From the Editor, Request for information for upcoming newsletters

This newsletter is an opportunity for IEF members to share their experiences, activities, and initiatives that are taking place at the community level on environment, climate change, and sustainability. All members are welcome to contribute information about related activities, upcoming conferences, news from like-minded organizations, recommended websites, book reviews, etc. Please send information to newsletter@ief.org

Please share the Leaves newsletter and IEF membership information with family, friends, and associates and encourage interested persons to consider becoming a member of the IEF.

RETHINKING SUCCESS –
A WAY TO SAVE THE PLANET AND OURSELVES

Rethinking Success - a Way to Save the Planet and Ourselves
ebbf's 30th annual conference in collaboration with the IEF
Lisbon, 14th to 17th of May 2020

"The time has come, then, to craft new narratives of ourselves and our societies—narratives that define different standards of success and wellbeing and assist those at all levels of affluence to construct more noble patterns of living and being together. Patterns which exalt the strength of community ties over the strength of quarterly earnings reports, which reward the depth of our commitment to universal wellbeing not the depth of our pockets, and which value the spirit of service rather than charisma."

Baha'i International Community at the United Nations – A perspective

We welcome you to a four-day expedition to rethink success. This will be the 30th annual conference of Ethical Business Building the Future – ebbf - in collaboration with the IEF's 24th annual conference.

It is evident that chasing the wrong kind of success has created many of the issues we are facing today. In this four day expedition we will encourage universal participation to explore together and create new kinds of success factors, new aims and goals that will allow us to focus our energies and those of our colleagues and partners to create ethical businesses and workplaces that will build the future, the more prosperous, just and sustainable future that is still within our reach, but we have precious little time left to make it happen, together.

This special learning event will provide the opportunity for the global diverse group of participants to share their practical experiences and have elevated conversations that break down old patterns and open our minds to what is possible.

> What does success mean to me?
> What kind of success is the ideal one for my organization?
> What does a successful new economic system look like?
> What does success for our planet require?

The conference will be mostly interactive, with short keynotes each morning and afternoon. IEF President Arthur Dahl will give the opening keynote, and IEF content is integrated throughout the program. The Annual General Assembly of IEF will take place on Friday 15 May at 18:00. Arrangements are being made for those not coming to Lisbon to follow the main parts of the conference at a distance.

The event will take place in Lisbon, Portugal. Register now online at http://ebbf.org/event-ebbfs-30th-international-annual-learning-event-lisbon/booking. The special early bird registration fee ends on 28 February. Space is limited.

On-site registration will open at 16:00 on Thursday the 14th of May 2020 and the expedition will end after lunch on Sunday the 17th of May 2020.

For information about the conference program, speakers and logistics, go here, just scroll down to find all information: http://ebbf.org/event/ebbfs-30th-international-annual-learning-event-lisbon/#ebbf

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A Video on the Many Dimensions of Success -
an Introduction to ebbf and to its up-coming Conference

What happens when a playwright, a corporate director, a fund manager, a teacher, an environmentalist, a lawyer... all meet to #rethinksuccess?
Enjoy the video below, introduced by youth and one of ebbf's annual conference speakers Avah Darling, told by ebbf members and beautifully produced by Mary Darling.

Click on this link to the video.

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Rethinking Success: What key dimensions of success are we failing to address?

An ebbf dialogue with Arthur Dahl to ...Rethink Success
YouTube video https://www.youtube.com/watch?v=BYi90Xo9h1s&feature=youtu.be (51 minutes)
19 December 2019
Edited transcript

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We need to take a systems approach to this new idea of success, a dynamic process that should balance material and spiritual.

A good first question as we rethink success is: success for whom?

In what framework do we define success or what would be successful?
In our Western individualist society, that is usually me, myself and I, individual success or the success of the individual company or nation winning out over others, a domination kind of success. So the set

of values within which the question is asked seems focused on some part of the whole, only a fragment of the whole.

I just returned from a complex systems science conference in Stockholm (), which basically said that the world is heading for catastrophe and we are going to collapse, and then asked how can complex systems science help us to navigate through the challenges ahead?

A wonderful example is the 2008 financial crisis, because economists and investment managers had found very effective ways of measuring the risk of each financial instrument that they were investing in, each derivative product, etc., but nobody thought about the success of the overall system. When the knock-on effects of weaknesses in one place started, the whole thing collapsed because nobody had looked at the success of the whole system. Each one was trying to maximize their own success in specific areas and not acknowledging that they were part of a larger whole.

So when we look at the issue of rethinking success, what good is success for an individual if the result is everybody else dying off, and as a consequence, the individual too eventually dying off?

In ecology we have the concept of overshoot and collapse: the flour beetles are a good example as they very successfully eat more and more flour and reproduce more and more, until suddenly they've eaten up all the flour then they all starve to death. So short-term success led to long term failure.

Perhaps more extreme but visually engaging is the example of somebody who's just jumped off a hundred storey building, looking around and saying "oh my the view is so beautiful, I'm really enjoying this" but not thinking about the landing when they get down the hundred floors to the ground.

I think very often that is what is wrong with definitions of success today: they're always partial and they're not asking about the behaviour of the overall system.

From systems science we look at the complex interactions and relationships of all the parts of the system and seek how to achieve some dynamic balance among all of them. Systems have emergent properties that appear beyond what you might predict looking at any individual part of the system.

