Synthesis report of several extended internet quick scans of future studies 2020-2070. 6th timeline; data ≤2015

Choices today, determine the options we have tomorrow and the futures we can or won't have the day after tomorrow.

In this note you will find:
- a 1-2 page overall summary of future studies on the decades of 2020 to 2070;
- of each decade a 1-2 page summary.

Bottom line: choices today, lead to options tomorrow and to different futures the day after tomorrow. So try to grasp the weak signals of the proverbial ‘today’ to look ahead for ‘tomorrow’ and to plan -future resilient- for the ‘day after tomorrow’.

“Lets time travel” (Without passing judgements!)

2010 - 2020 - 2030 - 2040 - 2050 - 2060 - 2070 - 2080 - 2090 - 2100

Infinite futures,
another number of infinite futures,
another number of infinite futures,
another number of infinite futures,
another number of infinite futures,
another number of infinite futures,
another number of infinite futures,
another number of infinite futures,
and so on !

Legenda: each ‘-’ and ‘star’ in the graph stands for myriads of choices, results and effects.

At each point in time there is a miriad of choices on each topic producing miyriads of options, producing miyriads of futures. Sometimes old choices can be reversed, old options caught up again; but time moves in one direction only (for the time being).

NOTE

This document is based upon the data of several internet scans on future studies of 2015 and before, targeting 2020 and further. The project started in 2007. The web address of this 6th time line document remains: www.bjernv.dds.nl/2010-2050.PDF (so no, no typo).

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Introduction

Since 2008\(^1\), the internet was searched five additional times with a simple set of search parameters (‘research AND <20Y0>’, the latter being 2010 to 2060) in 7 languages, each time the first 50 hits were checked (in English the first 100).

The results were checked. If was about research and future studies, quotes and graphs were sequenced by decennium/year prospected, and by topics and publication dates in a ‘timeline’ document.

Below you will find the one pager impressions of the results of the quickscan: overall 2020-2070\(^2\).
That serves as an appetizer for the one pagers per decade.

But as a starter there is also a one pager, reflecting on Famous Past Expectations. The lesson from that is that futures turn out quite different from the expectations of the best and brightest minds of their times. Or, to put it differently: expect the unexpected and the “absurd”.

In due time that insight led to an inventory of presently considered “absurd” futures, drawing on science fiction suggestions. Jules Verne and Aldous Huxley did have some crazy ideas that became realities... Why will it be different for the tales of Gene Roddenberry (Star Trek), Michael Straczynski (Babylon 5) or … a Franny Armstrong en John Battek (the Age of the Stupid)? However, what science writers come up with is from then onwards within our cognitive space; Known-Unknowns so to say.

The thrill really begins of course when stuff happens that even the most imaginative or crazy science writers have come up with; the Unknown-Unknowns. So we 'll finish with a one pager on unexpected and the “absurd”.

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\(^1\) The first search experiments were conducted in 2007. First for Dutch and English on 2010 + research. Then followed bij 2020 and so on, while extending the number of languages. These docs only had limited paper editions, sometimes with reprints as they drew the interest of those involved in the Dutch 2004-2007 Horizonscan Project, targeting 2040 without mentioning it. Report of that project: in English & cover and in Dutch & cover. And the project's history you'll find here (unofficial, courtesy of the former proj.secretary). It had a follow up in the STT 80 – Horizonscan 2050 (2014); for downloads, look in right bottom corner.

\(^2\) From the record, is hyperlink is kept the same as for the first timeline 2010-2050, as a courtesy to those who have bookmarked the link ever since.
Grand Resume 2020-2070 and beyond
Management Resume Sixth Timeline

Using Google and a simple set of search parameters (‘research AND <20Y0>’, the latter being 2010 to 2070) in 7 languages, each time the first 50 hits were checked (in English the first 100). The first searches were executed in 2006. The data for this sixth timeline was gathered very late December 2014 and very late December 2015, respectively. So 800 search results were individually checked and documented/added if, it was (serious enough) research. The total number of unique records in the appendixes count up to some 2,500. As quite a number have projections for several decades, some 3,000 citations, graphes and reference to sources can be read through the decades.

The objective was/is to see what ‘floating on top’ in the world wide information ocean called internet and NOT to focus a priori on any particular topic. All hits were checked for their reference to relevant research papers or press statements, clearly saying something specific about the future. If so, the copy/pasted text or graphs were, as 'items' or 'records' sequenced by decade, topic and anti-chronologically, in the appropriate appendix. In total to near 3000 quotes or more resulted, after having checked some 4400 search results. So it is probably the largest database of its kind in the world.

