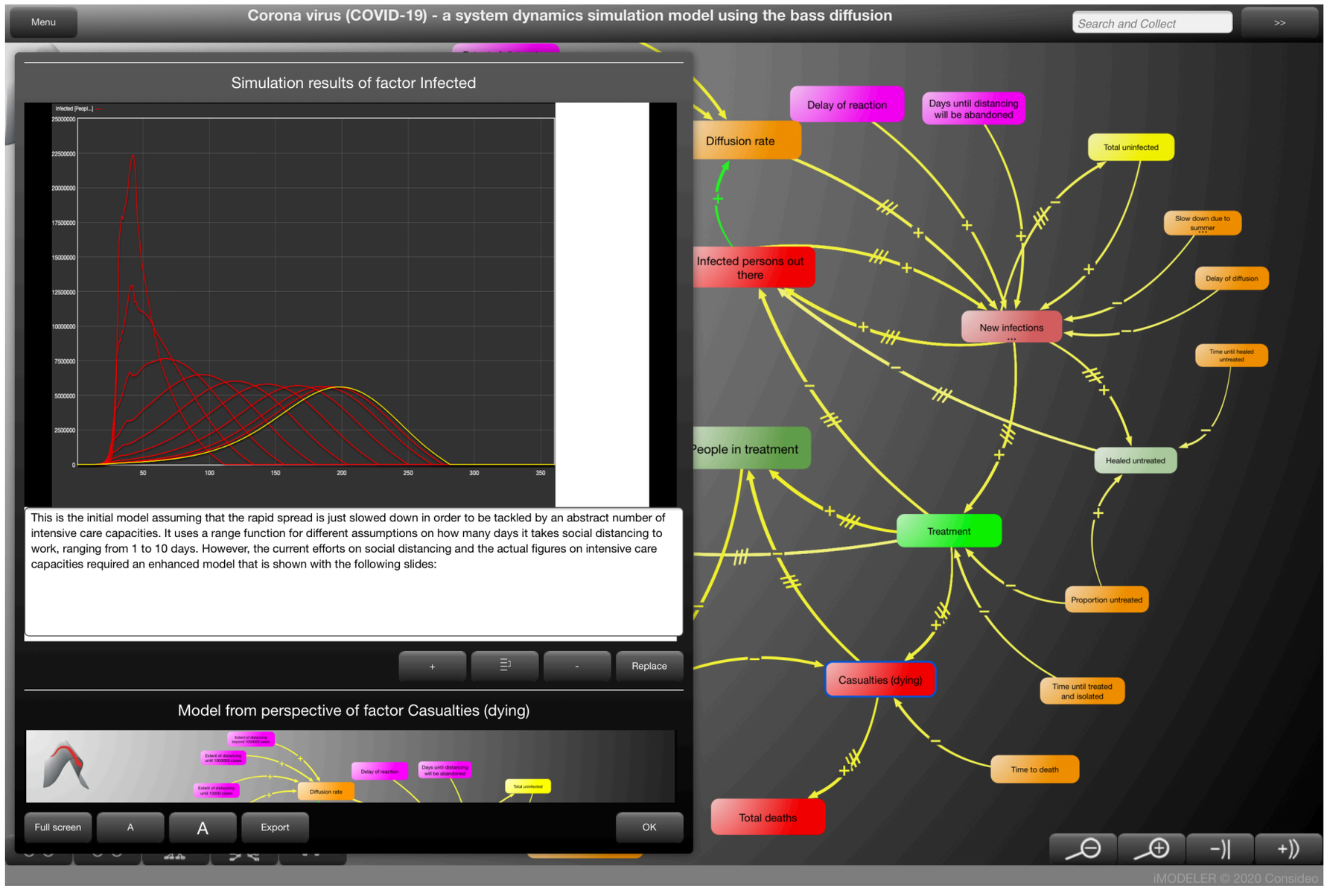
Coronavirus - a systemic view

Consideo - Kai Neumann, Franc Grimm



The quantitative simulation model of the potential spread of the disease displaying the iMODELER's Presenter, in which views and analyses of the model are stored. Shown are the classic curves of how the spread of the virus can be delayed by rapid social distance.

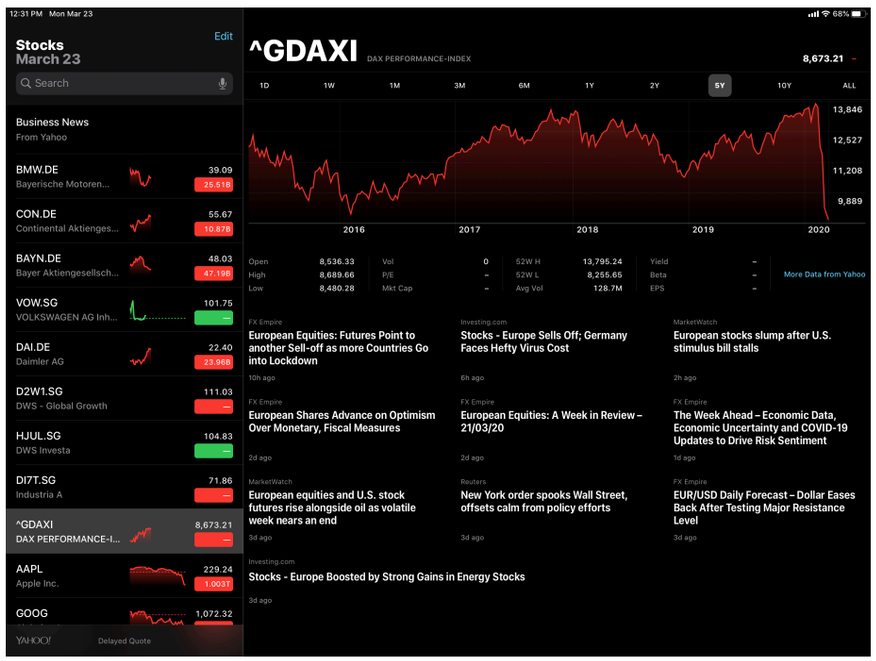
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Coronavirus - a systemic view

INSIGHTS FROM TWO CAUSE AND EFFECT MODELS EXPLORING THE COVID-19 PANDEMIC (CORONAVIRUS)

Summary

Fortunately, simulation models are currently providing the basis for understanding the potential spread of global corona infections and deaths. Media and politics take up the representations of simulation curves and point out the necessity of flattening the bell curve and shifting the spread forwards on the time axis.



The economy going down

Originally intended only as a tool for use by experts, we have published on KNOW-WHY.net a System Dynamics model to reproduce these curves. With each aspect of this virus we have then extended the model to discover that the event space is, or must be, potentially larger than currently discussed.

Thus, there are scenarios where it takes almost 2 years before the virus disappears at the greatest possible social distance - subject to the prior development of vaccines and cures. In a qualitative model, we have then explored factors that call into question the economic and social viability of maintaining social isolation for such a long time. This model also explores the possibility of isolating and protecting only vulnerable groups of people by all means, and letting the rest of the population survive the disease relatively quickly - a scenario that we would not have agreed to two weeks ago before a more precise simulation of developments.