At the systems science conference, most of the scientists there were also open to the spiritual dimension. I ended up sharing with a lot of people about the Baha'i approach to things which seemed to respond to some of their questions. For example, the Baha'i faith offers a systems approach to religion. Its concept of unity in diversity is all about observing systems, cooperation and reciprocity, all systems characteristics, along with solidarity, with each individual being a trust of the whole. All of these are systems ways of looking at all of humanity and how it fits into the natural world.

Another example came from COP25 in Madrid, where we saw how each country defending its self-interest made it very difficult to come up with a solution satisfactory to the whole. Too few there were looking at the common global interest. They're always having to balance what they think might pass at home, what will be politically possible or not possible, or following the vested interests of influential lobbies. They are measuring images of success in those narrower terms and ignoring what it means in consequences for the whole.

Another dimension of success: time-frame

Another dimension when thinking about success is the time-frame: in businesses it's the quarterly or annual financial report that measures how you are doing relative to the previous quarter. It's a very very short perspective. You wonder how often do people think about the future of the company?

When looking at the past, consider market leaders such as Westinghouse, Kodak or Pan Am. Because they didn't innovate, they perhaps were poorly managed, but most importantly they were not planning long enough into the future. They were too comfortable in their past dominant position. Suddenly they were left behind when it became too late to take any corrective action, and they went extinct like the dinosaurs.

So we really do need to measure the time-frame for when do you determine whether or not you're successful.

Of course success is not something you achieve and have and then have it forever after. It's a dynamic question of balance: how long have you kept your balance and how long have you continued to progress?

If you look at the Baha'i perspective, you are looking at time-frames of a dispensation of a thousand year cycle. So if we were to look at sustainability in that time context, we would really be laying the foundation for a civilization that will prosper long in the future. Perhaps we need to think of success that at least stretches beyond the extremely short term that is the common framework that most people use today.

Collective success

Another dimension of the Baha'i approach to rethinking success is really acknowledging that it is collective. What good is success to you as an individual if everybody else around you is failing? Shouldn't success mean collective success. We all need this to be successful together or we will all be failing together.

A company that looks at its individual short term success in terms of pure growth without looking for innovative ways to rein in its production of greenhouse gases will no longer have clients. Both its poor reputation and the practical climate consequences of its actions will have left it without people who will want to buy or consume its production.

We really need to explore how to look at planetary success. We really need to succeed on this planet, as we have reached planetary boundaries, overshooting many of them, and upsetting the balance of natural systems. How can we bring our impacts back into balance with planetary limits? How do we rethink the systems behind them, so that success is not how many more plastic packages have you sold, but can you find alternative packaging that can be recycled or become part of the closed cycles of a circular economy?

So how can we find the right measures of success beyond simply GDP or other economic measures? These fail to measure success but drive the system regardless whether it's constructive or destructive.

Let us start to think about how to take a systems approach to this idea of success, recognizing that success is a dynamic process, that success is really achieving balance, a balance of the necessary material needs we all have whilst also aiming for uplifting spiritual nourishment.

How do we consider success as a set of processes going ahead, where hopefully, instead of diverging towards catastrophe, we will be converging towards a more sustainable society both in material and spiritual terms?

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Source: https://medium.com/@ebbf/what-key-dimensions-of-success-are-we-failing-…
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The 1.5°C Business Playbook

At the World Economic Forum in Davos, a new 1.5°C Business Playbook was released. This is the first Business Playbook for exponential action on the climate emergency. It shows businesses how to integrate climate action in their business strategy and to halve their greenhouse gas emissions every decade to approach net zero by 2050.

The playbook can help businesses to take very significant climate actions in four important areas:

1. Reduce your own emissions
2. Reduce your value chain emissions
3. Integrate climate in business strategy
4. Influence climate action in society

The Playbook is concise, practical, very well written, and a valuable tool to help businesses become important actors in climate change mitigation.

Link to the article: https://futureearth.org/2020/01/21/new-1-5c-business-playbook-will-help-businesses-take-exponential-climate-action/?

Direct link to the 1.5°C BusinessPlaybook: https://exponentialroadmap.org/wp-content/uploads/2020/01/1.5C-business-playbook-1.0_digital-spread.pdf
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The "Zero Emission Cities" Conference
Vienna, Austria, 21 January 2020

Report by IEF Member David Menham

People came together from a variety of disciplines to discuss the Austrian government's 2020-2024 plans and the European Union's new 'Green Deal' for achieving Zero Emissions by at least 2040, ten years ahead of the original set target of 2050.

The meeting was jointly hosted by the President of the Chamber of Commerce and the City Mayor. Attending were a number of experts from a broad range of political, social, and economic backgrounds, including some from NGOs, reporting on the city's role in climate protection.

The main focus of discussion was on traffic, energy, and housing -- three areas that generate a great deal of greenhouse gasses. The general aim of this meeting was to improve the city's capability to reduce its emissions without reducing the quality of life for its inhabitants. At the same time the goal was to achieve some ambitious targets.

There was a definite awareness of the urgency of the situation as expressed through the following translated statements:

"… rapid changes require a review and adjustment in comparatively short intervals. The global crisis requires ambitious answers, and Vienna may still need to set new standards in the future." (Walter Ruck, WK Wien President)

"Events like these are important in order to raise awareness that we need to rethink housing, energy supply, and mobility; as well as to step into a climate-friendly future."

