Ethics of AI in Radiology: European and North American Multisociety Statement

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Disclosures

- Advisor, Philips Healthcare
- Advisor and investor, Innosphere

- Senior scientist, ACR DSI
- Chair, SIIM liaison committee
- NJH: machine learning for respiratory disease

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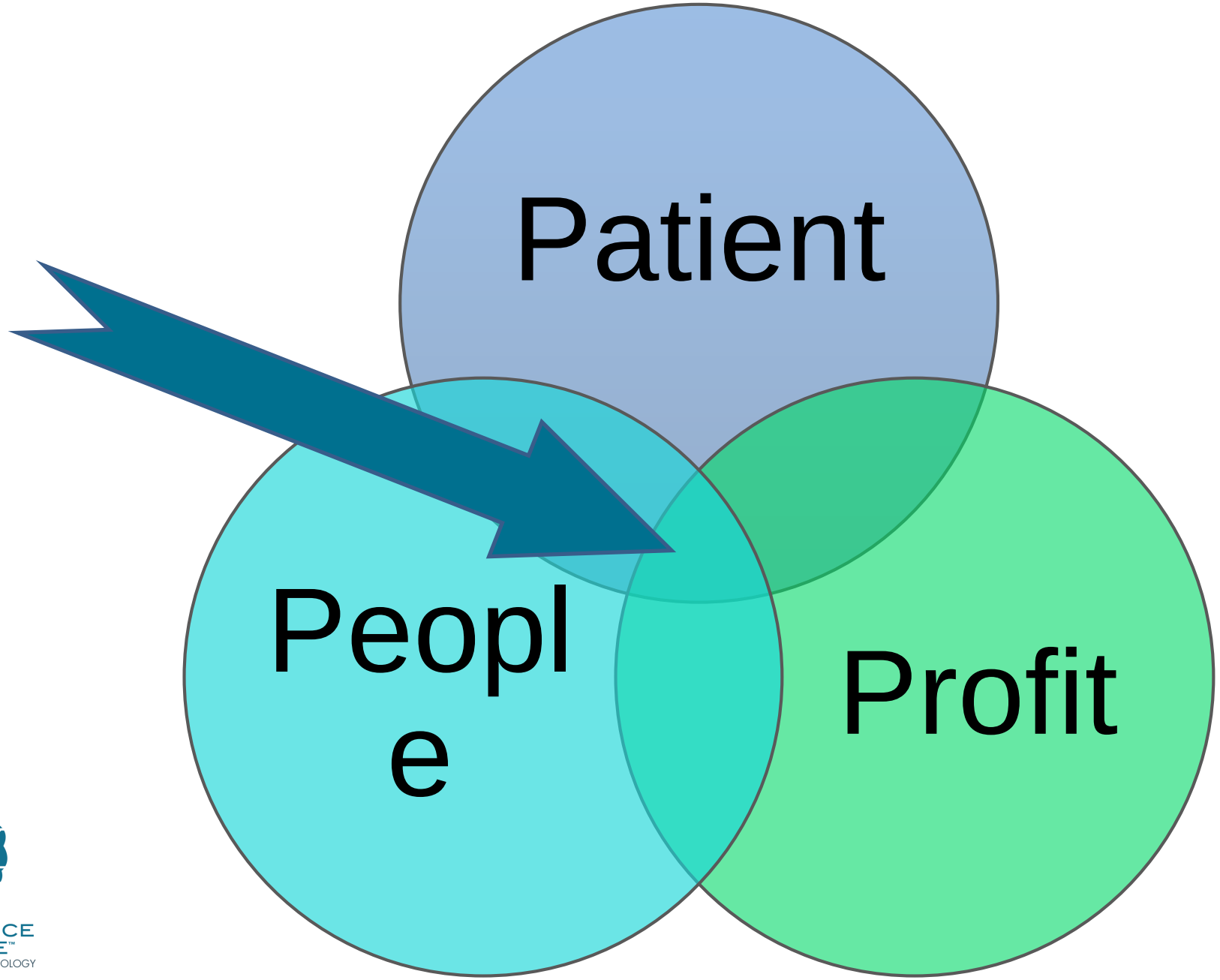