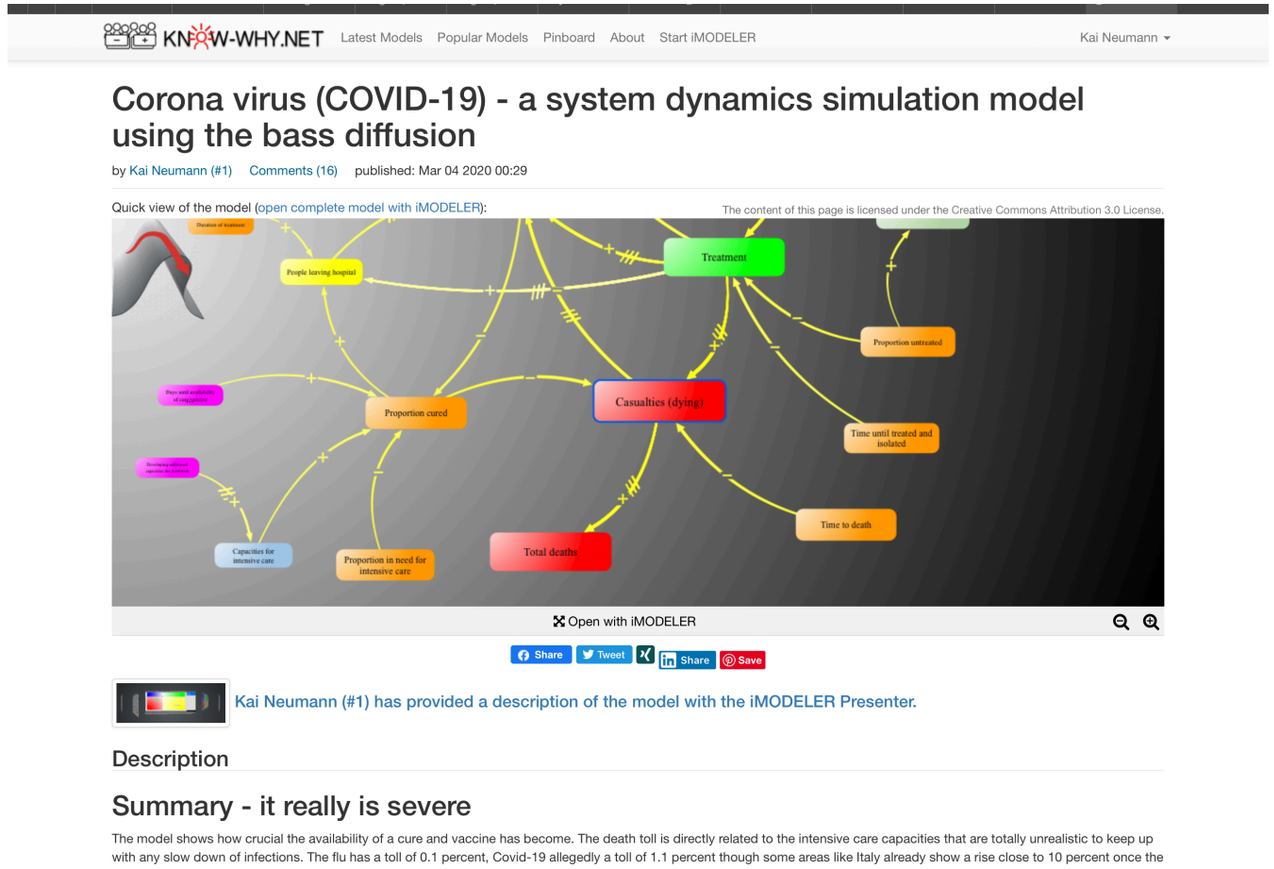
While the economy could theoretically hold out longer through globally concerted money creation, we do not believe that social chaos will be eliminated. Therefore, there is a certain probability that we will have to shift to the isolation of a few people.

In a third model we have explored the world after corona. Under certain circumstances and from some perspectives it may show positive long term effects.

The 'grey series'

Studies apparently do not reach the political arena at all, are usually too specific for the general public and are all too often perceived by other scientists as competition or are not taken up then.

We can reach politics through the public and we will continue to write official project reports and peer-reviewed articles for the scientific community. But for the public, we want to offer an attractive format that is easy to read and that summarises findings and the action to be taken - our 'grey series' based on the term 'grey literature'.



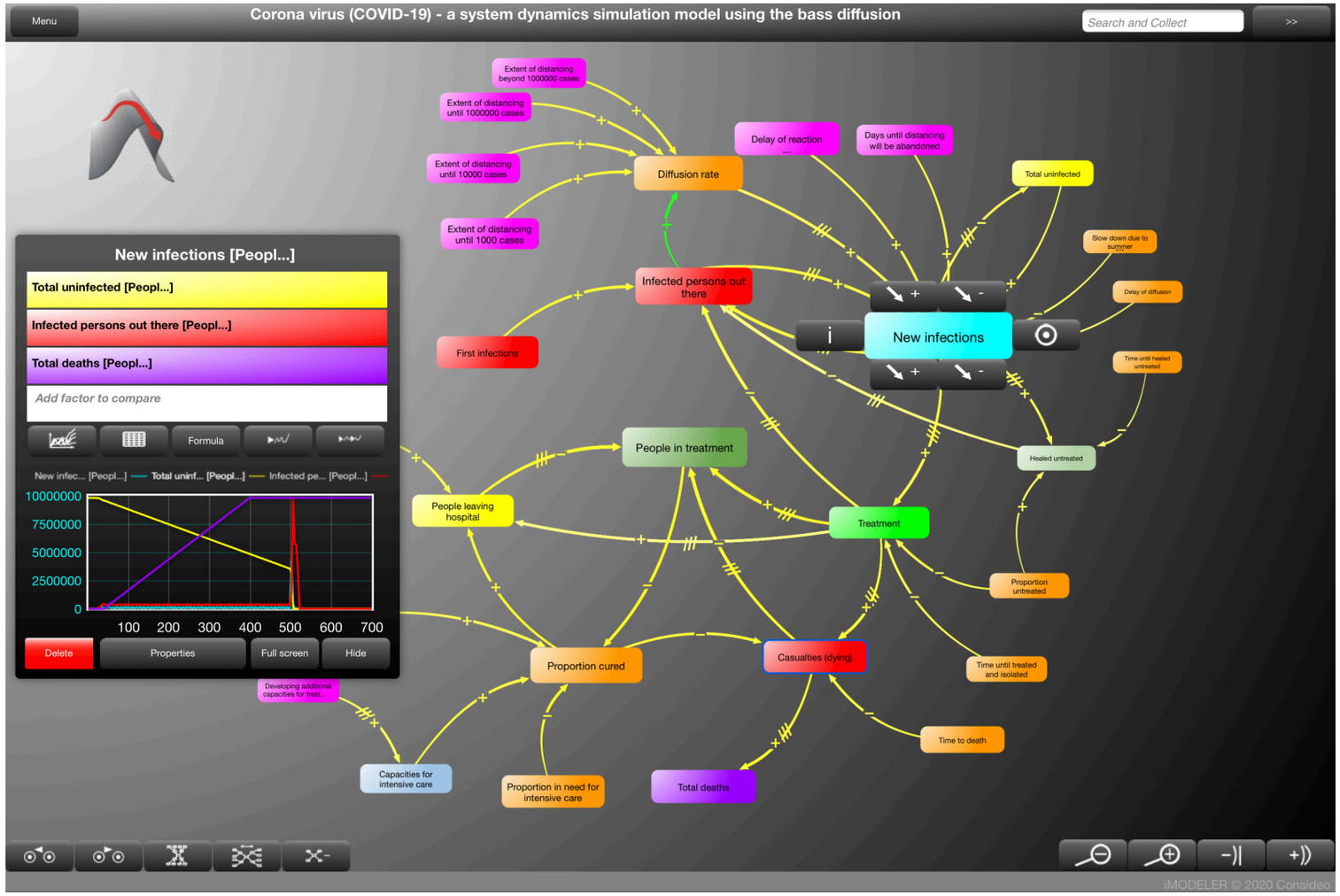
The simulation model published on KNOW-WHY.net

While overly complicated models can hardly do justice to the complexity of local, social relationships, many rough models have not yet been adapted to the particularities of the COVID-19 virus. We have now adapted our rough model and hereby present the possible (!) findings from this. In addition, we offer a qualitative cause-and-effect model to reflect further implications.

