates the prediction that is made by the final trained model.

Appendix E

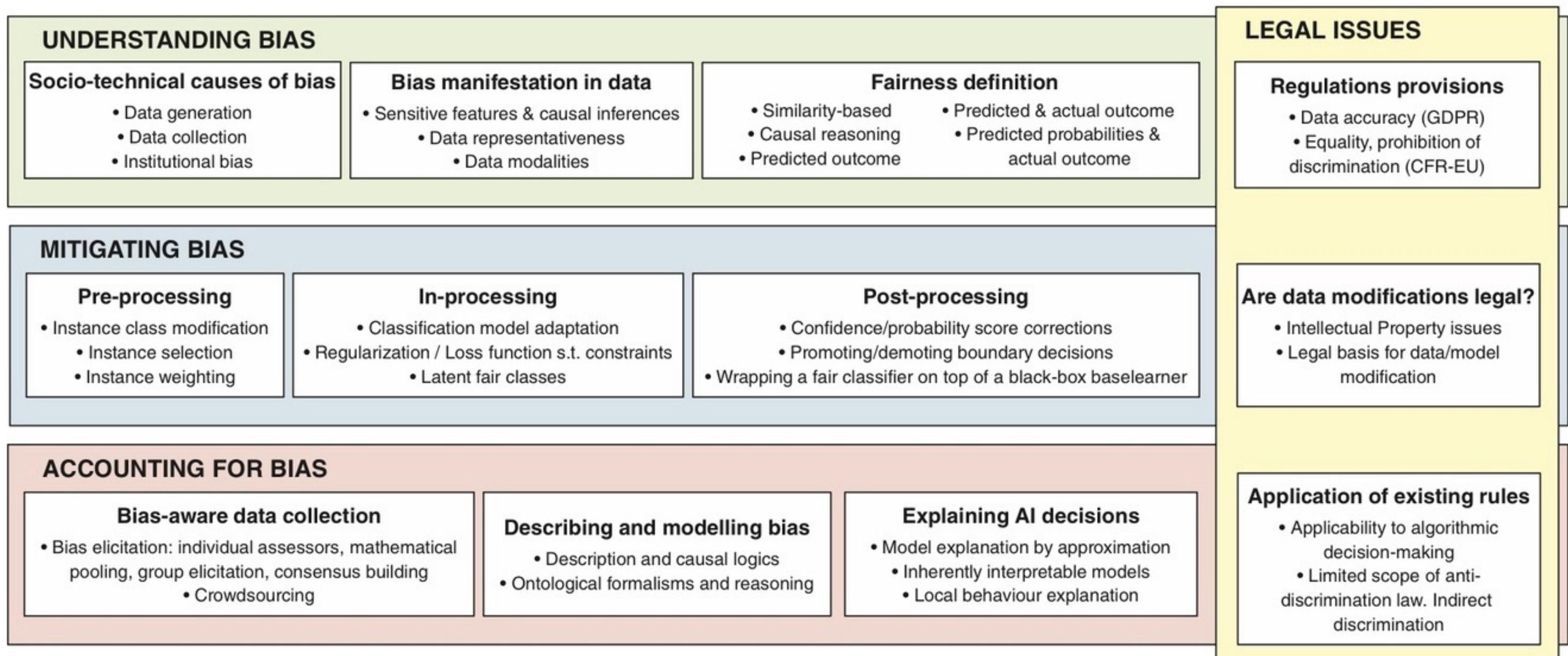
CRITERIA / ALTERNATIVES FINDINGS



Appendix F

Bias Management Framework

(Ntoutsi et al., 2020)



Appendix G Indicator Key

Criteria	Indicator	Scale
Equity	Reduce racial disparities in risk scoring	low score would be 30/1 high score would be 1/1
	Social Welfare	low score - no benefit to society, continued disparity in society. high score would be maximum benefit to society, no disparities in society
Economic Development	Economic Growth	low score - harms economic growth and high score, contributes greatly.
	Government Costs/Savings	low score - higher costs than savings, high score - make money, significant savings
Political Feasibility	Level of institutional support	low score - not sticky, High score sticky
	Legal Authority	low score - no legal authority, requires external approvals, high score - full executive discretion
Sustainability	Funding	low score - no budget currently and/or high budget required. high score - budget exists or low budget required
	Accountability	low score - opaque/closed private. high score open source, totally transparent process

