Comments received on VirgoLab organisation proposal - 5

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In order to reply to the comments we have received in a structured manner, we organised the comments according to the structure of the Organisational Proposal and grouped comments on similar topics together under a corresponding title.

1. Definition of VirgoLab

1.1 Purpose

1.1.a Ambition and Resources of VirgoLab

- In the presentation from the implementation committee given during the Virgo week, the purpose of the VirgoLab was described as producing "*data […] with sensitivities and timelines comparable to the data of the LIGO gravitational wave observatories*". I commented that unless there was a massive investment of resources to make that goal even a remote possibility, this was setting the VirgoLab up to fail. In VIR-1025A-24, this has been "changed" into "*data […] with sensitivities and timelines comparable to the data of world leading gravitational wave observatories*".
- more personpower is needed for a new organisation to be effective.
- Another mandatory need to improve the communication between the people/teams is to provide support to the Project Offices (long-term positions for planning preparation, integration, risks, quality…) and to provide support to the teams so that it is not exactly the same people who are the main contributors in all the projects. A commitment of the EGO Council about such evolution from their side is required for the new organisation to be possible.
- This assumes that VirgoLab will be provided by the funding agencies with enough resources so that it can indeed be operational and functional to impact the Projects. This requirement of financial support from the funding agencies, for secondment and fellowships in particular, but also for prototyping, should be mentioned in the proposal document. To be operational, the new organisation will need more personpower working in the Virgo detector related activities, so that it is not exactly the same people working in all the different parts of the structure, and enough resources for prototyping. This is a must for the future of Virgo and for possibly increasing the attractivity of the VirgoLab activities.

  → Indeed, also the 2024 "Organisational Review EGO and Virgo" recommends additional resources to be provided for VirgoLab. However, a document aiming to specify the governance structure of VirgoLab should contain the processes for managing the resources, not the resource level. The question of adequate resource loading will be treated by the Implementation Committee in the following.
  Adopting the proposed governance by the EGO Council, includes that EGO Council subscribed to the ambition of Virgo to be among the world-leading GWOs. Implicitly, it therefore takes the responsibility to provide the necessary resources.
  Besides these considerations, we added a sentence: *"To fulfill its ambitious mission, the VirgoLab requires steady and adequate financial support from its funding bodies.".*

- I think that "t*o be provided [...] with sensitivities and timelines comparable to the data*" does not make much sense: the data does not have timelines or sensitivities. Also, the usage of *"world leading gravitational wave observatories*" carries the connotation that Virgo is not one of them.
- In the definition of Virgo-Lab, it is stated "*to provide to the Virgo Collaboration with sensitivities and timelines comparable to the data of world leading GW observatories*". Considering the current funding and personpower affected to the project, it seems unlikely that Virgo could reach a comparable sensitivity. We suggest replacing "comparable ..." by "for having scientific output effective contributions in the network of GW detectors".

  → We modified the sentence: *"The aim of VirgoLab is to ensure that the Virgo interferometer reaches sensitivities and produces observational data in order to be a cornerstone of the worldwide network of gravitational wave observatories."*

1.1.b Role of DataAnalysis

- The purpose is that the VirgoLab has two deliverables: the detector (building and running it) and the strain data. Anything else is outside the scope of the VirgoLab. This leaves the scientific purposes and motivations completely unspecified. Presumably these will live elsewhere (an extended version of the IGWN charter, or something similar), but this elsewhere will need to be referenced in detail here as well. On the other hand, the LIGO Laboratory Charter (2024 – 2028) talks about the LIGO Lab and the LSC in parallel, so it opens spelling out – in this order – scientific objectives, technical objectives, and broader societal impacts. Perhaps the scope of that document will need to be updated and reduced as well once there is a more elaborate IGWN charter, but right now the imbalance does expose the VirgoLab creation to risks This document, or others it points to, must somehow clarify where other activities live. It is not only a matter of the complete absence of the Observational Science Division activities. The involvement in the current Operations and Computing Divisions is also drastically limited here. Right now, the VirgoLab is disjoint from the production and diffusion of low-latency triggers and related data products, as well as from any processing and storage of the very data it produces. All this requires an analog of "The LIGO Scientific Collaboration (LSC) carries out the LIGO instrumental and analysis research and development program, data analysis, and the publication of scientific results [...]" somewhere.
  I think a lot of what is said in this issue, not just in this comment, is solvable with a well organised container for the scientific purposes of all this effort. Do we know if the LIGO Lab Charter will be reduced, as a common, carefully written, IGWN Charter develops? My feeling is that this is perhaps compressed and lost in the sentences *"VirgoLab operates in coherence with the other observatories of the LIGO-Virgo-KAGRA* scientific collaboration*" ["scientific" should be removed] and "*Any author of VirgoLab should be automatically entitled to sign the publications related to the data produced by VirgoLab for the Virgo or LVK**". I can guess that the intention is probably for the VirgoLab to be one of the cornerstones of the LVK (then IGWN), but this needs to be said directly, clearly, and strongly. Operating with other observatories can imply, again, "only" providing strain data to the world, without an intent to support and be a core part

of the LVK/IGWN. The LVK/IGWN scientific program needs to be a major part of the L/V/K Labs charters.
→ You're right: we concentrated on VirgoLab matters, and did not give further precision on the physics analysis, therefore *a paragraph has been added:*
"The data analysis for research in the fields of fundamental physics of gravitation and astrophysics is carried out by the Virgo Collaboration. The Virgo Collaboration* is in charge of the publication of scientific results and of providing low-latency GW-candidates alerts. Scientists and engineers from the VirgoLab are members of the Virgo Collaboration and can participate in the full range of its activities."*
This part is much more detailed in the Ligo Charter and the IGWN charter should be more specific on the data analysis part. If necessary, the boundaries of the VirgoLab activities and responsibilities may be adjusted as the IGWN charter is established. However, the VirgoLab Organisation is also an important input for the discussions within IGWN: VirgoLab has to be recognized as a "cornerstone" within IGWN and its organisation to be considered in the way IGWN will be set up.

- The absence of any reference to data analysis in the VirgoLab document is striking, especially considering its centrality to the success of a project like VirgoLab, which is focused on gravitational-wave detection and analysis. This oversight could create several challenges for data analysts. First, in the VirgoLab governance structure the decision-making process is highly centralized within the Executive Board, which could reduce the responsiveness and flexibility needed for data analysis activities. Additionally, there is no dedicated representation for data analysts within the governance structure, meaning their specific needs and concerns might not be adequately addressed.

  → Indeed the data analysis will live in the Virgo(/IGWN) collaboration. The Virgo/IGWN scientific community is represented through the Virgo SpokesPerson as well as the Chair of the Board of PIs, who are part of the Executive Board and should bring a global scientific vision. If needed the EB can invite any additional person if their expertise is required.

- According to the current document VirgoLab will not deal with data analysis and basically turns the Virgo detector in a "data producer machine" which will be analyzed by someone else, e.g. IGWN. In particular, it looks striking that even online data analysis is not even mentioned.

  → Online/Low Latency Data Analysis is implicitly included in the Operation Project wich include the existing Computing and Low Latency Groups activities. The description of "Detector Operations" has been updated for clarity.

- Finally, a note about language; nowhere in the document is it possible to find any reference, even a passing one, to the scientific value of the detector, its scientific scope, or the role played by scientists and researchers. It is a barrage of "technical" adjectives, associated with skills and terms and teams. We find this derogatory towards the people involved and their dedication. We struggle to see how this represents a

selling point in terms of encouraging people to come and work as part of Virgo or for those research institutions that form part of this endeavor

→ We appreciate this comment. The aim of the document is to define an organizational structure of VirgoLab, which is mainly concerned with the management, the decision making and the resource handling. Our idea was to keep this document short to the essential points that need to be fixed, as the scientific relevance, motivation and dedication of the many collaborators looks obvious to us.
We could keep a placeholder in the beginning and it could filled with a text proposed by the Virgo Collaboration: a one pager about the achievements of the Virgo Detector and the motivation to join VirgoLab as a prologue to this document?

1.2 Organisation

1.2.a Hosting of VirgoLab by EGO

- *"VirgoLab is hosted by EGO and embedded into EGOs organizational structure"* needs clarification
- VirgoLab is defined as a *"distributed laboratory*" and, a few sentences later, it is said that it is "*hosted by EGO*". This is a contradiction. Also, the sentence "*embedded into EGO organisational structure*" is foggy: does it mean that the EGO organisation manages the VirgoLab one? Do they merge? How do they interact? This should be an important point and it is only sketched.
- The sentence "*VirgoLab is hosted by EGO and embedded...structure*" is unclear and requires further clarification

→ VirgoLab is the result of Memoranda of Agreements between EGO and the oversight organisations of the External Labs. The role of EGO is defined in the EGO Statues concerning its responsibilities towards the Virgo detector and the Virgo Collaboration. De facto, EGO acts as a host lab, in a similar way as CERN is the host lab of the LHC Collaborations, or LNGS of Borexino, Gerda, Crest…. As the legal entity, EGO manages the resources and has the legal responsibility of the Virgo detector and site. We modified the wording of this paragraph with the hope to make it clearer.

1.2.b Membership

- Attractiveness of VirgoLab toward experimentalists (they will be involved only in detector-related papers, GW science will be done by others, with implications also in the career of young people);

→ We are very concerned with the success of Virgo and the implication on the career of young people. If the Virgo detector is not functioning properly, the whole field of Gravitational Wave Physics will be damaged and major scientific results will not be able to be achieved. A Virgo detector that does not meet the required sensitivities, will also put in danger a 3rd generation project in Europe (i.e. ET). The impact on the career of young people working on gravitational wave physics will be dramatic. Therefore It should be the highest priority of anyone in this field of physics to engage in the next couple of years to make the Virgo detector fulfilling the highest expectations.

The idea of VirgoLab is to provide Virgo with the resources and the organisation to be able to have a central role in the network of GW detectors in the near-medium term. Experimentalists working on Virgo will have a central role of making this happen, which implies actively participating in fundamental physics research. This contribution from VirgoLab members will be highly recognised in IGWN as VirgoLab activities will be considered among the "needed" ones for default authorship.
In addition, as stated by the proposal, *"Scientists and engineers from the VirgoLab are members of the Virgo Collaboration and can participate in the full range of its activities." :* contributing to VirgoLab may be one among other activities of a person.