Though using Google searches is as a methodology a point, it can also be looked at as a general multi trait multi method approach as the admitted quotes represent the full spectrum of future studies from arithmetical extrapolations, to scenario and Delphi studies. Adds or paid top rankings can be and were ignored. Though the search algorithm might be biased for the user's interest in research, the results -to some degree- will show the 'interests of the crowd'.

The result allows you to observe the unfolding of the future by reading in the appendixes either by topic through a number of decades, or by decade and one can also “cross” two or more topics in the same way. As for the "results" and "conclusions" of this update, the conclusions of the previous timelines can be repeated. We briefly note the following:

1. there are within and between different language and administrative/governmental levels, different pictures (on each topic) and different views upon the future emerge [lesson: read in more languages and a higher and lower governmental levels],
2. references to the landmark foresights and future studies of the grand and prestigious (international) organisations (like UN & co, OECD & co, EU & co) are usually missing in the first 50 hits in each decade in each of the language areas [lesson: check on them — they are rare as they fear reputation losses];
3. quite a few impact topics are missing like (the growing frequency of) clockwise, disasters and catastrophes, crime and crook topics, war-peace issues, (world) governance issues (responsible custodianship for all generations to come, not only one's own) [lesson: think 'planet']. These issues do not or hardly turn up in the first 50 hits in either language used and in either decade.

Four other overall remarks still hold:
4. the top-three topics are likely to be a decade "overdue" (for instance, ageing ranked highest for 2050 while OECD warns that the biggest problems will already present themselves in 2040) [lesson: expect developments to unfold quicker than expected];
5. the weak signal is that the 'problem year' for a certain topic wanders/wandered forward from 'at the end of this century' to '2040 or 2030', to -oeps- '2013-2015' and sometimes even to -blieb- 'maybe this year'. Such a pattern was observable in the data on the topics of Energy and the Arctic Passage. In other words, this is reminiscent of Tetlock's expert paradox findings – the 'maybe this year' in 2007- came from a young woman doing her doctorate as it was the result of her (new) climate model [same lesson];

the same missing goes for:
6. lessons on previous best expert's best judgements – time caught up with them and their expectations worked out quite differently (see Famous Past Expectations) [lesson: take into account that even the best and brightest experts get it wrong – and don't blame them for that, respect them for sticking out their necks];
7. suggestions or possibilities of present 'impossibilities' that become common and wide spread realities within a few years or a few decades (so called ' black swans' but also mind slow changes passing tipping points). Best guess here: see Absurd Futures. [lesson: keep an open mind - always]

Last but not least there is a deafening silence on:
8. relevant (sheer survival type) topics (perhaps because these future studies lack the mentioning of a specific year like 2020, 2030...);
9. impacts of presently known emerging technologies, and unknown 'general purpose technologies' (GPTs; technologies that redefine economies and societies like the steam engine, the computer and internet did);
10. SDGs. In 2015, September 25, the UN's Sustainability Goals were approved. That is a big step forward. Future studies up to 2015 did/could not take that united stand into consideration. It most likely will change the outlooks and prospects for the coming decades; if united, we can stand to these objectives and change the lives of all generations to come on the entire planet – for the better!

Mind you, this does not mean that studies on these missing issues are non existent. It only means that they don't show up in the first 50 hits. That apparently means that these studies are not paid much attention / interest to by “everybody” in the crowd.

Bottom line proverbially: choices today lead to options tomorrow and to different futures the day after tomorrow! In full recognition of the drawbacks of the methods, operations, results and conclusions, two last remarks. One is: adopt an open mind about the future and happily expect the unexpected. Two is: do not be surprised if some predictions -or denials- arrive way sooner than expected – or turn out very differently.

The latter is a reason for a closer look at Famous Past Expectations as a starter.
Famous Past Expectations

Every generation is at its peak of the state of knowledge in mankind’s history. So are the scientists and experts, speaking with the authority of their reputations. One may smile later, from new peaks of the state of knowledge. In their times however, their opinions, views and judgments bore great weight.

The learnt lesson form these outstanding persons for us should be: beware when someone says something like:

- "Everything that can be invented, has been invented," announced Charles H. Duell, commissioner of the U.S. Patents Office, in 1899. *2)
- What can be more palpably absurd than the prospect held out of locomotives travelling twice as fast as stagecoaches? (The Quarterly Review, England (March 1825)*1)
- “When the Paris Exhibition closes electric light will close with it and no more be heard of.” (Erasmus Wilson (1878) Professor at Oxford University,*1)

The bottom line is that the future will always turn out different than expected. So in future times, expect that others will look back to us from their new peaks of the states of knowledge with a smile. And as for the future: expect the unexpected!

