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earthDECKS & MediaConnects

A Hybrid Human-AI System for Impact Tracking

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Abstract. Debates about how long industrialized civilization has to address climate change, social justice, systemic pollution, and other complex systems problems forestall the greater question: What methods can we use to begin addressing global challenges that we continue to exacerbate? Rather like the spark that originated life, a promising method must be conceived such that a small start has capacity to replicate, mutate, adapt to contextual demands, and evolve. As in natural evolution, successful experiments in this ecosystem can be translated, replicated and adapted. We will describe how a story-project feedback cycle offers a way to address an otherwise daunting "too big and complex" challenge.

Keywords: collaborative intelligence, hybrid human-AI, impact tracking, learning, reasoning, inference, clustering, recommender systems

Introduction

MediaConnects will use iterative cycles in a story-project feedback loop to Power Our World, harnessing human computation, hybrid AI, and collaborative intelligence to engage both human pattern recognition and machine learning in an evolving ecosystem that can scale, learn, and improve its performance. AI must be complemented by effectively "crowdsourcing citizen scientists" (human contributors) whose pattern-recognition capabilities complement AI, which performs data analytics, integration, impact tracking and provides capacity to scale.

World Game – Historical Antecedent

Buckminster Fuller's idea for World Game (1961) predated the Internet and distributed systems needed to implement this novel educational and global problem-solving concept. Massive multi-player online games did not yet exist. Instead, several hundred players assembled in university gymnasia to play World Game. An enormous dymaxion map was taped to the floor as the gameboard.[1] A day-long improvisational theater experiment in collaborative problem-solving occurred. All players were given hard copy manuals, instructions and assigned roles, either as officials or as citizens of countries (with the number of citizen gamers proportional to each country's actual population). The players, from students to senior citizens, became engaged as "citizen actor/ scientists" in this experiment. At the end of the day, many recounted the significance

of what they realized through playing World Game and how it changed their understanding of our co-dependency on this planet.

For several decades, this hard copy, in-person version of World Game was played around the world and described as "a script … [for] a production ensemble of gigantic proportions to achieve a new science of action in testing out the script. That is what a metaphor can do when it is powerful enough and when it is successfully delineated by the consummate artist of his era – that is what Buckminster Fuller has done with the design of his World Game."[2] In May 1968 World Game was presented by Dr. Fuller to a White House sponsored conference, convened for this purpose in Washington, D.C.; to the Muskie Committee to establish a select Senate Committee on Technology and the Human Environment in March 1969; to the Joint National Meeting of the American Astronomical Society and the Operations Research Society of America in June, 1969; and to the United Nations Conference on Human Survival in May, 1970.[3] After an intense flurry of interest, this Reality Game, conceived ahead of its time, was archived when Fuller died (1983). What it accomplished was to inspire a new, interactive learning paradigm where game participants could be made aware of global interdependencies and complex problem-solving challenges.

Zann Gill (author of this paper) studied with and worked for Buckminster Fuller during her graduate studies at Harvard. She was at MIT during the early days of the Internet. With the arrival of the public internet, she wondered, Is there an updated 21st century re-vision of the World Game concept that can harness the Internet and curate distributed collaborative intelligence? Defining collaborative intelligence as an evo-devo method was the first focus, culminating in Zann's proposal for a collaboratory at NASA called BEACon (Bio-Evolutionary Advanced Concepts), followed by her founding of earthDECKS where DECKS refers to a Distributed, Evolving, Collaborative, Knowledge System.

Sustaining the planet requires moving beyond traditional AI to Hybrid AI, a more advanced challenge because it requires integrating humans and AI into a learning system. In Machine Learning, the system is typically trained according to preset requirements of the designer. Here both humans and AI learn and evolve their performance. Twitter can rapidly mobilize many people to comment, but the synthesis challenge is not addressed.[4] Wikipedia exemplifies the collaborative creation of an encyclopedia,[5] but the collaborative creation of solutions for global problems requires a whole new business model – a distributed, bottom-up problem-solving model to develop and implement solutions such that many small efforts can be coordinated into a massive mobilization strategy. The vision of this possibility and recognition that this is possibly the only way to address the challenges we face today, has fueled her life work.