- It looks like groups not working on the detector will not have a chance to join VirgoLab, unless they can contribute e.g. to detector characterization/noise hunting activities (not clear in the document).
- For a group that can't contribute to the construction of a part of the detector but wants to contribute to the VirgoLab operation of the detector with people it's not clear where they should be placed, such as to analyze data from the detector control channels or data obtained from any tests to improve the behavior of the detector. These people could also work remotely but could they still be included in the virgoLab?

  → This is an important point: groups and people with no hardware contribution to the detector but wishing to contribute to the VirgoLab effort are highly welcome with contributions on detector related activities. They can be involved in Operations, Commissioning or even Upgrades. For example, in the document "Detector Operations" include "the production of calibrated, high-quality strain data…" Noise hunting and detector characterisation are needed to maintain and increase the sensitivity and for ensuring the "high-quality" of data and can be contributed by groups that are not involved in detector construction.
  How exactly this will happen is related to VirgoLab membership and is not defined yet. Groups and people only doing data analysis to produce scientific results would indeed not be part of VirgoLab but contribute solely to the scientific collaboration.

- My impression is that some of this future VirgoLab is shaped as a monolithic, quasi-militaristic entity where one person has complete shaping power over it, with no safety measures in place. The scientists and technicians working in (for?) it will be relegated as "resources" to be used as deemed appropriate, failing to a great extent the freedom of research that scientists have. The Groups (whose functionality in the Collaboration *needs* some tuning, I get that) are downsized to providers of money and people, to be transferred over to the Executive Board to be used as they deem appropriate. The attractiveness of VirgoLab will not last much, with this approach.

  → Even though we can understand some of the concerns expressed, any collaborative effort needs organization, in particular when dealing with complex and delicate instruments such as GW Interferometers. The proposed structure is not different from similar complex endeavors such as particle physics detectors, telescopes etc. The spirit and culture of such a collaboration has to be anchored in competence, exchange and motivation, which is generally sufficient to prevent abusive behavior. Decision making should be fact based and political consideration kept out as much as possible. Any decision is embedded in the larger structure of VirgoLab and includes many actors that contribute to the decision finding process. No person with

any management role should act in isolation, but there needs to be someone who has the final authority and responsibility for a decision taken. It is the pride to build and operate a fantastic instrument in a collective effort that motivates the work in VirgoLab, and goes along with an organisational structure.
In this sense, the proposal tries to shape a clear hierarchy between the roles and a well-defined decision tree for detector-related choices, with transparent accountability. The groups remain central players and are represented in the board of PIs. The board of PIs has a say in many of the decisions and is represented in the EB. As chair of the EB, the VirgoLab director should strive for consensus. The director also has to report to the Program Officer and to the Council and is subject to their evaluation.

- Fig 1 The external labs do not appear explicitly while they are essential blocks of the VirgoLab : Under the “Board of PIs” box should appear a box with the “External labs”

  → Thank you for the suggestion, the figure has been updated.

1.2.c Matrix structure

- The proposed strong matrix organisation does not appear functional. The organisation by projects is very fine, with the project team being multi-laboratories with distributed laboratories. However, once the projects are in place, the personpower is provided by the laboratories (External Labs and EGO). Hence technical teams are not functional since the VirgoLab direction does not have any hierarchical impact on the teams. They look at best as ways of animating some transversal discussions over the different projects and reporting general needs and issues. This is an important activity, but does not deserve a strong part in the organigram, with almost the same importance as the projects. We understood that these technical teams were set in particular in order to improve the communication between the people in the different laboratories and in the different Subsystems, and to ease the integration of new groups in the detector-related activities. To achieve this goal, we propose that the Technical Teams match clear Subsystems. Clarifying the Subsystems at the Virgo-lab organisation structure would solve this issue. Starting from this organisation, the laboratories can commit to take responsibilities for building, commissioning, upgrading, maintaining, operating the different Subsystems. It will help to identify long term commitments of groups in laboratories, and help to identify where (new) groups and new partners can contribute.
- The organization proposed (Strong Matrix) relies on the main advantage to have a clear chain of command (decision chain) with full control on resources and personnel. In the Appendix on ‘Strong Matrix’: *“The project manager is ultimately responsible for the project‘s completion, has final say on major project decisions and controls most aspects of the project, including the assignment of functional personnel, what they do and when”.* As clearly pointed out, it seems based on a very weak assumption unless he has a huge investment to have permanent personnel dependent on him in the TTs, that is by transforming the VIrgoLAB into something similar to the LIGO lab. How is it thought to implement this fundamental step? It is not a matter of details that can be settled in after! This is a crucial point because an organization without workers cannot work, even with the best ideal structure. Without this, it seems destined to fail. What are the comparable cases of organizations that can fit with these situations that have been studied and that can give credits to this proposal?

- What matrix flavor, between the "weak" (organization is in the hands of the Departments/VirgoLabTTs) and "strong" (organization is in the hands of the projects) alternatives, is more suitable for each of the technological and service areas involved.
- The primary assumption is the existence of a robust matrix-based project management approach. Such approaches typically rely on extensive control over resources, including personnel. This control is usually achieved either by the organization (e.g., VirgoLab) directly funding the salaries of dedicated personnel or by influencing their career progression. For VirgoLab, this level of control is unattainable without a substantial increase in EGO staffing and a corresponding budget expansion.

  → One of the major difficulties identified by the “Organisational Review EGO and Virgo” was the strong organization in subsystems, hampering the various subsystems to have a holistic view of the entire instrument. The subsystems will find their natural place in the Projects, where the construction, commissioning and operation will most likely be organized according to subsystems. Also the funding in some countries can be obtained rather for a subsystem, putting additional weight and a feeling of property to the groups providing subsystems.
  The Technical Teams are meant to bring a collaborative view beyond subsystems and to give a sense of ownership of the whole detector to the entire collaboration. Technical Teams should also help to reduce the entropy in the technical solutions applied on different subsystems (i.e: photodiodes, power supplies, software standards…) which should help to reduce cost and maintenance efforts. These teams are also meant to help new groups joining VirgoLab and providing their expertise.
  The alternative to the Matrix structure would be to be fully organized in projects, which would have many side effects and imply profound chances, while losing the benefits of having identified areas of collaborative exchanges.
  It is not in the power of the implementation committee to put in place a central organisation that would directly fund the VirgoLab members salaries or influence their career progression, and there is no wish from the EGO Council members to set up such an organisation.
  The proposed organization reflects the reality of EGO and Virgo being in an international, multi-institutional environment with several Oversight Organisations. Large international scientific collaborations are generally working with similar structures. Such structures rely on the motivation of their members and participating institutions to make them work. To maintain this motivation, it is important to enhance the communication efforts among the different members and stakeholders in the collaboration and to enforce an inclusive, collaborative and competence based management culture.

- The document is missing a figure that shows a matrix to visualize the matrix structure that is being described in words.

  → The protoEB will elaborate the structure of the Technical Teams, a figure can be provided once this work is achieved.

- My impression is that the text draws too much from the experience of HEP experiments, where the basic technology is fairly well-established and technological advancements are limited to minor changes in preamp electronics or similar details. There, the need of a strong matrix organization is dictated by the scale of the projects

and by their complexity, which stems from size and number of components. On the contrary, a GW IFO is an analog machine, where the complexity arises not just as a consequence of the number of parts but also from their strong non-linear interactions. This means that quite often the advancements in detector performance require new science, not just advanced or new engineering. Take for instance the developments in the science of mirror coatings: they depend on hard work but also on the serendipitous inspiration that often accompanies scientific discoveries. Another example of this is the 1/f^{2/3} mystery noise, where nobody can "order" a solution of the enigma to be found.

→ All “Big Science” instruments are complex and R&D activities take place in all fields in order to improve these instruments. One aim of the proposed reorganisation is to increase the vision and the awareness of the Virgo detector as a whole and not solely as an assembly of Subsystems. In particular tracking issues like the “mystery noise” requires a structured effort. The proposed structure is about organising operation, commissioning and upgrades, and it is obvious that R&D activities need to continue in the different groups, be shared within VirgoLab and with the GWO community at large.

- The intermingling of scientific and engineering issues means that the "*strong matrix organization*", which seems to be borrowed from industry, is not likely to work smoothly. When scientific problems appear, the leadership is justified if the leader is an expert of the field, and his authority is accepted if he/she is authoritative, and is refused if he/she is authoritarian. I think that we should not ignore this human side of science.

  → The major skill of a project coordinator or a team leader is to make people work together. They need to be able to listen to an expert, while having in mind the global picture of the needs for the detector work. If this is not the case, the coordinators should be helped or be replaced. This is the way similar scientific collaborations of the size and the complexity of Virgo are functioning and Virgo could benefit from subscribing to such a collaborative culture. In the described organisation, the members of the EB are there because of their expertise. Although the proposal is to have a clearer chain of decisions and responsibilities, the EB members are not imagined as authoritarian figures.

- We invite you to consider that the proposed structure seems too rigid to accommodate the multiplicity and diversity of the IT needs and tasks rooted at the Cascina site. At least a separation in "Infrastructures" and "projects" should better reflect the different workflows because we see no gain in turning into an ever-lasting project that fits naturally in a functional paradigm.
  Briefly, we think that:
  - the best organization to manage the global IT infrastructure at Cascina is more a functional structure like a local department rather than a Virgo TT ;
    - a Virgo TT for computing is useful for those tasks that are geographically distributed (see for example the Rucio-based data transfer) ;
    - projects or Virgo TTs, where useful for the development of an infrastructure, should be spawned and controlled by the infrastructure organization, i.e. the matrix in this case should be "weak" instead of "strong"

Conversely a different matrix "weight" could be discussed for the Virgo off-line or off-site computing where currently there are only few elements that can be considered a common infrastructure requiring a functional approach.

→ The overarching goal is to operate and exploit the Virgo detector to its best level: the technical teams, as functional entities, are therefore organised to allow the projects to operate, commission and upgrade the detector. It seems that this is true for IT as for any other area.

