Chronicle of a Failed Mapping Communication. Critical Deconstruction of the Maps Issued by French Government during the COVID-19 Crisis in Spring 2020

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ABSTRACT

Thirty years after the seminal work on critical mapping, it seems more necessary than ever to "deconstruct the maps" (Harley, 1989) used by the French government during the Coronavirus crisis in Spring 2020. Beyond obvious statistical and cartographic errors, the ambiguity of titles and legends, the use of unstable data, the absence of precise metadata, or irrelevant choices of semiology considerably bias the understanding of these maps. A detailed analysis of the choices underlying the construction of these maps and of the comments associated with them reveals that they serve more to legitimize a political strategy than to scientifically support the containment and then decontainment measures, as presented by the government.

Keywords: COVID-19 crisis, critical mapping, maps of deconfinement, cartographic and political rhetoric

RÉSUMÉ

Trente ans après les travaux fondant la cartographie critique, il apparait plus que jamais nécessaire de « déconstruire les cartes » (Harley, 1989) utilisée par le gouvernement français lors de la crise du Coronavirus au printemps 2020. Au-delàs d'erreurs statistiques et cartographiques manifestes, l'ambiguïté des titres et

légendes, l'utilisation de données instables, l'absence de métadonnées précises, ou encore les choix de sémiologie peu pertinents biaisent considérablement la compréhension de ces cartes. L'analyse précise des choix qui ont sous-tendu la construction de ces cartes et des commentaires qui y sont associés révèle que celles-ci servent davantage à légitimer une stratégie politique qu'à étayer scientifiquement les mesures de confinement puis de déconfinement, comme l'a présenté le gouvernement.

Mots-clefs : crise de la COVID-19, cartographie critique, cartes du déconfinement, rhétorique cartographique et politique

Between March and June 2020[1], the French government showed 40 different maps on the health stakes of the COVID-19 crisis[2]. Prime Minister Édouard Philippe, his Minister of Health Olivier Véran and the Director General of Health, Jérôme Salomon, took turns at their regular press conferences submitting maps to represent the transfers of patients in intensive care units (ICU)[3], the ICU occupancy rate[4], the repatriations[5], the emergency department visits due to suspicions of COVID-19 [6], the virological tests coverage[7], the positivity of these tests, the evolution of the basic reproduction rate R0[8], and summaries of some of this information[9]. Almost all the maps (93%) represent one of these indicators in mainland France and in the Overseas Departments and Regions (DROMs), on departmental (59% of the maps) or regional (37%) levels.

Thirty years ago, the work of John Brian Harley on the deconstruction of maps (Harley, 1989), of Dennis Woods on their power (Woods, 1992), or of Mark Monmonier on the lies they can carry (Monmonier, 1991), revealed the entanglement between power and mapping techniques, the constructed and discursive character of maps, and therefore the required critical decoding of these images and of their associated positivist convictions. This critical approach is still required today to understand the status and scope of the forty maps issued by the government during the COVID-19 crisis. Thus, these maps cannot be separated from the speeches they accompany (or which accompany them). Ultimately, both play a larger role in the management of a political crisis than to exhibit scientific facts.

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1. This article is the expanded, completed and updated version of an op-ed written in Libération on May 5, 2020 (https://www.liberation.fr/debats/2020/05/05/covid-19-des-cartes-tres-politiques_1787381).
2. Except the re-opening of schools presented by the Minister of Education J.-M. Blanquer on May 28, 2020.
3. Map presented on April 1, 3 and 4 by Jérôme Salomon and on April 19, 2020 by Édouard Philippe.
4. Map presented on April 19 by Édouard Philippe, on April 30 by Olivier Véran, updated daily until May 7, then again on May 28 by Olivier Véran (Fig. 1, Fig. 4, Fig. 10).
5. Map presented on April 19 by Édouard Philippe.
6. Map presented on April 30 by Olivier Véran, updated daily until May 7 (Fig. 3).
7. Map presented on May 7 by Olivier Véran (Fig. 5).
8. Maps presented on May 28 by Olivier Véran (Fig. 7, Fig. 8, Fig. 9).
9. Maps presented on April 30 by Olivier Véran, updated daily until May 7, then again on May 28 by Olivier Véran (Fig. 6, Fig. 13, Fig. 14).

A tool to lock down government communication

We can identify three key moments in the presentation of these maps to the French: first, the press conference by Édouard Philippe and Olivier Véran on April 19, 2020, when graph and mapping representations become synthetic images of the crisis, but not yet well thought-out. Secondly, the period from April 30 to May 7 2020, when the three "deconfinement" maps – map of the ICU occupancy rate, map of emergency department visits due to suspicions of COVID-19 and synthetic maps – are updated daily to prepare for the end of lockdown or deconfinement on May 11. Thirdly, the press conference by Édouard Philippe and his ministers on May 28, 2020. The number of "monitoring" maps then increases, and the vocabulary and some indicators for pandemic surveillance change.

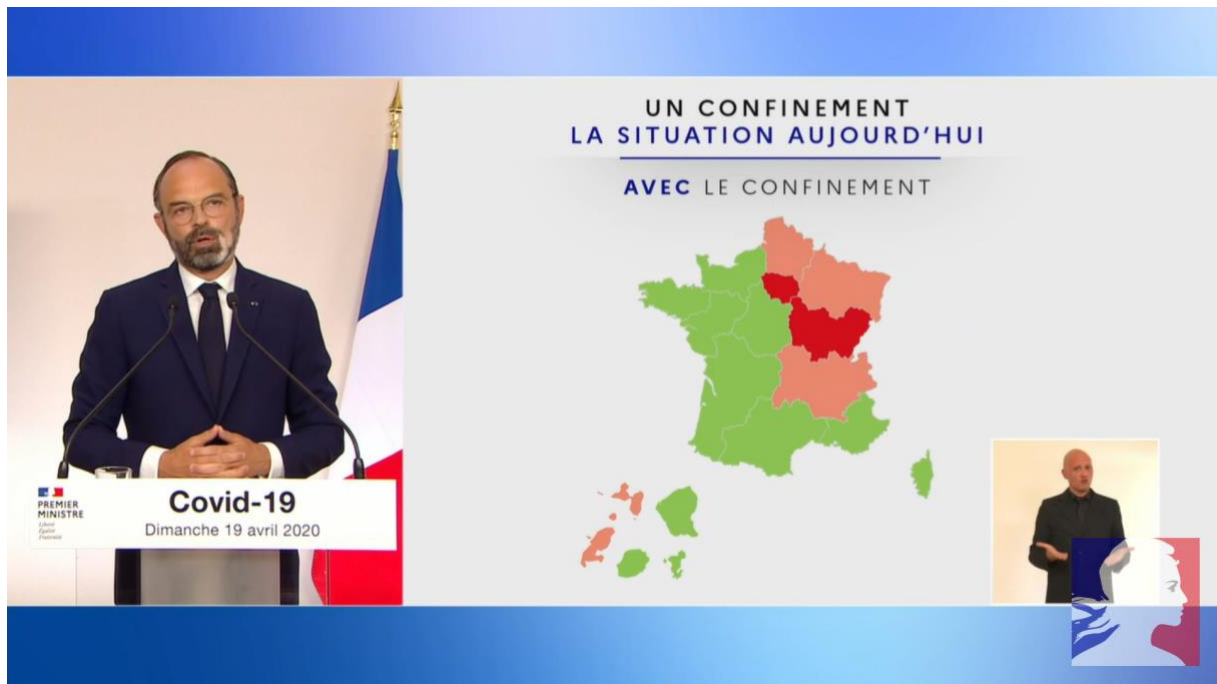*April 19, 2020: poorly thought-out images at the service of political communication*

