#SmartRestart - Protection package for

Health and economy of Switzerland

by Martin Bäumle et al. 29.03.2020 / Version 5.1 (Status 12.04.2020)

1. Abstract

This paper shows a **smart** way forward and calls for the efficient implementation - from about mid-April to early May - of a concept of measures that will allow a gradual exit from the current lock down and thus a **new start** into a more normal life, while protecting health and the economy.

Health and solidarity with the most vulnerable remains a top priority.

The **"SmartRestart"** package of measures to be implemented consists of screening, targeted testing, wearing masks and contact tracing, e.g. via App. The latter in accordance with data protection regulations and may only collect the data required to combat the SARS-CoV-2 pandemic and will be as anonymous as possible.

We must gain control of the situation to protect our lives (health and economy).

From the authors' point of view, in a balancing of goods, the minimal restriction of the population through contact tracing (data collection) and self-restriction in case of warnings must be contrasted with the enormous damage of a longer lock-down for the whole economy and society as well as the enormous restrictions of all people through the lock-down with all the negative consequences for society and the risks of an insufficiently controlled restart. In relation to the alternatives, this restriction is a justifiable price for the chance of a successful restart to ensure the protection of the economy and health.

The package of measures also consists of series tests to clarify the current immunisation and the number of unreported cases. This estimated number of undetected cases is decisive for assessing the possible relaxation of protective measures and for determining the right time for a gradual restart. In addition, tests of the environment of those who have been infected so far should contribute to a better understanding of the development of the pandemic and to reducing the rate of infection. Furthermore, guidelines for the wearing of masks in public places are useful. However, the authors consider contact tracing (most likely an app solution and as compatible as possible in an international context) to be a central factor in the package, since the virus spreads exponentially via contacts.

This means that information is collected largely anonymously and immediately necessary warnings are made available anonymously to all indirectly affected parties. In this way, infections can be detected quickly and those affected can be warned immediately with a targeted risk assessment and encouraged to take more stringent precautionary measures such as regular temperature measurement, wearing of masks and rapid and targeted self-isolation and testing. This allows new outbreaks of infection to be isolated quickly and the rate of further spread to be kept at a low level - the aim being to reduce the number of new positive cases to less than 20 to 50 per day. Only with these measures can today's blind flight be transformed into a controlled visual flight at the right altitude.

This comprehensive concept must be started immediately, so that appropriate data are available from mid-April and a gradual restart can be made as soon as infection rates have fallen below a defined value (e.g. < 20).

In this way, the economy can be gradually and specifically boosted with accompanying measures and thus protected from massive further damage. Subject to certain conditions, people will regain a large part of their freedom and will be able to move more freely again in the world of work and leisure. Schools, shops and restaurants can be opened step by step with a corresponding prioritisation. However, this still requires a high degree of personal responsibility, solidarity and transparency from everyone.

In the end, we not only protect people and the economy, but also ourselves. Society regains its ability to act and democracy can once again function without any major restrictions.

2. Initial situation

The worldwide and extremely rapid spread of SARS-CoV-2 and the risks to public health and the threat of overloading the health system have forced most countries to impose massive restrictions on movements and in the economy. In the process, most countries have adopted support packages for the economy - including Switzerland.

The lockdown in Switzerland, which has been in effect since 16.3.20 and will last at least until 26.4.20, has had a profound impact on the economy. A solution must be found quickly to reduce this damage to the economy and to gradually increase people's freedom of movement. The lockdown has led to massive but necessary restrictions on the population and has evoked both negative and positive influence at the social level (violence within the family, etc.). Therefore, a step-by-step way out of the lockdown is also central from a social point of view. However, the protection of health must remain a priority and a system of lockdown - restart - lockdown - restart... must be avoided. Appropriate measures must be taken to ensure that both objectives are met and that data protection is also ensured by appropriate measures:

1. Complete continuation of economic activities as quickly as possible and thus avoid economic costs amounting to billions of euros.

2. Preventing a further wave of exponential expansion of the virus until a safe and effective vaccine and/or effective drugs against the severe courses are available on the market and in sufficient quantity.

3. A solution should be as liberal and as voluntary as possible, and it should continuously incorporate the new findings into the process.

In the following, a package of measures is proposed which can fulfil these conditions and which must now be prepared and implemented quickly in order to gradually restart at time X and ultimately to return our lives to a largely normal state.