earthDECKS – a 21st century concept inspired by World Game

Only recently the real breakthrough came – a tiny idea that is hugely significant. Starting with complex systems problems (social justice, climate change, saving our ocean) will not work because we are then trapped in the old *define the problem, debate alternatives, establish consensus* model. The key is to start from stories, which are subjective and do not require consensus. Stories are a powerful tool to harness subjectivity and human perception – every story has not only the point of view of its storyteller but also the many perspectives of its interpreters. So, for example, if we use the 2021 film ***Ferguson Rises*** for our pilot, organizations galvanized by that film can join the ***Ferguson Rises*** story – project hub in our impact network. Our role is reporting, recommending, connecting, communicating, and augmenting with learning resources, not telling any organization how to run its own activities.

Or suppose that the film ***16 Bars*** becomes a pilot. This film shows how hip-hop artist Speech Thomas discovered amazing music talent when taught a hip-hop music workshop at the Richmond City Jail. Suppose that a viewer, who's a musician, watches ***16 Bars***. The viewer sees that a key theme of the film is music. That viewer tags this film with the Music icon and comments, "What a great idea to enable prisoners to make music."

The three options above are proposed as one of many possible ways to simplify the choice set that engages viewers after they watch a film. Of the three options above, suppose that the user chooses, "Tap my talents" and looks for ways to contribute his music talent. The system recommends program leaders at prisons, who were inspired by ***16 Bars*** and want to bring their prison into a network of prison music programs. The musician proposes to one of these prisons a music program that he's motivated to lead. His proposal is accepted.

MediaConnects notes this impact and includes this new program as a "Maximize my Impact" and, or "Donate" option for donors who want to fund Prison Music Programs. The system crowdsources a list of other prison musician volunteer opportunities and adds them to the "Tap my talents" or "Volunteer" lists. Under the third category, "Give me clues" and, or "Learn more" users can learn about the impact of these programs.

The acronym DECKS in earthDECKS – Distributed, Evolving, Collaborative, Knowledge System – characterizes DECKS as comprised of digital knowledge-cards — short stories, media portals, other information resources about a topic. Stories, and their associated projects online, serve as hubs around which to generate, organize and connect DECKS. Knowledge-cards within a DECK (as well as across DECKS) are correlated and tracked through both manual and automated tagging, clustering, and activity logging. The AI intermediary uses this information to provide recommendations and social media services to users based on their profiles.[6]

Human pattern recognition acts on recommendations (choosing either to follow them or not), which enables machine learning to adapt and improve its capacity to recommend. In this way, the ecosystem evolves as users navigate diverse paths, browsing projects, commenting on stories, engaging with other users, attending offline events, and performing tasks in the real world that are reported back online.[7]

Hybrid AI in Collaborative Intelligence

Five principles characterize how collaborative intelligence operates in an effective problem-solving ecosystem.[8]

First, *collaborative autonomy* implies that every intelligent agent in the system, whether human or device, is empowered to act independently, without permission from higher authority, or requirement for actions to align with a pre-established consensus: this is not a consensus-driven system. But there are traffic rules and controls to prevent hacking. How each contribution is trusted and admitted (or not), accepted and valued, or demoted and discarded, evolves in this multi-agent ecosystem, based on the values of all agents in the ecosystem.