The simulation model

Important: we have created the models based on information from the media and understand these models only as a tool to better understand possible developments. We do not commit ourselves that any of the scenarios will happen and we do not make final recommendations - this would require a larger group of experts. Rather, we want to make the tool available and encourage discussion!

The different simulation approaches from simple formulas in Excel to System Dynamics with the bass-diffusion function and agent-based models all come up with the bell-shaped progression of a pandemic with a slow and then steep rise in case numbers, followed by a peak and then a similar flattening of new



Without a license or the installation of the iMODELER you can run the model in your browser. You can look at the results from each factor adding factors you want to see the results at the same time.

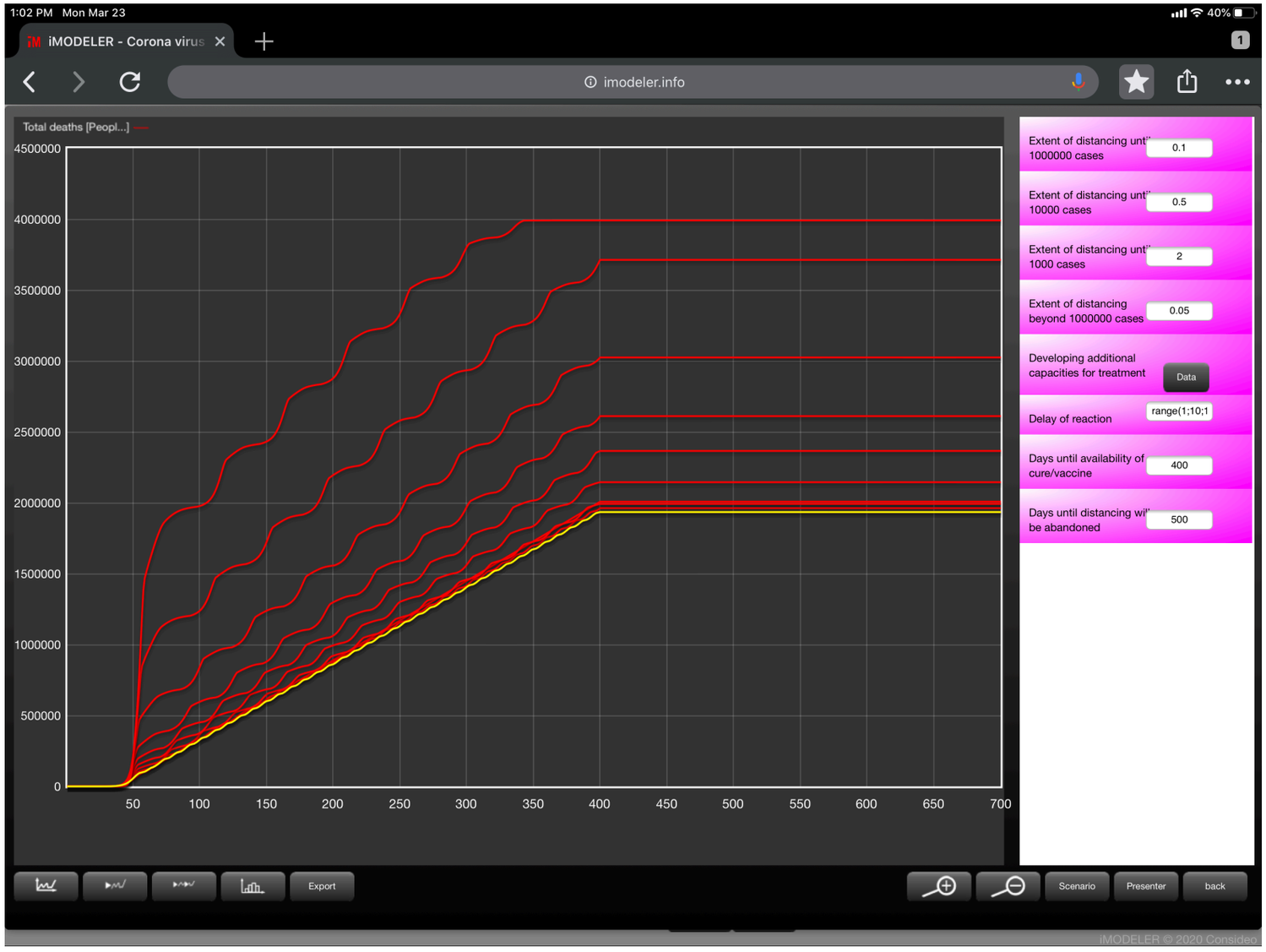
infections simply because there are fewer and fewer uninfected people who could become even more infected.

The present action aims to shift this peak to a later point so that we have sufficient medical resources and, hopefully, remedies and vaccines.

COVID-19 challenges

First of all, a virus like all viruses is something that can spread exponentially and therefore appears inconspicuous in the initial phase due to small case numbers. It is remarkable that so early models in the media show the potentially exponentially increasing case numbers and that the public behaves so constructively even though the numbers seem to be still small.

Mild progressions and apparently a majority of unidentified cases are a problem in two respects. On the one hand, they ensure unhindered dissemination and, on the other hand, sooner or later they leave parts of the population in a state of uncertainty as to their social isolation.