"For this reason, there is presently a massive investment in energy efficiency of the overall energy systems -- from generation to distribution -- with the urban energy supply continuously being converted from fossil to renewable energy sources." (Michael Ludwig, City Mayor)

"The necessary transformation to clean, sustainable, and climate-friendly mobility is one of the greatest challenges that clearly requires an intensified, voluntary, and active action by political, administrative, and business organizations as well as every individual (citizen)." (Dr. Jurgen Schneider, Ministry of the Environment)

One of the most interesting presentations was from Rana Adib the Executive Secretary of REN21 which is a global renewable energy community of actors from science, governments, NGOs, and industry. REN21 provides up-to-date and peer-reviewed facts, figures, and analysis of global developments in technology, policies, and markets.

"Economic systems built on the basis of fossil fuels are preventing national governments from focusing on the climate problem with the result that we are not on track worldwide to comply with the Paris Agreement. Since we must act quickly, this truth is difficult to bear. The Emission Gap Report 2019 published today by our partner UNEP shows the harsh reality: collectively, the states have so far not managed to stop the growth of global greenhouse gas emissions." (Rana Adib, Keynote Speaker member of REN21)

"The goal is clear - by 2050, extensive decarbonization (of fossil carbon) for our total energy consumption must be achieved. This is a huge challenge, since around 2/3 of the total energy consumption is provided from a fossil fuel basis". (Michael Woltran, OMV)

A Source of Optimism for the Climate?
Social tipping dynamics for stabilizing Earth's climate by 2050
Otto I.M. et al.

A brief Summary and Baha'i-inspired perspectives by IEF member Christine Muller
with thanks to Gary Colliver who drew IEF's attention to this paper

Many people have become pessimistic about the future of our planet due to the huge threat of climate change, the enormous scope of the necessary transformation in all aspects of the economy, and the inertia of human society. A newly released paper provides a more hopeful outlook: "Social tipping dynamics for stabilizing Earth's climate by 2050" which was recently published in *Proceedings of the National Academy of Sciences.*

The paper addresses the challenge of how we can achieve rapid decarbonization reaching net 0 by 2050, which is necessary for limiting global warming to not more than 1.5°C.

The paper discusses "the potential of social tipping interventions that can activate contagious processes of rapidly spreading technologies, behaviors, social norms, and structural reorganization within their functional domains that we refer to as social tipping elements. The identified interactions between the various social tipping elements mean that they can potentially reinforce one another, making a transition to decarbonization more likely if several are triggered simultaneously."

Six interventions that could move humanity toward a sustainable path are listed in the paper. An article by Sarah DeWeerdt in the *Anthropocene* summarizes these six recommended interventions:

> First, governments and energy ministries could remove fossil fuel subsidies, or redirect those subsidies towards renewables and low-carbon energy. At the same time, they could encourage decentralized energy production and storage. These efforts would erode the advantages that current policies afford to fossil fuels, and hasten the day when low-carbon energy production is more profitable than fossil fuels.

> Second, governments could build carbon-neutral cities or other large-scale demonstration projects, while grass-roots efforts could help existing towns and cities move toward being carbon-neutral. These actions would help spread information and build consumer interest in fossil-fuel-free technologies, until they become the first choice for new projects.

> Third, divestment from fossil fuel assets and withdrawal of insurance support for fossil fuel projects would help burst the 'carbon bubble,' making it unprofitable to develop remaining fossil fuel reserves.

> Next, activists and opinion leaders could emphasize the moral implications of fossil fuels – that is, the idea that burning fossil fuels in ways incompatible with the Paris climate targets is immoral. This has the potential to shift societal norms and, consequently, widespread patterns of behavior.

> Fifth, a massive climate literacy campaign to strengthen education about the climate in schools and universities, resulting in a generation of workers and leaders who are focused on stopping climate change.

> And finally, better education of the general public by disseminating information about the carbon impacts of consumer and lifestyle choices – basically the climate equivalent of nutrition labeling.

It is interesting to note that the first three points are economic and technical interventions and the second three are in the area of morality and education.

This is particularly illuminating from a Baha'i perspective. In its 1986 statement, *The Promise of World Peace*, the Universal House of Justice, the international governing institution of the Baha'i Faith, explained the importance of spiritual principles (or what some call human values) when addressing social problems: *"The essential merit of spiritual principle is that it not only presents a perspective which harmonizes with that which is immanent in human nature, it also induces an attitude, a*

dynamic, a will, an aspiration, which facilitate the discovery and implementation of practical measures. Leaders of governments and all in authority would be well served in their efforts to solve problems if they would first seek to identify the principles involved and then be guided by them."

In the meantime, the voices for climate justice have arisen from people of all religious backgrounds and interfaith collaboration to address climate change as a moral issue has gained momentum.

The two last recommended interventions consist of comprehensive education through schools and universities, as well as through general information sharing such as labeling consumer goods. Baha'u'llah, the Prophet-founder of the Baha'i Faith, already emphasized the importance of education in the 19th century, and Baha'is all over the world are engaged in spiritual education with classes for children, youth, and adults. There is much potential in this global endeavor to promote climate education and sustainable development.

It is encouraging to see that this paper about social change, as well as leaders in climate action, increasingly point out that technical and economic measures are essential to mitigate climate change, but that they need to be accompanied by a change in human values and cultural norms.