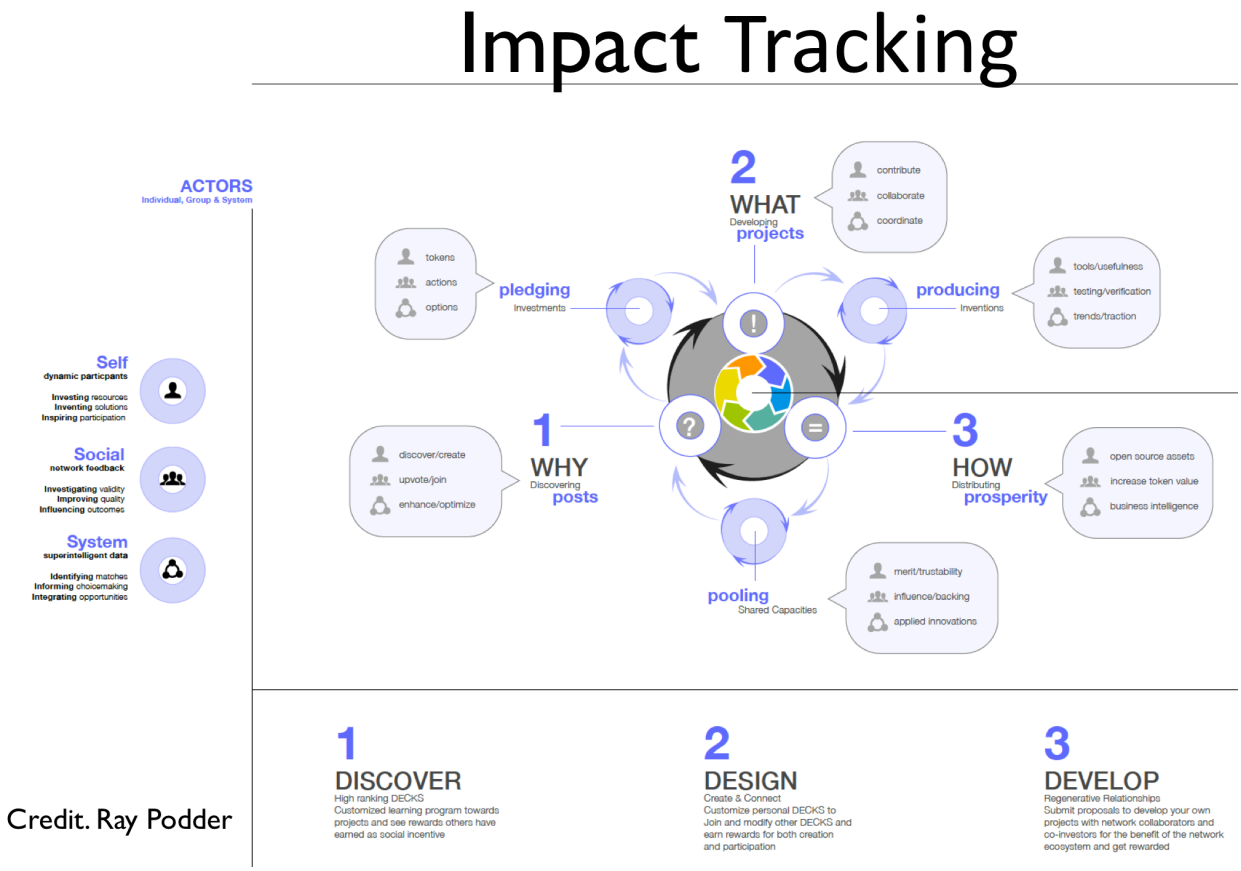
Second, *collaborative intelligence* is the global ecosystem result of the individual *collaborative autonomy* of all agents in the ecosystem. Unlike collective intelligence, where all agents are anonymous and alike, in collaborative intelligence, all agents are non-anonymous: they take credit and assume responsibility. And they are diverse: they have different needs to satisfy and different contributions to make. Collaborative intelligence aligns with the original vision of capitalism to empower individuals.[9]

Third, the *utility function*, and associated profile of every intelligent agent in the ecosystem, are uniquely co-defined, both by that agent's starting profile (signature) and by the actions performed by that agent in the ecosystem (footprint). In this way, the profile of the agent evolves, based upon how each agent's actions in the ecosystem contribute to the well-being of other agents in the ecosystem. The term *utility function*, when introduced by moral philosophers Jeremy Bentham[10] and John Stuart Mill,[11] focused on how to measure utility for each individual. When later adopted by neoclassical economists, the term was redefined to refer to *consumers*, rather than *agents*, which launched the abuse of private information.[12] The original concept was applied to agent satisfaction from choices made. The adapted term referred to a consumer's preference when offered a set of choices – what the consumer chooses and the outcome an advertiser targets, rather than the satisfaction an agent realizes from making that choice. Returning to the original intent of the term by focusing on agents, and the impacts of their actions, rather than consumers, our focus is not only on what an agent chooses when offered a choice set, but also on how other agents are impacted by that agent's choice, i.e. the cascade of impacts (assessed as responses) in the network.

