University of California, Berkeley
Spring 2020

HCE Toolkit

What is the HCE Toolkit?

A set of concepts and methods from Science, Technology, and Society (STS) and History selected to build understanding of the *datafied* world, helping students to identify where human power structures and value choices get built into technical work, and empowering them to discover how, when, and where they can responsibly and effectively intervene.

Tools		**Methods**
agency classification co-production expertise hybridity identity / positionality institutions labor	materiality performativity power representation scale sociotechnical imaginaries sociotechnical systems	compare contextualize interpret historicize - alternatives - contingency - trajectory - dynamics - patterns

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- theories that describe how technology and society relate
- elements of social life that undergo transformation and are salient in defining technological design, use, and forms of life in the datafied world.

Agency

Agency is the ability or capacity to act or exert power. Technology informs the way in which people both perceive and exercise their capacity to exert some degree of control over the sociotechnical relations in which they are enmeshed.

Exemplary cases:

- Algorithmic decision-making (COMPAS, Gig economy laborers)
- Real-time interplay of human and mechanical agency (autonomous vehicles, pilots)
- Patients tracking their health through data apps and devices
- Google Walkout
- Disruptive innovation and the tech entrepreneur agent

Questions to ask with this tool:

- How is human agency delegated to a technology?
- How does the delegation affect responsibility?
- What kinds of agency is amplified and what kind is constrained by the technology?
    - In what ways?
- What kinds of social structures does the specific form of agency aiming to challenge?

Classification

Implicit and explicit social organization of beings and knowledge into discrete categories governed by identifiable principles. Societies produce knowledge and do work (e.g. with technologies) by sorting, ordering, and classifying phenomena in the world. Classification systems inform social order and vice versa.

Exemplary cases:

- Bettina Wulff and Google autocomplete
- Risk and vulnerability assessment algorithms
- Content moderation; Designing ML for identifying and eliminating hate speech in social media

Questions to ask with this tool:

- How does the technology depend upon classification in order to work?
- How does the technology classify? What/who does it classify?
- What are the categories of classification? What's the process used to classify? (e.g. Does it count as the thing we're interested in? Do we count it? How?)
- How were the categories determined/decided upon? By whom? With what purpose? Can they be revised?

Co-production

Technology and society are mutually constitutive, or, in other words, they depend on one another for the forms they assume: technology makes society what it is, and society makes technology what it is. Or, “Technology is co-produced with society.”

Exemplary cases:

- Ideas of privacy co-produced with social media platforms
- Statistical tools are co-produced with the formation of the nation-state
- Ethical codes are co-produced with professions
- Labor conditions in the datafied world are co-produced with technologies of surveillance

Questions to ask with this tool:

- What technology is co-produced with what aspect of society?
- How does this co-production take place?
- What’s at stake in these two things being co-produced?

Expertise

Skill or knowledge in a domain. Technical expertise is usually institutionalized and is variously valorized in societies (e.g. associated with establishment of facts, trust, and authority). Technical experts often wield particular kinds of social power.

Exemplary cases:

- COMPAS algorithm and the expertise of the judge
- Value of transparency in algorithmic systems and necessary expertise to be able to engage it
- Cumbrian sheep farmers
- Climate science
- Risk management; work of regulatory agencies
- Tech workplace, expertise and gender

Questions to ask with this tool:

- Which aspects of expertise are shifting with technology? Which are staying the same?
- Who is thought to be an expert? What is the social role of their expertise? Relationship to "lay" or non-expert?
- What is the role of the expert in democratic institutions? How can expertise and democracy come into conflict with one another?
- What are the skills socially-deemed necessary to become an expert?
- What are the conditions of expertise necessary to participate in the public sphere?
- What qualities of expertise are valorized (e.g. objectivity, compassion, leadership, etc.)?

Hybridity

Entities or systems composed of heterogeneous elements. Technologies are layered upon bodies and spaces in ways that are messy, accidental, piecemeal, resulting in "landscapes" that are part new, part old.