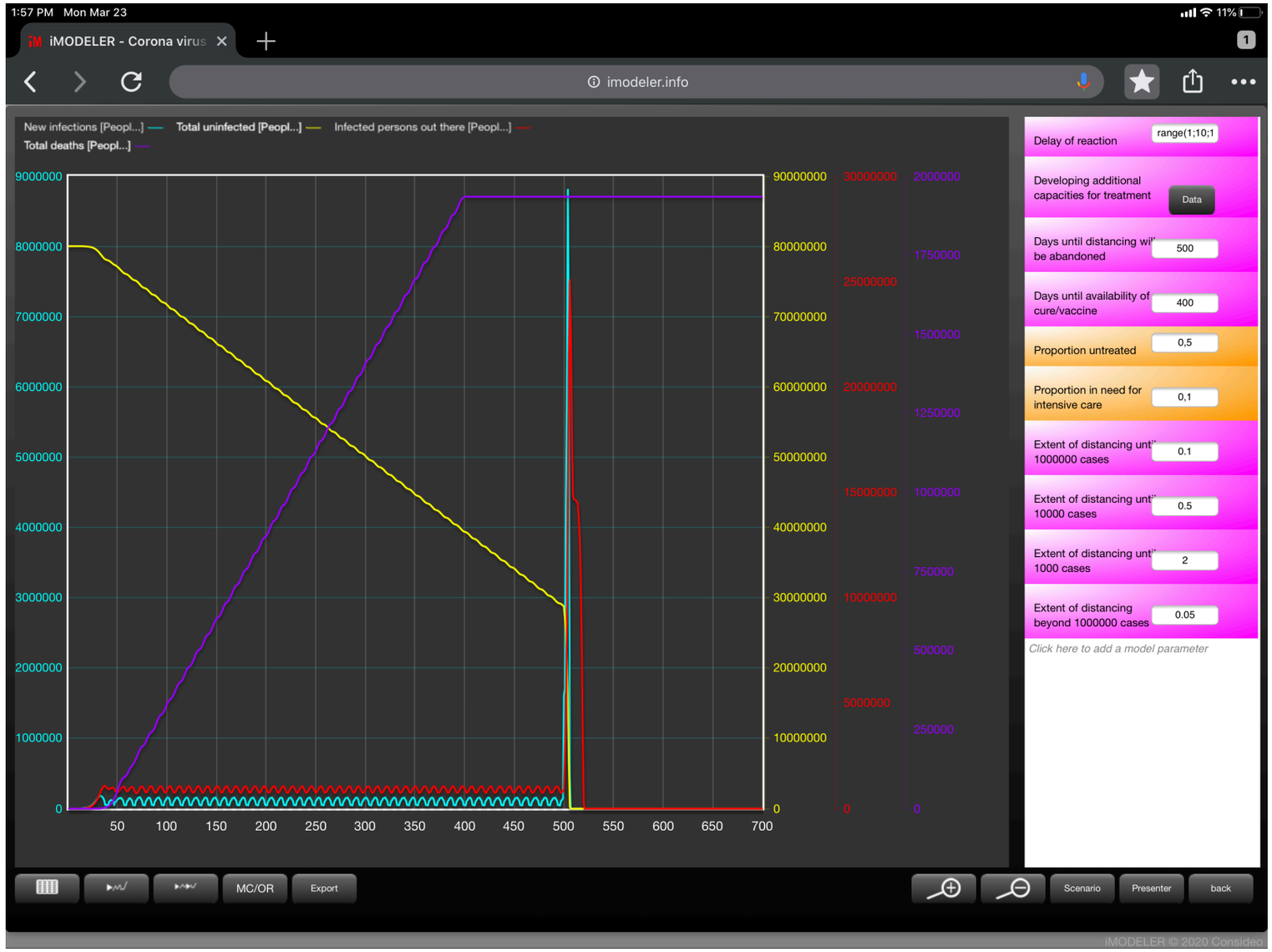
10 simulation curves for the number of deaths depending on how many days it takes to maintain social distance. If it takes 10 days, we have correspondingly the highest number of victims, because the medical capacities are immediately overloaded.

The critical cases, on the other hand, are currently running up against capacity limits, both in terms of testing facilities and intensive care in hospitals, where there is a lack of both equipment and staff.

Without a miracle

The figure shows a scenario in which we maintain disciplined social distance for 500 days and a vaccine/ cure is available after 400 days. Even in this hypothetical scenario, we would still have to multiply the medical capacity if we did not want to accept additional deaths due to lack of capacity.

But the scenario also shows that in this way the additional infections do not increase and then decrease continuously in a bell curve, but remain almost constant at a medium level, only to increase extremely strongly again after 500 days with the abandonment of social isolation, and the entire population would then pass through the disease.

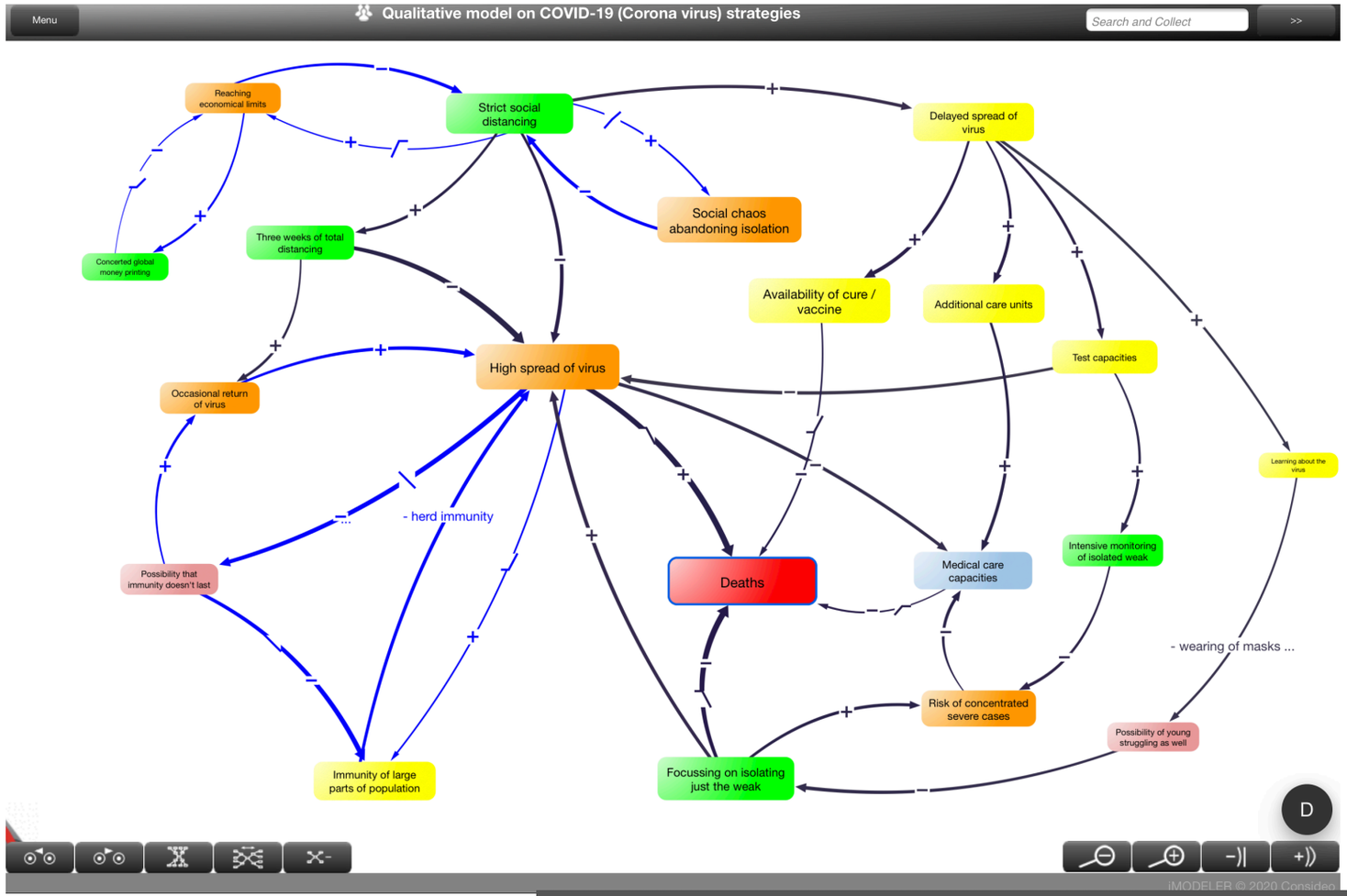


The initially rising red infection curve would oscillate permanently in cases of strong social isolation until after 500 days isolation would be abandoned because vaccine and remedies are available from 400 days onwards. ... only one assumption

