Meeting the future in the past - using counterfactual history to imagine computing futures

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ABSTRACT

The future is inherently hard to predict, yet we know there are various factors that will limit the future of computing (scarcity of materials, energy shortages and various biophysical limits) in both substantial and disruptive ways. When we look at the past and at mainstream projected computing futures, all we see is exponential growth. While it is easy to reject such trajectories, it is much harder to imagine and propose credible, preferable and evocative alternatives. Breaking away from default modes of thinking about computing is difficult but possible, and we here present a methodology - counterfactual history - that can help us imagine alternative scenarios for computing. We argue that by learning from counterfactual pasts ("what-if scenarios"), we can more easily liberate our ideas from various preconceptions that hamper them and box them in. This makes it possible to generate and entertain a more diverse "portfolio" of ideas about the future and help us better prepare for meeting future challenges.

CCS CONCEPTS

• **Human-centered computing**

KEYWORDS

Computing within limits, counterfactual history, defamiliarization

1 INTRODUCTION

It is hard to ignore the ever-strengthening indications that humanity and planet Earth is facing a future that will be not just "different" but in fact "disruptive". McKibben suggest that the planet has been altered by human activities to such a degree that it already now merits a new name, "Eaarth" [12]. We have so far overstepped at least four planetary boundaries [26], with implications for all life on Earth, as well as facing a sixth mass extinction event [33]. The effects of overstepping the planetary boundaries for climate change are already evident as is evidenced by extreme weather events, melting ice caps and heat waves causing wildfires [14]. We are also reaching a point where important nonrenewable resources are depleted, with far reaching impacts also for computing [17, 34]. It is, in light of this, prudent to "study, design and [develop] sociotechnical systems in the abundant present for a use in a future of scarcity" [32] and to work with challenges that are related to Computing within Limits. Yet this is harder than it seems since we also face limitations in our own thinking about, for example, future technical systems and in our ability to imagine futures that are characterized by various limitations [9]. Even when we strive to break free from such limitations, it is *still* hard to see what to practically aim for as an alternative to extending historical and current trajectories. Computing has, since its nascence, followed various exponential growth-trajectories and alternatives are difficult to perceive, see fig. 1.

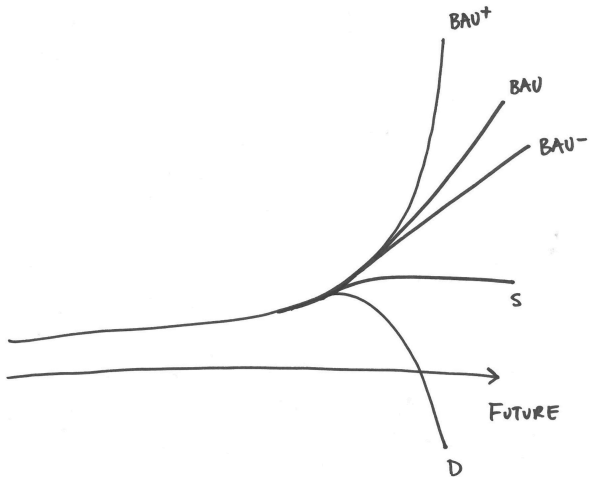

Figure 1. It is hard to argue that the future of computing will lead to something that is different from business-as-usual (with slight variations, e.g. BAU+, BAU and BAU-). Alternative are oftentimes considered preposterous (e.g. S - Steady state, D - Degrowth).