It certainly makes much sense to whole-heartedly pursue these six recommended "interventions" so as to initiate the large-scale systemic change that is necessary for human survival.

Sources:
Paper: Social tipping dynamics for stabilizing Earth's climate by 2050, Otto I.M. et al., *Proceedings of the National Academy of Sciences 2020*. https://www.pnas.org/content/early/2020/01/14/1900577117
Article: Here are a half-dozen nudges that could bring about rapid decarbonization, Sarah DeWeerdt, January 21, 2020, http://www.anthropocenemagazine.org/2020/01/here-are-half-dozen-nudges-rapid-decarbonization/

Items of Interest

The Wilmette Institute Climate Change Course will be offered from 9 April to 3 June 2020.
For more information, please visit the website. (More about this course in the next newsletter)

UN CC: e-Learn offers courses that are accredited by the UN on
1. An Introduction to Climate Change
2. The Green Economy
3. Children and Climate Change
4. Cities and Climate Change
5. Gender and the Environment

For more information, visit https://unccelearn.org/

Climate risk and response: Physical hazards and socioeconomic impacts
How could Earth's changing climate impact socioeconomic systems across the world in the next three decades? A year-long, cross-disciplinary research effort at McKinsey & Company provides some answers. Check out the report here: https://www.mckinsey.com/mgi/overview

New Record Temperature for Antarctic Continent

7 February 2020

The Argentine research base, Esperanza, on the northern tip of the Antarctic peninsula, set a new record temperature of 18.3°C on 6 February, beating the former record of 17.5°C on 24 March 2015.

The Antarctic Peninsula (the northwest tip near to South America) is among the fastest warming regions of the planet, almost 3°C over the last 50 years. The amount of ice lost annually from the Antarctic ice sheet increased at least six-fold between 1979 and 2017. Most of the ice loss takes place

by melting of the ice shelves from below, due to incursions of relatively warm ocean water, especially in west Antarctica and to a lesser extent along the peninsula and in east Antarctica.

Spanning 14 million km2 (roughly twice the size of Australia), the Antarctic is cold, windy and dry. The average annual temperature ranges from about −10°C on the Antarctic coast to −60°C at the highest parts of the interior. Its immense ice sheet is up to 4.8km thick and contains 90% of the world's fresh water, enough to raise sea level by around 60 metres were it all to melt. Some 87% of glaciers along the west coast of the Antarctic Peninsula have retreated in the last 50 years with most of these showing an accelerated retreat in the last 12 years.

Pine Island Glacier

Cracks in the Pine Island Glacier in Antarctica have been growing rapidly over the last days, according to satellite images. The Pine Island Glacier is one of the primary ice arteries in the West Antarctic Ice Sheet. The two large rifts were first spotted in early 2019 and have each rapidly grown to approximately 20 km in length.

Pine Island glacier, like its neighbouring Thwaites Glacier, has been dramatically losing ice over the last 25 years. Recently, the frequency of Pine Island Glacier calving events has increased. Today, the glacier is observed to be losing mass by a combination of calving events together with strong basal melting, where warm ocean currents erode the underside of the floating ice shelf. As the ice shelf both thins and calves enormous icebergs, the glacier discharge is unable to replenish the ice lost and the ice shelf front recedes from its previous position.

Thwaites Glacier

Antarctica's Thwaites Glacier has been in the spotlight in recent years, as scientists have undertaken a multi-part international project to study the vast glacier from all angles. The urgency stems from observations and analyses showing that the amount of ice flowing from Thwaites—and contributing to sea level rise—has doubled in the span of three decades. Scientists think the glacier could undergo even more dramatic changes in the near future. Indeed, Thwaites Glacier is one of the largest contributors to global sea level rise from the West Antarctic Ice Sheet.

Source: World Meteorological Organization https://public.wmo.int/en/media/news/new-record-antarctic-continent-reported

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Greta Thunberg's Remarks at the Davos Economic Forum

22 January 2020
New York Times, reporting from the World Economic Forum in Davos

DAVOS, Switzerland — Greta Thunberg spoke here Tuesday afternoon at an event hosted by The New York Times and the World Economic Forum. Here is the full transcript of her remarks:

One year ago I came to Davos and told you that our house is on fire. I said I wanted you to panic. I've been warned that telling people to panic about the climate crisis is a very dangerous thing to do. But don't worry. It's fine. Trust me, I've done this before and I can assure you it doesn't lead to anything.

And, for the record, when we children tell you to panic we're not telling you to go on like before. We're not telling you to rely on technologies that don't even exist today at scale and that science says perhaps never will.

We are not telling you to keep talking about reaching "net zero emissions" or "carbon neutrality" by cheating and fiddling around with numbers. We are not telling you to "offset your emissions" by just paying someone else to plant trees in places like Africa while at the same time forests like the Amazon are being slaughtered at an infinitely higher rate.

Planting trees is good, of course, but it's nowhere near enough of what is needed and it cannot replace real mitigation and rewilding nature.

Let's be clear. We don't need a "low carbon economy." We don't need to "lower emissions." Our emissions have to stop if we are to have a chance to stay below the 1.5-degree target. And, until we have the technologies that at scale can put our emissions to minus, then we must forget about net zero. We need real zero.

Because distant net zero emission targets will mean absolutely nothing if we just continue to ignore the carbon dioxide budget — that applies for today, not distant future dates. If high emissions continue like now even for a few years, that remaining budget will soon be completely used up.