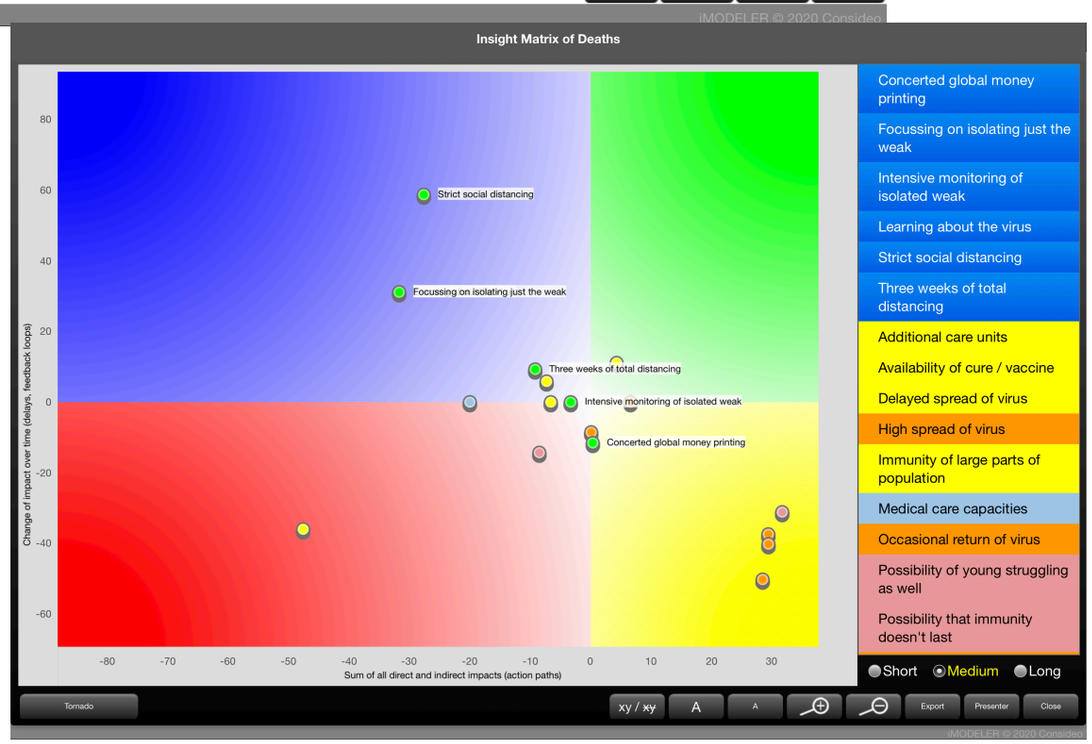
Alternative options

The quantitative scenario on the previous page shows the possible need to maintain a social distance for 400 days until a vaccine/cure is made available.

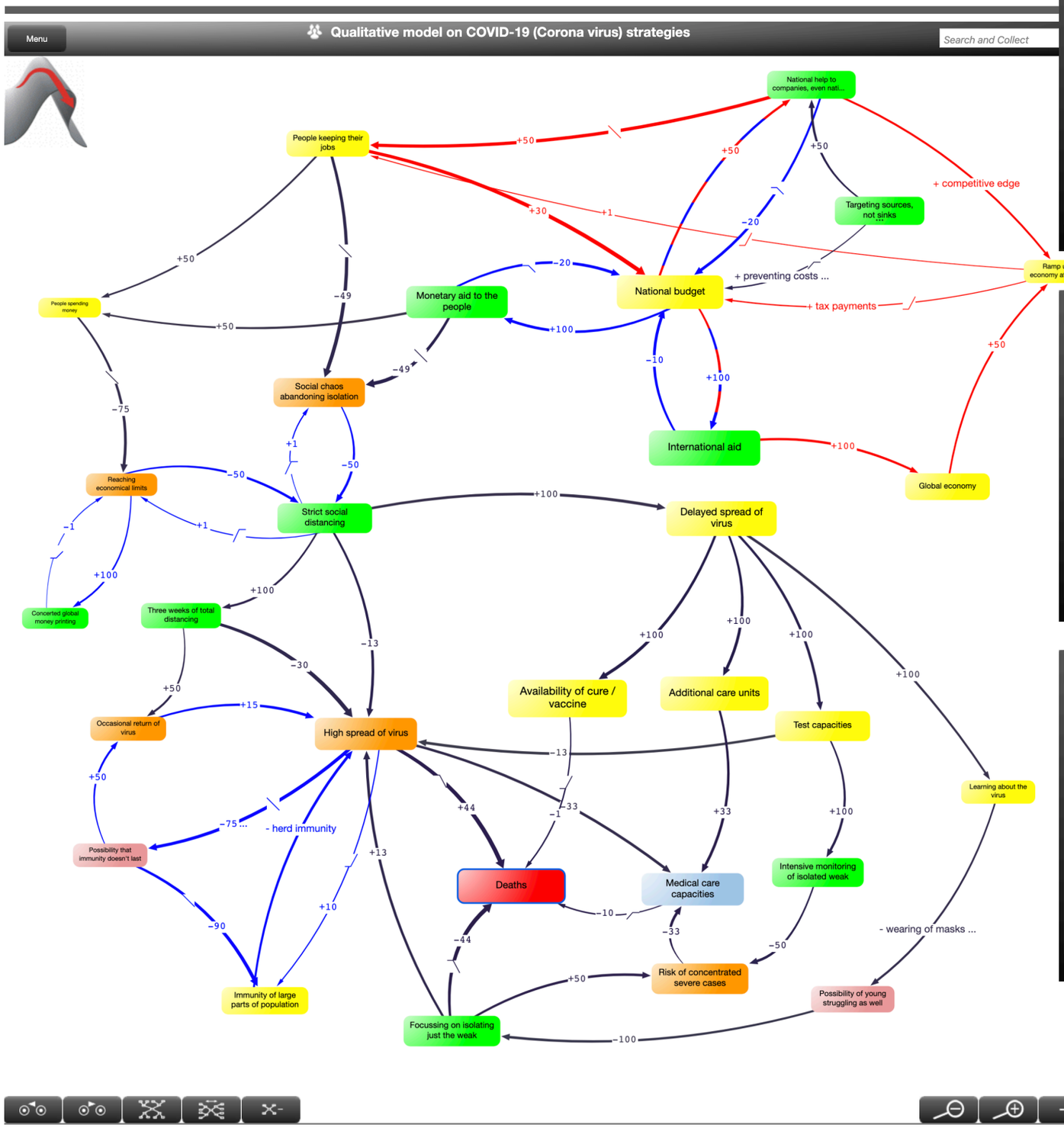
The qualitative model here looks at the possibilities of maintaining the social distance on the one hand through global, concerted money creation by states (this would be a new form ...), but on the other hand, due to social tensions, abandoning it and then resorting to the alternative of isolating only the weak and vulnerable people - but with all means, such as daily checks for new infections. In the background all the others would then hopefully pass through the disease mildly.