It can currently be assumed that, if the measures taken so far - which have been in force since 16.3.20 - are taken and consistently continued until the end of April, and if the measures are quickly ramped up in accordance with the concept, the infection rates between 15.4.20 and 30.4.20 (see Fig. 1 for own calculations in scenarios) should approach zero (less than 25 per day, preferably less than 10 new positively tested cases per day, and thus a controlled restart would be possible between 19.4. and early May, depending on developments in the coming weeks. If consistently implemented with monitoring, a low rate can be maintained, which minimizes the risks to health and largely normalizes life. However, the condition for this is that the current lockdown is consistently continued

and the population keeps to the rules. Further protective measures, such as masks in particular, e.g. when shopping, must be introduced.

This approach must be maintained until an effective vaccination and/or effective drugs against the serious diseases are available on the market and in sufficient quantities - presumably by the end of 2020.

Thereafter, the system could be gradually shut down again and remain active as a concept as a basis for a possible future pandemic (pandemic emergency measures). In a new case, the concept could thus be started more quickly and with foresight, in order to slow down and stop the first wave earlier.

At the same time, the other necessary measures must be defined (border controls, testing of entrants, etc.).

3. Testing:

A) Mass screening

Screening of at least 5,000 to 10,000 people (primarily random samples with blood tests and, depending on availability, tests with swabs) to clarify the infestation, immunization, latency in the average population (define a clean sample analogous to surveys). To this end, the data collected so far by the cantons and private individuals will also be evaluated.

This can provide valuable information about the current situation or the situation a few days before the current measurement. In principle, this screening can be done at any time in order to obtain more information about the previous spread and the number of unreported cases. It is advisable to repeat the measurements about twice at intervals of about 7-10 days in order to follow the development.

Such series tests should also be repeated with a new sample with a certain regularity (e.g. monthly) over the next months. This provides valuable information for managing the pandemic and adjusting measures.

B) Contact data acquisition of previously infected persons before restart

Targeted testing (initially only blood tests, if available also smear tests) of people in the immediate vicinity of those infected so far in stages (this should be around 15-20,000) - e.g. prioritised according to the most recently infected.

1. Tracking down as many contacts as possible approx. 5 days back and less than 5 metres apart for 15 minutes (e.g. grocery store) (this primarily from existing mobile phone data and in individual cases interviews) and testing these persons as quickly as possible (before restarting) and in as much self-isolation as possible and only wearing masks when out and about (estimate: approx. 20,000 to 100,000 tests).

   ➔ If < 10 % positive: no further row tests. The other 90 % should make as little movement as possible for 10-14 days - as much self-isolation as possible, home office, wearing masks, measuring temperature.

➔ If > 10% to < 25% positive: trace and test all contacts up to 10 days back and less than 5 meters apart for 15 minutes. The others should make as few movements as possible for 10-14 days - as much self-isolation as possible, home office, wear masks, measure temperature.

➔ If > 25 % positive: Detect and test all contacts up to 14 days back and less than 5 meters apart for 15 minutes. The others should make as few movements as possible for 10-14 days - as much self-isolation as possible, home office, wear masks, measure temperature.

➔ For those tested positive from the above cohort: Re-trace all contacts approx. 5 days back and less than 5 meters apart for 15 minutes and make as few movements as possible for 10-14 days - as much self-isolation as possible, home office, wear masks, measure temperature.

➔ This cascade can/must be continued until the number of positive findings is minimal, thus minimizing the risk of new flocks.

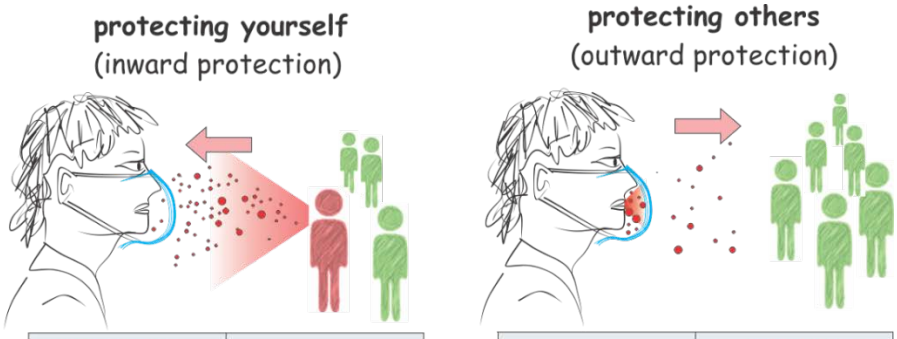
4. Wear masks:

In principle, the wearing of masks would have to be introduced immediately in outdoor areas and especially in shops or other indoor areas with a public. Since there are currently too few masks available, simple fabric masks (some of which are produced by the company itself) would also have to be implemented as a measure. Their effectiveness is also clearly proven if all or especially all infected persons wear a mask.

As soon as an effective app solution works, depending on the implementation of contact tracing (e.g. code), the wearing of masks may be voluntary, only in exposed locations or generally in external traffic with an audience.

Without the use and application of the app, however, a more comprehensive obligation to carry could remain in place.

**The effectiveness of even simple masks (disposable or home-made fabric masks) has been proven to result in fewer infections (factor 2-8) than without masks.*



	particles leaked through mask	particles produced in environment
TEA CLOTH (home made)	33	100 (reference value)
SURGICAL MASK	25	
FFP2 (=N95 equivalent)	1	

particles produced by coughing	particles leaked into environment
100 (reference value)	90
	50
	30

Source: Sui Huang, SARS-COV-2: WHY WE SHOULD ALL WEAR MASKS - THERE IS NEW SCIENTIFIC RATIONALE, Institute for Systems Biology

5. Tracing with App:

A digitisation step with contact tracing and the most effective and anonymous tracing of contacts possible is a useful and necessary addition, which, together with the above measures, enables a gradual restart towards rapid normalisation.

With international harmonisation, international travel could also be gradually eased again with a view to the summer, provided that the penetration of such an app is very high. International rail and air traffic could then also be gradually resumed.

An open source solution would be ideal to keep transparency and independence as high as possible. A solution is also desired that does not have to store any, as little or only anonymized data centrally. The data sovereignty should basically remain with the data owner.

For scientific monitoring, for human contact tracing and for prevention in view of a new pandemic - which we unfortunately have to expect - storing all essential data in anonymised form would be of enormous value. This would make it possible to evaluate distribution according to location, time, density, indoor or outdoor space and other factors such as weather, temperature, etc. This data is an invaluable basis for the better management of a pandemic.

Therefore it must be checked whether the data can really only be stored locally or whether it can also be stored centrally at the same time. In order to keep the discussions about the conflicting goals as low as possible, the transfer of the data to a central data hub - possibly in stages - could be provided as an option in the app.

This is analogous to the voluntary release of data in medicine, which can also gain valuable insights for further development thanks to these data. The authors are convinced that a large majority of users would be willing to do so in the interest of research and prevention.

Basics of such a solution: Approaches and contacts incl. the positions (using all data incl. WLAN and Bluetooth) of the app-users are recorded and basically only stored locally and/or can additionally be passed on voluntarily to a central data hub for further analysis. By default, this function would be deactivated. In principle, all data can be made anonymous.
In this context, the multi-national proposal (Pepp-Pt), which is currently being developed and which is based on local storage and protection of data privacy (Privacy by Design), could be a promising approach.

In principle, in addition to the position and an ID (e.g. mobile phone ID at the provider), gender, age, previous illnesses and risks could be recorded in typing (e.g. high blood pressure, smoker, heart problem, cancer...). A link to the name and other data is not necessary.

It remains important that the data is recorded and stored reliably and forgery-proof to prevent misuse of e.g. false positive warnings (troll protection). This would undermine trust in the app and slow down or even block its use.

Whether and to what extent a personalised identification is necessary for control and verification of e.g. the tests is not completely clear at this stage.

The analysis of the additional data could provide important information for the control of the virus to better understand values such as incubation period, infection rate and duration of the risk of infection, etc. (this would also be valuable in preparing for a possible next pandemic).

The data may only be used for protective measures against SARS-COV-2 and, after the pandemic, may only be used and stored in anonymised form for research and prevention purposes. The app would be switched off or could be deleted after the end of the pandemic.