*1) www.tfproject.org/tp/showthread.php?s=&threadid=45487
*2) www.time.com/time/covers/1101041011/story.html
*3) http://amasci.com/freenrg/larged.html

As a treat, the appendix of 2010-2019 results are added as 'past' expectations. You can check for yourself if and to what degree these expectations of the previous decade and before workked out.
Present expectations

The Decade of 2020-2029; what’s up?

Looking through eye lashes to the 1500 quotes of researchers for the 2020-2029 decade, showing graphs and references of future studies dating 2013 and earlier years addressing issues and topics in this decade, a picture emerges. Energy, Climate, Economy and Health Issues are addressed mostly. For Energy Issues, the preoccupation is to balance demand and supply (cost effectively) and there is a lot of optimism regarding clean energy to reach cost competitiveness with fossil fuels in 2020. [Comment: this ‘clean’ isn’t so clean if the ecological footprint is considered in total.] The update with future studies of 2014 and 2015 do not change the general picture of the studies up to 2013.

On Climate Issues; CO2 gets a lot of attention – curbing the emissions to the Two Degrees Celsius Threshold. In the more recent studies, there is some doubt and a three (or four) degrees rise is considered in its consequences. [Comment: as research and science is muzzled on this by wishful and (fossil) interests, optimism is not too realistic.]

Economy Issues? Yes, the battle of the giants (G7) is the issue; who passes who by what year. So far China surpassed expectations, though India is doing surprisingly well. And balancing national budgets get attention, with an eye on demographic effects (costs in health care, pension systems). [Comment: good of course that wealth also reaches the billions in these countries. Balancing needed supply regarding basic needs and basic materials for consumer goods, with the rest of the world will take diplomatic efforts. And national budgets… As for pension and health care: yes, costly as the values/proportions of the underlying parameters are “unexpected”. Costly will also be the replacement of past age public infrastructure systems.]

Health Issues focus on topics like Alzheimer, dementia, diabetis, infectious diseases, presenting dramatic rise in numbers [usually without a correction for population growths, so please do or present percentages too.].

As for other issues; science and technology draws the attention. There is high interest in Technology (ICT; data amounts-connectedness-AI surpassing humans), Research and Science Policy (what country will be world leading in science), and Society (with aging and demography as the issues of key interest).

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3 One note however. It seems that mankind responds/responded too little and too late regarding climate change urgencies. This however does not follow from the new 2014 or 2015 future studies but from other research that does not have a reference to some year in the future. And are more recent than 2015:
- 11/4/2018 Atlantic Ocean Circulation at weakest point in 1,600 years [www.sciencedaily.com/releases/2018/04/180411131642.htm];
- despite the econ.crisis, the 400 ppm CO2 mile stone expected by 2020, was already a fact in 2015 (27/10/2017): How the World Passed a Carbon Threshold and Why It Matters [https://e360.yale.edu/features/how-the-world-passed-a-carbon-threshold-400ppm-and-why-it-matters];
- biodiversity degrades to the level that experts start to refer to ‘the 6th extinction’: 10/7/2017 Earth’s sixth mass extinction event under way, scientists warn [www.theguardian.com/environment/2017/jul/10/earths-sixth-mass-extinction-event-already-underway-scientists-warn].
Comment
What’s missing? Well, the whole issue of (rare) materials; if more and more people start to ‘live like an American’, then one earth will soon not be sufficient.
So in total: different than expected? Hardly. The main issue should be: weak signals of expected developments to arrive way sooner (sea level rise), or –reverse– way later than expected (cost competitiveness of clean energies). Or with more impact than cautious scientists expect (human influence on climate, biodiversity, tipping points)? And of course: black swans – the highly events with enormous consequences. In particular in the area of ‘general purpose technologies’.

BV/2018/07/15
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The Decade of 2030-2039; what’s up?

Looking through eye lashes to some 950 quotes of researchers for the 2030-2039 decade, showing graphs and references of future studies—dating 2015 and earlier years—addressing issues and topics in this decade, a picture emerges. The findings for the ca 50 added references of 2014 and 2015 studies (and sometimes older ones) that came up in 400 checked search results, hardly change the big picture. That is disappointing and disturbing; do new developments (natural and manmade/innovation) do not make a difference?