Appendix H

CAM Support

Status Quo

Equity	Economic Development	Political Feasibility	Sustainability
<p>Equal ratio of recidivism classifications in black vs. white men Social Welfare</p>	<p>Economic Growth Government Costs/Savings</p>	<p>Level of institutional support Legal authority</p>	<p>Funding Accountability</p>
<p>The DOJ's 2021 report reviewing and revalidating the tool demonstrated large disparities for people of color. Specifically, it overpredicted the general recidivism rate for Black American men at higher rates than for White American men. Moreover, it's estimated that at least 14,000 people were categorized incorrectly by the tool (NIJ, 2021; Johnson, 2022).</p> <p>The average cost of federal incarceration per inmate in federal prison (2020): \$39,158 (\$120.59 per day). The average annual COIF for a Federal inmate in a Residential Reentry Center for FY 2020 was \$35,663 (\$97.44 per day) (BOP, 2021).</p> <p>As of May 5, 2022, there were 156,558 total federal inmates (BOP, 2022).</p>	<p>Even if one were to exclude the cost of jail, the aggregate burden of incarceration would still exceed \$500 billion annually (McLaughlin et al., 2016).</p> <p>In 2020, WH sought nearly \$300 million to fund improvements related to the law, of which only \$23 million was earmarked for programming. (Cyphert, 2020; Grawert, 2020).</p> <p>For every dollar in corrections costs, incarceration generates an additional ten dollars in social costs. More than half of the costs are borne by families, children, and community members who have committed no crime (McLaughlin et al., 2016).</p>	<p>The First Step Act (FSA) was signed into law on December 21, 2018. On July 20, 2019, 210 days after the passing of the FSA, PATTERN was implemented in Federal prisons. Since the FSA's implementation of the new system, 3,100 people have been released, 3,000 have been resentenced to shorter terms and 2,800 may become eligible for early release once "good time" credits are applied (Grawert, 2020; Benner, 2022). Additionally, BOP has admitted it's concerned about the racial and ethnic differences that affect PATTERN's predictions of risk for recidivism and researchers echo their sentiments (NIJ, 2021; Cyphert, 2020; Santos, 2022; Hamilton et al., 2021). Because it continues to present flaws the DOJ plans another overhaul of the tool and is working with consultants to make the tool fairer (Johnson, 2022).</p>	<p>Specific costs related to the creation of PATTERN are unavailable. It's understood that the FSA authorized \$75 million a fiscal year for the first five years. 80% to be directed to BOP for implementation of the initiatives (Grawert, 2020). BOP needed to find the first \$75 million from the budget until the Consolidation Appropriations Act's passage in 2019 which included full funding of FSA through the current fiscal year. These funds may not be enough. A member of the Independent Review Committee (committee mandated by the FSA) believes full implementation of FSA may take closer to \$300 million.</p> <p>FSA mandated an Independent Review Committee as part of the system. The committee consists of outside experts to advise and assist the government with implementing the law and to develop and publicly release a risk and needs assessment system. PATTERN is reviewed and revalidated by an IRC annually. The cost of the review is unknown (DOJ, 2020).</p>

Appendix I

CAM Support

Alternative 1- Algorithm Change: Reweighting Factors

#1- Rewrite Algorithm	Criteria	Score	Rationale
Equity	Reduce racial disparities in	5	Since criminal histories and age can be proxies for race, by rebalanced towards non-static, dynamic, rehabilitatory factors, fewer Black men should be automatically classified as higher risk (or not low risk) (Hamilton et al., 2022; Brennan Center; 2020)
	Social Welfare	4	Lower risk and a more "productive" scoring system should reduce time spent in prison, bettering the individual and the protected class' social welfare. But there also a risk of increased crime — this is the "trade-off" that undermines the social welfare outcomes. (Cyphert, 2021; NIST, 2022)
Accountability	Economic Growth	4	Research shows that successfully reintegrated felons can contribute to the economy, but current assessment mechanisms do not track income (O'Neil, 2016).
	Government Costs/Savings	3	Post-release expenses are similar to incarceration expenses, suggesting a limited cost savings. Moreover, effective risk assessments and programming to match may require additional resources for rehabilitation (Barkow, 2019).
Economic Development	Level of institutional support	3	The administration and Congress have signaled a commitment to reducing bias in algorithms, but Congressional action has been limited (Winters, 2022)
	Legal Authority	2	Explicitly using race within an algorithm faces political and constitutional challenges, as seen in the move away from affirmative action in college admissions, suggesting this change swiftly demand a court case. That said, given the use of weights for *all persons* not just Black may avoid some issues due to equal treatment (Harcourt, 2015).
Sustainability	Funding	5	Additional funding for the PATTERN 2.0 model would be minimal (~\$1M) (Grawert, 2019).
	Accountability	5	Regular audits are already part of the system, and an CIO Council approved acquisition should support further accountability (CIO Council, 2022)
Total		7.7	