One suggestion is for Computing within Limits to become more engaged in situations where collapse (e.g. sociotechnical "decomplexification") or limited resources plays a significant role already today. Chen suggests that computing within limits should become more involved in crisis, in development and in sustainability research (e.g. crisis informatics, ICT for Development, ICT for Sustainability, Sustainable HCI etc.) as a strategy to explore current and future limits of computing [2]. One example is Patterson's study of the Haitian infrastructure after the earthquake in 2010 and of people's workarounds to handle disruptions of various kinds [18]. Another example is Tomlinson's suggested system for an automated immigration assistant that could facilitate immigration in light of climate change or resource scarcity [30]. While we believe that computing within limits have much to learn from and to contribute to these fields of research, there are also limitations to this strategy. Both crisis management and working with ICT for Development (ICT4D) in (primarily) developing countries, assumes that there is abundance elsewhere from which help and various resources can be drawn to "get back on track". Hence these cases don't take into account how developed regions or countries would handle scarcity or dwindling resources or how collapse (slow or fast) could play out. It could be that we have seen precisely such developments for example in Greece during the decade that has passed since the 2008 global economic crisis (Greece has had a 50% youth unemployment rate for the better part of a decade and many young educated Greeks opted for leaving their country). Moreover, in situations of crisis or of development, the overarching aim today is to create trajectories of graceful ascent by way of economic development (growth) to get out of the crisis. This is sometimes expressed in terms of technological "leapfrogging", of skipping intermediate stages of technological developments for example by directly aiming for mobile telephony instead of first building a fixed network with copper cables, or to directly implement mobile phone-based solutions for (micro-)payments and money transfers. We argue that limits to computing should also (or perhaps even primarily) take scenarios of graceful descent and of economic degrowth [8] into account when developing futures scenarios.

If computing within limits aims to "study, design and [develop] sociotechnical systems in the abundant present for a use in a future of scarcity" [32], then we need to develop scenarios that does not shy away from decline and un-development and where the goal is to plan for graceful descent as an alternative to a crash landing. Another option for Computing within Limits scholars is thus to create scenarios of what computing within the developed (or "overdeveloped" [5]) world would or could look like in times of scarcity. There are already a few proposal along these lines such as Raghavan and Hasan [20] who elaborate on what would be needed to build and maintain a low-tech Internet that would support email but not massively multiplayer games, cat videos or Netflix binge watching. Other scholars have looked at how long current hardware and software will last in a collapse scenario [7] or how climate change will affect the design and use of information systems [31]. One weakness of these scenarios is that they tend to become "flat"; they are reminiscent of portraying a persona as a cardboard silhouette instead as a living, breathing person (persona) that engages us on a personal level [4]. One example of an effort to engage us in a gritty (and dystopian) futures, is proposed by Tanenbaum et al. [28], who suggests that fiction in general, and design fiction in particular, could help us better imagine and engage in such futures.

A problem that many projections or future scenarios (that have been introduced to Computing within Limits) share is that they to some extent are ahistorical. They all describe (the state of computing at) a hypothetical point in the future, but there is an acute lack of descriptions of how we ended up there, e.g. of what steps, what events and what decisions led to that particular scenario. How can we understand and prepare for such futures when we do not understand the mechanics behind the events that led us there?

We here thus ask how we can develop (multiple) scenarios in Computing within Limits that explore trajectories of graceful descent and that helps us imagine what to aim for when we strive to "study, design and [develop] sociotechnical systems in the abundant present for a use in a future of scarcity" [32]. Such scenarios would allow us to explore what descent could look like in

a stepwise manner. They could also do so without evoking too many negative emotions or challenge psychological limits in the sense that the scenarios are developed as a hypothetical sandbox of the past where the effects of descent is not experienced as very threatening to us here and now.

We will here present a method for creating and exploring such scenarios through the use of counterfactual history. Counterfactual history (virtual history, allohistorical scenarios etc.) is in essence the idea that we can explore the future through 'what-if-scenarios'. To exemplify we will present a scenario that we have started to work on [16]. Pargman et al. [16] is the first in a series of planned articles about the "Coalworld" scenario. While the first few articles will not have any direct implications for computing, future articles will. We however still believe that the presentation of this scenario can stimulate ideas and discussions about how counterfactual scenarios could be used for imagining futures that are in line with the assumptions behind Computing within Limits.