2030-2039 Climate, Energy, Health and Economy Issues are addressed mostly. Climate is the big issue in this decade and addresses the sub issues of biodiversity (land and oceans), CO2, melting of glaciers and (South) polar ice with consequent sealevel rise and consequences for grasslands on various continent. And sometimes agriculture but that’s in another section (food and water shortages are expected). [Many capital cities are in deltas but there are not many studies relating this to sea level rise. In 2018 the Cape Town reported water shortage]

Energy remains striving for clean energy, cost efficient as was expected for 2020-2029. So what’s new for 2030-2039? Well, little so the highlights might be surging world demand (by 2030 about 34,000 Twh [don't believe that, will be higher]). Of course in Asia (BRIC but no mention of MINT countries) and its 'fueling'. The core supply will (remain to) come from fossile fuels, expectations of the proportion of clean energy by 2030 varies from 10-25% (though some clean energy platforms grow considerably (as they come from very small proportions); biofuels, solar and wind energy think to be dominant in the clean energy section. Oh, and uranium is called to the rescue (yet an uranium shortage was expected for 2013 [no typo] whilst the use in 2030 is expected to be somewhere between 94,000 and 122,000 ton of it).

For Health Issues, the issues of an aging (world) population steers the focus in the future studies. Alarming figures are presented on the prevalence of Altzheimer, cancer, dementia, depression, infectious diseases (aids/hiv), obesity, Parkinson and strokes, and the costs involved. [Curiously; nobody expects breakthrough developments in health industries; not only in classic/traditional industries (medicine and pharmacology as it is know in the 1980-2029 periode), but also not in new areas like genomics and -very recently- upcoming ones (with a focus on the role and function of bacteria in, on and around us.]

Economy: the BRIC (but not the MINT) economies get attention. Overall the focus of the economic future studies has two sides; concerns about affordability on pension, social and health care systems in the light of aging populations and remaining competitive. The other focus is on market and profit volumes in new technologies of various kinds. [The attention for national budgets contrasts a lack of sense of mutual responsibility for a stable world economy. As for (technology) markets, it is rather illusory to outline that. Compare please the expectation about nuclear powered vacuum cleaners (by 1958), or the Horse Manure Problem.].
As for other issues; Labor Market, Spatial and Urban Planning, Infrastructures and are of interest. The labor market studies are often related to an aging workforce being pensioned or about the response to this exodus regarding higher needs of specific professionals (f.e. nurses, physicians, surgeons). The Spatial and Urban Planning relates to the increased population proportions living in cities and the consequences of demography. Infrastructures is mainly about the transportation sector; by water, road, rail and air and the devices needed for that. [No breakthroughs as we have previously seen in history?!]

**Comment**

What’s missing? Well, space isn't missing al together; there are expectations about bases on moon, Mars and space travel. [Yet, the few studies are rather conservative - a space elevator is missing, other breakthroughs?!]. The same goes for manmade Technology and the future products by 2030-2039, of 2015’s fundamental science and research effort. Given 2003 and 2007 expectations for examples, singularity is likely to be a fact – not only for “individual” ICT-systems (all connected to internet, blurring the border between the device/entity and internet), but also for the internet itself (and perhaps with more than one singularity within the internet). In line with this; interconnectivity and the blurring of borders between devices/hardware (non-biological and biological; ranging from (sub)nano scale to mega scale sizes), systemware, virtual “devices”, software, human ware internet might result in a few black swans. [In 2018 terms: no/little references to Internet of Things, robot(ics), autonomous vehicles or Industry 4.0 (or 5.0)]

So in total: different than expected? Hardly (expt for the missing things).

BV/1/8/2018

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The Decade of 2040-2049; what’s up?

Looking through eye lashes to some 300 quotes of researchers for the 2040-2049 decade, showing graphs and references of future studies –dating 2015 and sometimes earlier years-addressing issues and topics in this decade, a picture emerges. In a new search for 2014 and 2015 studies, only some 30 new entries have been added for this decade, out of some 400 hits. That is somewhat less than for 2030 and 2020. Apparently 2040 studies did not outrank studies from the earlier decades in Google's search algorithms. So the big picture remains the same. Society (Aging in particular) seems to be considered the number one issue is 2040. Followed by Energy and Labor Market respectively. And then come Climate and Economy.

Society/ageing

Aging is the biggest issue for the societies; consequences for health care (costs) and pensions (affordability), labor market (shortages), national productivity (too little numbers/shares in the active working population).

Energy

After 2040 the use of fossil fuels is expected to be at some 60% and to drop in the decade (very gradually) and solar power will become the big winner.

Labor Market

Labor shortages are expected, (partly) due to aging. Solutions are sought in getting more women and more immigrants into the labor market. Robots are expected to take over some 50 mln jobs (USA).

Climate

CO2 scenarios divert (wide ranges in CO2 price forecasts... to $100/ton in 2040); an Open Arctic Sea; quadrupling of heatwaves since 2010 (irrespective of CO2 levels).

Economy

Economies are impacted by the costs of clean energy/climate policies; China's economy is expected to surge. [Absent is: the economical role of megacities and of global companies with gross turn overs and/or political influences that rival the world leading nation states.]