- It is our heartfelt conviction that the strong matrix approach proposed for adoption, although not wrong of itself, has extremely limited application in an environment such as Virgo, to the point where it becomes more a hindrance than a real advantage. It is very difficult to imagine External Labs willingly lending their human resources to Technical Teams over which they have no control. The Technical Teams themselves then seem to be artificial and alien to the work process and flow, both in themselves and, even more so, when considered in relation to the EGO internal structure. Moreover the decision chain is not clear, considering a matrix where both the Project Managers and the Technical Teams coexist.

  → The EGO Council considered that the current organisation is not well functioning, and therefore a new organisation is proposed, that allows the projects to make the detector running with the specifications required. In the international, multi-institutional structure of VirgoLab, the External Labs will not simply “lend their resources”, but have commitments specified through MoAs and the annual resource review. It is a challenge to make such a matrix organisation work with a distributed lab, but it is done elsewhere and it is possible to be efficient and successful, if the collaborations are based on competence, communication and a commitment to the overarching goal of having Virgo running at its best.

1.2.d Role of scientists in hierarchical structures

- Scientists are not workers under a boss. We tried that, it leads to underperformance, loss of motivation, personal struggles and project failures.
- Should a scientist from a University or Research institute join the VIrgoLab to be considered available manpower? Is this a right way to incentivize experimentalists to join the work on detectors? An experimental physicist would like to do detector science not only be qualified manpower. This is true even and more for young people and PhD students. Where is Detector Science? It is leveled to the Infrastructure. It seems - as the name suggests - that people inside will be more technician than scientists.

  → Scientists need adequate room for creativity, yet any complex endeavour needs organisation. Scientific collaborations are generally not led by mindless people, managing their area of responsibility from an isolated office with an excel sheet and a stick. The technical teams are not there for people to become executives without any opinion and vision, but to broaden the vision on the various areas and to strengthen the collaborative effort.

1.3 Resources

1.3.a Transfer of the equipment property

- A particularly sore point is represented by the transfer of property (ownership) of equipment to EGO. The management of said equipment after integration, as described in the document, is fuzzy and it is unclear how the responsibility “of the groups who have contributed to the equipment” can be maintained to a degree that their investment in ensuring unwavering commitment over a period of many years is guaranteed.
- ‘’*The property of instrumental equipment … contributed to the equipment.*’’: External laboratories may face challenges due to vague responsibility allocation for equipment maintenance, repairs, and malfunction handling. A key question arises: who is responsible for addressing issues with installed equipment—the External labs that developed it, or EGO as the legal owner?

  → The transfer of property is a procedure applied in LIGO for equipment being provided to a detector site such that the host laboratory can have the full legal responsibility for the equipment, the equipment being considered as part of a collaborative effort and in case of a group not participating any longer in a collaboration, to prevent the equipment to be removed and the functioning of the instrument to be put in danger. The transfer of property does not mean that the experts and the constructors of the equipment are not taking care of the equipment as part of their collaborative contribution once the equipment has been delivered. They should also ensure the availability of documentation and the training of non-experts to be able to operate the equipment. The paragraph has been modified to be more clear.

1.3.b Resources in External Labs

- Who controls and manages the resources going to the External Labs? Can these funds be moved from one Lab to another by the EB if there is a shortfall in one area that has higher priority? The text states “The contributions of External Labs to VirgoLab are initially defined by a Memorandum of Agreement (MoA) between EGO and their home institution or funding agencies.” But it does not mention who manages and allocates these funds to what is required to run Virgo.
  What is the expected fraction of the VirgoLab operational budget that does not go directly to EGO?
  Perhaps also include Human Resources?

  → Resources in an External Lab, both financial and human, are managed by the External Lab. The MoA and the annual resource review may allocate resources to an External Lab or mention resources in an External Lab provided to VirgoLab. However, these resources are under the responsibility of the External Lab. In case, resource allocations should be changed in between the annual resources reviews, the EB and the concerned PIs have to agree on the modifications.
  The fraction of operational budget allocated to External Labs should not be very different from what is currently in place.
  Human Resources should also be considered in the MoAs and the annual review procedure.

1.3.c Memorandum of Agreements

- “*The contributions of External Labs to VirgoLab are initially defined by a Memorandum of Agreement (MoA) between EGO and their home institution or funding agencies.*”

These MoAs are the "legal" backbone of VirgoLab. A process needs to be put in place (maybe not now, but soon) that monitors, revises and updates the MoAs on a regular basis (every 2 years?).

→ The proposal would be to define a rather generic MoA rather stable in time, but to update the resources provided and given to each lab in the annual resource review procedure. This procedure should produce a document with the commitments and the pledges of each partner specified. This would circumvent a cumbersome procedure to update the MoA on short time scales and to monitor and allocate the resources in a more flexible manner according to the needs of the experiment.

- The document proposes a Memorandum of Agreement (MoA) between EGO and external laboratories as a mechanism for resource control. However, past experience suggests this is unlikely to succeed. For instance, the MoA for AdV+ was never finalized, primarily because laboratory directors could not assume direct responsibility for hardware commitments that ultimately depend on autonomous research groups. These groups retain the freedom to determine their scientific priorities. As long as the main competences on the detector, the ability to pursue R&D and realization of hardware remain concentrated in the laboratories, implementing a robust matrix approach appears challenging.

  → The MoAs and the annual resource review documents will be signed and agreed upon with the Oversight Organisations of the External Labs and EGO. There will be fewer documents, but with a stronger engagement of the partners. These procedures include naturally the PIs of the various research groups when an oversight organisation is signing a commitment. Research groups are free to choose their research topics, however the Oversight Organisations are evaluating the performance of these groups and determining their resources related to a project as Virgo.

- In the document, the responsibility of the laboratories (External Labs and EGO) is not clearly stated. Instead, it is stated, for example, that « *VirgoLab consists of personnel from EGO and the participating Virgo laboratories [...]* », or that « *The MoAs between EGO and the External Labs will specify the relation between EGO and the people from the External Labs contributing to VirgoLab* ». Instead, the contributions in the MoAs must rely on the External Labs, and not on personnel. Then, the External Labs are committed to find the human resources, and if needed the financial resources, to make the contribution they committed to. In the case of personnel stopping its activity in the External Lab (changing scientific topics, changing lab, retirement, …), it is a charge of the External Lab to look for resources to fulfill their commitment, or if not possible, to warn as soon as possible the VirgoLab about their issues with their commitment to discuss solutions at a higher level. But this implies that the commitments are made with the External Labs, instead of individual commitments as stated in the document. Also, the yearly review of all groups should allow the VirgoLab to realise if some specific areas need reinforcement.

  → The MoA will be signed between legal entities, which means EGO and the Oversight Organisations of the External Labs. It is the responsibility and common practice of the oversight organisation, that the PIs of the ExternalLabs are associated with this process. In case of difficulties, the PIs should be in touch with their oversight

organisation to find the adequate solutions. The sentences cited in the comment have been modified for clarity.

- Has the group in the MoA to declare the expertise present inside and assure that it can be available according to needs? Moreover in the case of an experimental scientist with expertise in a field that EGO personnel have not, how can the TTs assure the 'standards' and the appropriate training? This should be on the shoulder of the External Lab. In which way?

  → The MoA will specify in a similar way than now the groups involved in the various External Labs and the areas in which they will contribute. The resources specified in the annual resource review will be related to areas of activities, deliverables and goals to achieve. The Technical Teams are not EGO-only but are a joint VirgoLab effort, they can elaborate standards with the concerned groups participating in their elaboration and propose training sessions. For some training, it is EGO that imposes the necessary training to be on site and carry out specific actions.

- ''The MoAs between EGO and the External Labs will specify the relation between EGO and the people from the External Labs contributing to VirgoLab.'' To better understand what the groups will commit to, and in connection with comment on Section 2.2 VirgoLab Technical Teams (first bullet), it would be extremely informative to have an example of the MoA between EGO and the External Labs.

  → The protoEB is working on this point.

2. Organisational structure of VirgoLab

2.a Deputy and on-site/off-site presence

- Written in this way, it leaves the ambiguity of the Deputy constantly onsite with no decision power, and the Coordinator always offsite with full participation in management (EB for starters). There is some sort of clarification later when it is stated that the EB members should be present onsite a few days per week, but the presence of the deputy still gives freedom to delegate or report on behalf.
- "*Project Coordinators and technical Team Leaders…*": What if PCs or TTLs do not want or need a deputy? Why should they be required to be on-site when the majority of VirgoLab members are off-site?

  → The VirgoLab has to be a collaborative endeavour, and for Project Coordinators and Technical Team Leaders to work with a deputy, is already a first step to a collaborative spirit and culture. Deputies can share responsibilities and work burden, complete expertise, be a privileged person to reflect on decisions to be taken, prepare successions, step in in case of an impediment. About the needed presence on site, the protoEB is looking into the details.

- The duties of PCs vary significantly, as do the needs of different projects, both relative to one another and across the various phases of the project itself (see also the comment on section 3.1.2 Executive board Composition, page 6).

→ This is correct, but not within the scope of the Organisation Proposal, and will be worked out by the protoEB/EB.

2.1 VirgoLab Projects (Project structure)

2.1.a Scope and definition of detector operations/detector commissioning

- It changes the scope of the "*Detector Operations*" and "*Detector Commissioning*" compared to what is the current definition.
  The detector maintenance and on-call response has been moved from commissioning to operation. This can make sense, but it does make the scope of the *"Detector Operation*" larger and increases the load of unexciting issues. I think that can be a good change, but may make finding candidates to manage detector operation harder. *"Detector commissioning"* always discovers flaws in design or implementation that require retro-fits or minor upgrades. It would be good to mention minor upgrades as part of the detector commissioning project.
- (first paragraph): there is some superposition between Operations and Commissioning: it is not clear what Operations is, if only Science Runs or more, as it *includes* the "*production of calibrated, high-quality strain data [*.]", but not exclusively.

  → The scope and the boundaries of the different projects are worked out currently by the protoEB: the original proposal was meant to reflect the current status with minimal changes. Naturally, the Project Organisation may change over time as experience is gained and as the detector is evolving and changes may be implemented by the EB.