Fig. 1: Screenshot of Édouard Philippe's press conference of April 19, 2020, "Point du dimanche 19 avril 2020", 18'50. Prime Minister / Liberty Equality Fraternity / COVID-19/ Sunday April 19, 2020 / The lockdown / The situation today / With the lockdown.
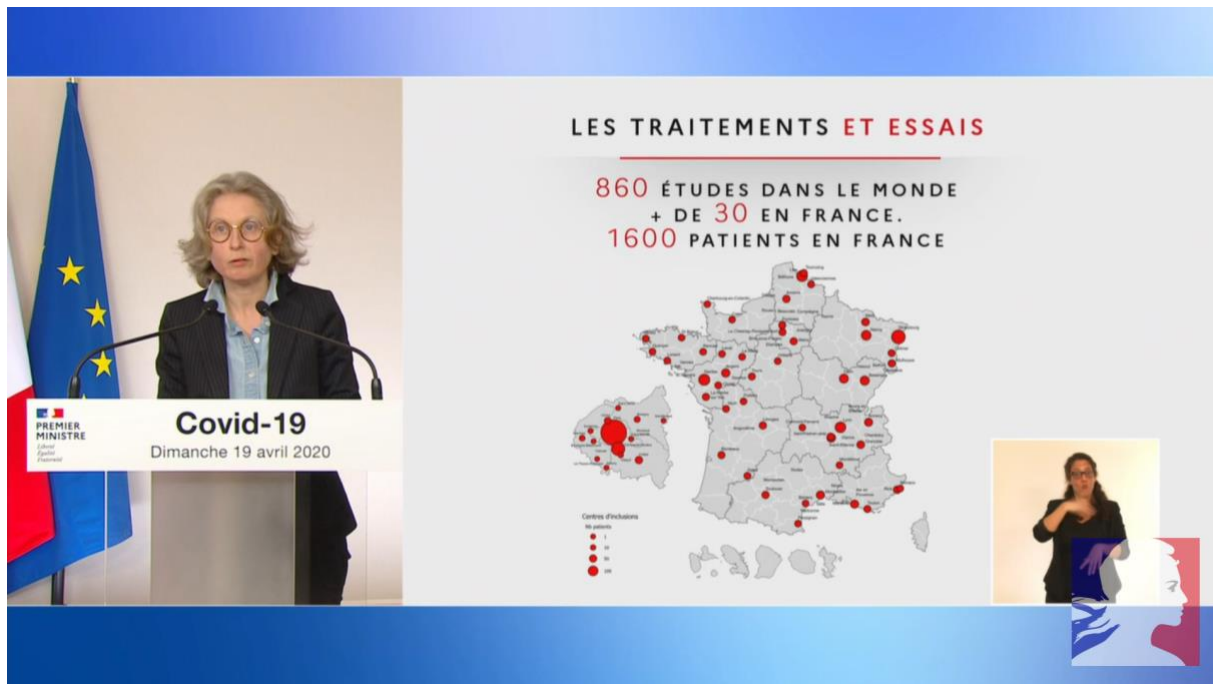
Fig. 2: Screenshot of the government's press conference of April 19, 2020 speech by Florence Ader, "Point du dimanche 19 avril 2020", 55'40. Prime Minister / Liberty Equality Fraternity / COVID-19 / Sunday April 19, 2020 / Treatments and tests / 860 studies worldwide / Over 30 in France / 1,600 patients in France / Inclusion centers / Number of patients.

When the map of ICU bed occupancy rates for COVID-19 patients first appeared on April 19 (Fig. 1), Édouard Philippe explained: "If we present the situation today in terms of ICU bed occupancy, we have this map, which shows that the strategy of lockdown limiting the circulation of the virus worked well, which is to be applauded." At this stage the map is not very precise, there are errors (inversion of the contour drawing of the French Overseas Departments and Regions) and it is not clear what the map or its colors represent. Yet its status is clear: it is a communication map[10] that the Prime Minister immediately makes impossible actually to read independently. The official interpretation is that the lockdown stopped the virus from circulating in the north-east of France.

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10. According to the difference made by Jacques Bertin between communication mapping and process mapping in *La Graphique, ou le traitement graphique de l'information*, Paris, Flammarion, 1977, p. 7-21-29.

During the rest of the press conference, five other maps are used, the last of which, presented by Professor of Medicine Florence Ader, gives a more scientific content (speaker status, name of places, captioning, figures, and proportional circles, see Fig. 2). The map becomes a strategic tool for the government's crisis communication.

From April 30 to May 7: processing maps to scientify the deconfinement
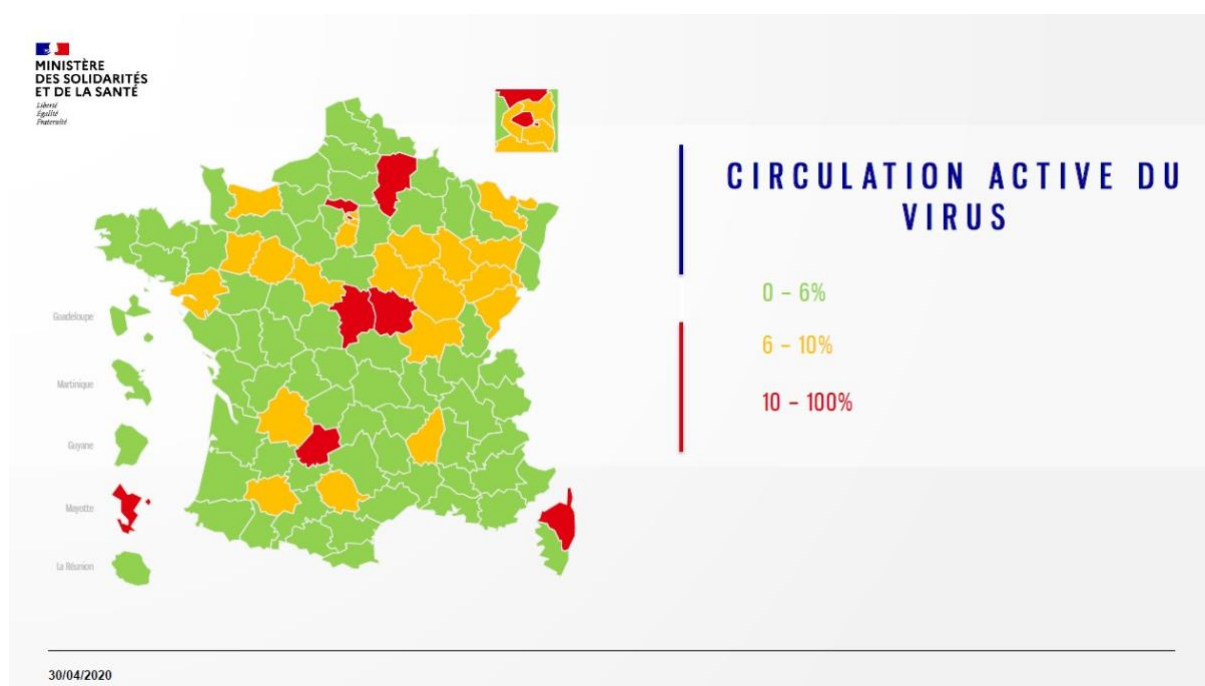
Fig. 3: Active circulation of the virus in terms of emergency department visits due to a suspicion of COVID-19, April 30, 2020. Minister of Solidarity and Health / Liberty Equality Fraternity / Active circulation of the virus / Guadalupe / Martinique / Guyana / Reunion / Mayotte.
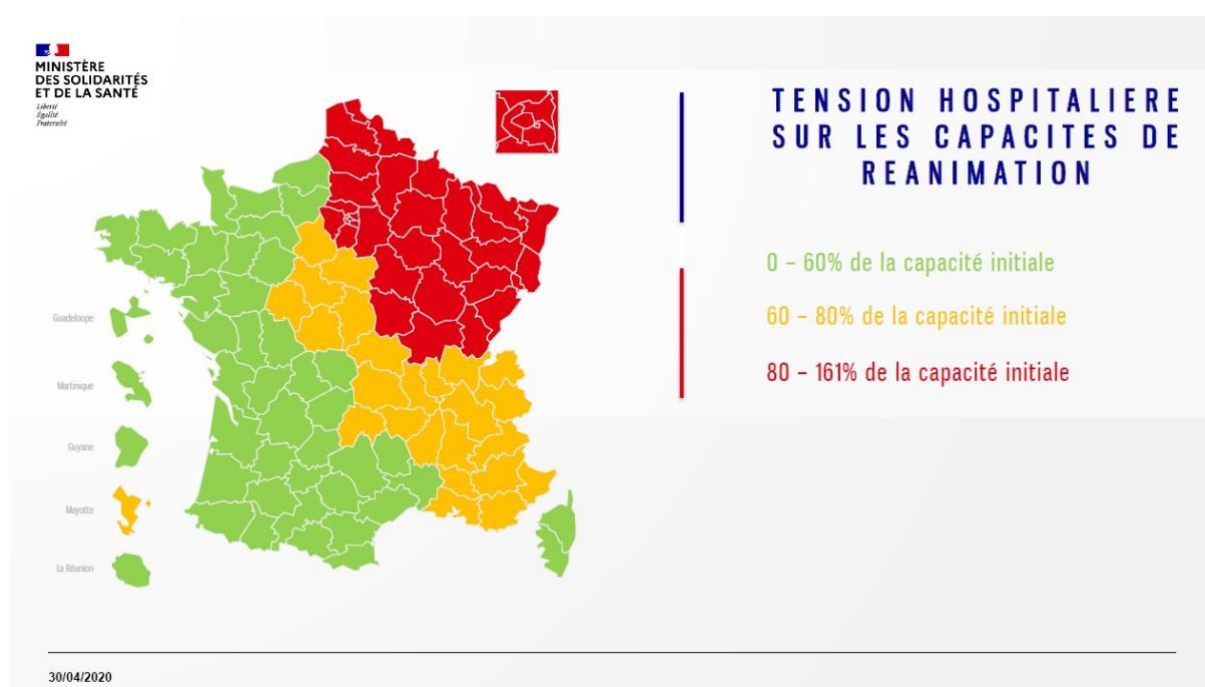

Fig. 4: Tension in the hospital on ICU capacities in terms of ICU bed occupancy by patients

with COVID-19, April 30, 2020. Minister of Solidarity and Health / Liberty Equality Fraternity / Tension in the hospital on ICU capacities / % of the initial capacity / Guadalupe / Martinique / Guyana / Reunion / Mayotte.