So in total: different than expected? Hardly.

Comment

Not too many future studies dare to look as far ahead as 2040-2049. And if they do, they are apparently outranked by studies from the other, earlier decades. Many have a focus on 2030 or even 2020 and just have graphs including 2040. The degree of uncertainty is way bigger of course of expectations are formulated for period or year so far in the future. The is a high degree of 'BAU-ness' in the studies (BAU; Business as usual). Scenario's? Plus or minus x% or xx%... That's a bit odd considering changes 1910-19 versus 1940-49 and the idea that 'progress is accelerating exponentially' which might be a reason to consider the changes of the world of 1910-1199 versus the world of -say- 1980-89, in order to grasp an idea of the world of 2040-2049 compared to that of 2010-2019.:-)

As for the BAU cases of demography (heading towards 9-12 billion people on the planet), studies on availability of water, food, housing, education scarcely turned up in the first 50 search hits. In fact there are too many things to mention, missing.
The accelerating speed of developments has been pointed out – proverbially: in the last 5 years more has changed than in the preceding 50 years. And in the last 50 more than in the last 500, and in the last 500 more than in the last 5,000 years. But there is little anticipation of the consequences of that trend. If this would be true, then a lot of what was speculated and seen in science fiction might have become a reality; space travel & space elevator and first extraterrestrial colonies (or onsets) but also colonies at the bottom of the ocean and in the desert, perhaps a transformation to type I civilisation (harvesting natural energy at planet scale without de harm and damage known from the 'type 0' ages of fossil fuels before), abundant food and (desaliniated) water, transportation, a circular economy nicely harmonized with ecology and responsible custodianship of the planet for the sake of the generations to come, and life long learning & labor (self development) like in Star Trek. Various developments commented as 'missing' in the 2030-2039 inventory are still missing in this 2040-2049. The will have been implemented:

- breakthroughs resulting from “old” fundamental research (energy fusion, gentech and genomics, internet of things (bio and non bio) & interconnectivity (& big data) in web5.0 or 6.0, virtual assistents, holodecks and lives;
- changes in the character of labor and economy (alike Star Trek's economy?).

BV/ 18/8/2018

PM
By the way: in 2042, a big rock (named 2009 BD81, 300 m in diameter) is expected to pass the earth at some 32,000 km (and is not considered a threat).
The decade of 2050-2059; what's up?

Looking through the eyelashes to some 950 quotes of researchers for the 2050-2059 decade, showing graphs and references of future studies –dating 2013 and earlier years– addressing issues and topics in this decade, a picture emerges. The update with references of future studies of -predominantly- 2014 and 2015, added some fifty or sixty new references; totalling the number of quotes to over a thousand. Clearly 2050 is a more popular 'target year'. Did the newbies change the general picture? No, not even when they shave off some of uncertainty that goes with looking ahead 35 years.

The issues with the biggest attentions are remain Climate, Society (aging) and Health. Within Climate, CO2 issues are more prevalent. The 400 ppm that was expected by 2020 was reached -despite an economical crisis- in 2015. The 2050 temperature is expected to be plus 4 (or six) degrees. 2009 reports however, already stated that emissions should haven been sharply decreasing after peaking in 2020 and should be negative by 2050. It is noted that even small changes in temperature affect agricultural productions significantly. Apparently, there is little attention for the agricultural food production effects of climate change (Stanford study).

Regarding Society, aging is the issue; the disproportionate number of elderly in nearly all (OECD) societies. The point of concern is the sustainability of national economies if such large numbers of labor forces are missing.

The Health issues are related to that, as certain health problem come by age so health organisations come up with big numbers for Altzheimer, dementia, diabetis and a number of other age related health issues. The numbers are rarely corrected for the growth of the population, nor presented in percentages and there is a BAU (Business As Usual) assumption regarding costs of research an curative health care.

Particular expectations for 2050 are: mass extinctions, wiped out reefs as are glaciers, 1.1. trillion euros of costs as a result of biodiversity losses, average climate mitigation costs 1 per cent of GDPs, a six meter risen sea level, millions upto a billion on the run for weather and weather related hazards (floodings, wild fires), G7 overtaken by E7 (China, India, Brazil, Russia, Indonesia, Mexico and Turkey), world economy four times the size as in 2007 requiring 22Gtoe (energy), high levels of clean energy (up to a 100% ?!), half of all jobs are performed by robots, several planets Earth needed to supply materials. not only large numbers of elderly (up to 40% of the population) but largely poor as well, an 11 billion population world wide will need a doubled global food production (hardly any fish left in the oceans) and 2 to 7 billion will face water shortages, super computers fit into your hand.