Fourth, *points* are the value assigned to each action or contribution in the ecosystem. Points enable grading in educational applications. The values assigned to actions evolve as the agent population changes and as the needs of the ecosystem change. Values in points enable those who contribute most, as assessed by the responses of other individuals in the community, to receive the most points. They are rewarded, not by hoarding points, as in a capitalist economy, but by contributing. Their profile rises, not only as they receive points for actions that contribute to the ecosystem, but also as they spend those points to enable other actions, by recycling points back into the ecosystem.

Fifth, *impact tracking* is traditionally seen as the application of pre-defined criteria to measure the impact of actions. In this ecosystem, assessment criteria evolve. All individuals have starting profiles, which evolve based on their performance. Users make choices about the DECKS that they assemble and the methods they choose to "make media actionable."[13] These choices are aggregated into the user's profile, which can be represented as an "avatar" or icon.[14] The AI system continually updates user profiles, consisting of explicitly and implicitly collected information about each user, organizing a diversity of social signals.[15] Values assigned to contributions also

evolve, as in any market-driven economy. And utility functions evolve, as do the criteria for tracking impact.



Key Performance Indicators (KPIs)

In a pilot implementation, points enable assessment of student performance. All projects included are proposed by, and managed by, their project owners. So, for example, if *Ferguson Rises* is a story hub for our pilot, organizations that see their mission as aligned with the story of *Ferguson Rises,* will join the *Ferguson Rises* story hub, encourage their members watch and discuss the film, propose constructive actions inspired by the film, report on progress as those actions are implemented. Students who watch the film will comment, write reviews, identify organizations working in this domain, perhaps do internships. Faculty who use the film as a teaching resource can publish and share learning materials that they develop with faculty at other institutions, growing community around this story hub.

Key Performance Indicators (KPI's) require metrics based upon reliable, transparent, integrated and automated measurement and scoring systems. The default value settings on startup of a particular Story hub or Project hub evolve as human users define the impact of each Story/ Project.

The hybrid AI "collaborative intelligence" of the system integrates human agent choices with AI capacity to track the cascade of human responses in the network, and to offer recommendations from a continually updated AI repository. As human individuals act with collaborative autonomy, the AI Impact Tracker calculates the network effect and distributed impacts of their actions, recognizing both constructive impact and warning signals to address.

KPIs attach values to a range of different services performed, both within the online ecosystem and offline in the real world, reported back to the system. Diverse, distributed projects can attach to multiple story hubs for reporting about their projects.[16] Values for tasks performed are assigned by human project leaders. As in any commenting system, players can comment about existing stories, as they would do in a pilot on *Ferguson Rises*, or (when the system is further developed) start new story hubs. A digg-type rating system enables the best-rated stories and comments to rise. Projects in the real world and online list talent needed and accomplishments achieved. Projects with site locations can be visited, pictures taken, and questions posed.

Users generate stories about projects. Impact tracking is powered by human reporting. Both manual and machine key word tagging provide data for AI tracking. Users power the system through their choices of which stories to read, rate, and which existing options they choose to "make media actionable" and what new ideas they propose.

Projects that contributors select to work on receive more points than projects whose films are merely watched and not acted upon. Students navigate their paths through an online ecosystem. The AI back end records choices made, and actions performed in the system, using those records to inform its recommendations to users. Human pattern recognition acts on those recommendations or not, enabling the AI system to learn and improve its capacity to recommend. All players receive points and other rewards for each review, comment, report or other contribution.

Conclusion

MediaConnects will gradually improve its capacity to match users to projects that need their talents, and to other like-minded users, enabling contributors to generate and disseminate information, to "learn by doing" and to be inspired by each other. The analytics challenge is to establish metrics that are reliable, transparent, with integrated, automated measurement and scoring to reward constructive performance. An effectively designed online ecosystem should operate rather like a safe neighborhood where neighbors are aware of, and support, each other, but also watch for anomalies. The goal is to improve human collaboration across disciplines, across language and opportunity barriers, and where complementary skillsets and diverse viewpoints are needed to develop solutions to real-world complex systems problems.

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