Fig. 5: Coverage rate of the testing needs estimated as of May 11, first presented on May 7, 2020. Coverage ratio of the needs in testing estimated as of May 11 / Guadalupe / Martinique / Guyana / Reunion / Mayotte.
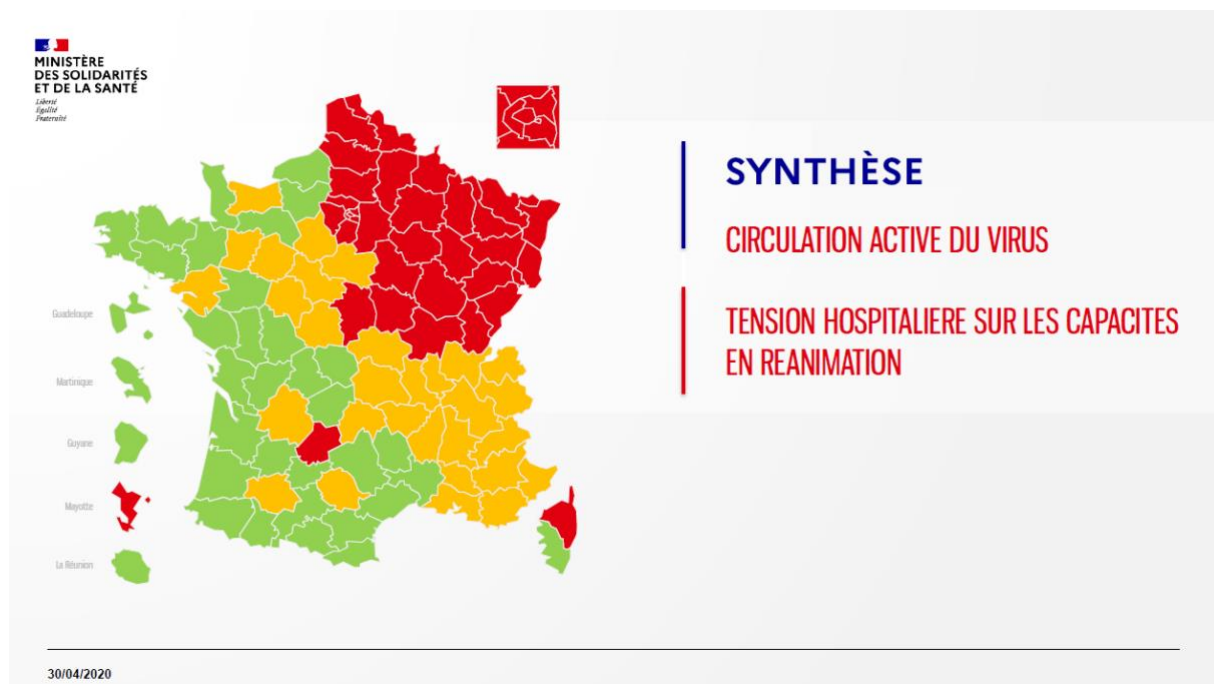
Fig. 6: Synthetic map of the first two maps, April 30, 2020. From May 7, the synthetic map also includes the third map above of the coverage rate of the testing needs. Minister of Solidarity and Heath / Liberty Equality Fraternity / Synoptic / Active circulation of the virus / Tension in the hospital on ICU capacities / Guadalupe / Martinique / Guyana / Reunion / Mayotte.

Two weeks later, the map of ICU bed occupancy for COVID-19 patients is updated (Fig. 4), along with the map of emergency department visits due to a suspicion of COVID-19 (Fig. 3), further with the testing coverage map (Fig. 5) and the synthetic map (Fig. 6). The status of these maps has changed significantly. They are now presented as exploratory processing maps, showing reliable scientific indicators, and are used by the government before making decisions on deconfinement[11]. The Minister of Solidarity and of Health have many reservations and "customary

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11. The first two maps are indeed described by Olivier Véran as "guiding us in the choices for the gradual removal of the lockdown as announced from May 11". (04/30/2020, 0'22) Which he confirmed a few days later: "These maps are tools that have and will continue to guide us in the coming weeks" (07/05/2020, 9'05). The Minister also insists on the fact that the data used are "well known, controlled, reliable, strongly, and extremely sensitive", but also "available, accessible, updated very regularly; [...] sensitive, [...] important to follow" (04/30/2020, 7'27). He considers these maps as simply factual: "it is only a snapshot of the viral situation on a given territory, which takes into account multiple data" (07/05/20, 9'10).

precautions", explaining that it will be necessary to observe the evolution of the indicators, which are "likely to change", up to the deconfinement, i.e. remain open to the possibility of adjusting policy measures according to the empirical observation of the data[12]. This inductive stance aims to strengthen the scientific basis of the deconfinement, while it could have been considered a decision coming from the highest level of the Republic when it was announced by Emmanuel Macron a few days earlier in his TV speech of April 13.

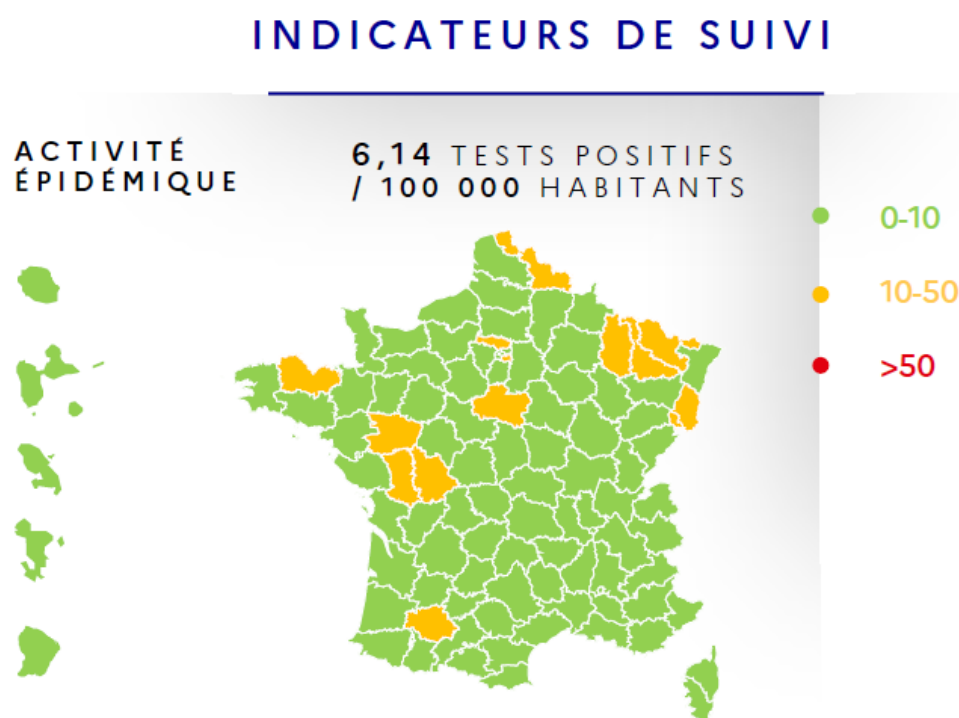*May 28: Reassuring images to confirm the end of the crisis*
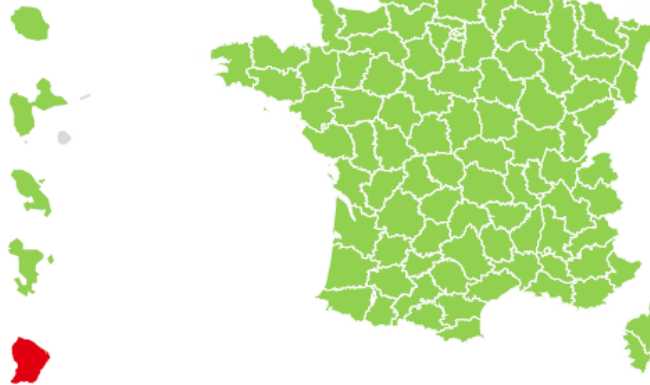

Fig. 7: Post-deconfinement monitoring indicator 1: Epidemic activity in terms of positive tests per department per one hundred thousand residents, May 28, 2020. Monitoring indicators / Epidemic activity / 6.14 positive testing / 100,000 residents.

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12. 04/30/2020, 7'30.

Fig. 8: Post-deconfinement monitoring indicator 2: Positivity rate of virological tests, as a percentage of people tested, May 28, 2020. Monitoring indicators / Epidemic activity / Positivity rate of virological test / 1.9% people tested positive / Realized over 7 sliding days (SI-DEP data).

