Can Digital Technologies Build a Viable Future for Enacting Sustainable Development Goals?

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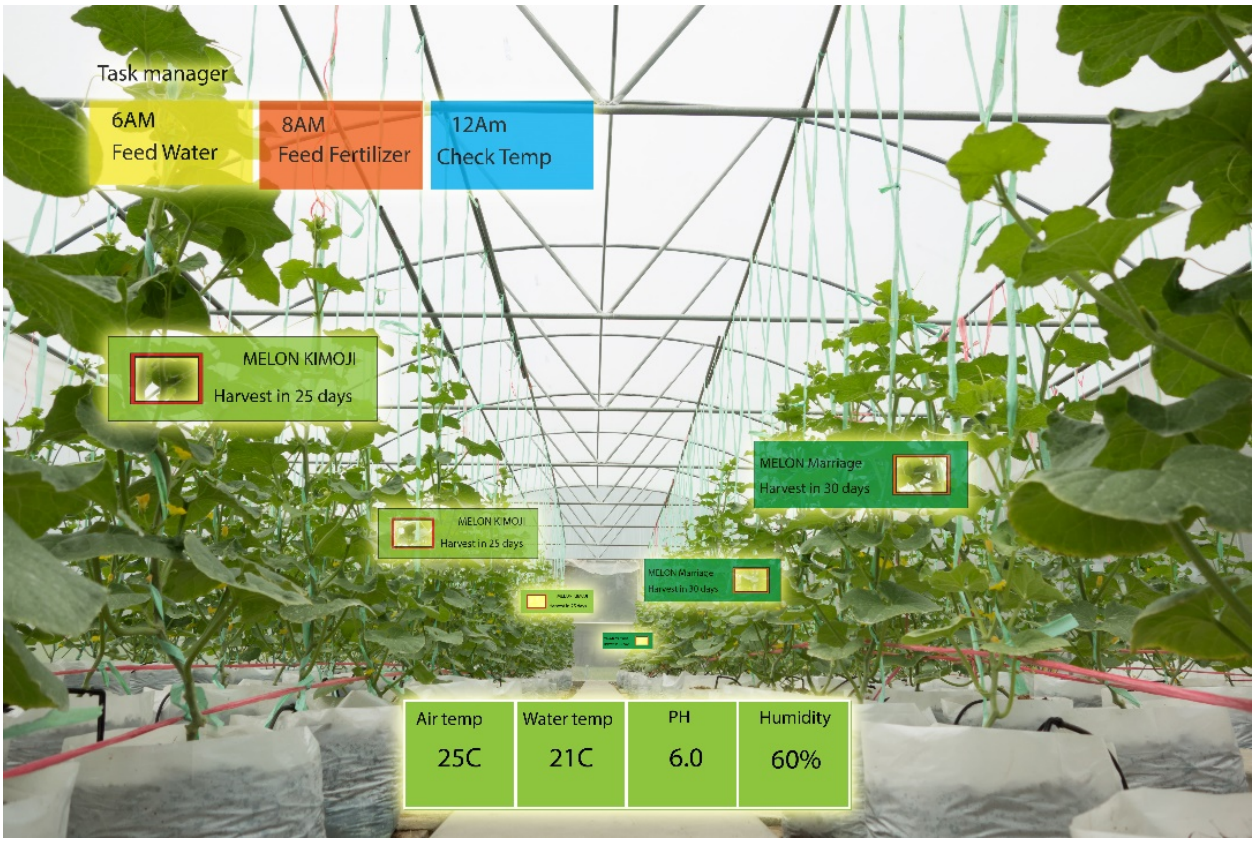

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Digital transformations are changing and challenging virtually every aspect of our lives. Of course, this is hardly news, since many high-profile scientists and technologists already mused about the challenges of digitization for core human values like friendship, family and work, as well as democratic institutions, human psyche, and decision-making, for better or for worse. [1] [2]

Against this backdrop, one of the touted benefits of digitalization is its potential ability to aid sustainable development goals. As an example, at the latest InnoTrans meeting, the world's largest transportation technology fair, several exhibitors showed that public transit will soon begin to use Internet of Things (IoT) to optimize their operations. IoT refers to the concept that computers can be embedded into physical objects to collect information and data about them on a real-time basis. One anticipated outcome here is curbing transit emissions by gathering real-time data on railcar performance through automated sensory input, as well as introducing

self-driving rolling stocks that can adjust and maintain speed and acceleration more predictably than a human; therefore, there is a chance to enable more consistent eco-friendly behaviors and accurate data in meeting emissions targets. IoT can also provide real-time information to adjust transit routes so that there are no empty busses and rail cars that get suboptimal return on the energy invested.

Such environment where a ubiquitous cyber-ecosystem works silently behind the curtains to do things humans struggle to do has been in the works, at least in fiction. For instance, the whole premise of the Star Trek franchise is a universe where preconfigured algorithms work calmly underneath every apparatus to control, regulate, and collect large amounts of data on such complex phenomenon as temperature, atmospheric gas concentrations, and subatomic particle interactions in objects and materials. This effort is scaled up so effectively that we get to know literally everything about our food, drink, clothing, living and working spaces, and our technologies, and their effects on us or the environment through sensor data. In this universe, most humans no longer pursue labor to survive and own possessions. Instead, they focus their time largely on mental and physical self-improvement thanks to a silent cyber-ecosystem taking care of things for them.