- Among the projects, we think that one more project is needed, for long term operation and maintenance of the detector. While the current projects seem to be only about upgrade, commissioning and operation during observation periods.

  → Long term operation and maintenance should be an entire part of *"Detector Operations",* with the EB being in charge to have a long-term vision for the detector. Details are currently worked out by the protoEB.

2.1.b Scope of and organisation of detector upgrades

- What does "*at large*" mean? Means that a group develops and R&D and then this will be evaluated to be included or not in the project once it will be mature and the baseline will be defined? In meantime people that work on the R&D can be considered included or not in the project? And if not, and the group has to develop R&D without support of the VIrgoLab, once reached the maturity (readiness means scientific evidence that implies even publication, that can be published without the collaboration approval, having the group developed in autonomy the R&D), which will be the interest and the real advantage to be included in the VirgolAb after and to work on detector.

  → *"At large"* means that some long-term developments may be done by individual research groups within LVK/IGWN. However, this is a relevant point and currently under discussion in the protoEB, introducing or not an additional project for long-term upgrades of the detector. For this reason "at large" has been removed from the text. In any case, all groups are welcome to discuss R&D developments in the Technical Teams.

- "*Innovative long-term R&D is carried out in the scientific collaboration at large and becomes part of the Detector Upgrades project depending on its readiness level (e.g., as soon as the baseline design is being established).*" Will there be coordination of experimental activities external to VirgoLab, and who will be responsible for it? Groups and individuals involved in R&D would find themselves at the boundary of VirgoLab, entering or exiting depending on the readiness of their work. This situation risks diverting significant workforce towards ET, relegating Virgo to the role of a detector crystallized around the urgency of the present, with little hope of playing a significant role in the coming decades as we await the third generation.
- "*Innovative long-term R&D…*": While we agree with the idea that long-term R&D should be managed by the collaboration, it seems necessary to introduce another permanent project focused on the preparatory phase for upgrades beyond the current one. For example, the Upgrade Coordinator manages the O5 Project, while a Next Upgrade Coordinator would oversee the preparatory phase for O6 (see also the comment on section 3.1.2 EB Composition).

  → Indeed, this relevant point is currently under discussion in the protoEB and the relevant sentence has been modified. The incentive to contribute to VirgoLab is to contribute to the detectors and the physics of Gravitational Waves now compared to the next generation projects that may become reality in 10-15 years. VirgoLab allows to gain expertise and know-how, new technologies that may serve for ET can in some cases be used and tested with the Virgo detector. In the context of VirgoLab and IGWN, we agree that the issue of supporting an experimental European community is important and needs the attention of the Oversight Organisations.

2.1.c Definition of Project Managers

- "*Each of these projects will be led by a Project Coordinator (i.e., Project Manager). The Project Coordinator will manage all aspects of the project, from planning and resource allocation to execution and delivery. These projects require collaboration across the VirgoLab Technical Teams, leveraging expertise and resources from each. The Project Coordinators will direct personnel on tasks related to project deliverables, deadlines, and milestones, in agreement with the MoA with the concerned External Labs. Personnel participating in a project will report to their Project Coordinator for project-specific work.*": The role of the PMs is quite large: the fact that a PM can steer directly people in or out of tasks is extremely dangerous, as this bypasses Groups, SSs and TTs: it can lead to a complete expulsion of someone from a Project because "reasons", leading such person possibly out of the VirgoLab itself or rescoping completely their career. The MoAs (which we have no detail about at all) cannot prevent this if they are not extremely granular, which hardly looks the case. **This is one of many places where protections and safeguards have not been thought of**.

  → This comment seems to reflect an experience that indicates a necessary change in collaborative culture and management practices. The action of a Project Coordinator should be based on competence and collaboration, else Virgo will fail. If someone is treated in an inappropriate manner, the first person to discuss with is the PI of their group, who should then take up the matter to the relevant instances (VirgoLab management, oversight organisation, EGO Council…). As it can happen that someone

has to be removed from a task, the matter should be treated in consultation with the PI in a respectful and appropriate manner. (see also answer below)

- The fact that the people report directly to the PMs bypassing SSs and TTs is not healthy from a scientific and working point of view, as it breaks the chain of responsibility, accountability and trust: something like that was already attempted in a previous project, but apparently *we did not learn any lesson*.

  → For each project, the Project Coordinator will have to set up an internal structure, with different groups coordinated by convenors, group leaders etc. Therefore the Project Coordinator acts within a structure carrying forward the reporting from one level to another: it seems obvious that not all members of a project report directly to the Project Coordinator, but that the Project Coordinator should be informed of all relevant and major activities in the project, such to be able to endorse the final responsibility for a project. The text has been modified to clarifying this point.

2.1.d Appointment of Project Managers

- "*The Project Coordinators are appointed for a renewable fixed term (in line with the term of the EGO director). If a change should become necessary during the mandate of the EGO Director, the EGO Director will present the change to the Board of PIs and will seek approval from the EGO Council*": This is one of too many things where the Director has total and complete arbitrary power. Having the PCs synced with the Director will lead to a "spoil system", which naturally leads to a system where personal trust and loyalty overcome qualification and expertise. Every new Director will shape the PCs (and the EB, see later on) to their own idea, possibly making every transition very difficult, long and cumbersome, with significant downtime and frictions during the change.
- "*The Project Coordinators are appointed for a renewable fixed term (in line with the term of the EGO director)*".
- Inconsistency also seems to characterize the role of the Upgrade Coordinator. If, as stated, the mandate for the position ends at the same time as that of the EGO Director, it appears as though the role is not linked to the completion of the Project. Is this really what the proposal wants to accomplish?

  → It is practice in many organisations (not only scientific ones), that an incoming director is reviewing the management level they are working with. In case of VirgoLab, this means that the EGO Director can consider the Project Coordinators in order to ensure to work coherently with them. As it is currently foreseen to have an overlap period of about 6 months between the incoming and the outgoing EGO director, this time should allow for changes in the management without being disruptive. It looks healthy to us, that there are at least some decision points, where the Project Coordinators in place are regularly reconsidered and they themselves can consider if they would like to continue or not: Project Coordinators can be renewed or can be changed, within the process of a new EGO director taking office. Any personnel decision should, as indicated in the document, be part of a consultation process and discussions with the various stakeholders. Concerning the EB, the EGO director has the authority to pick 3 people, whereas 3 other people are designated by other bodies.

2.2 VirgoLab Technical Teams (Functional Structure)

2.2.a Purpose and definition of Technical Teams and role of Subsystems

- The main point being that the need/functionality of the Technical Teams are not understood

  → Currently technical activities are either part of Subsystems or taken over by EGO departments. This organisation does not favour exchanges on common technical aspects transverse to different Subsystems (e.g. photodiodes, power supplies, electronics development, control software….) The Technical Teams are meant to favour the discussion, exchange and coordination to adopt technical solutions that are efficient, sustainable and used by more than one Subsystem. The protoEB is working on a precise definition of TTs.

- The statement that "*(TTs) organize... all technical activities related to the Virgo interferometer*" is too vague. What are their specific prerogatives and limits of action? How do they coordinate with the "technical" activities already embedded in the Projects?

  → The sentence has been changed into : *“The Technical Teams coordinate and support technical activities driven by the needs of the projects”. T*he scope of this is to encourage different people and groups with a technical expertise to work together to optimise resources in the interest of the project. If for example a technology has to be chosen for a project: the projects would ask the relevant TT to come up with a sustainable, efficient solution according to the specifications and in line with systems used for other subsystems. After discussion among the experts, the TT proposes a solution to the project, which would be supported and would involve the different proponents. If the project validates, it will be implemented, else the reservations of the project concerning the solution proposed will be addressed by the TT.

- It is unclear what the different technical teams are. Is it the list that is shown, or is a different list that needs to be created. Without having a better idea of what the technical teams actually are it is hard to understand what is really the proposed organization.
- “*While VirgoLab operates within the broader EGO structure, the VirgoLab TTs do not coincide with the established EGO departments and operate independently of the existing EGO departments, as they are distributed, cross-institutional teams, integrating personnel from EGO and from External Labs. This separation ensures that EGO’s standard organisational structure continues to play a key role in the VirgoLab activities, while enabling VirgoLab to draw on a wide range of expertise from across all External Labs in a flexible, project-oriented manner. Like External Labs, EGO can participate in other projects (e.g. ET activities), besides VirgoLab, with contribution from the EGO departments.*” This is delicate. It will take some "fine-tuning" at the beginning to find the right boundaries between EGO departments and VirgoLab TTs. The EB needs to make sure that TTs are appropriately staffed and lead by a balance of EGO staff and external lab personnel.

  → The Technical Teams are about to be defined by the protoEB. Technical Teams are not EGO departments, as they include people working at EGO and at External Labs.

Tuning may indeed be necessary as experience will be gained with a proposed structure.

- *"The Technical Teams will be proposed in detail by the Executive Board.*" What does it mean? That at every change of the EB this will be re-defined? Will this be defined only once and for all, having the first VirgoLab Director shaping it for years to come?

  → The Technical Teams are in the process to be designed by the protoEB. In principle the structure should be rather stable, but can be updated and tuned whenever necessary and in particular after some first experience has been gained.

- Also, the interaction of the Technical Teams with the Subsystems is not clear at all, as no definition of Subsystem is ever given in the document.
- (second paragraph): No clear definition of TTs; no definition at all of Subsystems, and no clear explanation how the two will interact with the EGO organisation.
- It seems quite evident that the actual Subsystems will be part of the TTs. They cannot all be under "interferometer technology", as it will make a much too heavy TT. So it should be written clearly: Add after the bullet points: "The actual Subsystems should be part of the TTs".

  → In the proposed organisation, the Subsystems are part of the projects and not as an explicit structure of the Technical Teams. Therefore, the Subsystems are defined within the projects and even though they are not supposed to be changed now, they can change over time. As part of a project, the Subsystems interact through the projects with EGO.

- How VirgoLab Technical Team (TT) about computing is related with the EGO IT Department mission;

  → The EGO IT Departments, as any other group concerned with this topic, will contribute to the relevant Technical Team, taking into account the needs of the projects.