INDICATEURS DE SUIVI

EVOLUTION DU R-0 (NOMBRE DE PERSONNES CONTAMINÉES PAR CHAQUE MALADE)

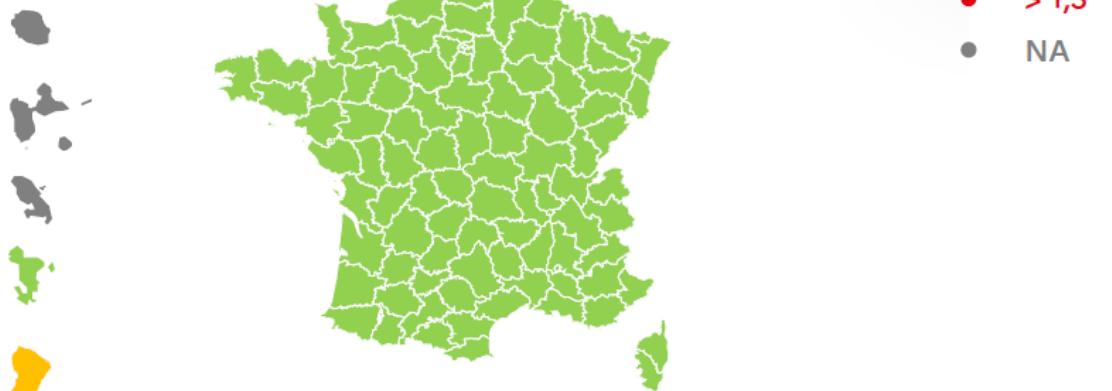**0,77** personne contaminée par un malade

- 0-1
- 1 – 1,5
- > 1,5
- NA

Fig. 9: Post-deconfinement monitoring indicator 3: Change in R0, in number of people infected by each patient, May 28, 2020. Monitoring indicators / Evolution of the R-O (number of people infected per sick patient / 0.77 people infected by one sick person.
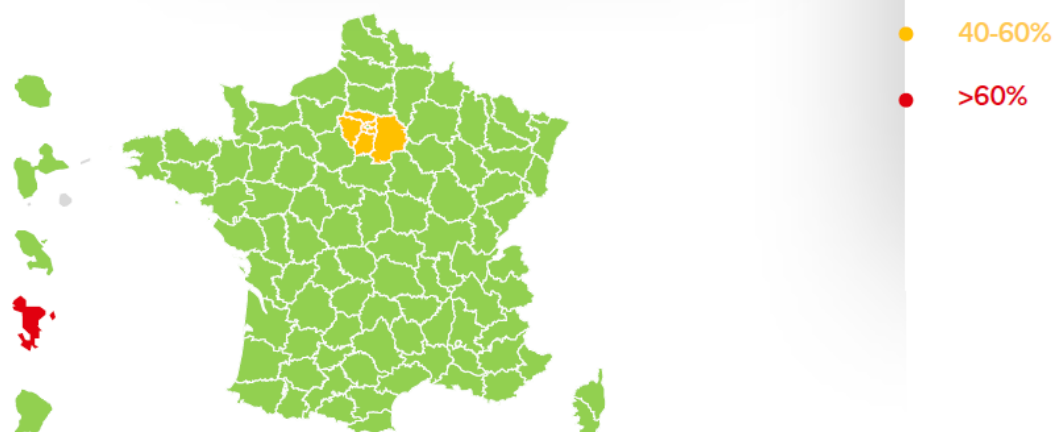
Fig. 10: Post-deconfinement monitoring indicator 4: Tension in the hospital on ICU capacities in terms of ICU bed occupancy rate per patients with COVID-19 compared to the pre-epidemic initial capacity, May 28, 2020. Monitoring indicators / Tension in the hospital on ICU capacities

Fig. 11: Screenshot of the vigilance map "based on the 4 indicators [epidemic activity, positivity rate of virological tests, evolution of R0 and tension in the hospital on ICU capacity]

and [...] enhanced by a risk analysis", published regularly on the website gouvernement.fr/info-coronavirus/carte-et-donnees, last update of the synthetic map called "vigilance" on July 8, 2020, accessed on July 9, 2020.

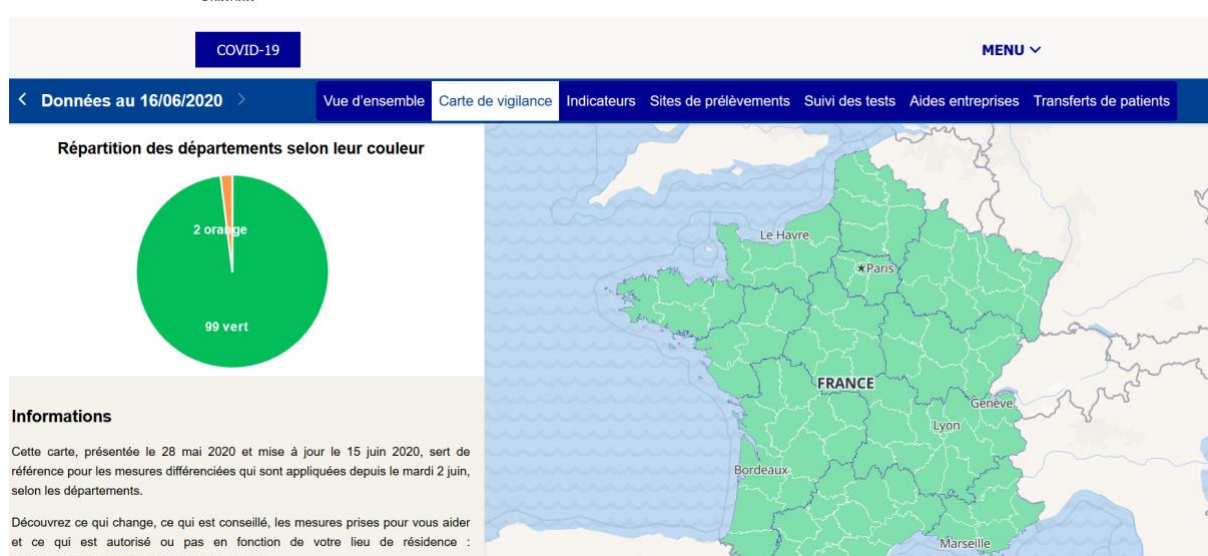*COVID-19/ Menu / Data on 06/16/2020 / Synopsis / Warning map / Indicators / Sampling sites / Test monitoring / Assistance to companies / Transfer of patients / Distribution of departments according their color / Information*

This map, presented on May 28, 2020 and updated on June 15, 2020, serves as a reference for the differentiated measures in force since Tuesday June 2, according to departments.

Find out what is changing, what is advised, the measures taken to assist you and what is allowed or not depending on where you live: https://www.gouvernement.fr/info-coronavirus.

Based on this scientific construction of the map, Olivier Véran and Édouard Philippe present four new maps during their speech on May 28: two maps of the positivity of virological tests, one per 100,000 residents (Fig. 7), the other as a percentage of tests (Fig. 8), a map of the evolution of R0 (Fig. 9) and a map of the ICU bed occupancy rate for patients with COVID-19 (Fig. 10); the latter being the only map that remains throughout the period. Despite the change in indicators, the maps are enhanced as tools for monitoring the evolution of the epidemic[13], and from then on regularly updated on a dedicated web interface (Fig. 11). Guarantees for the quality of the information appear: clearer captions, sources, indication of missing numbers. Evidently: all indicators switch to green, the situation seems reassuring, the good management and end of the health crisis are confirmed.

However a closer look reveals a different story. If we peel away all the choices made in mapping, statistics and semiotics, we realize that the government's communication strategy relies on the scientific look of maps and statistical indicators that are not actually what they seem to be, in order to convince of the rightness of its policy.

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13. The maps are considered by the Prime Minister as "a monitoring device [...] that enables to take precautionary measures countrywide if necessary", 05/28/2020, 5'54.

Questionable and even incorrect map backgrounds and display elements

Incomplete captions and inadequate titles distorting the interpretation of the information

Some versions of the maps issued by the government during the COVID-19 epidemic are without captions (e.g., the maps from the press conference on April 19, see Fig. 1, the synthetic maps, see Fig. 6). Captioned maps are often incomplete (e.g. Fig. 3, Fig. 4, and Fig. 10). This lack of captioning is matched by a systematic absence of data sources and dates[14], such that the maps cannot be understood outside of the context of the press conferences.

Because of their imprecision some map titles are also problematic. For example, the first of the three deconfinement maps issued from April 30 to May 7 is titled "Active circulation of the virus". The synthetic map of deconfinement indicators is titled "Epidemic situation" on May 28, when it was previously titled "Synthesis" and later on "Points of vigilance". The term "situation" had already been used on April 19 to show ICU bed occupancy for COVID-19 patients in the French regions[15], while from April 30 this same map is titled "Tension in the hospital". Finally, the map of test positivity per 100,000 residents is titled on May 28 "Epidemic activity"... Changing the titles of the same map from one day and from one update to another causes confusion in the interpretation of the maps. It also creates incertitude as to the consistency of the indicators. Furthermore, the words "circulation", "situation" and "activity" are used with vague meanings and seem de facto interchangeable. For instance, the map titled "Active circulation of the virus" at the end of April does not show – no more than the other forty maps issued by the government – a dynamic phenomenon of circulation. It only settles for the average number of emergency department visits due to a

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14. Except the only map of test positivity rate in percentage of people tested, 05/28/2020 (Fig. 8).

15. On that day, the map showing ICU occupancy in metropolitan areas and Overseas Departments and Regions is titled "The situation today" (18'50 in the press conference). The maps and graphs showing ICU occupancy in the Overseas Departments and Regions are titled "Overseas situation" (19'15 of the same press conference).

suspicion of COVID-19 in each department during a one week period. When speaking, Olivier Véran describes this map as "a reflection of the viral activity on the territory". The use of the word "activity" – the same as in the title of the map of test positivity per 100,000 residents – is used as a synonym of "virus circulation", confirming the incoherence of the titles and, more seriously, the misleading interpretation it can lead to.