Of course, we don't know if the fourth industrial revolution – the digital – will bring about a similar utopia. With all environmentally alarming things being considered, that type of future seems out of reach. But here's the part where I will request the reader to suspend their disbelief. And I will argue that arriving at that kind of future may hinge on how well we understand what sustainable development is and how well and fast we can harness the digital to help accelerate the learning curve of organizations and institutions that largely determine how we live.

What Sustainable Development Is

Obviously, the first problem here is that both the public and decisionmaker understanding of sustainable development is severely restricted; a lay person may not immediately grasp that it refers to something more than putting three circles together. In reality, sustainable development is a bioeconomic law based in thermodynamics. It stresses that there is a natural asymmetry in the biosphere between what gets produced and what gets consumed and then ejected for absorption and recycling through biogeochemical processes: the source must always be more plentiful than the potential waste so that ecosystem services do not deplete faster than new ones are being made. To ensure this asymmetry ensues, ecological economists argue that we must improve the quality of our lives without actively and quantitatively expanding in the physical ecosystems.

The last sentence above is a hard sell because historically we are used to achieving qualitative improvements through active and quantitative expansions in place of nature's source functions. In our brief history, we appropriated a significant amount of net primary production for residential, industrial, and agricultural expansions that incurred significant opportunity costs to both primary producers like heterotrophs and species that depend on them for their livelihood, including ourselves.

Considering that sustainable development did not enter the modern psyche until the Brundtland report in 1987, it would be reasonable to say that we are yet to fully grasp its message regarding how we should live and work. To wit, while we can assess and quantify impact granularly, we still don't have overarching, actionable frameworks ratified by binding legal mechanisms that will compel us to identify and mitigate those opportunity costs. Likewise, we have pockets of policy, science, and technology innovations. However, they struggle to link their results for the same reason above. In the absence of a framework, much needed organizational-level change and learning based in this bioeconomic law also takes place in ways that struggle to produce measurable and scalable impact.

Therefore, the challenge of sustainable development, is not just about innovating new environmental technologies, but also about accelerating the learning curve of organizations and systems that largely determine how we live and work. The question is: can digital technologies help accelerate this learning curve? And at what cost?

Accelerating Sustainable Development Learning Curve Through Digitalization

The example I chose to illustrate here is the conference and meetings industry. Like most professionals, we attend to conferences and meetings every year to grow our network and keep up to date with new research, best practices, and processes. In many organizations, it is a mandatory requirement for professional improvement. Yet just like many professional practices we have established and institutionalized during 20th century, this one too is suspect in its violation of the sustainable development law.

The stakes are high enough to warrant serious discussion. I used to go to conferences in Chicago every year. When I put my travel numbers in CarbonZero, it shows that my roundtrip travel from Calgary to Chicago emits 1.09 tonnes of CO_2. If need visualization, this is what one tonne of CO_2 looks like. This is not an insignificant amount considering the scale of activity: Millions of people from all around the world attend to conferences every year. A PwC survey found that nearly 225 million participants attended to meetings (conventions, congresses, trade shows, exhibitions, incentive events, corporate/business meetings) by some type of

transportation in 2012. Accordingly, the gross amount of CO_2 generated by this enterprise alone is colossal.

The emerging sustainability alternative here enabled by the digital is the use of Virtual Reality (VR) interfaces that bring conferences and meetings to the people. Today's VR technology has advanced enough to simulate life-like interactions through avatars; it is only a matter of time when it begins to fully simulate a conference environment where we should be able to interact with others through our headsets, from our office or home.

But here is the rub: the conference enterprise is responsible for $106 billion share of the GDP and supports 1.7 million jobs in the US alone. Introducing VR as a sustainability alternative would be disruptive in ways that has consequences for the economy, the jobs, and the social connections conferences nurture along the way. We don't know what would happen to them if we commercialize and scale VR – would there be more jobs or less? And what kind?

On the other hand, the VR replacement is exactly the kind of disruption required to accelerate the sustainable development learning curve of many organizations that take part in this industry. Clearly it is a departure from a certain way of doing things. But if we convert at least half of these meetings into VR mediated interactions, the amount of CO_2 generated would be greatly offloaded to the direct and indirect emissions of VR devices themselves.

In theory, these new VR-based emissions should be less than all other fossil fuel resources that will get me to the conference (airplane, taxi etc.), plus saving me significant amount of stress and anxiety associated with the air travel. Once the consumer demand shifts from the old to this new method of engagement, there can be sufficient justification and budget to begin measuring the actual socioeconomic and environmental impacts of this emissions trade. The data emerging from this activity will almost certainly nudge organizations to rethink more saliently about how to be compliant with the sustainable development law.

Of course, data rarely educates. But it is necessary to strategize change. Especially, if it can be shown that technological shifts like the one above lead to qualitative improvements without significant quantitative expansions in natural ecosystems, then we will have at least one good, evidence-based reason for optimism about enacting the sustainable development law through digital innovations.

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Resources

[1] https://www.scientificamerican.com/article/will-democracy-survive-big-data-and-artificial-intelligence/

[2] https://www.theatlantic.com/magazine/archive/2018/06/henry-kissinger-ai-could-mean-the-end-of-human-history/559124/