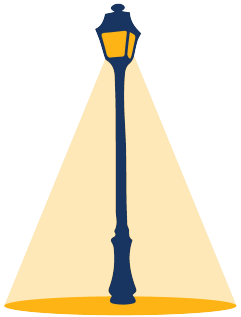
Exemplary cases:

- Smart cities (the way in which data is intertwined into the fabric of the city)
- Cyborg, or the ways in which people incorporate technologies into their ways of doing and being (how we think about ourselves and how we perform certain care of the self, e.g. health, work)
    - Pilot
    - Nuclear power plant operator
    - Self-tracking

Questions to ask with this tool:

- How is the technology incorporated into the body, self, city, or organization? What part of it is incorporated?
- How does the technology interact with structures, materialities, values that pre-exist it?
- What new capabilities or ways of being does the hybrid enable? Constrain?

Identity / Positionality



Life-shaping and socially conditioned aspects of selfhood, such as gender, race, class, disability status, income, immigration status. Identity is not only about how you see yourself but also how society sees and treats you (positionality). Identity is co-produced with technology.

Exemplary cases:

- Disparate impact of algorithms on different identities (facial recognition technologies; "Gaydar"; predictive policing)
- Social media activism as a component in the civil rights struggle for the recognition and rights for people with particular identities
- Self-tracking technologies built around particular concept of identity (self-aware, efficient)

Questions to ask with this tool:

- Which aspects of identity are shifting with technology? Which are staying the same?
- How does identity inform how people choose to interact with technologies?
- How do social identities regulate who has access to what technological and political resources?

Institutions

Informal customs, norms and practices or formal laws and organizations that support and generate forms of social order (e.g. institution of marriage, economic or legal system, courts and schools).

Exemplary cases:

- Role of private data corporations in policing (e.g. Palantir)
- Use of algorithms in the courtroom
- Social media and the public sphere

Questions to ask with this tool:

- Which aspects of institutions are shifting with technology? Which are staying the same?
- How does the transformation in institutions influence their social function? With what consequences for the balance of power?
- How/which institutions regulate technologies? In what ways?
- What kinds of new institutions are created?
- What role does the institutional context play in the way in which a technology is used or imagined?

Labor

Physical or mental activity or exertion for the sake of sustenance of life, and the conditions in which this activity takes place and acquires value.

Exemplary cases:

- "Gig-economy" -- driving, delivering, on-demand dog-walking, etc.
- Anti-Eviction Mapping Project
- Amazon warehouse
- Doctors and judges assisted by algorithms
- Imaginaries of robotics and the automation of certain types of labor

Questions to ask with this tool:

- Which aspects of labor are shifting with technology? Which are staying the same?
- How are forms of work and production structured in the datafied world?
- What is the relationship between work done by people and work done by machines?
- How are the rewards for work products allocated? With what consequences?
- What kind of labor is considered valuable and what kind is not? What role does technology play in this valorization?

Materiality

The quality of being composed of matter.

Exemplary cases:

- TSA body scanners and privacy
- Carpenter v. United States and doctrine of search and seizure of phone v. physical property
- Environmental externalities and energy resources of technology production
- Warehouse labor v. "seamless" delivery of on-line orders
- Infrastructure; Robert Moses' bridges
- Google Sidewalk Labs
- "Clean tech"

Questions to ask with this tool:

- Which aspects of materiality are shifting with technology? Which are staying the same?
- What are the material supports and consequences of seemingly immaterial processes? What's at stake?
- How do imaginaries of the virtual and immaterial become embedded in or interact with physical reality (bodies, artifacts, devices, buildings, infrastructures)?
- Pay attention to issues like durability, maintenance, and environmental contexts of technologies

Performativity

The way in which systems for organizing knowledge (language, concepts, metaphors, models, classification systems, automated decision-making systems) bring into being the very phenomena they set out to describe.

Exemplary cases:

- Racial classification systems
- Algorithmic Self
- Quetelet's "Average Man"
- Performance rating/scoring systems
- Surveillance capitalism, A/B testing and behaviorism
- Predictive Policing (urban surveillance; Allegheny Family Screening Tool)

Questions to ask with this tool:

- How does a classification system create and impose identities on individuals and populations?
- With what kinds of effects on their agency and well being? Whose agency or power does it serve?
- What are the mechanisms that make this knowledge productive?
- How does performativity enable knowledge to serve the aims of social control?

Power

The asymmetric capacity of an agent to structure or alter the behavior and decisions of other agents, populations, or systems. Technological (computational) power is intertwined with political power.