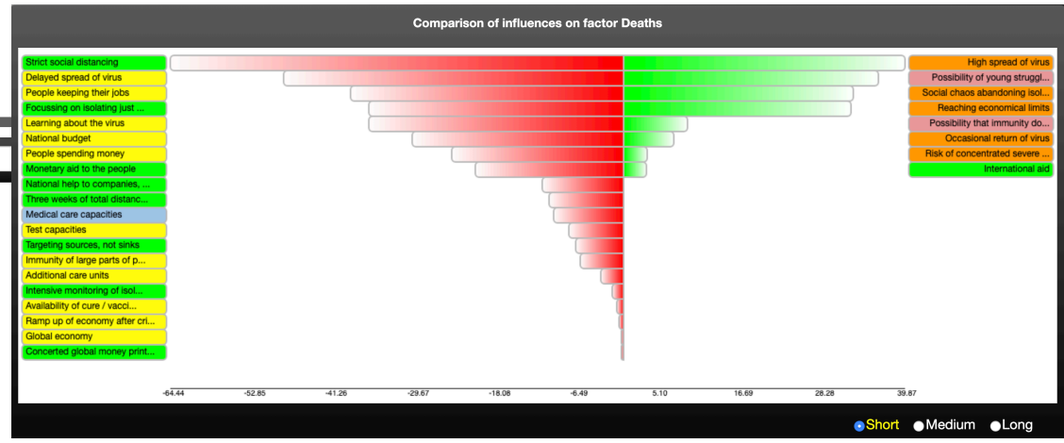


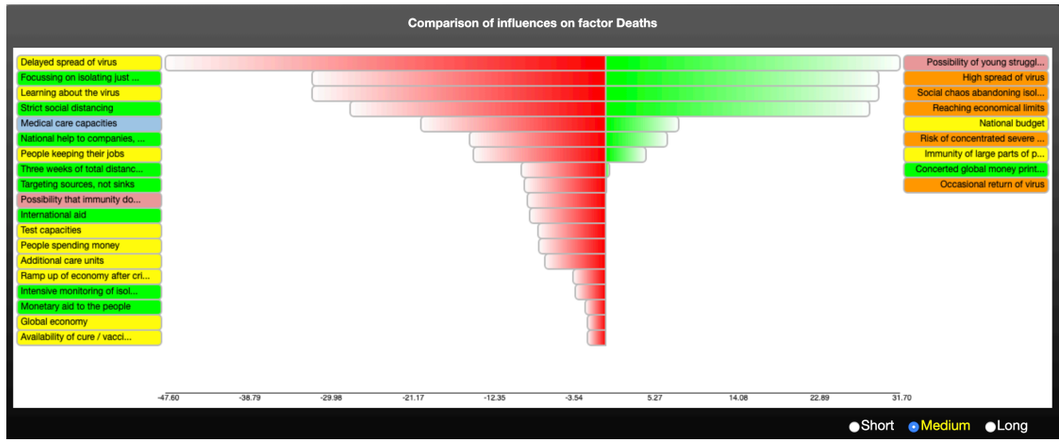
The qualitative model shows possible further arguments. The qualitative weighting distinguishes between short, medium and long-term. Green are the basic options. The analysis in the insight matrix indicates that possibly the isolation of only those at risk will lead to fewer deaths in the medium term. Short term the current strategy seems to be neccessary to learn.

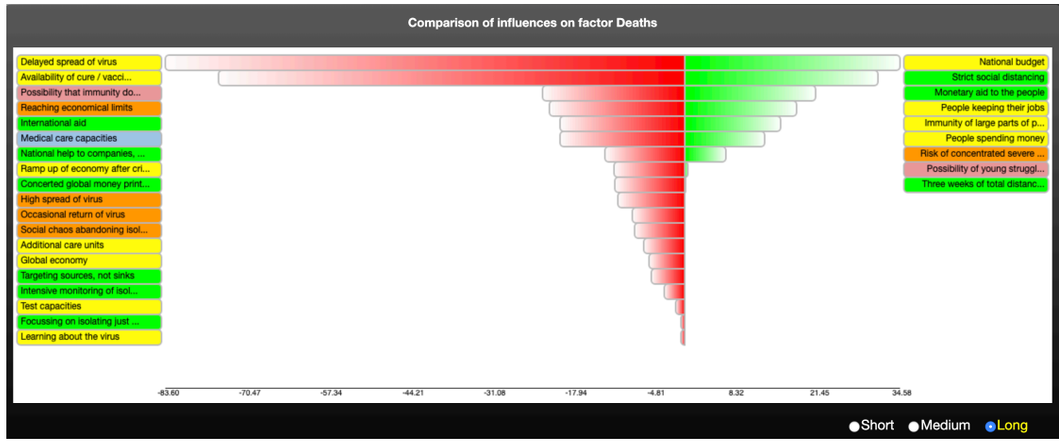


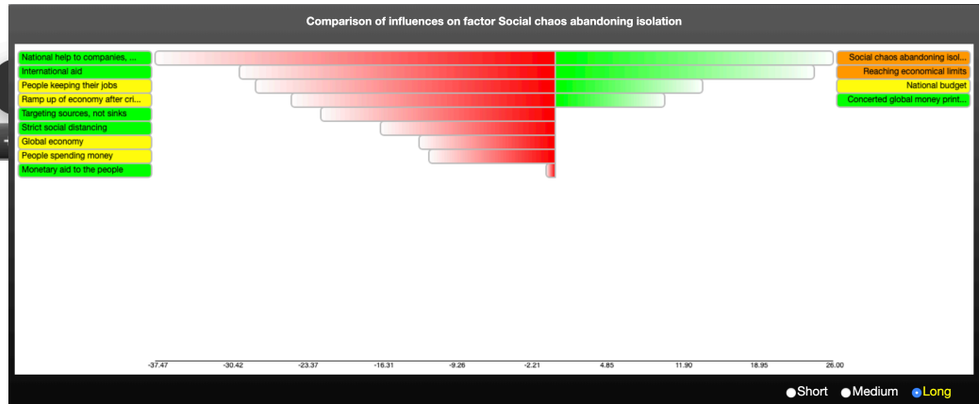
CORONAVIRUS - A SYSTEMIC VIEW











The extension of the qualitative model explores the aid to the people, companies and the international aid. The tornado charts show the importance of the factors short, medium, and long term.

The model as a tool

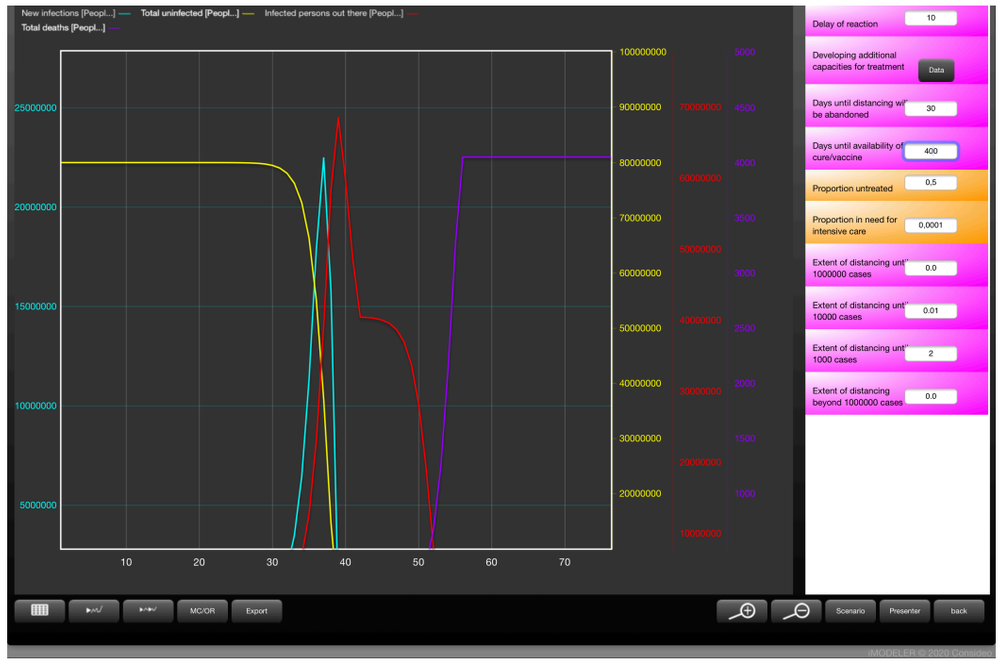
The freely available simulation model, which can be used immediately in the browser, allows a number of assumptions and scenarios to be played through using various settings.