Picture: Fabrice Coffrini/Agence France-Presse — Getty Images

The fact that the U.S.A. is leaving the Paris accord seems to outrage and worry everyone, and it should. But the fact that we're all about to fail the commitments you signed up for in the Paris Agreement doesn't seem to bother the people in power even the least.

Any plan or policy of yours that doesn't include radical emission cuts at the source, starting today, is completely insufficient for meeting the 1.5-degree or well-below-2-degrees commitments of the Paris Agreement.

And again, this is not about right or left. We couldn't care less about your party politics. From a sustainability perspective, the right, the left as well as the center have all failed. No political ideology or economic structure has been able to tackle the climate and environmental emergency and create a cohesive and sustainable world. Because that world, in case you haven't noticed, is currently on fire.

You say children shouldn't worry. You say: "Just leave this to us. We will fix this, we promise we won't let you down. Don't be so pessimistic."

And then, nothing. Silence. Or something worse than silence. Empty words and promises which give the impression that sufficient action is being taken.

All the solutions are obviously not available within today's societies. Nor do we have the time to wait for new technological solutions to become available to start drastically reducing our emissions. So, of course the transition isn't going to be easy. It will be hard. And unless we start facing this now together, with all cards on the table, we won't be able to solve this in time.

In the days running up to the 50th anniversary of the World Economic Forum, I joined a group of climate activists demanding that you, the world's most powerful and influential business and political leaders, begin to take the action needed.

We demand at this year's World Economic Forum, participants from all companies, banks, institutions and governments:

- Immediately halt all investments in fossil fuel exploration and extraction.
- Immediately end all fossil fuel subsidies.
- And immediately and completely divest from fossil fuels.

We don't want these things done by 2050, 2030 or even 2021. We want this done now.

It may seem like we're asking for a lot. And you will of course say that we are naïve. But this is just the very minimum amount of effort that is needed to start the rapid sustainable transition.

So either you do this or you're going to have to explain to your children why you are giving up on the 1.5-degree target. Giving up without even trying. Well I'm here to tell you that, unlike you, my generation will not give up without a fight.

The facts are clear, but they're still too uncomfortable for you to address. You just leave it because you think it's too depressing and people will give up. But people will not give up. You are the ones who are giving up.

Last week I met with Polish coal miners who lost their jobs because their mine was closed. And even they had not given up. On the contrary, they seem to understand the fact that we need to change more than you do.

I wonder, what will you tell your children was the reason to fail and leave them facing a climate chaos that you knowingly brought upon them? That it seemed so bad for the economy that we decided to resign the idea of securing future living conditions without even trying?

Our house is still on fire. Your inaction is fueling the flames by the hour. And we are telling you to act as if you loved your children above all else.

Thank you.

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Source: https://www.nytimes.com/2020/01/21/climate/greta-thunberg-davos-transcr…

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It is 100 seconds to midnight

2020 Doomsday Clock Statement
Science and Security Board
Bulletin of the Atomic Scientists

To: Leaders and citizens of the world
Re: Closer than ever: It is 100 seconds to midnight
Date: 23 January 2020

Humanity continues to face two simultaneous existential dangers—nuclear war and climate change—that are compounded by a threat multiplier, cyber-enabled information warfare, that undercuts society's ability to respond. The international security situation is dire, not just because these threats exist, but because world leaders have allowed the international political infrastructure for managing them to erode.

In the nuclear realm, national leaders have ended or undermined several major arms control treaties and negotiations during the last year, creating an environment conducive to a renewed nuclear arms race, to the proliferation of nuclear weapons, and to lowered barriers to nuclear war. Political conflicts regarding nuclear programs in Iran and North Korea remain unresolved and are, if anything, worsening. US-Russia cooperation on arms control and disarmament is all but nonexistent.

Public awareness of the climate crisis grew over the course of 2019, largely because of mass protests by young people around the world. Just the same, governmental action on climate change still falls far short of meeting the challenge at hand. At UN climate meetings last year, national delegates made fine speeches but put forward few concrete plans to further limit the carbon dioxide emissions that are disrupting Earth's climate. This limited political response came during a year when the effects of manmade climate change were manifested by one of the warmest years on record, extensive wildfires, and quicker-than-expected melting of glacial ice.

Continued corruption of the information ecosphere on which democracy and public decision making depend has heightened the nuclear and climate threats. In the last year, many governments used cyber-enabled disinformation campaigns to sow distrust in institutions and among nations, undermining domestic and international efforts to foster peace and protect the planet.

This situation—two major threats to human civilization, amplified by sophisticated, technology-propelled propaganda—would be serious enough if leaders around the world were focused on managing the danger and reducing the risk of catastrophe. Instead, over the last two years, we have seen influential leaders denigrate and discard the most effective methods for addressing complex threats—international agreements with strong verification regimes—in favor of their own narrow interests and domestic political gain. By undermining cooperative, science- and lawbased approaches to managing the most urgent threats to humanity, these leaders have helped to create a situation that will, if unaddressed, lead to catastrophe, sooner rather than later.

Faced with this daunting threat landscape and a new willingness of political leaders to reject the negotiations and institutions that can protect civilization over the long term, the Bulletin of the Atomic Scientists Science and Security Board today moves the Doomsday Clock 20 seconds closer to midnight—closer to apocalypse than ever. In so doing, board members are explicitly warning leaders and citizens around the world that the international security situation is now more dangerous than it has ever been, even at the height of the Cold War.