**A further evaluation of data according to the concept would have to be excluded. For exceptions such as accidents or crimes with possible fatal consequences, an evaluation would have to be approved by judicial authorities and would have to be provided with a possibility of appeal. A suspensive effect may only be refused if it is highly likely that a crime against life and limb can be prevented.*

With all these measures, data protection can be safeguarded as far as possible. The minimal restrictions in a balancing of interests in the current emergency situation are probably much less severe than a continued lockdown, a blind flight with regard to data and the massive damage to the economy and society without such a solution.

***Data treatment should be in line with the requirements of the "Joint civil society statement: States use of digital surveillance technologies to fight pandemic must respect human rights" (link: https://www.amnesty.org/download/Documents/POL3020812020ENGLISH.pdf). This would clearly rule out the concerns of undesirable developments and ensure the confidence of the population. Any data hosting and data handling would have to be carried out by an independent body (e.g. a university) under the control of the GPDEL and possibly supported by experts and the data protection agency. This would ensure the confidence for the correct implementation.*

As an example, Appendix 1 presents a possible differentiated handling with a color coding in the app in order to keep the isolation as short and as deep as possible in terms of duration and number, but as effective as necessary. In addition, those particularly affected can be reached more quickly and in a more targeted manner, can be medically questioned more quickly and, if possible, tested at an early stage and adequately treated.

The authors are thus very open to solutions that do not require central data storage and can only store the required data locally and also achieve the goal with appropriate algorithms. For example, the position at contacts between X and Y could be recorded but, depending on the location (e.g. bar or garden restaurant), then be calculated with the algorithm in a risk-weighted manner and thus the position could not be stored but stored locally in the app as a basis for the risk assessment for X and Y.

This would help to allay the concerns of those who fear the surveillance of their movements and strictly oppose it.

In the end, more important than the exact design of apps is that apps are used in a high spread; especially among people who are very mobile and have many contacts with other people. A coverage of at least 65% is necessary, better would be even over 80%. The deeper the coverage, the less useful an app can be and the greater the risk of a new flare-up of the spread, which can only be slowed down or stopped by a new lockdown or massive restrictions and must be prevented at all costs.

Examples from other countries show that too little penetration is apparently not enough and a new wave cannot be ruled out. The higher the coverage, the quicker and more comprehensive the relaxation of measures can take place and remain sustainable if the protective measures are consistently continued. The principle of "one for all and all for one" can be used symbolically here.

6. Routine process after restart

Targeted questioning (human contact tracing through interviews) and testing of as many people as possible for early detection of possible sources of infection or risk areas (e.g. in the health care environment or in the case of frequent contacts such as crèches, etc.).

In addition, temperature measurements must be made possible at certain locations as an additional protective measure, e.g. restaurants, shops, etc.

Call for targeted testing of all persons in the environment of a newly infected person by e.g. positive test for symptoms or temperature measurement or from a series test:

Proceed in principle as described in point 2:

Tracking down as many contacts as possible approx. 5 days back and less than 5 metres apart for 15 minutes and weighted according to location (indoor or outdoor). This is primarily based on the data from the app and, in individual cases, surveys. This information can be reported to the persons concerned without delay and automatically (e.g. push message or automated info in the application).

The persons informed in this way should then go to a test as soon as possible and, at least until then, be in the greatest possible self-isolation and wearing only masks. Since a gradual restart can only be carried out when new infection rates are low, this number should always be small and the tests should be completed within 1-2 days. In addition, a second test after a few days may be advisable to improve data quality.

- ➔ If < 10 % positive: no further row tests. The other 90 % should make as few movements as possible for 10-14 days - as much self-isolation as possible, home office, wearing masks, measuring temperature.

- ➔ If > 10 % to < 25 % positive: warning/detecting and testing all contacts up to 10 days back and less than 5 meters apart for 15 minutes. The others should make as few movements as possible for 10-14 days - as much self-isolation as possible, home office, wear masks, measure temperature.

- ➔ If > 25 % positive: warning/detecting and testing all contacts up to 14 days back and less than 5 meters apart for 15 minutes. The others should make as few movements as possible for 10-14 days - as much self-isolation as possible, home office, wear masks, measure temperature.

- ➔ If there are new positive cases from the above cohort: Additional warning/tracking of contacts about 5 days back and less than 5 meters distance for 15 minutes and keep them as little movement as possible for 10-14 days - as much self-isolation as possible, home office, wear masks, measure temperature.