- Are all VirgoLab members expected to be part of the TTs? If not, defining the TTs—specifically, setting clear boundaries—can be very challenging. If all VirgoLab members are included, we recommend using a different name for these teams to avoid suggesting that VirgoLab members contribute only technical expertise rather than wider scientific input.

  → It is our broad understanding that all VirgoLab members should be in one (or more) TT. Concerning the naming: we are open to propositions.

2.2.b Functioning of Technical Teams with External Labs

- Relation between the TechTeam Management and the External Labs: The team leader will have to manage a number of team members from different home institutions. It is not clear from the document what authority the team leader has on the team members. The document says : the team leader "*coordinates the functional expertise and resources of the team*". How is this done in practice ? How do the home institutions interface in this coordination process (which may lead to changes of resource

allocation, redirection of the team member missions)? I think this interface should appear in Fig 1.

→ Following the comments, we further discussed our vision of the Technical Teams: International scientific collaborations are generally based on working groups with participants from various laboratories and the Technical Teams should work in a similar way. They are meant as long-lasting structures overarching the Subsystems and underpinning the Projects. Projects may reorganise the way they are structured in Subsystems, but this would not impact the technical teams. E.g. : as squeezing has been adopted by a project, a technical team for optics will continue to exist, but acquire and share the relevant expertise with all participants. The Technical Team Leaders are coordinating and leading the group, they are not exercising any legal authority as in any international, scientific working group. In case of questions or concerns, the Team Leader should be in contact with the PI.

- From the description in the previous and other parts, the TTs appear as technical expertise 'collectors'. It seems that the experimentalists from External Labs will join the TTs in a way that according to the needs they can be addressed on the project task (not clear who addresses who, if Project M or TT leaders). Example: a person that has a scientific interest on Quantum Noise reduction will join the ITF Tech TT, but having expertise on optics, can be addressed on other optical task, according with the needed, (The flexibility in the personnel addressing is one of the advantage of the 'Strong Matrix' organization)
- There are doubts and questions around these technical teams and their role. One of the open points concerns the possibility that VirgoLab members may be assigned by the TT leaders to tasks outside their research interests or responsibilities. The comments we heard concern ethical issues (the freedom of the researcher, who could be deprived from the autonomy of their choices), and the impact that this project-needs-fixing approach might have on their CVs and careers, which are typically and hopefully built following a fil rouge of internal consistency. Given these premises, it would be very healthy for the Collaboration if a clarification of the modus operandi of these TTs could be given.

  → For example: a task is defined by the Project Management and discussed with the relevant TT to find the person who can take it over. If this person and their PI agrees, the person can fulfil the task, else the Project Coordinator and the TT Leader will try to find someone else, as in any multi-institutional collaboration. The idea is not to forcefully move personpower around, but to give the system a way to ensure needed and available resources are identified for key activities. The key activities are defined by the needs of the Projects. A coordinated effort should also help to prevent a strong disequilibrium on "fancy tasks".

2.2.c Role of TeamLeaders

- *Each member of a VirgoLab TT will report to their Team Leader on their activities and for their technical development and skill training.* – "Reporting" needs clarification. In general, the respective roles of Team Leaders, Heads of Projects are not clear.
- "*Each member of a VirgoLab TT will report to their Team Leader on their activities":* If a member of the TT is also part of a Subsystem within the project(s), they should report

to the SS manager as well. Who is responsible for certifying the actual work completed—the Team Leader or the SS manager? Moreover, how should possible *disagreements be resolved?*

→ "Reporting" means that a TT Leader should be aware of all major activities within the TT they are responsible for. All activities in a TT are associated with a project and it is the need of the projects that drives the activities in the TTs. As a consequence, after discussion and exchanges, it is ultimately the project decision that prevails and it is always the responsibility of the project to certify if the work was completed (e.g. the 2024 reviews and the validation of the reports). The Projects themselves are typically organised along Subsystems.
The sentence has been changed into: *VirgoLab members participating in a TT will report through the structure of the TT on their activities and for their technical development and skill training.*

- (seventh paragraph : *Each VirgoLab TT is headed by a Team Leader who will coordinate the functional expertise and resources of the team. The Team Leaders ensure that the defined workmanship standards are applied in all projects. The Team Leaders will also be responsible, in collaboration with the home institution or EGO departments, for appropriate training and competence development of its members. Team Leaders are particularly in charge to ensure all means that allow members of the External Labs to contribute efficiently. The VirgoLab Team Leaders are appointed by the EB*.): This is (luckily) in partial conflict with the statement commented in point 6. (Comments from DB: The role of the PMs is quite large: the fact that a PM can steer directly people in or out of tasks is extremely dangerous, as this bypasses Groups, SSs and TTs: it can lead to a complete expulsion of someone from a Project because "reasons", leading such person possibly out of the VirgoLab itself or rescoping completely their career.) However it still looks like that the TLs will only manage, up to some extent, whatever the PC decides to assign them.

  → Indeed, VirgoLab is based on projects, and TTs work on activities that are relevant for the projects. This is different from "whatever the PC decides to assign them", as projects are decided and prioritized by the VirgLab Executive Board and as any project has an internal structure with work-packages, subsystems etc. Therefore Project Coordinators can not take arbitrary decisions by themselves, but are linked to the structures inside the project. However, it is mandatory to ensure a culture of competence and respect. Proposed tasks should be considered by the members of VirgoLab involving their PI in the decision making process.

2.2.d Appointment of Team Leaders by the EB

- The TLs are appointed by the EB (as everything and everyone), but the mandate is not clear, nor is its duration. Do they cycle in sync with the Director (and half the EB), increasing even more this spoil system
- Additionally, this is the first of many issues about the EB deciding on "low-level" scientific matters, which gives the idea that **everything below the EB are just workers**, with little consideration to the status of scientists of many of the people supposedly working in (for?) VirgoLab. This is particularly bad for EGO personnel, as

the Director will also have contractual power over them, which is a disparity with others and will cause even more friction and de-motivation.

- In many cases there will be one dominant lab leading one TT. It seems therefore normal that the TT leaders are proposed by the labs. We propose to change to : “The VirgoLab team leaders are proposed by the board of PIs to the EB.”

  → We discussed this point and understand the logic of having the TTL proposed by the EB and ratified by the Board of PIs. The term of the TTLs should be fixed (3 years?).

2.2.e Role of EGO in projects outside VirgoLab

- *Like External Labs, EGO can participate in other projects (e.g. ET activities), besides VirgoLab, with contribution from the EGO departments.* – Redundant, does not belong here

  → We agree, the sentence was removed.

3. Governance bodies

3.1 Executive board

3.1.1. Key responsibilities

3.1.1.a Scope of the EB

- (preamble): VirgoLab has ONE high-level governance body: the EB. The other two are merely consultants or scouts for people and money. No governance in the TC and the BPIs is present. In particular: it is not said down to which level the EB can make technical decisions; the demeanor of the document is "to all levels", making PCs or TTs at a time too powerful downstream and irrelevant upstream. This looks similar to what was already tried in the past, just much more, and it was something we had to fix, not increase. It is part of what went wrong.
- First bullet point: "*all decisions*": down to what level? It is not clear, so arbitrariness is open. It is also not clear if the majority of the EB can overcome the opinion of one Coordinator on *their* matters of expertise, making them (as other figures) very bossy downstream but very weak upstream, as the Director decides it all. This is one of many places where no safety measures have been thought or put in place. Fourth bullet point: again, too specific oversight from the EB down to the single piece of hardware. There should be PC, TTs, SSMs and others to supervise. What is their role at this point?
- “*Maintenance*", "*operation*" and *"performance monitoring*" of hardware equipment look too technical to be managed directly by the EB; they should be directly managed by PMs or TTs, or Local Experts being a link between VirgoLab and the laboratories

  → The organisational proposal is only concentrating on the high-level governance body of VirgoLab, but not on the fine structure of the organisation that those bodies should put in place. As such, the EB is the high-level management body and has therefore the ultimate responsibility for the functioning of the detector. However, the EB is based on an organisational structure within the projects and the technical teams

that will act with some autonomy and not directly manage all aspects of the activities within VirgoLab. The reporting lines in place should allow the EB to be aware of any major difficulty that could endanger the proper functioning of the detector and put in place the resources needed to solve or mitigate the problem. In its decision-making the EB will be based on the whole structure put in place for the organisation of VirgoLab and strives for consensus and the EGO DG only has the last word, if no consensus can be reached.
Taking into account comments made about the leadership of the technical teams, we propose to have the TT Leaders be proposed by the EB and ratified by the BPIs.
In case of major difficulties with the management in place and its decision, bodies like Council, or the Council Committees in place (STAC, AFC) as well as the recommended Programme Officer should take the appropriate action.

3.1.1.b Responsibility over resources

- EB responsibilities include Resource Loading. Relevant to my previous questions: it reads here as though the EB also controls resources from External Labs if they are necessary to reach the best performance?

  → The EB has no control of the resources in the External Labs and resources within the External Labs or allocated to the External Labs are under the entire responsibility of the External Labs. The EB is in place, to ensure that all the resources needed are covered, either by contributions from the External Labs or by using the resources of the common fund. The EB is also in charge of monitoring the use of the resources and the delivery of contributions. This monitoring, as well as the establishing the needs of VirgoLab in the upcoming year, is part of the annual resource review process. If the EB would suggest moving allocated resources from one External Lab to another, the PIs have to agree. The PIs should also inform the EB at the earliest, if pledged resources or deliverables can not be provided as foreseen in the annual resource review, in order to find an alternate solution.

3.1.2 Composition

3.1.2.a EB Composition

- The EB is composed by the Director, three people proposed by the Director, and one appointed by the EB itself. This is widely self-referential and a possible emanation of the Director, especially if there is some level of spoil system as the Coordinators' mandates are in sync with the Director's. From what I commented above, it is clear that there is a high risk of a spoil system, which defies continuity, proficiency and expertise replacing them with loyalty, compliance and opportunity. The Chair of the Board of PIs is largely irrelevant not having any decision power, and so looks the Spokesperson as well (no definition of them is present in the document). The Groups are relegated to talent scouts and money-seekers, all of which shall be donated to the EB to be used as deemed appropriate, with no oversight. Again, no safety measures.