The first illustration shows how, after reducing social contacts only until no new infection occurs, they flare up again and again.

The second shows the controversial scenario that the virus is allowed to spread through the population, while those at risk are protected for a limited period of time with extreme effort. However, this scenario also raises the question of whether herd immunity really allows the extreme protection of those at risk to be lifted promptly.



Extreme social distancing followed by loosening the regulations leads to an endless up and down



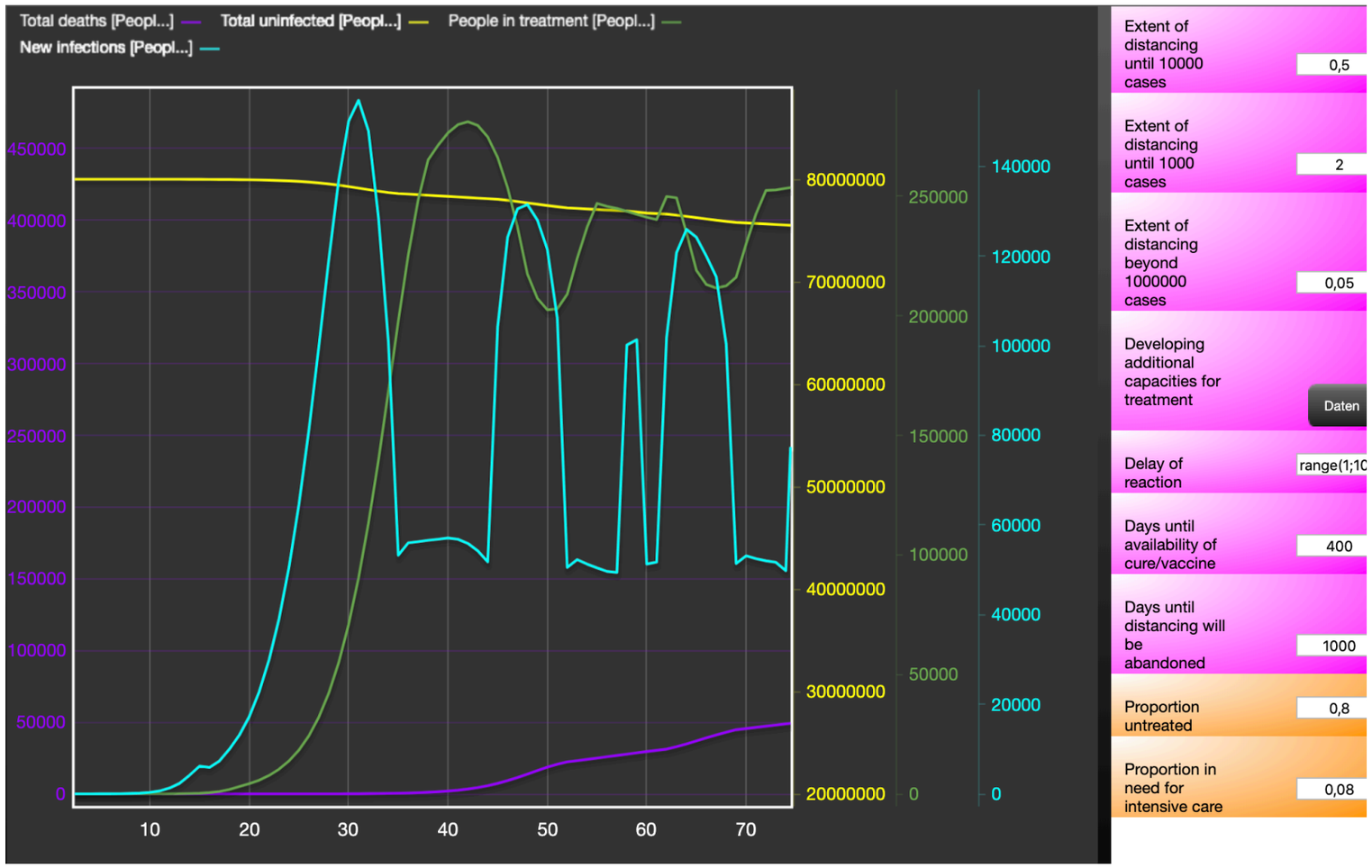
Protecting just the high risk population could lead to a herd immunity within a few weeks and overall comparable or less deaths

A model can’t be correct

What is not clear to many: models can only be falsified but not validated. If data from reality is different, the model is missing something. If the model matches, it could also be coincidence.

Corona models also lack data. It is not known how many ultimately go through the infection without diagnosis, which is why infection rates cannot be determined at all. The diagnosis also depends on the availability of tests. The mortality rate depends on the capacities of intensive care medicine (ventilators) and on the depth of the infection (presumably to be alleviated by masks on the part of the infected person), through which younger people can also undergo critical courses.

Our model yields apparently plausible data when 50 per cent pass through the disease unnoticed. However, there are several parameters (see figure) that can be varied in order to achieve the same or completely different results. The effect of masks, an app, the isolation of the weak, and so on can only be examined by making assumptions, but not predicted.



New infections going down but also only few people - even if 80 percent go untreated - not infected yet.

The world after Corona

Many people are wondering what efforts are possible for Corona, which obviously were not possible for climate protection, and wonder whether climate and environment are now seen as secondary.

The economic experts on the other hand assume that the economy will undergo a rebound and are actually only arguing about how long it will take.