- ➔ This cascade can/must be continued until no positive case is found and the risk of new flocks is minimized.

- ➔ In the best case, this is only a few 100 cases per day.

7. Step-by-step restart:

After implementation of the above package of measures, the restart can be started gradually slower or faster, depending on the results of the screening tests. The following list is only an example:

- Schools open (kindergarten and primary schools first), upper secondary schools later and high schools and universities again later.
- Open shops/shops
- Public transport gradually restarted
- Office work again increasingly on site
- Open restaurants
- Allow domestic travel
- Simplifying the admission of cross-border commuters
- Only later allow risk groups to return to work
- And also later on leave people from 65/70 onwards out of self-isolation again, but continue to move as little as possible also in the sense of solidarity.
- …

Travel to and from Switzerland must remain heavily regulated until further notice. These can only be gradually relaxed if a reliable international solution is found.

8. Conclusions:

A targeted restart must be smart and can only be so if it is based on a dynamic package of protective measures. Only then do we have a real and good chance of coming out of this deep sleep, the lockdown. This costs up to one billion francs a day, threatens to choke off the economy or have an extremely negative impact on it. Moreover, people's lives are made difficult by isolation, fear, loneliness, insecurity, unemployment, etc.

We cannot therefore remain in this lockdown for too long, because a restart without dynamic protective measures will have an extremely negative impact on health and the economy, and ultimately the economy needs healthy people who live, work and consume without fear.

A targeted restart, on the other hand, gives us the opportunity to reduce the risks and damage to health, the economy and society at a minimum cost.

It is a matter of weighing up the restrictions: The measures in the concept - in particular the storage and possible release of certain data to record potential infections as quickly as possible and to inform those affected as quickly as possible, thereby specifically isolating risks and providing rapid clarification through testing - is a restriction on personal freedom.

On the other hand, there is the gain of freedom for the whole society and economy from hopefully the beginning of May until mid-May.

The restriction with regard to contact tracing is many times less than the loss of freedom during a longer lockdown, a restart - lockdown - restart - lockdown cascade or the restrictions caused by the separation and isolation of those particularly affected over possibly months. The social and economic damage would be immeasurable.

Appendix 1: possible coding App:

Possible color coding on the app and measures for this (this can also be arranged differently, but shall exemplarily show a possible solution):

Blue: immunized and thus free access to everything, including the sick, can be used as a helper in the health care system or for the care of particularly vulnerable persons.

Green: no infection present / proven: free access to all places, except hospitals, clinics, etc. - Mask wearing only in densely frequented places, otherwise voluntary.

Yellow: Due to trajectory calculation possibly infected and therefore with a limited radius (no gatherings, restaurants, bars, etc.) and mandatory with mask outside private, a test is either

(a) detects antibodies (code blue)

(b) does not result in infection (code green)

(c) Test result C19 pos: (code red)

(d) no symptoms have appeared after 14 days

orange: higher probability of an infection and therefore, for safety's sake, 14 days self-isolation/home office and only minimal movement and only with mask (strongly reduced radius to necessary movements.

red: Tested positive based on test result and no antibodies, no or only weak symptoms and not belonging to any risk group: self-isolation for 14 days and if possible separated from family/partner (spatially or generally) or these also in self-isolation (CODE orange).

dark red: Tested positive based on test results and no antibodies, symptoms or risk group: Self-isolation for 14 days and if possible physically separated with measures taken by family/partner and these also in self-isolation. Daily monitoring of the condition and, if symptoms are severe, hospital admission.

Additional code for members of a risk group with risk factors (65 plus (+), 75 plus (++), previous illness such as heart problem (+), high blood pressure (+) etc., more severe or acute previous illness (++)

+: at least one factor: e.g. 65 plus or high blood pressure

++: at least two factors: e.g. 75 plus or 65plus and high blood pressure or two previous illnesses

+++: at least three factors: e.g. 75 plus and high blood pressure or 65 plus two previous illnesses

Recommendation depending on +, ++ or +++:

reduced movement (avoid accumulations) / only compulsory movements (shopping, work) / avoid movements as much as possible (strong self-isolation) and contacts as much as possible/very much/completely Wear masks in public places.

Annex 2: Scenarios of the trap development (estimation):