Civilization-ending nuclear war—whether started by design, blunder, or simple miscommunication— is a genuine possibility. Climate change that could devastate the planet is undeniably happening. And for a variety of reasons that include a corrupted and manipulated media environment, democratic governments and other institutions that should be working to address these threats have failed to rise to the challenge.

The Bulletin believes that human beings can manage the dangers posed by the technology that humans create. Indeed, in the 1990s leaders in the United States and the Soviet Union took bold actions that made nuclear war markedly less likely—and as a result the Bulletin moved the minute hand of the Doomsday Clock the farthest it has been from midnight.

But given the inaction—and in too many cases counterproductive actions— of international leaders, the members of the Science and Security Board are compelled to declare a state of emergency that requires the immediate, focused, and unrelenting attention of the entire world. It is 100 seconds to midnight. The Clock continues to tick. Immediate action is required.

A retreat from arms control creates a dangerous nuclear reality

The world is sleepwalking its way through a newly unstable nuclear landscape. The arms control boundaries that have helped prevent nuclear catastrophe for the last half century are being steadily dismantled.

In several areas, a bad situation continues to worsen. Throughout 2019, Iran increased its stockpile of low-enriched uranium, increased its uranium enrichment levels, and added new and improved centrifuges—all to express its frustration that the United States had withdrawn from the Iran nuclear deal (formally known as the Joint Comprehensive Plan of Action, or JCPOA), re-imposed economic sanctions on Iran, and pressured other parties to the Iran nuclear agreement to stop their compliance with the agreement. Early this year, amid high US-Iranian tensions, the US military conducted a drone air strike that killed a prominent Iranian general in Iraq. Iranian leaders vowed to exact "severe revenge" on US military forces, and the Iranian government announced it would no longer observe limits, imposed by the JCPOA, on the number of centrifuges that it uses to enrich uranium.

Although Iran has not formally exited the nuclear deal, its actions appear likely to reduce the "breakout time" it would need to build a nuclear weapon, to less than the 12 months envisioned by parties to the JCPOA. At that point, other parties to the nuclear agreement—including the European Union and possibly Russia and China—may be compelled to acknowledge that Iran is not complying. What little is left of the agreement could crumble, reducing constraints on the Iranian nuclear program and increasing the likelihood of military conflict with the United States.

The demise of the Intermediate-Range Nuclear Forces (INF) Treaty became official in 2019, and, as predicted, the United States and Russia have begun a new competition to develop and deploy weapons the treaty had long banned. Meanwhile, the United States continues to suggest that it will not extend New START, the agreement that limits US and Russian deployed strategic nuclear weapons and delivery systems, and that it may withdraw from the Open Skies Treaty, which provides aerial overflights to build confidence and transparency around the world. Russia, meanwhile, continues to support an extension of New START.

The assault on arms control is exacerbated by the decay of great power relations. Despite declaring its intent to bring China into an arms control agreement, the United States has adopted a bullying and derisive tone toward its Chinese and Russian competitors. The three countries disagree on whether to pursue negotiations on outer space, missile defenses, and cyberwarfare. One of the few issues they do agree on: They all oppose the Treaty on the Prohibition of Nuclear Weapons, which opened for signature in 2017. As an alternative, the United States has promoted, within the context of the review conference process of the Nuclear Non-Proliferation Treaty (NPT), an initiative called "Creating the Environment for Nuclear Disarmament." The success of this initiative may depend on its reception at the 2020 NPT Review Conference—a landmark 50th anniversary of the treaty.

US efforts to reach agreement with North Korea made little progress in 2019, despite an early summit in Hanoi and subsequent workinglevel meetings. After a North Korean deadline for end-of-year progress passed, Kim Jong Un announced he would demonstrate a new "strategic weapon" and indicated that North Korea would forge ahead without sanctions relief. Until now, the willingness of both sides to continue a dialogue was positive, but Chairman Kim seems to have lost faith in President Trump's willingness to come to an agreement.

Without conscious efforts to reinvigorate arms control, the world is headed into an unregulated nuclear environment. Such an outcome could reproduce the intense arms race that was the hallmark of the early decades of the nuclear age. Both the United States and Russia have massive stockpiles of warheads and fissile material in reserve from which to draw, if they choose. Should China decide to build up to US and Russian arsenal levels—a development previously dismissed as unlikely but now being debated—deterrence calculations could become more complicated, making the situation more dangerous. An unconstrained North Korea, coupled with a more assertive China, could further destabilize Northeast Asian security. As we wrote last year and re-emphasize now, any belief that the threat of nuclear war has been vanquished is a mirage.

An insufficient response to an increasingly threatened climate

In the past year, some countries have taken action to combat climate change, but others— including the United States, which formalized its withdrawal from the Paris Agreement, and Brazil, which dismantled policies that had protected the Amazon rainforest—have taken major steps backward. The highly anticipated UN Climate Action Summit in September fell far short of Secretary General António Guterres' request that countries come not with "beautiful speeches, but with concrete plans." The 60 or so countries that have committed (in more or less vague terms) to net zero emissions of carbon dioxide account for just 11 percent of global emissions. The UN climate conference in Madrid similarly disappointed. The countries involved in negotiations there barely reached an agreement, and the result was little more than a weak nudge, asking countries to consider further curbing their emissions. The agreement made no advances in providing further support to poorer countries to cut emissions and deal with increasingly damaging climate impacts.