  → Besides the EGO director and the project coordinators, the EB is composed of the Virgo Spokesperson (designated by the collaboration), the chair of the Board of PIs (designated by the BPIs) and the Chair of the technical committee. For this later one,

we propose to change and have this person being designated by the TTL (who are themselves proposed by the BPI). Besides the EGO director, there is an equilibrium in the number of persons appointed by the EGO director, and persons appointed by the members of VirgoLab or the scientific collaboration.

- The “Virgo Spokesperson” placekeeper box -- will this person be a regional (deputy) IGWN spokesperson, or the IGWN spokesperson?

  → Indeed, we would think that either the IGWN spokesperson, or the deputy in relation with Virgo would take up this position. It is currently under discussion in the relevant IGWN committees.

- *Upgrades coordinator*. – Role needs clarification in case more concurrent upgrades are ongoing. Maybe change the name (Detector Coordinator?). This role should be above the individual upgrade coordinators?
- IF the preparatory phase for the post-O5 upgrade is considered a project relevant to the mid-term future of Virgo, requiring a structured organization that spans across VirgoLab groups and is supported by centralized funds, it seems strange that the person responsible for ensuring the proper execution of this project is not part of the EB.

  → These questions are in the hands of the protoEB.

3.1.2.b On-site presence

- *“The members of the EB are on site…”*: Except for the Commissioning Coordinator, it is difficult to understand why the other Coordinators should be required to be on-site on a regular basis for a significant fraction of their time, especially considering that this is not the case at LIGO or KAGRA, and VirgoLab is an even more distributed organization with most of its members based off-site. While some presence at EGO is undoubtedly beneficial, mandating a minimum presence of typically a few days a week does not appear to have a well-founded justification.

  → These questions are in the hands of the protoEB.

- *The members of the EB are on site on a regular basis, typically a few days a week and more if the situation requires it*. – Local support and logistics must be ensured

  → Absolutely: for people being at EGO, support should be given by EGO. Recommendations about improving this support have been made by the “Organisational Review EGO/Virgo”. An additional sentence was introduced in section 1.3.

3.1.3 Meetings

3.1.3.a Meeting frequency

- Meeting once a week to discuss day-to-day operations is a contradiction in terms. I assume that also other people besides the Director can propose points to the agenda, but at this point I am not sure anymore.

→ The EGO director chairs the EB meetings and is therefore in charge of establishing the agenda of the meetings, taking into account, as in any committee, the propositions and suggestions of the committee members, including AOB as an open, standing agenda item. The EB should meet at least once a week, and more often if it is deemed necessary. Besides, the persons in the EB should interact with each other to handle any question or concerns that comes up.

3.1.4 Decision-Making

3.1.4.a Decision making process

- There is no safeguard against the Director considering the EB as a sort of consultant body, with no effective power. Consensus could mean "the whole EB", with the opposition of the Director. Who then dismisses the opinion of 7/8 of the EB. The first three lines are written as "flavor text", not as a policy.
- "*In the event that the EB cannot … the final authority*." Does this mean that if the EGO Director disagrees with a decision reached by the EB through discussion or a vote, he/she cannot overrule it? Or does the EGO Director retain the authority to impose a decision even if the rest of the EB or its majority disagrees?
- *“In the event that the EB cannot reach consensus on a particular issue and no decision by means of discussion, including votes, can be reached, the EGO Director has the final authority.* “ This is delicate. It will take some "fine-tuning" at the beginning to find the right boundaries between EGO departments and VirgoLab TTs. The EB needs to make sure that TTs are appropriately staffed and led by a balance of EGO staff and external lab personnel.

  → The EGO director has the ultimate responsibility for the Virgo detector, and should therefore also have the final authority. In the current proposal, we foresee that the EGO director would stick to any decision taken by majority vote and has only the final world, if no consensus is reachable. The general idea is that the EB works together through discussion to find the best possible solution and to agree on it, based on scientific and technical arguments. Vote and/or disagreements should only occur in exceptional circumstances and probably be discussed in various instances.

3.1.5 Reporting

3.1.5.a Information spread

- *"The members of the EB report the relevant decisions to the entities they are responsible for"*. This sentence is not clear at all; does it mean that the PCs report the decisions downstream? Or to the Group/Institution they belong to?

  → Indeed, the EB members should be in charge in reporting back to their constituencies: the Project coordinator will inform the project about any relevant decisions, the Chair of the Technical Committee will inform the TTLeaders, the Chair of the BPIs will inform the group leaders, who will inform the groups, the Virgo Spokesperson should inform the VirgoCollaboration and the EGO director, the EGO staff. The EB should centrally make minutes or decision points available to the Virgo Community.

3.2 Technical Committee

3.2.1. Key Responsibilities

3.2.1.a Role of TC

- The TC "*reviews*", "*recommends*", *"assesses*", "*advises*", *"ensures*"; no technical decision rests in the Technical Committee, which is counterintuitive; it looks like a consultant with very little utility. It is cited "Subsystem coordination", but the definition of SS is still missing in the document.

  → The feedback on the Subsystems was extremely helpful, and we situate the subsystems as part of the Projects, not of the Technical Committees. The TTs should elaborate and propose technical solutions, but it will be the final responsibility of the Project, and in case of major decisions, the EB and EGO Council to move forward with technical solutions. The protoEB is looking into the details.

- Subsystem Coordination: the term Subsystem is already defined in the context of the AdV+ project. What is a Subsystem in the context of TTs and how does it relate to the SS in the AdV+ project?

  → We removed the Subsystem Coordination as the Subsystems are part of the Project Organisation.

- For 1/, this seems to duplicate the internal and external reviews that are led by the EB. This needs to be clarified.

  → As it is the Projects and the Project Office who lead the internal and external reviews, we removed this point: the role of the TTs and the TC is to participate and support the reviews not to organise them.

- *"The TC ensures that technical challenges are addressed collaboratively and that resources are deployed effectively to meet project goals."* Based on this description, the tech committee appears to be an advisory and supervisory role. However, the TC is part of a decision process.

  → The TC bundles the vision and the expertise of the Technical Teams, who have an active role in proposing technical solutions. The chair of the TC conveys this vision to the EB and is entirely part of the consensus building and decision-making process.

3.2.2. Composition

3.2.1.a Appointment TC

- The TC chair is again appointed by the EB (3.2.2) and they have no real authority even on technical matters.

  → Taking into account the comments made, we changed the Organisation Proposal, such that the TT Leaders are proposed by the EB and ratified by the BPIs and the TC Chair is designated by the TTLs. The TTL is a member of the EB.

3.2.3 Meetings

3.2.3.a Meeting frequency

- The TC meets too rarely (3.2.3) to be effective, four times less than the EB. Currently, the SSMs meet once a week

  → Given its nature, we expect a monthly schedule to fit the purpose of the Technical Committee. As stated in the Organisation Proposal, meetings can be more often if deemed necessary.

3.2.4 Decision-Making

3.2.4.a Positioning TT decisions

- *"The TC also oversees the coordination among the VirgoLab TTs. In case no consensus can be reached, the TC Chair has the final authority".*
  It is not clear to me how this coordination is performed in practice.
  Has the TC precedence on the VirgoLab project managers on the decision regarding the human resource allocation?
  I think this should be clarified, and ideally materialized on Fig 1.

  → In the process of answering the comments, we conceptualized further the role of the Technical Teams, the Projects and the Subsystems. The Project will prevail over the TT in the decision-making. However it is the TT who will propose technical solutions being coherent among several Subsystems. The role of the TC, is therefore closer to one of coordination among different working groups and exchange between collaborators.

- The TC presents all possibilities to the EBs (3.2.4), watering down any priority, preference or consensus they made so that the EB (i.e. the Director) can have a different final word. In 3.2.5 are cited "decisions made by the TC" but actually there are none whatsoever
- same comment as for section 3.1.4, in this case referred to the TC chair: Does this mean that if the TC chair disagrees with a decision reached by the TC through discussion or a vote, he/she cannot overrule it?

  → The TC should report to the EB the discussions in the TTs to inform the decision-making process, not to water down any priority. If a priority is set by the TTs, the TT Chair should report it (together with a summary of the discussion leading to it). Only if no consensus is reached, the TT Chair decides on the priority, but still has to report the discussions within the TTs. The TT Chair will have to be able to convince the EB of their (the TC's) proposal.

  3.2.5 Reporting

3.3 Board of PIs

3.3.1. Key responsibilities

3.3.1.a Role of BPIs

- The Board of PIs is largely irrelevant in the Projects. This can lead to a (*additional*) detachment between groups and Projects, as Groups are only a provider of human and financial resources to be used by the Director.
- It is said that the Board of PIs should not "*interfere*" w*ith the operational chain of command"*. The use of the word "interfere" makes explicit the fact that the Groups are considered an external body who should just give away resources to VirgoLab; the impression is that we are borderline to utter contempt towards the Groups.

  → The review committee recommended decisions to be taken by an Executive Board with the relevant expertise, based on scientific and technical arguments. However, the chair of the Board of PIs is part of the Executive Board, and can convey the vision of the External Labs. The BPI also designates the TTLs (ratified by the EB), who designate the TC, member of the EB. Beyond, the EB is not acting in a vacuum: its members are mainly coming from External Labs. The members of the Projects and the TT are also mostly coming from ExternalLabs. We changed the wording in the proposal to make the role of the BPIs clearer, but while the BPIs has an oversight role, it is not an executive committee.

- Board of PIs responsibilities includes the following: While the Board of Virgo Lab PIs plays an important advisory role, it does not interfere with the operational chain of command. Does this answer my previous question as to what happens if elements of the operations budget have to be realigned and moved around?

  → see answer to comment in 3.1.1.b: Once allocated or pledged resources through the annual resource review process can only be moved around upon suggestion of the EB if the PIs agree. The PIs inform the EB at the earliest, if pledged resources or deliverables can not be provided as foreseen in the annual resource review.

- Shouldn't the board of PIs also be responsible to define and follow up the group responsibilities?
- Resource Review Process: … It reviews the resource requested for the upcoming year and liaises…". Can the Board of PIs change or propose changes to the request of resources?