2 WHY WORK WITH SCENARIOS?

Computer-related research such as Human-Computer Interaction and Computing within Limits is inherently future-oriented. By dint of designing digital technologies, we are part of creating A Future That Will Be. How this will actually play out in terms of the short- and long-term impact of the artefacts we create is seldom explored. It is, within the field of Human-Computer Interaction, recognized that this is an issue that should to a larger extent be addressed, as in calls for incorporating Futures studies methodologies within HCI [11], or scenarios for exploring the sustainability of future information societies [15].

As Computing within Limits positions itself in the unenviable position of addressing a future that does not exist and that in important respects is significantly different from the world we live in, there is an essential need for imagining what future(s) we are heading towards in ways that are fundamentally different from relying on forecasting or extrapolation of current trends. The fact that we (especially in computing) have lived with and in some respects, have incorporated decades of exponential developments into our worldview[1] makes it extremely hard to viscerally imagine that "scarcity" or even that "less" (of something, anything) could be part of our future.

"Defamiliarization" is helpful in the process of breaking free from the already taken for granted, or as Bell et al. argues in relation to domestic technologies: "defamiliarization is a useful tool for creating space for critical reflection and thereby for opening up new possibilities for the design of domestic technologies. Making domestic life and technologies strange provides designers with the opportunity to actively reflect on, rather than passively propagate, the existing politics and culture of home life and to develop new alternatives for design" [1].

While Bell et al. uses defamiliarization to reimagine kitchens and other domestic spaces as spaces for future smart home technologies, it is an equally valid technique for defamiliarizing ourselves from taken for granted narratives about the (glorious) future of computing to instead brave a future of Computing within Limits.

Design fiction have been used extensively for purposes of defamiliarization in Human-Computer Interaction. Design fiction invites us to reflect upon and reconsider near-future technologies while encouraging us to question the incremental development of our society. Design fiction is a tool that can challenge business-as-usual and that pluralizes the future, see fig. 2.

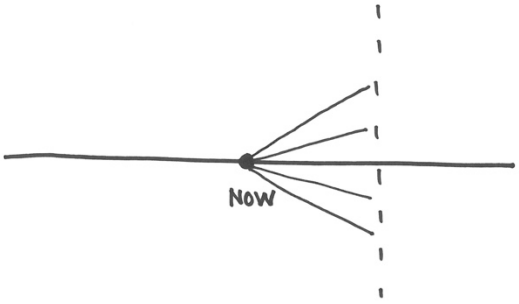

Figure 2 Design fiction can pluralize the future and show possibilities beyond business-as-usual.

Design Fiction also represents a low-cost method for suggesting or problematizing avenues for future developments of technology and research and hence can be seen as a technique that democratizes the future by lowering the bar for exploring it. "Anybody" can "invent the future" through Design Fictions instead of leaving that important issue (only) to (well-funded) engineers and to

[1] See for example:
- Moore's law: the number of transistors (on integrated circuits) doubles every second year.
- Kryder's law: magnetic disk storage density is increasing at a pace much faster than (semiconductor chip performance in) Moore's Law.
- Metcalfe's law: the value of a telecommunications network is proportional to the square of the number of users connected to the system.
- Bell's law: new types of computing systems create new applications resulting in new markets and new industries.
- Koomey's law: the number of computations per joule of energy doubles every 18 months.