Comment
Looking ahead for more than 30 or 40 years always was and is a challenge. Changes happen overnight. And the speed is increasing. The speed of changes for 2010 to 2050 will be higher than between 1910 and 1950. Its impact will also be global, not only local (Western Europe). That being said, all in all, there is a lot missing in the 2050-2059 picture. Not only the consequences of 2014 and 2015's technologies like 3D printing (objects but also meat will be
printed). Even consequences and effects of robotics and artificial intelligence is largely missing and not grasped (singularity). More worrisome is the obliviousness or lightheartedness about the climate change and its consequences for societies, this planet and mankind as a species. How will or can we be humane and civilised when facing huge shortages of everything essential (water, food, housing, health, education)? And moving from a 9 billion people world population (2050), to one of 11 billion or more (2100)!

BV/1/9/2018
What's up 2060-2069?

This was a quick read; only 24 pages and less than a 100 records. Hardly any studies really 'dedicated' to the 2060-2069 situation. Mostly 2020 or 2050 studies with graphs and tables illuminating 2060, or saying something about the period 2050 to 2100. Apparently 2060 is not in view yet in the future studies up to 2013. The update with 2014 and 2015 studies did make much of a difference: only 15 quotes could be added. This is partly due to the search used; 2060 studies lost the popularity rankings Google used to line up the search results. But... at the other hand of course; 2060 is a less appealing target year than 2050 (so far). After an UN SDG Agenda 2030, there will be -most likely and hopefully- an Agenda 2060.

What's the picture by content? Well unchanged: Society (demography in particular), Climate and Energy seem to be the issues of most interest. Respectively the expectations are that:

- The ratio of working people to the 'inactive' others is shifting from 4 to 1 in 2012 to 2 to 1 by 2060;
- Global warming causes 300,000 deaths a year, says Kofi Annan's thinktank;
- Solar energy is a marginal resource after wind, biomass and hydropower.

Highlights? Depends on what one calls a highlight:

- The mean annual climate of the average location on Earth will slip past the most extreme conditions experienced during the past 150 years and into new territory by between 2047 and 2069, depending on the amount of climate-warming greenhouse gases that are emitted during the next few decades.

What's missing? Well....EVERYTHING?!!!!

BV/5/9/2018
2070 and beyond?

What's up: 2070 and beyond?

2070 is almost only a half a lifetime ahead of us. Most of all twens living now, will still be around by then. Yet it is more difficult then ever to do a future study for 2070 and beyond. Compare for example: 1615 with 1670; 1715 with 1770, 1815 with 1870 and 1915 with 1970. And then 1970 with 2025!

Only some 70 pages and perhaps 300 "records" could be collected so far. Issues tend to be climate, CO2, biodiversity, sea level, food but curiously enough technological developments/impacts are virtually absent. The update with quotes of and references from 2014 and 2015 studies did not change the picture.

In brief on the climate issue (not a bliss):

- ../2013 Table S.1– State of knowledge on potential candidate processes that might undergo abrupt changes; Long Term Outlook (for a Significant Change) after 2100. These include both abrupt climate changes in the physical climate system and abrupt climate impacts of ongoing changes that, when certain thresholds are crossed, can cause abrupt impacts for society and ecosystems. The near term outlook for this century is highlighted as being of particular relevance for decision makers generally.
  - Disruption to Atlantic Meridional Overturning Circulation (AMOC)
  - Sea level rise (SLR) from ocean thermal expansion
  - Sea level rise from destabilization of WAIS ice sheets
  - Decrease in ocean oxygen (expansion in oxygen minimum zones (OMZs))
  - Changes to patterns of climate variability (e.g., ENSO, annular modes)
  - Increase in intensity, frequency, and duration of heat waves
  - Increase in frequency and intensity of extreme precipitation events (droughts/floods/hurricanes/major storms)
  - Increasing release of carbon stored in soils and permafrost
  - Increasing release of methane from ocean methane hydrates
  - Late-summer Arctic sea ice disappearance
  - Winter Arctic sea ice disappearance
  - Rapid state changes in ecosystems, species range shifts, and species boundary changes (Species distribution models (Thuiller et al., 2006) indicate between 10–40% of mammals now found in African protected areas will be extinct or critically endangered by 2080 as a result of modeled climate change. Analyses by Foden et al.(2013) and Ricke et al. (Ricke et al., 2013) suggest 41% of bird species, 66% of amphibian species, and between 61% and 100% of corals that are not now considered threatened with extinction will become threatened due to climate change sometime between now and 2100.)