  → The BPIs has a very active role in the annual resource review: for each External Lab the PIs needs to propose and agree on the resources that can be provided, in its ensemble the BPIs can comment and propose changes to the resource loading and has to endorse the proposal. The resource review procedure will be defined in further detail by the protoEB.

3.3.2. Composition

3.3.2.a Membership in the BPIs

- The role of national representatives has been clarified in the new Virgo bylaws. This role is important and must be addressed in the new VirgoLab organisation. We think it should be an invited member to the board of PIs, and a member of a financial and

resources committee of the VirgoLab, where they can bring to the committee the information about the personpower and financial resources in the laboratories of their country, and inform back to the laboratories about the needs and issues from the VirgoLab.

→ We fully agree: for countries having National representatives, who are not PIs, they can participate in the BPIs without voting rights. This has been added to the proposal.

- What subset of the current Virgo Collaboration PIs is expected to comprise the Board of PIs?
  Will all Board PIs be required to apply and be appointed from the beginning, or will there be a foundational group of PIs who automatically become the first Board of PIs?

  → The membership in VirgoLab is currently discussed in the collaboration and the Virgo Spokesperson will come up with a proposal. These groups will be invited to join VirgoLab, and if the PI and the Oversight Organisation agrees, the group will be included in the MoA. Groups who want to join later make a proposal to the BPIs and can join upon approval by the BPIs.

3.3.3 Meetings

3.3.4 Decision-Making

3.3.4.a Decisions in the BPIs

- There is no real decision-making from the BPIs, but the voting system for it is already drafted, while many other important aspects of decision-making are much more foggy in previous parts of the document. The BPIs meets 3-4 times a year, which marks even more the irrelevance of the Groups. In case, another full point (3.3.5) states this again. Then people talk all the time about "increasing attractiveness". Sure.

  → The BPIs has several responsibilities and to take decisions on several topics that are laid out in the document, e.g. new groups joining, TT leads, vote on the annual resource review, designation of a chair to be a member of the EB. However the executive power is with the EB. The 3-4 meetings per year was meant to be an indication, we have added “typically”. When the Virgolab will be functioning, the board of PIs can meet more often if needed and will have the freedom to find their best schedule and adjust the way of functioning.

3.3.5 Reporting

3.3.5.a Weight of External Labs

- *“While advisory in nature, the Board’s feedback is communicated to the EB through the Chair of PIs to ensure that the perspective of the External Labs is considered in strategic decisions. The board of VirgoLab PIs does not have decision-making authority over the operational activities of the VirgoLab.*” While the first part of the sentence seems coherent with the overall new organization, the second part has made us think: does having the power to provide resources not influence the operational activities of VirgoLab and, consequently, exert some form of authority?

→ Indeed, the External Labs have the power to provide resources and to participate in VirgoLab. Yet the BPIs will not e.g. vote on any operational decision, this will happen in the EB. As in many organisations, there is a separation between the executive power and the oversight bodies.

3.4 Other committees

- "*The STAC provides periodic reviews of the scientific and technical aspects of EGO to the EGO Council. With the creation of VirgoLab, which will be the major scientific and technical activity of EGO, the STAC should be mandated to review the performance of VirgoLab. The STAC should assess if VirgoLab meets the scientific and technical milestones and even if EGO Council is its primary recipient, the relevant findings will also be made available to the VirgoLab EB and the VirgoLab Board of PIs*." → I think the STAC role described here is OK. The STAC vs External Technical review Committee (ETRC) boundary needs to be defined by the council. The way I see it: STAC: general continuous ST advice on all VirgoLab matters.
- ETRC: Advice on particular specific technical matters (e.g. suspension for stable cavities, or particular design choices, technical problems, ...) on request from EB or STAC or council. The STAC meets regularly (2 per year) the ETRC when necessary. But all that is for the council to decide.

→ We agree. The AFC, STAC and ETRC are Council appointed committees and therefore it is for the Council to decide on their mandate.

4. Management Positions

4.1. EGO Director

4.1.a Appointment of new EGO-director

- The organizational structure relies on an EGO Director with significant decision-making authority and accountability. Effectively fulfilling such a role necessitates adequate control over resources—a condition that, under the current circumstances, appears hard to attain.

→ Many collaborations are operating large instruments and are organised in a similar manner. Even though being part in the same scientific organisation would simplify many aspects, VirgoLab has to operate in the current environment. However, the EGO director has direct authority over the EGO budget and the common funds as well as on the EGO personnel.

- This reform is therefore necessary. I believe it was conceived to solve this Gordian knot of responsibility:it assigns that responsibility to VirgoLab, which will take charge of the development of the VIRGO detector. The collaboration, along with its spokesperson, will definitively step out of the scene. However, this change must occur with clarity and should not create further processes of dilution: it must be clear that the figure of the old EGO director will no longer exist also. The "new" EGO director is the director of VirgoLab. Therefore, I believe it is essential that this deep change in the organisation and management of Virgo is synchronised with the transition from the

"old" to the "new" EGO director, meaning a clear redefinition of the profile required for this role, following the newly defined duties and responsibilities, as outlined in the proposal. If the VirgoLab change process is initiated without fully clarifying this point, there is a risk of creating a project lacking its main component: the clear definition of who, ultimately, holds responsibility for the detector. To put it bluntly, it must be clear from the very beginning whose head will be glorified in case of success or cut off in case of failure.

- The criticality of the profile of the future Virgo-lab Project Leader and the importance of hiring the first Project Leader before putting the Virgo-Lab organisation in operation

→ We understand this comment as referring to the EGO-director and we fully agree that the role of the EGO-director changes significantly with respect to their current role, which would make it reasonable to accompany the change in organisation with a new call for an EGO director. Yet this decision is not for the Implementation Committee to take, but belongs entirely to Council.

4.1.b EGO-director vs VirgoLab project leader

- We think that the Virgo-lab project leader and the EGO director should be two different persons, so we use the two names in the following paragraphs. The profile of the Virgo-lab project leader is VERY CRITICAL for the success of the Virgo-Lab. They need very high skills and competences, with knowledge in the GW domain. This will be mandatory for getting the necessary confidence from the members of the Virgo-lab, and for wisely selecting the coordinators of the Executive Board. The success of Virgo must be the main priority of the EGO Council when selecting the Virgo-lab project leader, leaving aside political matters that have existed in the past of EGO.
  We are also convinced that a single person, the EGO director as stated in the proposal, cannot manage both the Virgo-Lab AND the Virgo site. First, this represents an extremely high workload which looks too high for a single person. In addition, there are clear conflicts of interest between providing/prioritizing the resources to the External Labs and locally to EGO. Other examples of conflicts are between the Virgo-lab activities and other activities of EGO (long term R&D and E.T. for example). Having two different persons in these roles would help in raising and discussing such issues ; having a single person doing both roles will on the contrary hide them and be less transparent, both for the EGO Council and the VirgoLab.
  The document states that “the EGO director is particularly engaged in VirgoLab, which is the Director’s principal activity ; other responsibilities might be delegated to deputies (e.g. site management, non VirgoLab projects, …)”. If the EGO director is to be the VirgoLab project leader, we think that the document should clearly say that the other responsibilities, in particular the management of the site and of the local matter with the Italian administrations MUST be delegated to deputies.

- It seems too much for a single person to be responsible for the VirgoLab and for the whole of EGO activities. It is suggested that “other activities might be delegated to deputies”. We would make this statement stronger: “The EGO director will nominate one or several deputies who will be responsible for all the strictly EGO-related activities, like: site management, non VirgoLab activities, EGO group management “

- To begin with, we strongly believe that the EGO Director and the VirgoLab Director are two distinct, profoundly different roles and that they should therefore be attributed to two different people.
  If this division of roles is not implemented, we feel it is of the utmost importance that the document states unequivocally that the part the EGO scientific Group plays is not limited to its role in Virgo, but has a wider scope in the GW research framework.

  → The Organisational Review Committee recommended: *"The EGO Director is responsible for all activities at the EGO site and is the final authority for all decisions relating to the operation of the Virgo interferometer on site. He/she takes final responsibility for the success or failure of Virgo in meeting its operational and technological objectives."* The Organisational Review Committee came to this conclusion after discussions with many stakeholders and intensive discussions. This committee is in charge of implementing this recommendation.

  We modified the sentence in the proposal concerning Deputies to the EGO director, to "other responsibilities may be delegated" to leave the leverage to the EGO director for his preferred organisational scheme.

4.1.1. Key Responsibilities

4.1.1.a Authority of the EGO Director

- *"The EGO Director holds the primary executive authority of EGO as defined in the EGO statues. They are therefore responsible for all activities conducted at the EGO site, ensuring that the Virgo interferometer meets its operational and technological goals. The EGO Director plays a key role in overseeing the organisation's operations, ensuring the smooth execution of its scientific objectives, and liaising with external advisory bodies. As Chair of the VirgoLab EB, the EGO Director is particularly engaged in VirgoLab, which is the Director's principal activity; other responsibilities might be delegated to deputies (e.g site management, non-VirgoLab projects,...)."* This is full unconstrained power over the whole VirgoLab; this is the main case of lack of safety measures or power balancing. The fact that the Director would take full responsibility in case of failure is just a silver lining if Virgo fails. More elaboration of what this means are already in previous points. [second paragraph] It is cited a "Scientific Collaboration", but there is no definition of it (authors? VirgoLab participants?).

  → The EGO Director has the full responsibility for the functioning of Virgo and therefore the primary executive power. The EGO Director has to report to the EGO Council as the ultimate governance body and highest supervising authority. In the proposal, the oversight of the EGO Director by EGO Council is reinforced through the appointment of a Programme Officer. Besides, the External Advisory boards have an incumbent responsibility to assess the performance of VirgoLab and the EGO Director. Finally the EGO Director acts within the EB in close contact to technical and scientific experts. The PIs can report any difficulty in the BPIs or to the Council Delegates. So from our point of view, we agree that the role of the EGO Director changes, that with their responsibility comes also an increase of executive power. However, the EGO Director is not acting without any checks and balances.