No direction or scale giving context to the regions affected by the epidemic

The orientation and the graphic scale are necessary in some cases to fully understand the mapped phenomenon or recognize its space if this is basically unclear for the public, either because they don't know it or because the representation is unconventional. At first glance, the lack of orientation and scale of the maps issued by the government is not a problem. Maps describe static phenomena that do not directly involve distance or area. It is assumed that the shape of the mainland territory and the Overseas Departments and Regions are well known to their residents. However, a closer look reveals that most maps issued by government juxtapose spaces of different scales, without this being specified. For instance, the island of Martinique, the department of Lot and the Guyana region are about the same size in the image, while Martinique is actually five times smaller than Lot and fifty times smaller than Guyana. These different areas probably involve different logics of the virus circulation and therefore of epidemic management, which the lack of scale entirely hides. Furthermore, the way in which the Overseas Departments and Regions was depicted on April 19, 2020 troubled and even shocked some French. The contours of these regions were inverted along a vertical axis (the west was to the east and vice versa), probably due to a mistake in the handling of a computer drawing software (Fig. 12). Such a mistake might have been avoided if an orientation or a graphic scale had been added. It shows how all those involved in the making of the government's press conference – up to the Prime Minister – ignore the very shape of

the Overseas Departments and Regions. (Incidentally, let us note that problems with the backgrounds of maps occur repeatedly with the Overseas Departments and Regions and never with the mainland.) Ultimately such mistakes support the hypothesis that this cartography is the work of amateurs and cast doubt on its quality.
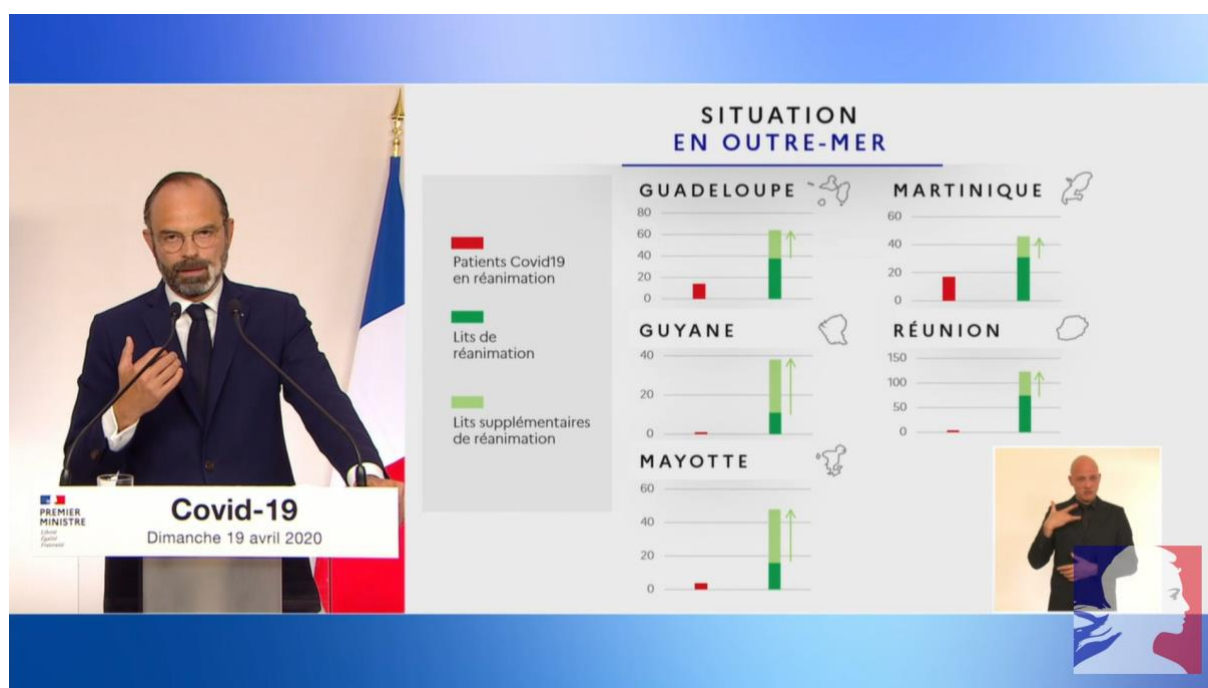

Fig. 12: Screenshot of Édouard Philippe's press conference on April 19, 2020 (19'15), showing the capacities of the ICU services in the French Overseas Departments and Regions. Prime Minister / Liberty Equality Fraternity / COVID-19 / Sunday April 19, 2020 / Overseas situation / COVID-19 patients in ICU / ICU beds / Additional ICU beds / Guadalupe / Martinique / Guyana / Reunion / Mayotte.

Misleading cartographic grids

One last element of presentation specific to the maps should be mentioned: the mismatch between the administrative entities shown on some of the maps and the entities toward which data is applied. Starting on April 30, on the "Tension in the hospital" maps representing the ICU bed occupancy by patients with COVID-19 (see

Fig. 4 and Fig. 10), the boundaries of the departments are shown when the data are actually calculated at a regional level. Although Olivier Véran insists in his speeches on the fact that the ICU occupancy only makes sense at a regional level (without further explanation), the resulting image is false: the departments in red do not all have rates of ICU bed occupancy by COVID-19 patients higher than 80%. Furthermore this indicator is the one that establishes the color of the departments at the time of their deconfinement, and thus the implemented measures, since the regional leveling has made all the other criteria (measured for each department) invisible on the synthesis maps[16].

Choosing the data: what maps represent

Regarding the data featured on the maps, three main problems can be identified: first, data not open to the public as promised; secondly, indicators not sufficiently sought of to sum up the epidemic activity; and finally on the maps, errors of categorization in relation to the numbers.

OpenData is thwarted, impeding the tracking of data

The first problem has to do with OpenData or "the opening of data of public interest". According to the French State it should "encourage the re-use of data

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16. For instance, the departments of Burgundy-Franche-Comté remained red for a very long time when most of the indicators were green. See on this subject the articles of France 3 Bourgogne-Franche-Comté "Burgundy remains red, but we do not know why", published on May 19, 2020, accessed on June 26, 2020 (https://france3-regions.francetvinfo.fr/bourgogne-franche-comte/deconfinement-pourquoi-bourgogne-franche-comte-reste-rouge-on-ne-sait-1830718.html) ; "Deconfinement map: the representatives of the Jura department one after the other got 'red' angry", published on May 20, 2020, accessed on June 26, 2020 (https://france3-regions.francetvinfo.fr/bourgogne-franche-comte/jura/carte-du-deconfinement-elus-du-departement-du-jura-entrent-colere-rouge-1831504.html) ; Step-by-step analysis, "Deconfinement: a map with very political data", published on May 8, 2020, accessed on June 9, 2020 (https://www.arretsurimages.net/articles/deconfinement-une-carte-aux-donnees-tres-politiques). Similarly from May 29 the map making of the R0 evolution on the web visualization interface seems to be regional and not departmental while it's the boundaries of the departments and not of the region that figure on the maps, tab "indicators" / "R - Effective reproduction number", posted online on ?, accessed on ?, (https://www.gouvernement.fr/info-coronavirus/carte-et-donnees).

beyond their primary use by the administration", particularly in order to "encourage the democratic transparency of institutions and representatives"[17] and the reliability of data. The State signs off on raw data, publishes and distributes it so that raw data is used properly without errors or corrected if necessary. These guidelines have been promoted repeatedly by members of the government regarding the maps for COVID-19[18]. In reality, the principles of OpenData have not been respected. What has been published at data.gouv.fr is the classification of departments (green / yellow / red) and not the raw data[19]. The raw data can still be retrieved[20] or reconstructed[21], but with great difficulty, and they are never clearly identified as the data used in the maps, which contradicts the OpenData transparency approach[22].

The fallout from this lack of transparency is obvious for one of the three maps presented on April 30, namely the transfer to hospital emergency departments due to suspicions of COVID-19 (titled "Active circulation of the virus", Fig. 3). Many media outlets at first reported counting problems leading to surprising classifications in some departments. The Cher (18), Haute-Corse (2B) and Lot (46) appeared as departments with high "active virus circulation" (in red on Fig. 3) when they were only

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17. See the documentation page of the Data.gouv.fr website, accessed on June 19, 2020 (https://doc.data.gouv.fr/).

18. On April 30, Olivier Véran indicates regarding the map "Active circulation of the virus" (Fig. 3): "These data are updated daily on the Data.gouv.fr site", then about the synthetic map (Fig. 6) "these data are available, accessible, and updated on a regular basis". About the same map, Édouard Philippe stated in front of the Senate on May 4: "This map of France will be updated every day, openly".

19. "Data from the COVID-19 warning map", Data.gouv.fr created on April 30, 2020, last update on June 17, accessed on July 9 (https://www.data.gouv.fr/fr/datasets/donnees-de-la-carte-de-vigilance-covid-19/).