Lip service continued, with some governments now echoing many scientists' use of the term "climate emergency." But the policies and actions that governments proposed were hardly commensurate to an emergency. Exploration and exploitation of fossil fuels continues to grow. A recent UN report finds that global governmental support and private sector investment have put fossil fuels on course to be over-produced at more than twice the level needed to meet the emissions reduction goals set out in Paris.

Unsurprisingly, these continuing trends are reflected in our atmosphere and environment: Greenhouse gas emissions rose again over the past year, taking both annual emissions and atmospheric concentrations of greenhouse gases to record highs. The world is heading in the opposite direction

from the clear demands of climate science and plain arithmetic: Net carbon dioxide emissions need to go down to zero if the world is to stop the continuing buildup of greenhouse gases. World emissions are going in the wrong direction.

The consequences of climate change in the lives of people around the world have been striking and tragic. India was ravaged in 2019 both by record-breaking heat waves and record-breaking floods, each taking a heavy toll on human lives. Wildfires from the Arctic to Australia, and many regions in between, have erupted with a frequency, intensity, extent, and duration that further degrade ecosystems and endanger people. It is not good news when wildfires spring up simultaneously in both the northern and southern hemispheres, making the notion of a limited "fire season" increasingly a thing of the past.

The dramatic effects of a changing climate, alongside the glacial progress of government responses, have unsurprisingly led to rising concern and anger among growing numbers of people. Climate change has catalyzed a wave of youth engagement, activism, and protest that seems akin to the mobilization triggered by nuclear disaster and nuclear weapons fears in the 1970s and 1980s. Politicians are taking notice, and, in some cases, starting to propose policies scaled to the urgency and magnitude of the climate problem. We hope that public support for strong climate policies will continue to spread, corporations will accelerate their investments in low-carbon technologies, the price of renewable energy will continue to decline, and politicians will take action. We also hope that these developments will happen rapidly enough to lead to the major transformation that is needed to check climate change.

But the actions of many world leaders continue to increase global risk, at a time when the opposite is urgently needed.

The increased threat of information warfare and other disruptive technologies

Nuclear war and climate change are major threats to the physical world. But information is an essential aspect of human interaction, and threats to the information ecosphere—especially when coupled with the emergence of new destabilizing technologies in artificial intelligence, space, hypersonics, and biology—portend a dangerous and multifaceted global instability.

In recent years, national leaders have increasingly dismissed information with which they do not agree as fake news, promulgating their own untruths, exaggerations, and misrepresentations in response. Unfortunately, this trend accelerated in 2019. Leaders claimed their lies to be truth, calling into question the integrity of, and creating public distrust in, national institutions that have historically provided societal stability and cohesion.

In the United States, there is active political antagonism toward science and a growing sense of government-sanctioned disdain for expert opinion, creating fear and doubt regarding well-established science about climate change and other urgent challenges. Countries have long attempted to employ propaganda in service of their political agendas. Now, however, the internet provides widespread, inexpensive access to worldwide audiences, facilitating the broadcast of false and manipulative messages to large populations and enabling millions of individuals to indulge in their prejudices, biases, and ideological differences.

The recent emergence of so-called "deepfakes"— audio and video recordings that are essentially undetectable as false—threatens to further undermine the ability of citizens and decision makers to separate truth from fiction. The resulting falsehoods hold the potential to create economic, social, and military chaos, increasing the possibility of misunderstandings or provocations that could lead to war, and fomenting public confusion that leads to inaction on serious issues facing the planet. Agreement on facts is essential to democracy and effective collective action.

Other new technologies, including developments in biological engineering, high-speed (hypersonic) weapons, and space weapons, present further opportunities for disruption.

Genetic engineering and synthetic biology technologies are now increasingly affordable, readily available, and spreading rapidly. Globally, governments and companies are collecting vast amounts of

health-related data, including genomic data, ostensibly for the purpose of improving healthcare and increasing profits. But the same data could also be useful in developing highly effective biological weapons, and disagreements regarding verification of the Biological and Toxin Weapons Convention continue to place the world at risk.

Artificial intelligence is progressing at a frenzied pace. In addition to the concern about marginally controlled AI development and its incorporation into weaponry that would make kill decisions without human supervision, AI is now being used in military command and control systems. Research and experience have demonstrated the vulnerability of these systems to hacking and manipulation. Given AI's known shortcomings, it is crucial that the nuclear command and control system remain firmly in the hands of human decision makers.

There is increasing investment in and deployment of hypersonic weapons that will severely limit response times available to targeted nations and create a dangerous degree of ambiguity and uncertainty, at least in part because of their likely ability to carry either nuclear or conventional warheads. This uncertainty could lead to rapid escalation of military conflicts. At a minimum, these weapons are highly destabilizing and presage a new arms race.

Meanwhile, space has become a new arena for weapons development, with multiple countries testing and deploying kinetic, laser, and radiofrequency anti-satellite capabilities, and the United States creating a new military service, the Space Force.

The overall global trend is toward complex, hightech, highly automated, high-speed warfare. The computerized and increasingly AI-assisted nature of militaries, the sophistication of their weapons, and the new, more aggressive military doctrines asserted by the most heavily armed countries could result in global catastrophe.