decision- and policymakers. Design fiction can thus not only work as a tool to challenge future developments, but can also be a tool that proposes or shapes agendas for actionable futures. However, design fiction as it has been used to date within HCI primarily projects (or propels) us into various technology-oriented near futures that are examined, but has paid less attention to more explicitly spelling out the *connection* between those futures and the present. There are no (systematic or otherwise) stepwise discussion of how we ended up in the proposed future state. Hence, the potential for developing actionable futures is severely diminished. In this regard, Design Fiction is similar to speculative design that also provokes and wants to invoke discussions [3] - a kind of forward looking 'what-if-scenarios', but without facilitating the formulation of an "action plan" in regards to what steps to take in order to move from the present state to the future state (or what steps to take to avoid the future state). The agenda of Computing within Limits *is* to work towards a goal - we are hence not only interested in speculation for the sake of speculation but would instead like to formulate ideas about actionable futures that can direct and guide research in the present. Something more is thus needed beyond speculation that helps explore direction and speed - that helps explore how to get from *here* to a projected (desired or perhaps feared) *there*. Backcasting is an example of a futures studies methodology that also seeks to evoke discussions about values, norms and worldviews by projecting desired futures and then exploring what steps need to be taken from now and onwards to be able to aspire to reach those (desired) futures [23, 24]. However, in the case of Computing with Limits, the future might to some extent be undesirable in the sense that the futures we want to explore are intrinsically linked to limits and scarcity [13] and therefore perhaps also to hardship. The desired state and the best we can hope for becomes nothing more (and nothing less) than graceful descent. To explore such scenarios, we here present another defamiliarization technique, "counterfactual history". Counterfactual history is akin to design fiction and backcasting in that it posits "what-if-scenarios" but the difference is that it postulates a point of divergence *in the past*. By positing a point of divergence in the past, it becomes possible to work through the consequences of that divergence and reach an alternate present. The point of the exercise is to explore possible worlds that could have been and the idea is that such explorations will help us understand what we could/should have done as well as *what we should do here and now* to direct developments towards more desirable (and less undesirable) futures.

3 COUNTERFACTUAL HISTORY

Counterfactual history has been used within a diverse set of disciplines and it is also known as alternate, alternative, virtual, allohistorical or uchronical history. What distinguishes counterfactual history from other speculative "what-if-scenarios" is the temporal position; instead of describing possible futures, it posits alternative pasts that then lead to alternative presents. Counterfactual histories are in a certain sense thought experiments that invite the reader to engage in imagining how history could have played out differently. Hence it has been used for example within historical research [25] and in historical geography [6]. It has also been widely used within (science) fiction and Todorova [29] explains how the connection to fiction to some extent has discredited the methodology among (for example) "serious" historians:

> *"Alternative or virtual history has existed for some time but primarily as a literary genre or a sub-genre of science fiction. For this reason, many authoritative historians have long refused to take it into account. But an increasing number of scholars are now making use of it in an academic context." [29]*

Due to counterfactual history's basis in hypothetical assumptions, the legitimacy, relevance and validity of such studies has (naturally) been disputed, especially from more conventional disciplines within history (e.g., see [6, 10, 25]. Gilbert and Lambert [6] argue that instead of framing counterfactual history as a 'denial of real history', it could equally well be framed in such a way that it provides and extends traditional methods. Gilbert and Lambert [6] also argue that all causal explanations, to some degree, implicitly include a counterfactual dimension since "[a]ny claims that event or factor x made a critical causal contribution to the outcome y, necessarily imply an imagined situation where y did not occur because x was absent" [6]. Liedl [10] argues that the epistemological function of alternative history and counterfactual history is the same as for historical narratives, e.g. to draw relevant lessons from the past that are applicable to the present and the future.

So how then are counterfactual scenarios constructed? Todorova has proposed an overarching structure for how to create a methodology of counterfactual analysis:

1. The counterfactual belongs to the family of the non-factual;
2. It describes an alternative course of history;
3. It compares the suggested alternative course of history to the actual one (either explicitly or implicitly);
4. It specifies one historical event after which the actual and counterfactual courses become separated; and
5. It requires an assessment of the plausibility of the applied analysis. [29]

The creation of a divergence is central to the creation of a counterfactual narrative. After the divergence has been created, the task becomes one of exploring the time- and space cone that that spreads out from the point of divergence and the diverse and far-reaching consequences of creating an alternative world [6]. This is, in a sense, similar to any other speculative methodology (design fiction, speculative design, thought experiments etc.) but the temporal position makes counterfactual history different from all other similar methodologies:

"It is in that second half of the game that science fiction and alternate history come together. Both seek to extrapolate logically a change in the world as we know it. Most forms of science fiction posit a change in the present or nearer future and imagine its effect on the more distant future. Alternate history, on the other hand, imagines a change in the more distant past and examines its consequences for the nearest past and the present." (Turtledove 2001, p. 7-8, cit. [10])

There are a few more methodological principles that we have adopted in our own use of counterfactual history. The first is to use the 'the minimal rewrite rule' [6] which states that the point of divergence should be based on positing a change that is "as small as possible" but still big enough to put things in motion (e.g. to not change anything more than what is absolutely necessary in order to alter the course of history in the direction that is to be explored). Moreover, even if the point of divergence is fictional, the relationship between causes and effects must be plausible and the difference between the counterfactual timeline must be easily distinguished from the real timeline [22].