20. For instance for the rate of emergency visits due to a suspicion of COVID-19: https://www.data.gouv.fr/fr/datasets/donnees-des-urgences-hospitalieres-et-de-sos-medecins-relatives-a-lepidemie-de-covid-19/

21. For example, to recover the percentage of ICU beds given to COVID-19 patients, we need to compare the number of COVID-19 patients in ICUs (https://www.data.gouv.fr/fr/datasets/donnees-hospitalieres-relatives-a-lepidemie-de-covid-19/) to the number of ICU beds per department/region (and again, this second figure is not published precisely on data.gouv.fr) (https://www.data.gouv.fr/fr/datasets/repartition-des-lits-de-reanimation-par-departement/). It is also possible that we did not find this figure, in which case this is indicative of its non-accessibility.

22. For example, Andrew Saurin, Research Fellow at the CNRS (UMR 7288), who concluded in the discussion of the web page devoted to the synthesis map published from 31 April 2020 on the data.gouv.fr website: "there is no official publication on how this synthesis is generated from the other datasets. I conclude, in a personal capacity, that it is therefore not scientifically possible to recreate this dataset independently and in its entirety..." This is precisely the definition and the objective of OpenData, all the more so in a context of political management of a health crisis. All the discussions on the page of data.gouv.fr concerning the "COVID-19 vigilance map data" are edifying on this subject. "Data.gouv.fr [Online] page created on 30/04/2020, last updated on 17/06/2020, accessed on 09/07/2020 (https://www.data.gouv.fr/fr/datasets/donnees-de-la-carte-de-vigilance-covid-19/#).

marginally affected by the epidemic[23]. The government quickly solved the problem. The very next day, Friday, May 1, all the misclassified departments turned green on the updated map. Was this change made because the earlier data were actually found to be incorrect or instead to counter the critics? It is not clear. One thing is certain: from then on there are inconsistencies between the data published on data.gouv.fr and the color of the departments on the maps. Indeed, according to the revised figures, in Haute-Corse from April 23 to 29, the number of transfers to emergency departments due to COVID-19 suspicions is still at 25 %, and at 20.5% from April 25 to May 1[24], which should have maintained the department in red according to the caption. Yet on the maps it has turned green...

Unstable and opaque indicators

The miscount invoked in this case by the government and specific to the way the statistics were compiled prior to their mapping reveals above all a more fundamental problem: the instability of certain indicators. Notably the indicator chosen to express the circulation of the virus – the number of transfers to emergency beds due to a suspicion of COVID-19 per department – is too sensitive to the slightest daily fluctuations in the least affected and populated departments. Based on very different population density, it is hardly comparable from one department to another[25]. For example, on Sunday April 26, the Lot recorded 52 transfers to emergency wards, with 2 due to a suspicion of COVID-19 (i.e. 3.8%). According to that method of calculation and with these government thresholds, 4 more people with a suspicion of COVID-19

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23. See articles posted online on *Le Monde* on May 1, 2020, (https://www.lemonde.fr/planete/article/2020/05/01/des-erreurs-relevees-dans-la-premiere-cartographie-du-coronavirus_6038356_3244.html/) ; on *Europe 1* on May 1, 2020 (https://www.europe1.fr/sante/coronavirus-pourquoi-le-lot-apparait-il-en-rouge-sur-la-carte-du-deconfinement-3965581/) and on *France Info* on May 1, 2020 (https://www.franceinter.fr/societe/premiers-couacs-sur-la-carte-du-deconfinement-trois-departements-classes-rouges-a-cause-d-uneerreur?utm_medium=Social&utm_source=Facebook&fbclid=IwAR3nE95X2c3Kz-Jr2vWiuujkJcPaJ7Ppifth4e5yld9w_JTgaPZPAcp6EBg#Echobox=1588322963/).

24. Figures accessed May 2 and 3, 2020 on data.gouv.fr (https://www.data.gouv.fr/fr/datasets/donnees-des-urgences-hospitalieres-et-de-sos-medecins-relatives-a-lepidemie-de-covid-19/).

25 Between February 24 and April 29 2020, the number of emergency department visits in the Lot averages 88 per day, while in Paris, it reaches 1,099.

that day would have upgraded the department to red with 11.5% where it would have increased of only 0.5% in Paris.

As Olivier Véran promised, one week after the first maps of deconfinement, on May 7, a third prospective indicator is added to the first two to better "fine-tune" them[26]. This is the "coverage rate of estimated testing needs as of May 11". The resulting map is at the very least surprising (Fig. 5). All departments are green, i.e., as of May 11 according to the caption, the testing needs of all mainland and overseas departments would be covered over 100%. A monochrome map presents an absurd image since the purpose of a map is to show spatial disparities; it becomes irrelevant when there are none. It is then more efficient to state the information than to show it. This monochromy, the vague, modalized form of the title and caption ("estimated", "needs"; "> 100%"), the lack of information on the sources or the method of calculation (or more precisely "estimation"), and the fact that the data are not publicly available[27] suggest that these are at best approximate, at worst totally made up.

Obvious synthetic mistakes

Furthermore the synthetic maps of May 7 and later of May 28 show obvious errors. These maps are supposed to show the count of departments where rates above the red thresholds are present (becoming "alert thresholds" on May 28) as set by the government, across the various indicators used. On May 7 (Fig. 13), the Haut-de-France region was misclassified as red on the synthetic map, whereas on May 28 (Fig.

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26. Olivier Véran said on April 30: "By next Thursday [May 7, 2020], we will be able to present predictive data for May 11. [...] In order to fine-tune these data, we will rely on other indicators, which are called low signals, but which are important indicators [...] such as, for instance, the feedback we receive from general practitioners, [...] the number of positive tests that can be carried out in this department".

27. We were unable to retrieve the data from the Internet. This difficulty is also mentioned by Loris Guémart, in an article on data-journalism during the COVID-19 period, on the *Arrêt sur Images* website (https://www.arretsurimages.net/articles/deconfinement-une-carte-aux-donnees-tres-politiques).

14) the four indicators chosen to describe the situation and the method stated[28] are clearly not applied in the "vigilance" map. These synthetic maps are thus not only superfluous – the first version relied on only two indicators that were easy to synthesize visually – but also opaque and therefore not scientific, but arbitrary – as are the decisions supposedly relying on them.
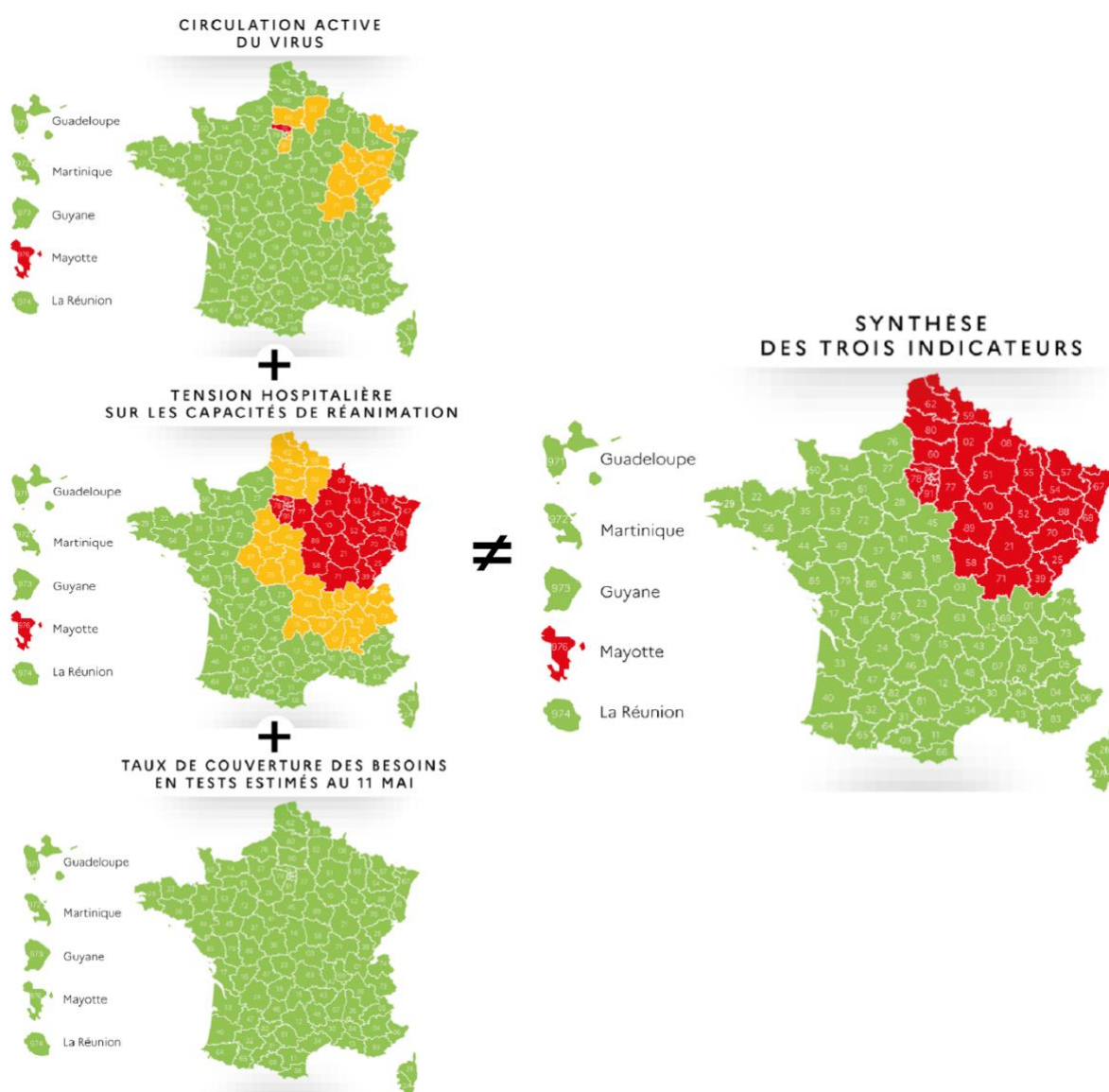

Fig. 13: Synthetic error on the map of red and green departments for deconfinement, May7, 2020.