Exemplary cases:

- Indian Aadhaar biometric system
- Chinese social credit score
- Facebook, misinformation, and violence in Sri Lanka, Myanmar
- Panopticon, Surveillance and predictive policing / Vision technologies
- Anti-Eviction Mapping Project
- Media/data literacy

Questions to ask with this tool:

- How does the technology transform the status quo of power?
  - How does it transform the balance of power? In whose favor?
  - Is the power exerted in a more explicit or more covert way?
- How is technical power intertwined with political power in the case? What's the significance of this?
- Who is said to be empowered by the technology or technical event?
- What are the checks on the power?
- What mechanisms exist to challenge this power? Who can challenge it?

Representation

The way in which one thing is made to "stand for" another. Technologies create representations of people and of social/natural phenomena that do particular work in the world and acquire a life of their own, refiguring the identity and agency of the represented person/phenomena.

Exemplary cases:

- Pima Indian Diabetes Database
- The "right to be forgotten" and the persistence of data
- Ownership of genetic information
- FSM and student protests against being treated as "information to be processed"
- Technologies of the census and political representation
- Measuring climate change and exercise of citizenship

Questions to ask with this tool:

- How does data "stand for," "speak for" or "represent" a phenomenon in the world?
- What work goes into creating the representation? Whose work?
- Who creates the representation? With what goal?
- What makes this representation authoritative? What gives it power?
- How does the life of the representation relate to the life of the entity from which it was derived?
- How is the way in which the technology represents a person connected to forms of political representation?

Scale

The relative size or extent of something.

Technology reconfigures the relationship between the relative size, extent, or other established relationship of a phenomenon (e.g. local and the global, national and international, the one and the many).

Exemplary cases:

- Surveillance, and ability to zero in on individual while also seeing the population
- Social media and amplification of individual voices
- Palantir and work of immigration policing

Questions to ask with this tool:

- What scale is at stake (e.g. spatial, temporal, relationship between classes of people)?
- How does the technology reform the scale of a phenomenon?
- What's being re-scaled (e.g. reach, agency, responsibility)?
- What's at stake in the change of scale (e.g. for power, for responsibility)?

Sociotechnical Imaginaries

Technologies are a crucial way with which individuals and collectives imagine and build their desired futures. Beyond vanguard visions, sociotechnical imaginaries are collectively held, institutionally stabilized, and publicly performed.

Exemplary cases:

- Smart cities
- Various promises of what data analytics, AI, ML might help societies to achieve (e.g. US Precision Medicine Initiative, algorithms for allocating resources)
- Fair Information Practices (FIPs) and imaginary of privacy as control over personal information

Questions to ask with this tool:

- What imaginary(ies) of the good life or human flourishing are attendant a technology?
- Whose imaginary is it? Where did it originate? How is it stabilized by institutions, publicly performed?
- How is the technology imagined to bring about this future?
- How does the imaginary guide the development of the technology and vice versa?
- What does the imaginary reveal about the kinds of priorities or values that a collective holds *in the present*?

Sociotechnical Systems

An organization in which people and technology interact and work together such that human and technical agency is complexly intertwined and distributed. Large and highly complex sociotechnical systems distribute risks and responsibilities widely and unevenly, and are difficult to regulate. When they fail it is often difficult or even impossible to identify a single human or mechanical cause.

Exemplary cases:

- Self-driving cars; nuclear power plants; airplanes; streetlights
- Risk society
- Social media platforms and the public sphere
- Internet-of-things, Smart city

Questions to ask with this tool:

- How do humans interact with a particular technology?
- How is risk and responsibility distributed in a sociotechnical system? Whose agency is affected?
- How does a sociotechnical system come about and change over time? Through which pressures and mechanisms?

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Methods = techniques for analyzing phenomena in the datafied world

Compare
(across industries, nations, cultures)

For any given phenomenon, look for analogous phenomena in different contexts. Different cultures (corporate, professional, national) design, imagine, use, incorporate, and regulate technologies in different ways and for different purposes. Looking at the similarities and differences in these approaches can help to reveal society's commitments, identify alternatives, and de-naturalize any universalizing claim about a technology (e.g. privacy is the natural frame through which to think about personal implications of data).

Examples:

- Compare “privacy” and “dignity” as guiding principles of data regulation in US and Europe
- Compare the debate about the use of social credit scores in US, China, India, Europe
- Compare how different cities regulate self-driving cars (SF, Arizona)

Questions to ask:

- In what ways is the technology, event, or regulation implemented or interpreted differently in different industrial, cultural or national contexts?
- How does different culture/sociopolitical order account for the differences?
- What do we learn about the technology/event from these similarities and differences?