4 ELABORATIONS

What would it meant to use counterfactual history as a method to explore possible futures in Computing within Limits? To exemplify, we will here first present a scenario that we have begun to develop [16] and then shortly discuss ideas about counterfactual history scenarios with relevance to Computing within Limits.

4.1 Coalworld

In the counterfactual history scenario Coalworld (which has been presented in [16] and that will continue to be developed in forthcoming papers), the reader is invited to consider the proposition, *what if there had only been half the oil*? What if only half the oil ever existed beneath the earth's crust at the point in time (1859 in Titusville, PA) when we started to exploit it and used it to put the industrial revolution into a higher gear? The goal of developing such an alternate world is to explore what society and life could look like in an alternative post-peak oil *present* (e.g in an alternative 2018). The purpose of that exercise is to think about the effects of a shift in our energy system that *should* (to meet climate targets) or that *will* (in the aftermath of peak oil) happen in a relatively near future in our world. The premise for the instantiation of this scenario - *half the oil* - is complemented with geological modelling that posits the probable (or at least plausible) distribution of the Coalworld oil, and the scenario will be fleshed out into a full blown counterfactual world in a series of future papers. Many other design decisions need to be taken as this one point of divergence (half the oil back in 1859) actually could result in several different "Coalworlds", e.g. if half the oil is gone, exactly which half is gone - the "first" half or half of the oil in each oil well? Hence the Coalworld scenario is (this far) based on six design decisions and most of them by and large adhere to the minimal rewrite rule (presented above). The design decisions are here presented in an abbreviated form, longer explanations can be found in [16]:

1. Do not violate any laws of nature. That would have repercussions and the scenario could deviate too much from our own world in unexpected ways. We are aiming for learning something that is applicable to our own world!
2. Only half the oil exists in Coalworld - this is the proposition that starts the whole Coalworld world-creation exercise.
3. Half the oil has been removed in Coalworld due to (a slightly higher frequency) of earthquakes and faulting during the periods when oil reservoirs were formed (tens of millions of years ago). This is arguably the actual point of divergence, but world history is only changed when the effects made themselves known some decades ago.
4. Besides oil, also associated gas reserves (formed at the same time and as an effect of the same processes) were decreased by half but all other fossil fuels reserves (non-associated gas, non-conventional oil and gas, coal etc) are just as big as they are/have been in our world. Removing other fossil fuels (especially coal) would have required much larger changes to geological events (and would therefore be much harder to explain).
5. The "missing" Coalworld oil is the "second half" of the oil that we discovered in our world. This decision means that all historical developments in Coalworld and in our world are the same up until the point in time when the difference started to be noticeable, e.g. the point in time when peak oil happens in Coalworld. This means we "only" have to rewrite the history of the last 45 years

(e.g. we don't have to rewrite the history of WWII or the Cold War.

6. The underlying connection between oil resources and oil production is described by a logistic curve, one of many bell-shaped curve models. This is a choice that draws on empirical data from U.S. oil production which has been found to follow a logistic curve.