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28. "Yellow departments are those for which there are at least two indicators out of the four overpassing the vigilance thresholds", explains Olivier Véran, May 28, 2020, 14'58. But the Illustration 11 shows the departments of Ile-de-France (except Val-d'Oise) and Mayotte are yellow when they have only one yellow or red indicator each.

- *Active circulation of the virus / Guadalupe / Martinique / Guyana / Reunion / Mayotte*
- *Tension in the hospital on ICU capacities / Guadalupe / Martinique / Guyana / Reunion / Mayotte*
- *Coverage rate of the needs in testing estimated as of May 11 / Guadalupe / Martinique / Guyana / Reunion / Mayotte*
- *Synthesis of the three indicators / Guadalupe / Martinique / Guyana / Reunion / Mayotte*

ACTIVITÉ ÉPIDÉMIQUE — 6,14 TESTS POSITIFS / 100 000 HABITANTS

TAUX DE POSITIVITÉ DES TESTS VIROLOGIQUES

1,9% de personnes testées positives parmi toutes les personnes testées

EVOLUTION DU R-0 (NOMBRE DE PERSONNES CONTAMINÉES PAR CHAQUE MALADE)

0,77 personne contaminée par un malade

TENSION HOSPITALIÈRE SUR LA CAPACITÉ EN RÉANIMATION :

POINTS DE VIGILANCE POUR LA PHASE 2

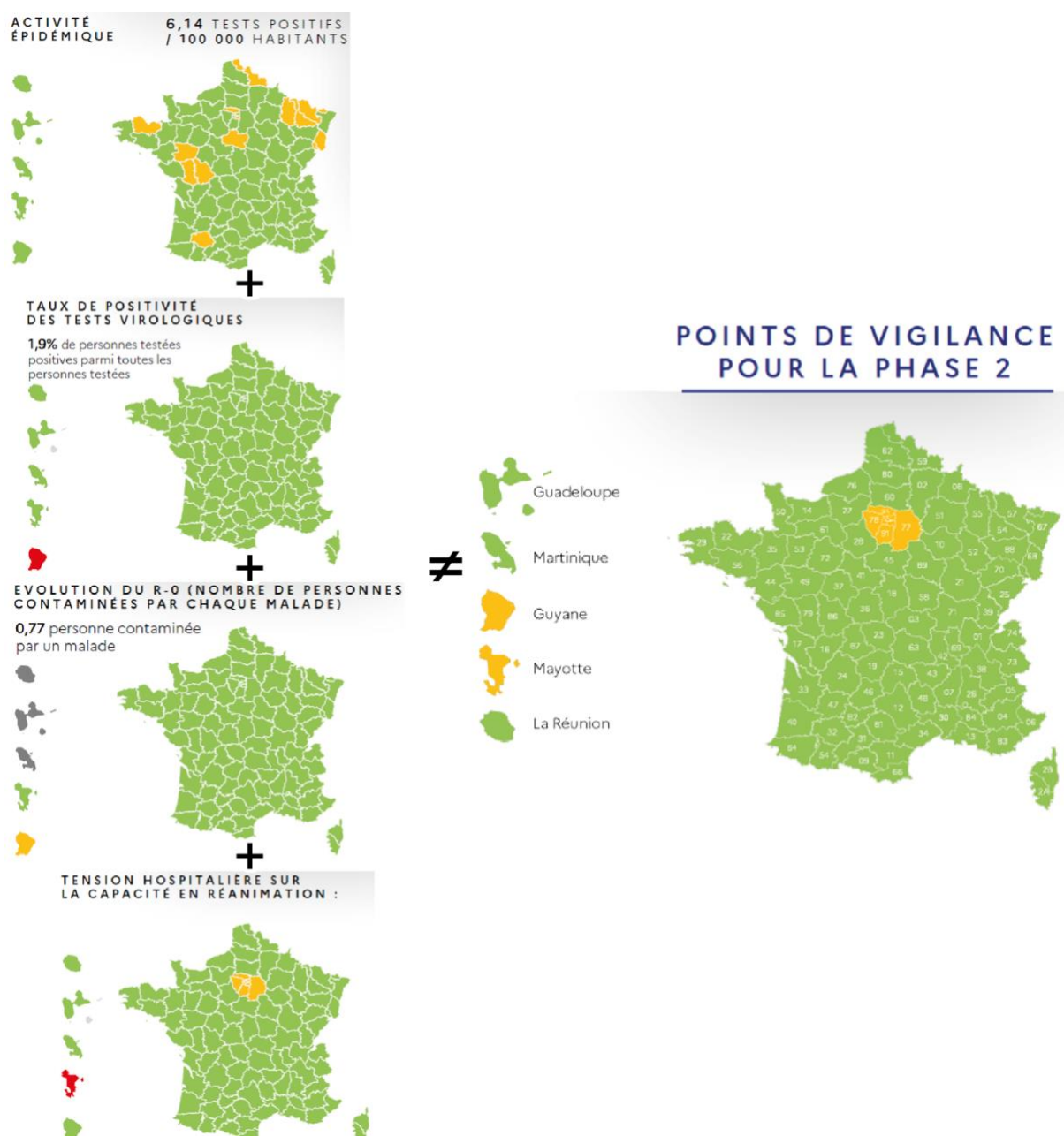Guadeloupe
Martinique
Guyane
Mayotte
La Réunion

Fig. 14: Noncorrelation between the four selected indicators and the synthetic map as of May 28.

- *Epidemic activity / 6.14 positive tests per 100,000 residents*
- *Positivity ratio of virological tests / 1.9 % people tested positive*
- *Evolution of the R0 (number of people infected per sick patient / 0.77 people infected by one sick person*

- *Tension in the hospital on ICU capacities*
- *Vigilance Point for stage 2 / Guadalupe / Martinique / Guyana / Reunion / Mayotte*

Inappropriate semiology

Red and green: antagonistic colors with strong connotations, unsuited to express gradually measured phenomena

To represent a relative quantity, i.e. a partial quantity of a total reference quantity (such as percentages, but also the number of people infected per patient, etc.) the rules of graphical semiology[29] recommend the use of a single color ranging from light to dark as it better indicates a numerical progression. Therefore, if we follow these rules, almost all the maps realized by the government between the end of April and May 2020 are incorrect. They go from green, to yellow, to red to express the same numerical continuum. Cartographers are not required to carry out these rules to the letter. Still this discrepancy is worth noting. It reveals a non-neutral graphic choice whose purpose is to visually produce a political rhetoric previously developed by the Prime Minister on April 28 before Parliament opposing "green departments" to "red departments". Above all, this graphic choice misleads us on the epidemic. It visually opposes red and green departments, as if two separate and opposite phenomena were taking place when it is actually the same phenomenon but of different intensities. This Manichaeism is all the stronger as the two colors chosen have strong cultural connotations: green = good/safety; red = evil/danger and by extension fear/anger. The shock caused by this visual rhetoric was real, and the government understood it well.

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29. Formalized by Jacques Bertin in the 1960s and 1970s (*Sémiologie graphique*, 1967; *La Graphique et le traitement graphique de l'information*, 1977). It is a reference among most French cartographers but less among Anglo-American ones.

Value classes built without apparent logic

To make quantitative data visually easier to read on a map, we usually use classes grouping similar values. Various statistical methods exist, which the cartographer applies in accordance with the map's objective, the underlying data analysis or the number of classes desired. This is called discretization. In each governmental map, discretization was used since a grouping of various values is performed, yet no precise information is given about the method used. A closer look fails to show that any of the customary discretization methods can be identified. Are these epidemiological thresholds scientifically established or just randomly selected numbers? Another problem is the number of categories. Considering the rules of graphic semiology and the important social, health and political stakes, four – ideally five – categories would normally be recommended to reflect the diversity of situations countrywide. But here, political reasons dictated a summary of reality in three (green – yellow – red), then only two (green – red) oversimplifying categories.