Contextualize

For any given phenomenon in the datafied world (problem, technology, institution, event, etc.) **expand outwards** and survey the landscape around it. Identify and analyze the significance of other features of the world which are distinct but directly connected to it.

Examples:

- Influence across sectors: how a technological innovation (e.g. social media platform) affects the distribution of power and resources in political and economic systems
- The origins of datasets used for machine learning (PIDD)
- What legal regimes govern the use of a particular technology?

Questions to ask:

- What are the relevant systems in which it is embedded? How are they relevant?
- Who is potentially affected by it? Who are the relevant stakeholders? Whose values are in play?

Interpret

For any given phenomenon in the datafied world (problem, technology, or event) **move inwards** and explore its various meanings. Identify and explore the significance and implications of the concepts, metaphors or images used to characterize or make sense of the phenomenon.

Examples:

- Analyzing sociotechnical imaginaries (Selfish Ledger, MIT Media Lab)
- The meanings of categories used in classification systems

Questions to ask:

- What do specific metaphors say about how a group of people understand the world?
- What are the cultural meanings associated with particular categorizations used in a classification system? How does a group understand their interactions with a particular technology?

Historicize

For any given phenomenon in the datafied world (problem, technology, or event) **move backwards** and explore its antecedents and the conditions of its emergence in time. Consider both the unique moment of its emergence, and the longer term processes and changes that made this moment possible. Leverage the **historical pointers** (alternatives, contingency, trajectory, dynamics, patterns)

Examples:

- Origins of statistics in the formation of the modern state
-

Questions to ask with the pointers:

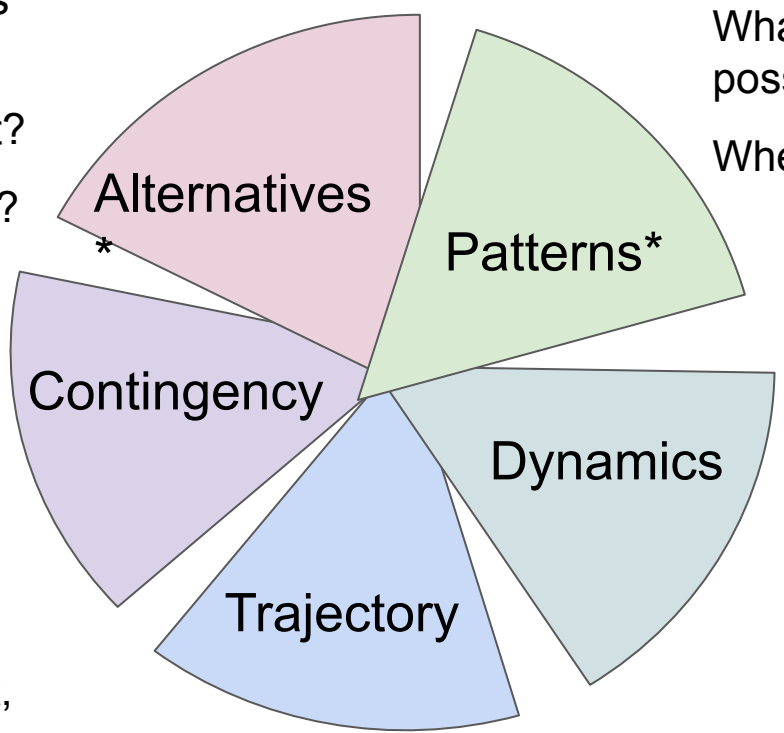
- **Alternatives**: When or where have things been different? What do we learn from that? Could things change again?
- **Contingency**: How might things have happened differently? What made them turn out the way they did?
- **Trajectory**: Where did something come from? Where has it landed? How was the outcome shaped by how it came into being?
- **Dynamics**: What forces are driving? What structures are shaping? What is the timescale?
- **Patterns**: What looks familiar or similar? How are they similar? Where have we seen this before?

Historical pointers

When or where have things been different?

What do we learn from that?

Could things change again?



What looks familiar or similar (and possibly structural)?

Where have we seen this before?

What forces are driving?

What structures are shaping?

Are there regular timescales?

Are there openings for intervention or influence?