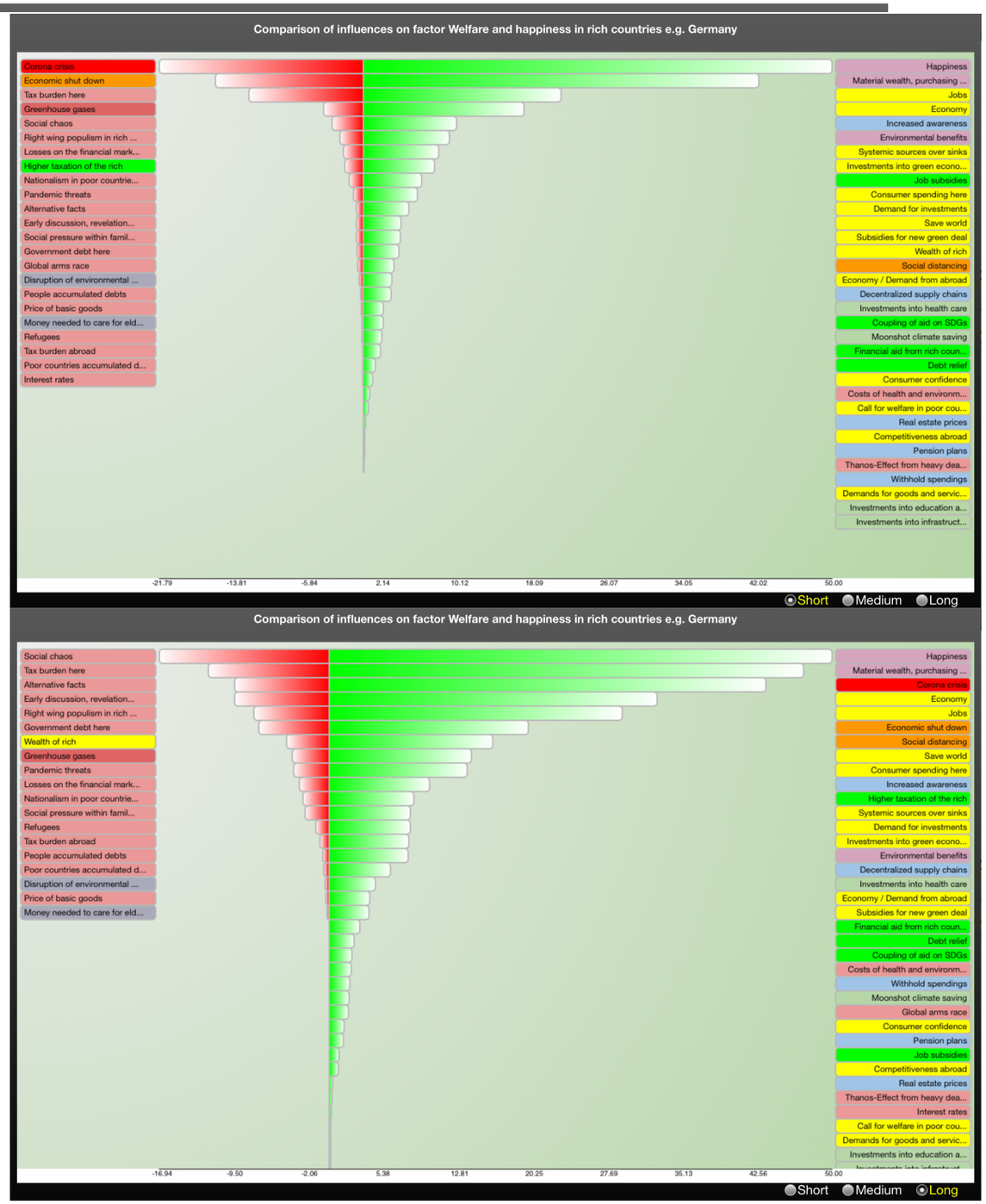
And many are also currently discussing the possibility that we as a society can grow on Corona, find more common ground.

With a cause-and-effect model we have put all these arguments into perspective and with the KNOW-WHY method we have explored the gaps in the argumentation.

As a first conclusion, we cannot share the optimism from economists - too many reinforcing effect loops with globally reduced consumer spending and long-term private and public debt burdens.

However, the decoupled financial markets could be brought back into line with the real economy and, supported by a change in values, we could aim for qualitative economic growth at the expense of the rich.

The alternative would be chaos with social uprise, nationalism, refugee crises, climate change and wars.

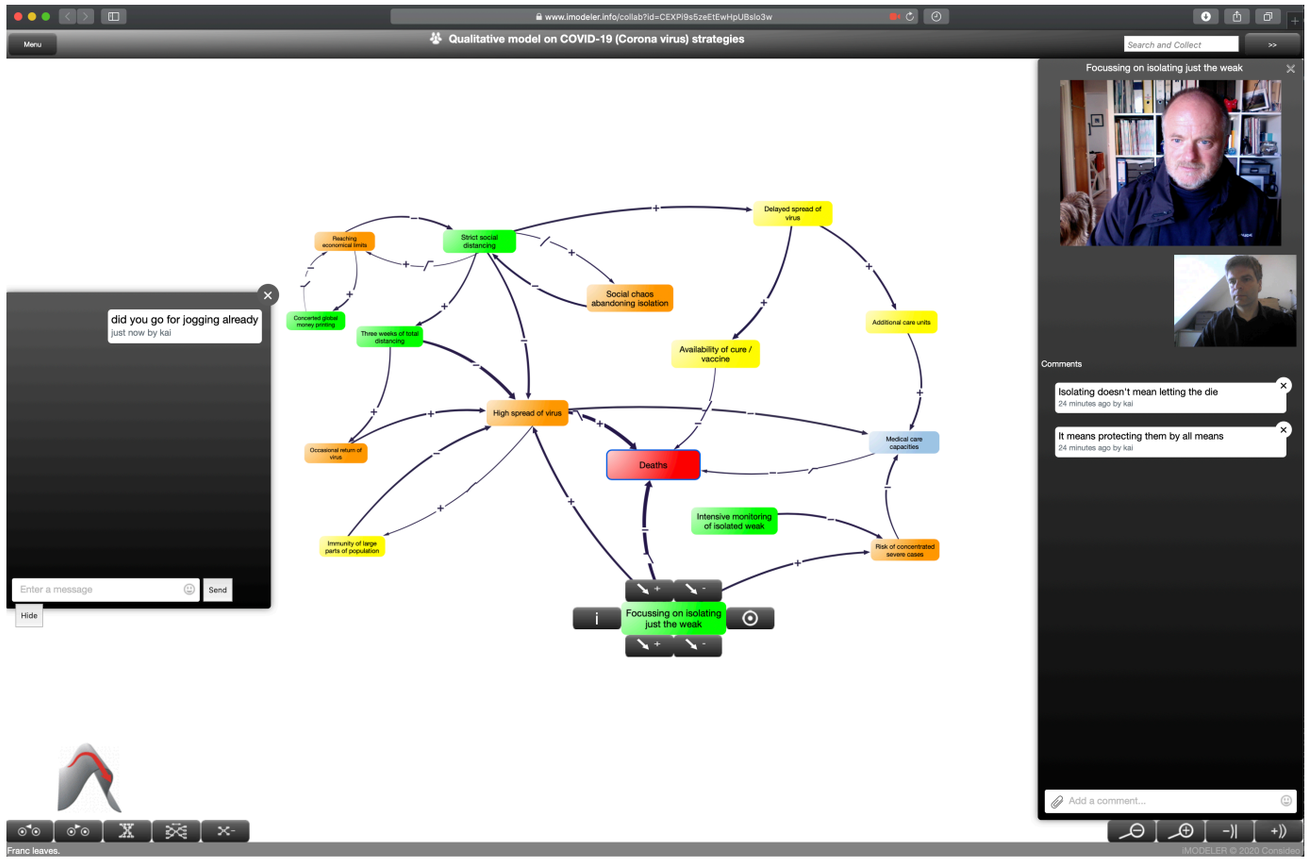


In the short term, of course, the corona crisis harms us, but in the long term there may also be positive effects, such as more mindfulness among the population, a qualitative reorientation of the economy while avoiding sinks, and the ethically questionable 'Thanos' effect of 'less hungry mouths' in poor countries, vs. dangers from political extremism.

Sources, links

The models are published on KNOW-WHY.NET.

Consideo now models virtually using iMODELER's brand new video conferencing and chat tools.



About Consideo

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Consideo has the vision of a better world. The mission is to help people to understand the context. We work with the award winning software iMODELER for business, research, politics and private individuals.

With the platform KNOW-WHY.NET we offer a collective library of interconnections.

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