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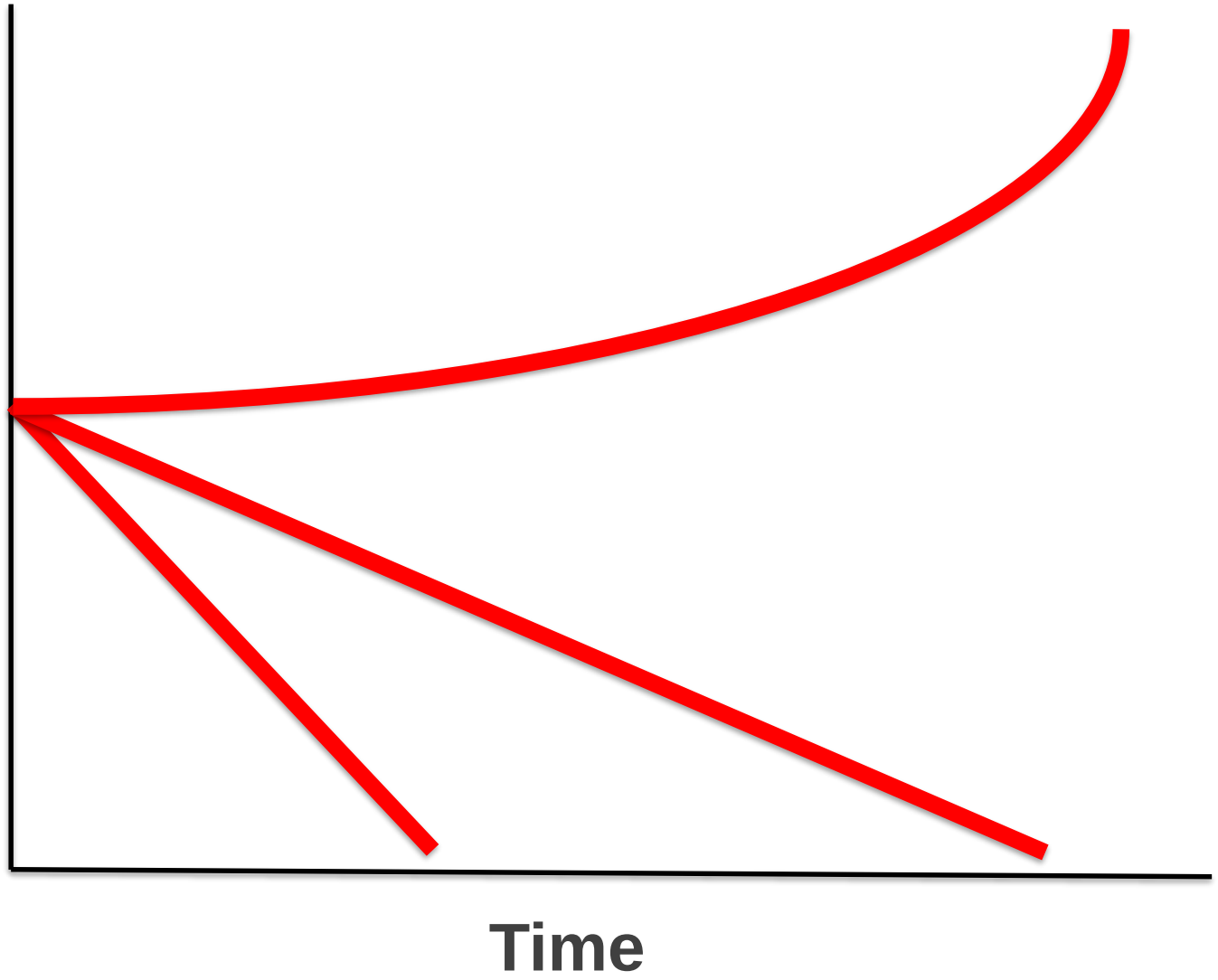

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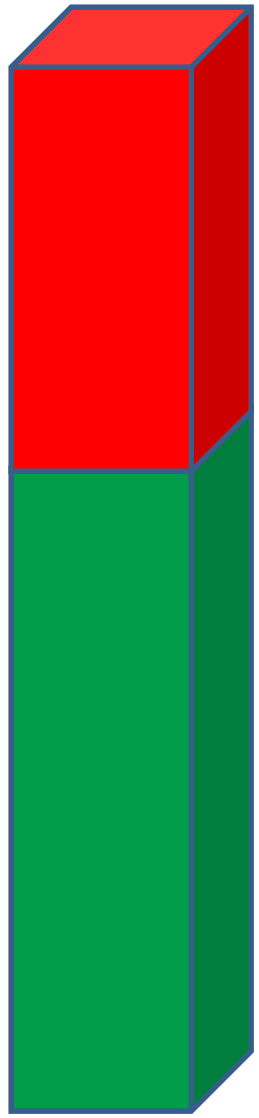
Maximize barriers to obtaining value from unethical data use

Maximize value from ethical data use



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Implicit (Unintended) Bias

Technical - Dataset shift

Marital Status

Upbringing

Physical Ability

Gende r

Age

Race

Religio n

Parental Status

Physical Attributes

Sexual Orientation

Educatio n

Cultur e

Appearance

Ethnicity

Environment

Confounding Attributes - Comorbities

Location

Religio n

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Categories are Discrete
Humanity is Continuous

@sargsyanz

Consistency

Domain Sense

Generalizability

Algorithm Transparency and Explainability

Fairness

Trust/Performance

Fidelity

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Ethics of Data

- How will we document and notify patients, about how are data are used, both by us and others?
- How do we document data used to train an algorithm, including descriptors for features traditionally associated with bias and discrimination?
- How and by whom are labels generated? What bias might arise from the processes used?
- What kinds of bias may exist in the data used to train and test algorithms?
- What have we done to evaluate how our data are biased, and how it may affect our model?
- What are the possible risks that might arise from biases in our data, and what steps have we taken to mitigate these biases?
- Is our method of ground truth labeling appropriate to the clinical use case we are trying to resolve?

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Ethics of Algorithms

- Are we able to explain how our AI makes predictions?
- How do we protect against malicious attacks on AI tools and/or data?
- How do we create sustainable version control for AI data, algorithms, models and vended products?
- How will we minimize the risk of patient harm from malicious attacks and privacy breaches?
- How will we evaluate trained models before clinical application, for clinical effectiveness, ethical behavior, and security?
- How will we monitor AI models in clinical workflow to ensure they perform as predicted and that performance doesn't degrade over time?

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Ethics of Practice

- What are the risks associated with this AI implementation, and what level of human oversight is necessary to mitigate these risks?
- What education and skills are needed to decide whether to apply AI to our patients, and to safely and effectively use it when appropriate
- What system/process should we implement to monitor the impact (outcomes, privacy, and unintended discrimination) of AI on our patients, and providers (automation bias)?
- How do we continuously and actively monitor AI driven autonomous and intelligent tools to verify they are working as expected in clinical care?
- What guardrails should we use to determine when, and more importantly when not, to implement autonomous or intelligent mechanical agents?

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