Appendix J

CAM Support

Alternative 2 - Risk Assessment Review Task Force

Equity	Reduce racial disparities in risk scoring	2.5	Implementing a process to challenge the outcome could introduce bias from the task force. It could also give an opportunity to reward cooperation and potential (Santos, 2021).
	Social Welfare	4	Beneficial for society to improve social welfare, families do better when they are not in prison, though they continue to have challenges, being in prison is most challenging (Comfort, 2016).
Economic Development	Economic Growth	5	It will be very easy to audit the outcomes, using a paper trail to evaluate the impact. Established best practices exist in most states and England as an example. (National Audit Office investigation into the Parole Board, 2017) and (Massachusetts Auditor: 'Audit of Massachusetts Parole Board', 2021)
	Government Costs/Savings	2	The process should be transparent, as far as how to challenge, and open records, but when discretion comes into play, that's when the transparency becomes a little cloudy. No established standards (Tonry, 2014).
Political Feasibility	Level of institutional support	3	Helps economic growth slightly to release prisoners, as they can contribute to society, increased economic output for target populations, and greater fairness in the range of government services utilizing AI (House Committee on the Budget, 2020).
	Legal Authority	2	Slightly higher costs to keep someone incarcerated than to rehabilitate. (Annual Determination of Average Cost of Incarceration Fee, 2021)
Sustainability	Funding	4	First Step Act was a bipartisan bill, any updates to PATTERN should be widely accepted. (Cyphert, 2021)
	Accountability	3	Could not find funding, and would need funding for task force to pay for 20 staff members to manage the backlog of 14K challenges, 2 million, which shouldn't be hard to find, insignificant in comparison to overall budgets.
		6.4	COSTS: Each employee can process 2 prisoners a day. 7,000 - days worth 20 people - \$100K salary

Appendix K

CAM Support

Alternative 3 - Acquisition Reform

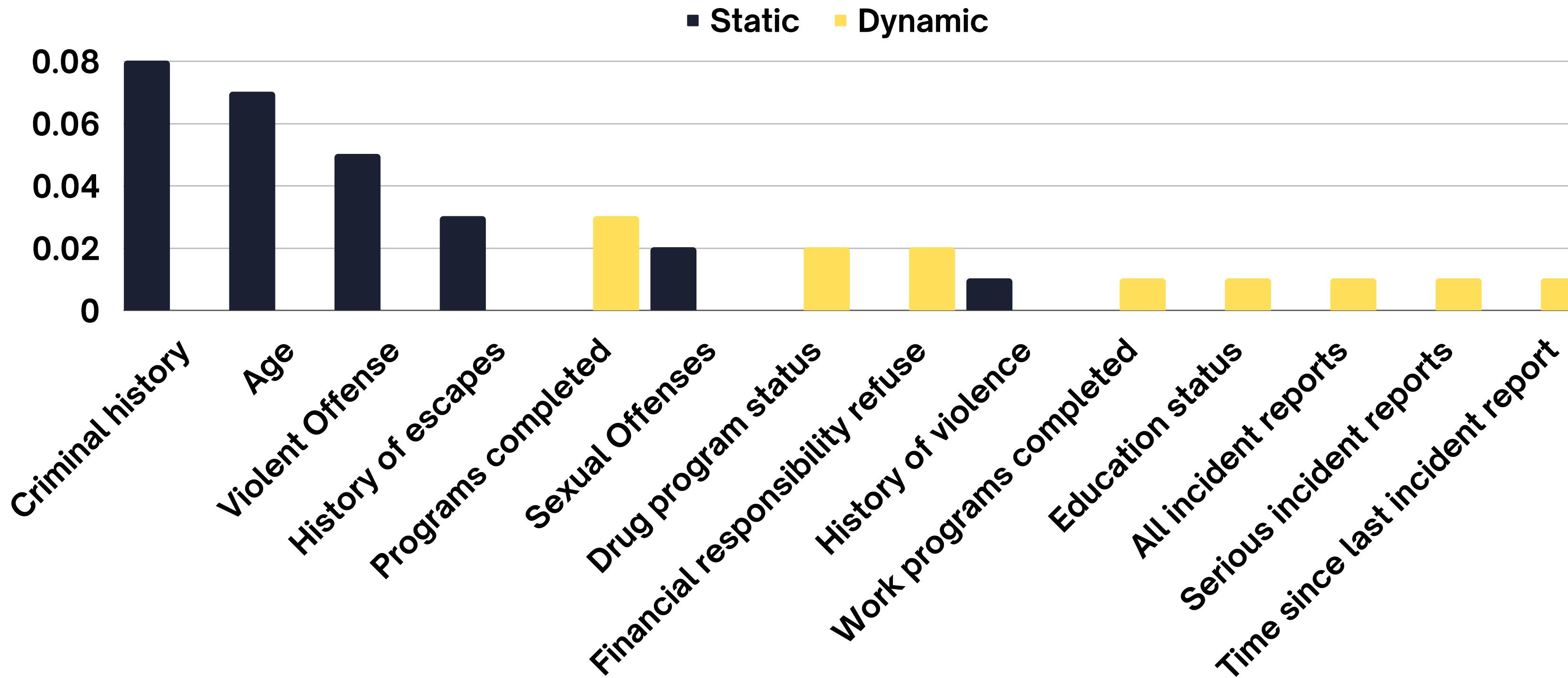
Equity	Reduce racial disparities in risk scoring	2	Reforming acquisitions to include open-source can help with future algorithms, but not for PATTERN (Department of Justice, 2021).
	Social Welfare	2	Beneficial for society as more equity and trust in the algorithm for future algorithms (Department of Justice, 2020).
Economic Development	Economic Growth	2	The addition of extra layers of requirements may cost additional charges or stop conducting business with the government as they can provide other services to other companies, leaving no competition (Kang, n.d.).
	Government Costs/Savings	3.5	higher cost to the government to purchase open code, but also savings to have an in-house development (Manuel, 2011)
Political Feasibility	Level of institutional support	4	The AG office is focusing on equity and lowering recidivism rates through the justice department (Department of Justice, 2021).
	Legal Authority	3	The AG's office has discretion on BOP; there are many authorities for updates on Federal Acquisition Regulation (FAR, n.d.; BOP, 2016).
Sustainability	Funding	3	While there is no budget requirement, there may be other costs associated that are unknown at the time (BOP, 2016)
	Accountability	5	The requirement of open source will allow accountability in reforming algorithms (Jenkins, 2021)
		5.5	Changes to acquisition will not lead to any cost