How might things have happened differently?

What cause or chance made them turn out as they did?

What's predictable or controllable? What's not, and why?

* Linked to comparison

Where did something come from? Where has it landed?

How was the outcome shaped by how it came into being?

Alternatives

It once was different. … It's different somewhere else.

Cases we've seen:

- Population thinking and statistics aren't automatic. They don't emerge in contexts where states aren't trying to govern their resources (human and others).
- The notion of "normality" sits at the core of early population studies and statistics -- which we only notice because today we give much more attention to the long tails and the outliers.
- The seemingly inevitable aspects of Silicon Valley growth didn't always hold and don't seem apply everywhere. (In fact, they don't even get recognized and described until the 1990s.)
- Self-tracking in Ben Franklin's day may look similar to self-tracking today -- but different motives may underlie its practice.

Questions to ask to use this pointer:

- Why were things different then or there? What does that comparison tell us about here and now?
- What might make it change? Change again?
- How does this call into question notions of what's natural, inevitable, or automatic?

Contingency

It could have happened differently. … It's not controllable or predictable.

Cases we've seen:

- Today's approaches to responsible conduct of research emerged a context of biomedical experimentation -- and seem to be showing their limits in the big data era.
- "Choice architecture" and "nudge theory" emerged in a particular context -- the industrialized Anglophone West in the 1990s.
- An individual decision by Edward Snowden opens the floodgates on state surveillance. An individual decision by Chris Wylie breaks open Cambridge Analytica, and an avalanche of FB critique follows.

Questions to ask to use this pointer:

- Did an individual's actions change the course of history? How do individual actions get amplified by systematic dynamics ("floodgates," "avalanche")?
- Is there a reason this particular thing happened at this moment? Is it really by chance?
- If something originated in contingency, how might it need to be changed for different circumstances?

Trajectory

Where did something come from? How has it landed?

Cases we've seen:

- Population thinking and surveillance seem to be shifting from the state to private industry.
- Multiple "industrial revolutions" seem to follow one another in a common trajectory.
- The notion of a "public sphere" starts in the Enlightenment and changes on its path to the present.
- Developments in the sciences seem to move in bursts, with some form of discontinuity (paradigm shift, revolution) between the phases.

Questions to ask to use this pointer:

- How are the outcomes different from the starting points?
- How do we describe the process of change? (See "Temporal change" in the other diagram)
- What story do we tell?
- What is left out of the story?
- What are the timescales on which changes unfold?

Dynamics

What forces are driving? … What structures are shaping?

Cases we've seen:

- Data science emerges as a new science in the force field between industry and academia, at a moment when industry needs are pushing ahead of institutions of higher education.
- Silicon Valley moves in waves, with financial gains from one era's technology seeding the next.
- No major public outcry emerges around the tech industry until it all emerges in multiple dimensions all at once (i.e., now).

Questions to ask to use this pointer:

- What structures and forces are responsible for the underlying dynamics?
- How might history unfold differently if some of those element were changed?
- Is there any particular element which, if it were removed from action or operated differently, would lead to decisively different outcomes?
- Where could individual agency matter in shaping (or acting against) those structural forces?
- What interventions or mechanisms might change those dynamics?
- Where could there there space for well-chosen actions to influence things?

Patterns

Something looks common here. … We've seen this before.

Cases we've seen:

- Calls for "codes of ethics" emerge at moments of drawing boundaries around professions, and in eras when it's not really clear what to do.
- Cambridge Analytica is just one instance of Facebook's troubles.
- Technology industries seem gravitationally pulled to the military.
- Protests appear across multiple tech companies at the same time (last summer and fall).
- Issues of gender, race, and inequality appear in Silicon Valley at the same time as they appear in society at large.

Questions to ask to use this pointer:

- What could be responsible for the patterns?
- How can we use patterns to imagine what might come next? What might we need to do to shape it?
- Who sees which patterns? What do they see, because of what they're looking for? What might they not see, because of the lenses they're not using?

About using the Toolkit

Using the HCE Toolkit is a **constructive project** — it's useful for offering ways forward (not just critiquing or dismantling what others think).

> It's pedagogical and ethical aim is to *together* engage in responsibly making worlds with technologies

Try it on **new cases**, including in relation to other technologies

Use of the Toolkit **requires your life experiences**, identities, values, devotions, frustrations...