How the world should respond

To say the world is nearer to doomsday today than during the Cold War—when the United States and Soviet Union had tens of thousands more nuclear weapons than they now possess— is to make a profound assertion that demands serious explanation. After much deliberation, the members of the Science and Security Board have concluded that the complex technological threats the world faces are at least as dangerous today as they were last year and the year before, when we set the Clock at two minutes to midnight (as close as it had ever been, and the same setting that was announced in 1953, after the United States and the Soviet Union tested their first thermonuclear weapons).

But this year, we move the Clock 20 seconds closer to midnight not just because trends in our major areas of concern—nuclear weapons and climate change—have failed to improve significantly over the last two years. We move the Clock toward midnight because the means by which political leaders had previously managed these potentially civilization-ending dangers are themselves being dismantled or undermined, without a realistic effort to replace them with new or better management regimes. In effect, the international political infrastructure for controlling existential risk is degrading, leaving the world in a situation of high and rising threat. Global leaders are not responding appropriately to reduce this threat level and counteract the hollowing-out of international political institutions, negotiations, and agreements that aim to contain it. The result is a heightened and growing risk of disaster.

To be sure, some of these negative trends have been long in development. That they could be seen coming miles in the distance but still were allowed to occur is not just disheartening but also a sign of fundamental dysfunction in the world's efforts to manage and reduce existential risk.

Last year, we called the extremely troubling state of world security an untenable "new abnormal."

"In this extraordinarily dangerous state of affairs, nuclear war and climate change pose severe threats to humanity, yet go largely unaddressed," we wrote. "Meanwhile, the use of cyber-enabled information warfare by countries, leaders, and subnational groups of many stripes around the world exacerbates these enormous threats and endangers the information ecosystem that underpins democracy and civilization as we know it. At the same time, other disruptive technologies complicate and further darken the world security situation."

This dangerous situation remains—and continues to deteriorate. Compounding the nuclear, climate,

and information warfare threats, the world's institutional and political capacity for dealing with these threats and reducing the possibility of civilization-scale catastrophe has been diminished. Because of the worldwide governmental trend toward dysfunction in dealing with global threats, we feel compelled to move the Doomsday Clock forward. The need for emergency action is urgent. There are many practical, concrete steps that leaders could take—and citizens should demand— to improve the current, absolutely unacceptable state of world security affairs. Among them:

• US and Russian leaders can return to the negotiating table to: reinstate the INF Treaty or take other action to restrain an unnecessary arms race in medium-range missiles; extend the limits of New START beyond 2021; seek further reductions in nuclear arms; discuss a lowering of the alert status of the nuclear arsenals of both countries; limit nuclear modernization programs that threaten to create a new nuclear arms race; and start talks on cyber warfare, missile defenses, the militarization of space, hypersonic technology, and the elimination of battlefield nuclear weapons.

• The countries of the world should publicly rededicate themselves to the temperature goal of the Paris climate agreement, which is restricting warming "well below" 2 degrees Celsius higher than the preindustrial level. That goal is consistent with consensus views on climate science, and, notwithstanding the inadequate climate action to date, it may well remain within reach if major changes in the worldwide energy system and land use are undertaken promptly. If that goal is to be attained, industrialized countries will need to curb emissions rapidly, going beyond their initial, inadequate pledges and supporting developing countries so they can leapfrog the entrenched, fossil fuel-intensive patterns previously pursued by industrialized countries.

• US citizens should demand climate action from their government. Climate change is a serious and worsening threat to humanity. Citizens should insist that their government acknowledge it and act accordingly. President Trump's decision to withdraw the United States from the Paris climate change agreement was a dire mistake. Whoever wins the 2020 US presidential election should reverse that decision.

• The United States and other signatories of the Iran nuclear deal can work together to restrain nuclear proliferation in the Middle East. Iran is poised to violate key thresholds of the deal. Whoever wins the United States' 2020 presidential election must prioritize dealing with this problem, whether through a return to the original nuclear agreement or via negotiation of a new and broader accord.

• The international community should begin multilateral discussions aimed at establishing norms of behavior, both domestic and international, that discourage and penalize the misuse of science. Science provides the world's searchlight in times of fog and confusion. Furthermore, focused attention is needed to prevent information technology from undermining public trust in political institutions, in the media, and in the existence of objective reality itself. Cyber-enabled information warfare is a threat to the common good. Deception campaigns—and leaders intent on blurring the line between fact and politically motivated fantasy—are a profound threat to effective democracies, reducing their ability to address nuclear weapons, climate change, and other existential dangers.

The global security situation is unsustainable and extremely dangerous, but that situation can be improved, if leaders seek change and citizens demand it. There is no reason the Doomsday Clock cannot move away from midnight. It has done so in the past when wise leaders acted, under pressure from informed and engaged citizens around the world. We believe that mass civic engagement will be necessary to compel the change the world needs.

Citizens around the world have the power to unmask social media disinformation and improve the long-term prospects of their children and grandchildren. They can insist on facts, and discount nonsense. They can demand—through public protest, at the ballot box, and in many other creative ways—that their leaders take immediate steps to reduce the existential threats of nuclear war and climate change. It is now 100 seconds to midnight, the most dangerous situation that humanity has ever faced. Now is the time to unite—and act.

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