These design decisions lead to the following narrative timeline; some 100 million years ago only half the oil was formed in Coalworld. Humans evolved and civilizations rose and fell oblivious to this counterfact. In the year 1859 oil was discovered (in our world as well as in Coalworld) and the U.S oil industry was born. Eventually, in the 20th century, "trajectories of oil *discoveries* in Coalworld and [in our world] start to differ (i.e. diverge) several decades before the *production* of oil starts to diverge" [16]. This does not however affect the (geo-)politics, technological developments, energy policies or energy prices in Coalworld during the subsequent decades as people living in that world are as oblivious to the fact that oil *discoveries* peaked some time ago as we are oblivious to the fact that the 1960's was the one decade when the most oil was discovered in our world and that every decade since has seen decreases in the cumulative amounts of oil discovered. Just as we (at least on on a personal and a political level) choose to not examine the unavoidable effects of a looming peak oil crises, the good people of Coalworld manage to avoid contemplating the effects of peak oil until it hit them the beginning of the 1970s. During the first half of the 1970s, oil production starts to differ between Coalworld and our world and the global decline becomes steadily more apparent over time. Early estimates suggest that the design decisions above will result in a Coalworld peak in oil production happening at about the same time we experienced the first oil crisis in our world (October 1973 - March 1974). This is the narrative point of divergence and from that point on Coalworld and our world starts to follow different trajectories. Most of what the Coalworld trajectory looks like has not been written yet, but we end the first paper posing a set of questions that reader can delve into:

- How does the decline of oil impact transport infrastructures?
- How does the decline of oil impact geopolitical power?
- How does the decline of oil impact food production and health?
- How does the decline of oil impact industrial design and technological innovation?
- How does the decline of oil impact socio-cultural norms, practices, beliefs, and narratives?
- How does the decreased availability of fossil fuels impact greenhouse gas emissions and climate change?
- What would Coalworld schoolchildren read in their history books about the period after the 1970s divergence of the Coalworld timeline?

These are only some of the questions that are possible to explore in the Coalworld scenario, and the ultimate goal of exploring that scenario, is to open up the question of how peak oil can/should be handled in *our* world.

4.1 Computing within Limits Scenario?

While some of the questions that were listed (above) might be of interest to the Computing within Limits community, the list could naturally be expanded with questions that are more immediately relevant to Computing within Limits. It could for example be the case that the Coalworld scenario, which builds on decreasing amounts of oil and (probably) decreased access to energy in general, as well as decreased economic growth, is a relevant framework to bring to Computing within Limits. How would decreased economic growth have affected research & development in computing and the rapid dissemination of computing in society during the last decades? And although oil is primarily used for transportation today (rather than for example generating electricity), less oil would have had effects for trade and globalization and it could be the case that less oil or higher oil prices would have exerted pressure on energy prices in general (including electricity) and that this could have affected the path that computing would have taken in Coalworld. However, as the Coalworld point of divergence is set in the first half of the 1970's, it might also be the case that it is hard to use that scenario for exploring the consequences of a *graceful descent for computing* today.

We could however imagine other counterfactual scenarios that diverge not in the early 1970's but rather one or a few decades ago, and that would be more relevant for us to be thinking about futures of scarcity in the here and now. For example, finding a reason to fiddle with the economics of Internet use, with a focus on cellular networks (for example in terms of the speed of rolling out new infrastructure, of the costs per GB of data transferred and of resulting business models) could hint at the effects of various limiting factors in futures of scarcity.

What then could characterize an interesting computing within limits counterfactual scenario? We can discern at least two different types of counterfactual scenarios that have the potential to be used within Computing within Limits. The first would pose limits to the surrounding society in which computing technologies are used and

these limits would have an impact on technological development and innovation. Such limitations could for example be *economic* (e.g. the 2008 financial crisis stretched on in perpetuity while getting worse every year), *political* (increased trade barriers or trade wars) *historical* (Chinese economic reform didn't happen and China never became the factory of the world), *environmental* (climate change triggering various tipping points), *geological* (e.g. magicking away half the oil in the Coalworld scenario above, or that materials needed for computing was severely diminished), *technological* (accidents leading to the dismantling of nuclear power plants), *military* (new cold - or hot - wars), *energetic* (significantly more expensive electricity) etc. The scenario should obviously be chosen in such a way that the effects on computing will be relevant to us, here, today.