Discretization has major consequences for the understanding of maps. For instance, the thresholds of the maps issued on May 28 (Fig. 7, Fig. 8, Fig. 9 and Fig. 10) seem to be more solidly built than in the previous ones. The Minister of Solidarity and Health speaks of "vigilance threshold" (lower limit of the yellow class) and "alert threshold" (lower limit of the red class). He explains that "these thresholds [...] are consistent and [...] converge with thresholds adopted by neighboring countries, in particular Germany" (10'05). Some of them seem perfectly logical, like on the map of the evolution of R0, where the vigilance threshold is set at 1, in order to establish the difference between departments where the circulation of the virus is declining (a sick person infects in average less than one person) and those where it is spreading. However most of the red classes in the caption do not figure on the map. It would be logical if the previously used thresholds were maintained for instance to compare an indicator of May 28 with one in the previous days and weeks. But why create a red category above 50 positive tests per 100,000 residents (Fig. 7) when no department is

concerned and the indicator is being used for the first time? Similarly for R0, what is the point of setting the threshold at 1.5 infected persons per patient to move into the red category if it does not figure on the map (Fig. 9)? These choices are all the more puzzling as the categories of the only indicator that remains over the period from April 19 to May 28, Tension in the hospital expressed as ICU capacities in terms of ICU bed occupancy for patients with COVID-19 (Fig. 10), are modified[30]... As a consequence of these choices of discretization, the maps turn green at the end of May when the second stage of deconfinement begins and while the government all at once wants to make people forget the visual shock caused by the red of the maps of April 30, show that the decisions made then were the right ones and enable activities to resume more strongly. Hardly explainable otherwise, it is likely to be a communication strategy which began with the green map of May 7, 2020 (Fig. 5). In any case, it indicates a change in the status of maps in the governmental discourse throughout the period. From April 19 to May 28, the change in most of the monitoring indicators, the modification of the titles and the different discretizations blur the analysis of the evolution of the epidemic in time and space. This blurring ends up deconstructing the idea posted by Olivier Véran that the indicators and maps serve the methical and systemic observation of the evolution of the epidemic.

Epilog: Political and cartographic rhetorics

The cartographical chronicle for COVID-19 ends on June 14 when Emmanuel Macron states at the beginning of his speech: "From tomorrow, the whole territory, except Mayotte and French Guiana where the virus is still actively circulating, will become part of what is henceforth usually called the "green zone". Following this declaration,

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30. As Olivier Véran explains: "We have modified the thresholds of this indicator to keep up with the comeback to normal. We lowered the vigilance threshold to 40% while it was previously at 60% and the alert threshold to 60% while it was previously at 80%", May 28, 2020, 13'32.

all mainland departments turn green on the "vigilance" synthetic map on the internet (Fig. 11) while the indicators on which it is supposed to be based are not all and everywhere bellow the vigilance thresholds (see, for example, Fig.15 and Fig.16). In any case, this synthesis map is not captioned, so it is impossible to know exactly what the green color corresponds to – and its metadata leaves everything open potentially: the map is "based on the 4 indicators and is enhanced by a risk analysis". This "risk analysis" is nowhere documented, blurring the threshold between yellow and green departments, disregarding the data. It is then the politician who decides performatively what the mapping should be, brushing off the indicators with a flick of the wrist and with them the supposedly scientific approach promoted for weeks by the Prime Minister, the Minister of Solidarity and Health and the Director General of Health. Emmanuel Macron's sentence confirms the hypocrisy of the maps issued by the government and completes their gradual but systematic unraveling by the executive power itself. Their purpose now seems clear. They were used in turn to support the arguments justifying the political decisions of the moment. It was first the idea that the lockdown was necessary and effective (before April 30). Then the idea that the epidemic was differently virulent according to the territories to justify flexible deconfinements (maps from April 31 to May 28). Then the idea of an improvement, limited but undeniable, of the epidemic situation in order to urge all the French people to resume their activities while remaining cautious (between May 28 and June 14). Finally the idea of a complete liberation of the entire mainland territory, leading to the official declaration of victory over the epidemic and hence putting an end to the "war" the president himself had declared (from June 14). The French government did not invent anything: the ambiguity between knowledge and power has always been the basis of the political use of maps. Indeed, this confirms that critical vigilance is more than ever necessary.
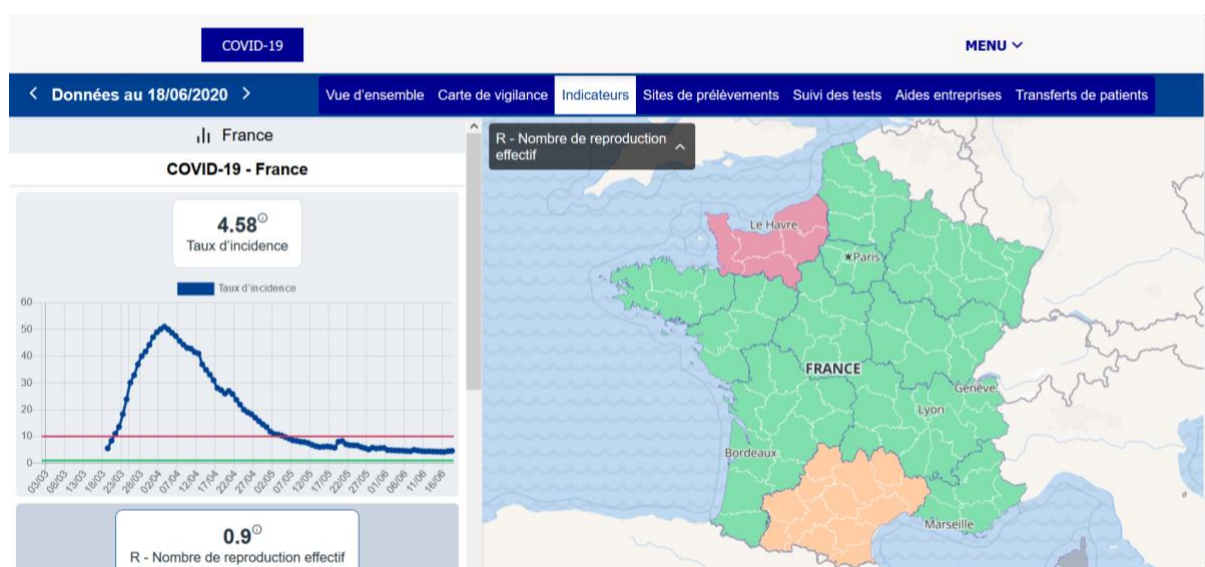
Fig. 15: Screenshot of the web map showing the evolution of R0 on June 18, https://www.gouvernement.fr/info-coronavirus/carte-et-donnees, accessed on June 26, 2020. COVID-19/ Menu / Data on 06/18/2020 / Synopsis / Vigilance map / Indicators / Sampling sites / Test monitoring / Assistance to companies / Transfer of patients France /COVID-19-France / 4.58 incidence rate / incidence rate / 0.9 / R-Number of effective reproduction.
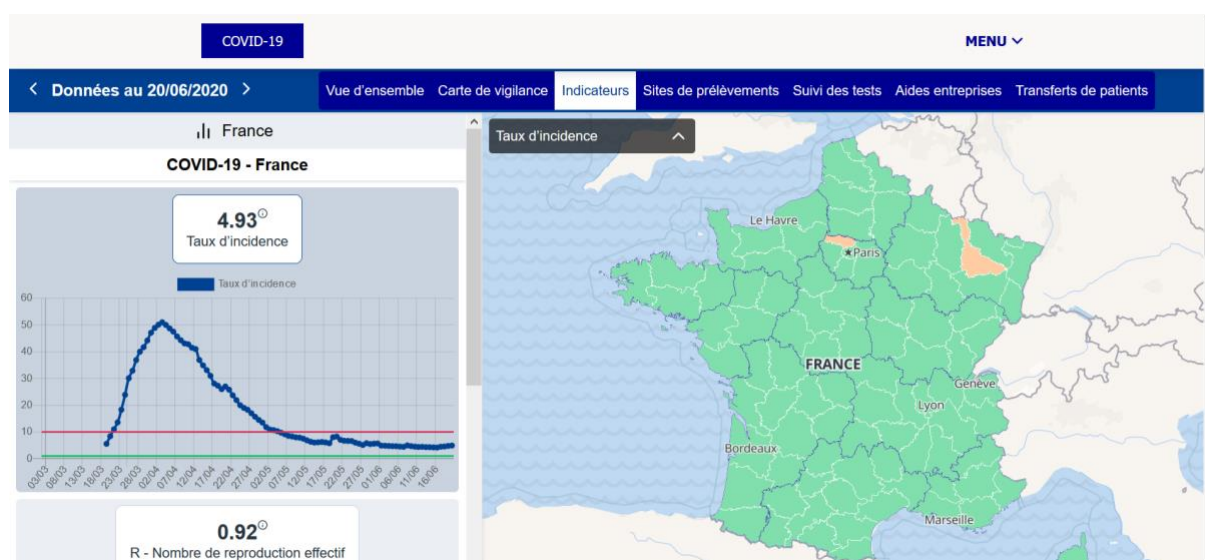

Fig. 16: Screenshot of the web map showing the percentage of positive tests per 100,000 residents on June 20, https://www.gouvernement.fr/info-coronavirus/carte-et-donnees, accessed on June 26, 2020. COVID-19 / Menu / Data on 06/20/2020 / Synopsis / Vigilance map / Indicators / Sampling sites / Test monitoring / Assistance to companies / Transfer of

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