The great absent factor is technology. What about:

- a 100% cradle to cradle 3d printed economy or bragging 'Industry 4.0'?
• 3d printed food, medication & healthcare (any body part printable – even brain tissue ((when) will there be experiments with printed androids – what is in a concept?)
• 12 billion world population to feed, drink, house, sanitize, educate and entertain in a weird climatic world (will the populated million coastal cities be moved or will the well-to-do have moved to -secluded- huge cruise ships of floating cities
• imagine a 12 billion robot and AI population (production, recycling and serving humans; 'Real Humans' like the Swedish SF serial)
• is the energy problem solved as we moved from a (Kardashev scale) Type 0 Society to a entirely clean energy Type I Society.
• how has mankind managed war conflicts and avoiding societal breakdowns over scarce resources?
• have societies become Big Brother societies without privacy like the one in Orwell's 1984 or like in some well known, authoritarian run states? [China's social credit system was launches in 2014 and was/is supposed to be operational nationwide by 2020. What other states and companies will have adopted such a system by 2070 to monitor and control their citizens, workers or “customers”...as slaves?] And 'Minority Report' precautionary dealings with crmes and offences as Big Data runs societies and private lives? Artificial intelligence used to fight crime is already present..
• what new General Purpose Technologies will radically change the sofar known world
• how many colonies will there be on Mars, on the Moon, on the bottom of the seas of Earth and other planets; and... elsewhere?

Other questions may about:
• the 'black swans' to be expected (the infinitesimal unlikely events with colossal impacts; killer asteroids, or an alien civilisation that takes a stroll on our planet or we meet in space [what will be the figures of Drake's equation in 2070?]);
• and the very slow developments towards, and then the surprising discovery of having passed tipping points of no return? For example;
  * during the last century we lost gradually 30-40% of the variety of species at all levels of the pyramid of life (flora and fauna), biologists expect 50% extinction by 2100, after which global mass extinction gets it lift off.
  * gradual global warming leads to escape of methane from perm frosted tundras and of methane ice in the oceans depths at the bottoms and flanks of continental slopes, as the volume expands by 2.63, which might lead to earthquakes and tsunamis. And as a greenhouse gas it is some 30 times more potent than CO2.

Those and quite a number of other questions are mainly not addressed. Quite odd, this reluctance. But Okay, harvesting 2070 (and 2080) future studies has just began.

BV/8/9/2018
Absurd Futures

We all know some famous past expectations that turned out very differently, yet voiced by the best and brightest in their times. And that it is logical that present future expectations of our best and brightest of our time might meet the same fate. And we all know that a number of fictions of Jules Verne or Gene Roddenberry came “true”, to some degree. So the lesson learnt is: seek the unexpected, the science fiction for Absurd Futures Expections (see list below) as these might come true (to some degree...one day)!

We can find Absurd Futures in countless ‘narratives’ of fiction; stories, novels and movies (and presently also in computer games). Yes, Jules Verne’s stories, Wells’ Time Machine and many others. By making an inventory on (science) fiction futures certain events or chains of events are lured into the domain of our cognitive space. We can describe to each other the characteristics of such a future, pose research questions and perhaps take the effort to start research on it. Think of the stories in Forbidden Science by R. Milton (1998) about the lives and works of people like Helmholtz, Marconi, Gauss, Bell, Edison and the Wright brothers; all in some degree despised by formal science.

But even science fiction will not reveal Unknown Unknows (UUs) as we can not even think them (yet). So tuest for the Holy Grail of UUs will never end. But when we look at our collection of some 50 Absurd Futures (AFs); we can learn three things about them:

1. The AFs we can think of, are of the man-made or technological kind, or of the natural kind;
2. ‘Unknowns’ about them concern “only” time, impact and implications of an occurrence – leading to research attempts obviously;
3. The real UUs are to be found outside these categories. Let us call it –as a thought experiment- the category ‘Neither’. And in that category, there is only room for events that are not man-made or technological, and not natural (neither biological nor physical; both by our present definitions).

So what might turn up in the category Neither, our Holy Grail of UUs? Imagine:

- Non made-made? Perhaps a tiny dinosaur species got smart 100 million years ago and did spread into space (too and comes back);
- Non technological? Perhaps we suddenly will not need devices anymore to exchange information, knowledge, know how, or enhance our sensory limitations or to communicate. (yes, we all know that Sheldrake concluded in an critical experiment that morfogenetic fields do not exist…);
- Non natural (physical/biological)? Perhaps sometime there will be a safe gateway to other universes in the Multiverse, to the dark energy universes or to the other side of Black Holes in space. Perhaps we will discover and use non biological (carbon based) life forms to better our health and lives?
Greatfully referring to the UN's 1998 Classification of hazards might also of to classify the KUs of science fiction (www.who.int/disasters/repo/5506.pdf)