Another type of counterfactual scenarios that is relevant to Computing within Limits is scenarios that limits the development of computing as such, e.g. what-if-scenarios that explore alternative timelines where pivotal discoveries, inventions or innovations in computing never happened or where they for different reasons were delayed or where they were significantly more expensive. It would be possible to create and play around with scenarios that would defamiliarize us from the kinds of 'cornucopian paradigm' we have seen in computing [19], e.g. where new hardware and software drives the development of new services, which in their turn drives demand, which in their turn drives the development of new hardware and software etc. Creating counterfactual scenarios could help mentally liberate us from our (pre-)conceptions and instead allow us to think beyond established technological lock-ins and the path-dependence that follows from decisions that might have been taken decades ago. Counterfactual scenarios allow us to explore paths not taken and these paths could in a best-case scenario provide us with insights that are of relevance today.

All of our suggestions are tentative and we invite the Computing within Limits community to collectively and collaboratively explore them.

5 DISCUSSION

We have in this paper presented counterfactual history as a methodology that suitable for exploring various topics in Computing within Limits. We argue that the methodology could even be particularly suitable for Computing with Limits, since it would give us a means to explore potential (albeit fictional) historical descent paths in order to learn from them and use that knowledge to plan for futures of scarcity here and now. The nature of counterfactual history scenarios, e.g. to propose what-if-scenarios that have consequences for the (for *their*) past harbor the possibility of liberating us from business as usual scenarios and from the cornucopian paradigm [19]. Counterfactual scenarios furthermore differ from other methodologies for defamiliarization such as design fiction and speculative design since counterfactual history allows for a wider set of possible trajectories compared to those methodologies that start with present and project their consequences into an (inherently uncertain) future (see fig. 3).

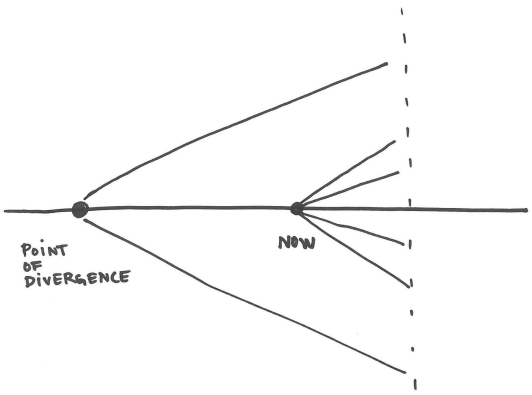

Figure 3. the trajectories of counterfactual scenarios that are anchored in the past allow us to imagine and model scenarios that are impossible to perceive when using other futures studies methodologies such as forecasting, "conventional" future scenarios, backcasting, Design Fiction and other varieties of speculative design.

Furthermore, we argue that the counterfactual scenarios could fill the function of a sandbox - a safe place where it is possible to explore decisions, actions and paths that would be (more) frightening if placed in the present or the near future of *our* world. Future scenarios that could evoke negative reactions can be regarded "from a distance" when placed in the past while still showing us how we could work through various difficulties. As such, constructing and exploring the consequences of counterfactual scenarios could act as a support structure that would help us handle the loss that inevitably will be experienced when we move from an era of abundance and affluence to a time of scarcity and hardship, an issue that has been explored in the context of climate change by [21].

Looking forward, we believe that it would be interesting to cooperate with computer historians to discuss interesting and suitable points of divergence particularly in relation to computing. Furthermore, we can also see that if we would develop more elaborate counterfactual scenarios with a more direct bearing on computing, some of the work that has already been presented in collapse informatics and Computing within Limits, could "find a home" to roost in. One example of

this could be the energy agile data centers that were proposed by [27] and that could have been developed within the Coalworld scenario (with scaled-up renewable energy sources to make up for the lack of fossil fuels).

Whilst we see that counterfactual history scenarios can be used within all of computing, we argue that this methodology is particularly well suited for Computing within Limits where we know what future we are not aiming for (BAU) but where we have a harder time figuring out what future(s) to aim and to design for instead. We invite the community to further explore the past so as to better face the future we meet.

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