Appendix L

CIO Council Algorithmic Assessment Tool

Appendix M

Top Criteria Weights in PATTERN (Hamilton et al., 2021)



Appendix N

PATTERN Risk Assessment Tool (BOP, 2021)

MALE PATTERN RISK SCORING							
Register Number: Inmate Name:		Date:					
MALE RISK ITEM SCORING	CATEGORY	GENERAL SCORE	Enter Score	VIOLENT SCORE	Enter Score		
1. Current Age	> 60	0		0			
	51-60	7		4			
	41-50	14		8			
	30-40	21		12			
	26-29	28		16			
2. Walsh w/Conviction	< 26	35		20			
	No	0		0			
3. Violent Offense (PATTERN)	Yes	1		0			
	No	0		0			
4. Criminal History Points	Yes	5		5			
	0 - 1 Points	0		0			
	2 - 3 Points	8		4			
	4 - 6 Points	16		8			
	7 - 9 Points	24		12			
5. History of Escapes	10 - 12 Points	32		16			
	> 12 Points	40		20			
6. History of Violence	None	0		0			
	> 10 Years Minor	2		1			
	5 - 10 Years Minor	4		2			
7. Education Score	< 5 Years Minor/Any Serious	6		3			
	None	0		0			
	> 10 Years Minor	1		1			
	> 15 Years Serious	2		2			
	5 - 10 Years Minor	3		3			
	10 - 15 Years Serious	4		4			
	< 5 Years Minor	5		5			
8. Drug Program Status	5 - 10 Years Serious	6		6			
	< 5 Years Serious	7		7			
	Not Enrolled	0		0			
	Enrolled in GED	-2		-1			
9. All Incident Reports (120 months)	HS Degree / GED	-4		-2			
	No DAP Completed	0		0			
	NRDAP Complete	-3		-1			
	RDAP Complete	-6		-2			
10. Serious Incident Reports (120 months)	No Need	-9		-3			
	0	0		0			
	1	1		1			
	2	2		2			
11. Time Since Last Incident Report	> 2	3		3			
	12+ months or no incidents	0		0			
	7-12 months	2		1			
	3-6 months	4		2			
12. Time Since Last Serious Incident Report	<3	6		3			
	12+ months or no incidents	0		0			
	7-12 months	1		1			
	3-6 months	2		2			
13. FRP Refuse	<3	3		3			
	NO	0		0			
14. Programs Completed	YES	1		1			
	0	0		0			
15. Work Programs	1	-2		-1			
	2 - 3	-4		-2			
	4 - 10	-6		-3			
	> 10	-8		-4			
Total Score (Sum of Columns)	0 Programs	0		0			
	1 Program	-1		-1			
	>1 Program	-2		-2			
General/Violent Risk Levels		General:	Violent:				
OVERALL MALE PATTERN RISK LEVEL							
Male Cut Points							
General		Violent					
Minimum = 8 or less		Minimum = 6 or less					
Low = 9 - 30		Low = 7 - 24					
Medium = 31 - 43		Medium = 25 - 30					
High = 44+		High = 31+					

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