A AN ANALYTIC FOR APPLYING CONTESTED CONCEPTIONS OF FAIRNESS IN COMPUTER SYSTEMS

Dimension of Fairness	Description of Dimension	Example of Dimension	Interrogation Questions
DIMENSIONS OF THEORY			
Purpose	That which fairness provides or contributes to those protected.	○ Individuality (i.e., not viewed as a statistic) ○ Dignity (ability to participate) ○ Respect (presentation of self/recognition of self) ○ Empathy (recognition of unequal starting points, capacities, etc.)	What is fairness for?
Justification	That which justifies fairness, i.e., *fairness is justified because of X*	○ Historical Oppression (Racism, Sexism, etc.) ○ Inherent sameness ○ Diminishing impact of luck/uncontrolled benefits & risks ○ Social Welfare ○ Self development ○ Incentives for X ○ Rewards for X ○ Reparations	Why should this be fair?
Contrast Concept	That which contrasts to fairness, i.e., *that which is fair is mutually exclusive with that which is X*	○ Inequality ○ Bias ○ Discrimination ○ Racism, Sexism	What's not fair?
Exemplar	The prototype of fairness, i.e., *fairness is best illustrated by X*	"one person, one vote"	What's an example?

Table 1. Dimensions of theory for contests over fairness.

Dimension of Fairness	Description of Dimension	Example of Dimension	Interrogation Questions
RELATIONSHIP TO SOCIETY			
Relationship to Justice	The extent to which fairness overlaps with or supports justice.	○ Distributive justice ○ Retributive justice ○ Compensatory justice	How does justice relate to fairness?
Stakeholder Viewpoint	Fair as seen from whose point of view? (This person might not be the subject of fairness analysis.)	Stakeholder viewpoint	Fair as seen from whose point of view? (This person might not be the subject of fairness analysis.)
Boundary of the System	The scope of the system being evaluated for fairness.	○ Technical System ○ Technical system and user ○ Technical system and user and organization ○ Technical system and user and organization and norms/regulations	What is the (socio-)technical system that is being made fair?
DIMENSIONS OF UNFAIRNESS			
Action	That which contributes or constitutes unfairness	○ Unequal treatment/discrimination ○ Unequal outcomes ○ Unequal process ○ Stereotyping ○ Statistical Treatment	What violates fairness?
Offender	Actor(s) violating fairness, i.e., *fairness violated by agent X.*	○ Government ○ Business entity ○ Individual	Who violates fairness?
Consequences of unfairness	What harms result from a defecit of fairness?	○ Loss of benefits ○ Loss of dignity ○ Loss of autonomy	For stakeholders of the system, what are the consequences of failing to realize fairness?

Table 2. Dimensions of unfairness for contests over fairness.

Dimension of Fairness	Description of Dimension	Example of Dimension	Interrogation Questions
DIMENSIONS OF PROTECTION			
Target	The ideal end state toward which fairness aspires. At a high level, this could be substantive or procedural.	○ Formal equality (blind to all other variables)—to each person an equal share; ○ Need-based allocation—to each person according to individual need; ○ Effort-based allocation—to each person according to individaul effort; ○ Social contribution— to each person according to societal contribution; ○ Merit-based allocation—to each person according to merit; ○ Information and participation rights ○ Accurate and robust representation	What should fairness provide?
Subject (and, in relation to who/what?)	Actor(s) or Entity(ies) to whom fairness is provided. Fairness is often used comparatively, requiring the construction of categories along some attribute or set of attributes.	○ Individual ○ Social Groups ○ Roles	Fairness is at stake for whom or what? What properties or attributes are being made fair? What groups are being compared? Granularity?

Table 3. Dimensions of protection for contests over fairness.

Dimension of Fairness	Description of Dimension	Example of Dimension	Interrogation Questions
DIMENSIONS OF PROVISION			
Provider	Actor(s) charged with being fair or avoiding unfairness.	○ Government ○ Business entity ○ Technology ○ Individuals	Who or what is supposed to behave fairly or avoid unfair behavior?
Mechanism	Modalities used to support fairness.	○ Legal regulations ○ Technical design ○ Business processes ○ Education ○ Norms	How is fairness operationalized?
Implementer	Actor(s) tasked with operationalizing fairness through chosen modalities.	○ Lawyers ○ Engineers ○ Product Managers ○ Designers ○ Professional associations ○ Educators	Who brings fairness into practice?
DIMENSIONS OF CONTEXT			
Social Practice	That wherein fairness applies, i.e., *a situation, a field, a site, a model.*	○ Hospital or University ○ Nation-State or Globally	What is the context of fairness?
Scope	Extent of application of fairness, i.e., *fair should be applied at scope X.*	○ Universally as strict rule ○ Casuistically as per-case	How widely does fairness apply?
Time	The time period(s) over which fairness is measured and observed, i.e., *fairness applies for span X of time.*	○ Before decisions are made ○ When decisions are made ○ After decisions are made	When is fairness observed? When do we measure what is fair? Is this a static process or a dynamic one?

Table 4. Dimensions of provision and context for contests over fairness.