<table>
<thead>
<tr>
<th>Natural (biological)</th>
<th>Manmade/Technological</th>
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<tr>
<td>1. Epidemics</td>
<td>- Industrial disasters</td>
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<td>2. Infestations</td>
<td>- Nuclear accidents</td>
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<td>- Chemical accidents</td>
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<td>- Fires</td>
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<td>- Wars, civil strife</td>
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<td>- Structural failures</td>
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<th>Natural (physical)</th>
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<tr>
<td>Weather related (meteorologicale 1998)</td>
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<td>Earth movement</td>
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<td>1. External (topographical)</td>
</tr>
<tr>
<td>2. Internal (tectonics &amp; tellurics)</td>
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Final words

All of the previous is the result of ‘looking back about what is said about the future’. That is somewhat contradictory of course. Yes, the lesson is: expect the unexpected. The unexpected can present itself in various ways.

The sudden, total change is what sparkles the imagination. But very slow changes, going on for centuries, might suddenly show a tipping point without a point of return. And then there are: interactions. One harmless change might be harmful when it coincides with another. And there is no telling what interacts with what, when and with what effects.

The great absentee that is left out of the equation is 'governance'. That is: 'world governance'; that is, taking responsibility/custodianship for the well being of ALL future generations -ANYWHERE- and this PLANET with all its ecosystems and limited resources, resources in our entire solar system included. Yes, the SDGs 2030: a major step – will there be SDGs for 2050 and for 2075 and 2100?
Will that help and will we be able to defy Fenner's 2010 expectation the mankind will be extinct at the end of this century – because we (=governance) were not able to resolve these issues?

So in the end, the future is in the dark – as always...;-).
Appendices

The past learns, to extrapolate from the present to the absurd.

I. Famous Past Expectations

400 BC-2005

www.bjernv.dds.nl/FPE.pdf beta version
and less famous, to judge by your self ;-) 

2010-2019


II. Present Expectations

Scan a decade or scan a topic throughout the decades, and make up your own mind

2020

www.bjernv.dds.nl/2020-2029.pdf (update ≤ 2015 data)

2030

www.bjernv.dds.nl/2030-2039.pdf (update ≤ 2015 data)

2040


2050

www.bjernv.dds.nl/2050-2059.pdf (update ≤ 2015 data)

2060

www.bjernv.dds.nl/2060-2069.pdf (update ≤ 2015 data)

2070 (and beyond)

www.bjernv.dds.nl/2070eb.pdf (update ≤ 2015 data)

III. Not Expected – Absurd Futures

www.bjernv.dds.nl/AF.pdf (data ≤ 2011)
Useful links:

Future Study Organisations:

*European*
VERA Visions on the European Research Area [http://eravisions.archiv.zsi.at/](http://eravisions.archiv.zsi.at/)

*Netherlands*
Database; >300 NL toekomstverkenningen [www.toekomstverkenning.nl](http://www.toekomstverkenning.nl)
NTV: [www.ntvweb.nl](http://www.ntvweb.nl)
Horizonscan: [https://stt.nl/horizonscan/](https://stt.nl/horizonscan/)
Rathenau [www.rathenau.nl](http://www.rathenau.nl)
STT: [www.stt.nl](http://www.stt.nl)
WRR: [www.wrr.nl](http://www.wrr.nl)

*Incidental Future Studies (Netherlands) from:*
CPB [www.cpb.nl](http://www.cpb.nl)
KNAW [www.knaw.nl](http://www.knaw.nl)
SCP [www.scp.nl](http://www.scp.nl)

*Databases Future (related) Studies*
Links to over x,000 studies: [www.foresightinhindsight.com/tags](http://www.foresightinhindsight.com/tags)

*Examples of how this timeline database can be used:*
- July 2010 (in Dutch) Uitzicht Arbeidsmarkt 2010-2050
- June 2010 Future of Energy

*Previous Timelines*
The First of 2008: [www.bjernv.dds.nl/2007-2010-2050.PDF](http://www.bjernv.dds.nl/2007-2010-2050.PDF) (2.0 as it had additional inquiries). Prior to this one, were paper issues by decade (and a synthesis report which is considered the 0th version).
The Second 2009: www.bjernv.dds.nl/2008-2010-2050.PDF (1.0 as it was only a simple update)

The Third 2010: www.bjernv.dds.nl/2010-2010-2050.PDF (data <2009). This was also a 2.0doc as it had additional inquiries.

The Fourth 2012: www.bjernv.dds.nl/2012-2010-2050.PDF (data <2011)

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Dif-tor heh smusma (Live long and prosperous.)
A Vulcan Greeting)