- We see a subsequent potential issue with the amount of power the EGO Director has; there appears to be a complete lack of checks and balances. Rules should foster and have provisions for promotion of the pursuit of shared technical solutions, not unrestrained power. In our view even a simple majority could possibly be insufficient and a qualified one in the EB would better suit our working environment.
  A further clear asymmetry lies in the different level of authority the EGO Director would have in terms of power exerted over EGO personnel and members of the Virgo Collaboration Group.

  → The EB should first of all take decisions on a consensual basis, guided by the exchange of scientific and technical arguments and in depth discussions. The proto-EB is currently refining how the EB should be working, on a fair basis concerning decision taking and voting.

- *"In view of the organisation of VirgoLab…"*: does it mean that the EGO Director is also responsible for the success of the VirgoLab Projects? So the Coordinators are only executors with no responsibility? A definition of the boundaries between the responsibilities of the EGO director and of the Coordinators is missing and needed.

  → As in any collaborative structure, there are several levels of responsibility: the EGO director has the final responsibility for the Virgo interferometer; the Projects Coordinators are responsible for their portfolio, organised in various substructures. If something goes wrong (i.e. a project is failing, a part of a project is failing, etc), the consequences fall on the responsibilities on various levels.

- *"The EGO Director has the final authority on all decisions concerning the operation and maintenance of the Virgo interferometer. They take ultimate responsibility for the success or failure of Virgo's mission, ensuring that both operational and technological objectives are met*." Some fine tuning is needed
- *"They are therefore responsible for all activities conducted at the EGO site*": This is delicate. It will take some "fine-tuning" at the beginning to find the right boundaries between EGO departments and VirgoLab TTs. The EB needs to make sure that TTs are appropriately staffed and led by a balance of EGO staff and external lab personnel.

  → You are completely right, that there will be some fine tuning. In the process of responding to your comments, we further clarified our vision on the role of the TTs. We modified the involvement of the BPIs in the selection of the TT Chairs. Further details are worked out by the protoEB and fine tuning will certainly occur as the organisation progresses.

4.1.2 Mandate

4.1.3 Appointment

4.1.3.a EGO Director selection criteria

- *"Selection criteria include leadership capacities, management skills, and expertise in gravitational wave science and interferometry.*" agreed

  → Thank you, we agree as well, but the final authority lies with the EGO Council.

4.1.4 Reporting

4.2. EGO-Virgo Program Officer

4.2.a EGO-Virgo Program Officer

- EGO-Virgo Program Officer -- is this someone from one of the funding agencies?

  → The Program Officer has to be outside of EGO, VirgoLab and the Virgo Collaboration. He may be either from one of the EGO Council Members, or be completely independent, but work in close connection with EGO Council and the EGO Council President.

- *"Even though their responsibility is not only focused on VirgoLab*": Not clear. Does it mean that this person is also overseeing other projects (LISA, KM3nET, whatever...) or that he is overseeing VirgoLab and all of EGO?

  → Program Officer is not intended to be a full time activity, and as this person coming from outside, they will certainly have other activities.

4.2.1. Key Responsibilities

4.2.2 Mandate

4.2.3 Appointment

4.2.4 Reporting

5. Procedures

5.1 Resource Review Procedure

5.1.a Flexibility for resource allocation

- The resource allocation process, which is largely handled by the Executive Board, may also slow down or complicate access to essential tools and computational resources critical for data analysis. Lastly, the overall structure and procedural rigidity could limit the flexibility and efficiency of the analysis teams, ultimately affecting the productivity of critical data analysis work.

  → We fully understand worries concerning a rigid, mindless bureaucratie, that we all encounter from time to time. However, this is not the intention: the resource review procedure should allow to have an overall picture of the needs and the engagements and having a relatively accurate picture of the situation to allow for flexible responses, in case they are needed.

- The creation of the VirgoLab will further help this process by reducing its focus only on the activities and the laboratories of the VirgoLab, which will be less than the number of activities and laboratories in the Virgo Collaboration. Having less topics/people/labs to review, it could be useful to have yearly reviews, for a tighter monitoring, at the

VirgoLab level, of the laboratories MoA commitments, and tackle possible issues sooner.

- This will also permit, at the VirgoLab level, to clarify every year the needs, for example personnel needs in the sub-systems and in the laboratories, and then to set priorities for providing fellowships in the sub-systems and groups.

→ Thank you for these comments: this is indeed the purpose.

5.2 Selection procedure for the EGO Director

5.2.a EGO Director Search committee composition

- If the search committee is composed of only three members (e.g. Council representative and STAC chair, plus someone else), it means that the *majority* can be found all in people outside the Collaboration, outside EGO and outside VirgoLab. Under-representation of Groups and VirgoLab itself is a risk; from the proposed list of members, a minimum of 5 looks a more cautious number, to increase inclusiveness in the process of the search of the EGO Director.

→ After discussion, we removed any number and only indicated people that could be relevant to serve on a search committee. In addition, we specified that there should be at least one person outside the EGO/Virgo Community.

5.3 Process for the admission of new groups

5.4 Publication policy and process

5.4.a Technical Publications

- Taking the context at face value, I fail to see what else beyond detector related publications this can entail to, so the statement "*Any author of VirgoLab should be automatically entitled to sign the publications related to the data produced by VirgoLab for the Virgo or LVK**" catches me by surprise. [Bonus track: "LVK" is not defined :-)]

→ Indeed, VirgoLab would be in charge of detector related publications, yet the members of VirgoLab should sign the primary publications from the associated scientific collaboration, who analyse the Virgo Data.
LVK is defined in paragraph 1.1.

- The publication policy for short-authorlist papers looks quite stringent, with little possibility for it (they are called "exceptions" to begin with); "detector performance" is too vague (does it mean just h(t)?). This is a clear worsening over a situation that took a long time to the Virgo Editorial Board to update.

→ The corresponding section has been expanded to take into account all provisions currently made in the Virgo collaboration.

- "*The VirgoLab establishes an author list to be used for Virgo detector related publications*" Unclear. Who does this? The EB? The board of PIs: Not clear to me. I guess this does not mean scientific publications with the full LVK author list, but

"technical" publications that concern only Virgo, and more specifically VirgoLab. It is an important point to make clear that VirgoLab members can (and are expected to) carry out research on detector science and publish it. One of the main worries we found when at Cascina recently, concerning the re-organization, is that some people on site are worried about becoming simple "operators" with no research involved.

→ The BPIs is in charge of establishing the author list, possibly through an authorship committee. The question of which criteria are applied to be on the author list and who decided upon them has to be continued with the Implementation Committee and the protoEB.

- Furthermore, the publication policy does not appear to fully recognize the contributions of data analysts.

  → Any publication concerned with data analysis is managed by the scientific collaborations.

6. General comments

6.a. Case studies

- The document does not provide references and a case study to support the proposal in case of Virgo, including the evaluation of risk in the assuming similar structure and, a feasibility study that includes a realistic timeline of implementation and the funding needed.
- Moreover, the impact on the finalization of the Stable Cavities project has been considered? (again, missed the timeline and the risk)

  → EGO Council insisted on an organisational change, before the approval of the Stable Cavity project takes place.

6.b Transition to IGWN

- In general, it would be helpful for the transition from Virgo to VirgoLab+IGWN to be discussed from the beginning already in this document but if I understand correctly there are still too many uncertainties about IGWN so the IGWN part will come later... but in the meantime, how will the groups that are currently part of Virgo but would not be part of VirgoLab be configured? If there are already ideas about this it would not hurt to include them in this document or at least mention this possible limbo.

  → As the organisation of IGWN is still under debate, the current organisational proposal of VirgoLab can only be worked out with the existing collaboration scheme. However, to have a VirgoLab organisation in place, will allow the formation of the IGWN organisation taking into account VirgoLab.

- Timeline: VirgoLab or IGWN? It is not clear at all what is the motivation of its urgent implementation. There are evident reasons that would constrain the whole LVK to a cascade of organizational issues, both scientific and administrative, as most of the collaborators are not at all employed by the Lab.What is the motivation ? I have the impression that even in the LIGO community there is not a sufficiently wide consensus.

Even though in that case the impact may be to some extent smaller. And probably there isn't an actual pressure to share it. But I may be mistaken on the last sentence. The Virgo Council has the power and a sufficient weight to slow down the process or re-tune it on a more shared basis, if there are concrete reasons. The weight is related to the existence of Virgo Detector. I think we should not lose bargaining power. This might be the last occasion. There is no urgent reason in my opinion. Unless we are confident that such a revolution may help in providing value to Virgo detector. But I do not see any tiny evidence to infer that, through an urgent implementation of a new and never-tested-before organization (with several implications on most of the contribution by the Virgo collaborators through their institutions), the Virgo sensitivity understanding and improving would speed-up. And that seems indeed something urgent. On the contrary, a detrimental impact on the motivation of Virgo Contributors through their institutions may be expected. This is why I would simply postopone the decision, waiting for a more mature and wise reasoning. Noting and exploiting the good points of the Lab reorganization proposal, of course.

→ EGO Council has made clear that they would like to have an organisational change now. As the organisation of IGWN is under discussion, having some experience upfront with the implementation of VirgoLab would be beneficial.

Main points from discussion with IGWN committee (December 3rd)

- Experience from LIGO on the resistance of groups PIs to be represented by one LIGO lab director

  → Indeed.

- Need to define boundaries (what is in the labs what is outside)

  → Currently in the hands of the protoEB

- Discussion on representation, “double citizenship” – action item to think of it more

  → Should be part of the VirgoLab/IWGN DIscussions.

- Discussion on whether the EGO facilities and site aspects should be accounted for in the VirgoLab.

Replies to Nikhef Case studies:

Example 1: stable recycling cavity suspensions and Nikhef:
The Virgo Upgrade Coordinator recently informed us that, considering all the inputs he collected, he decided to choose the Nikhef solution for the implementation of the stable recycling cavity suspensions. This would be a huge challenge and a huge responsibility. It will not be possible for Nikhef, or any other group, to deliver (ie, design, assemble, commission, test and install on site) all the necessary suspensions: this should be shared work with other Virgo groups. With the implementation of the current proposal of the Virgo Lab we could not guarantee that the project will be successful: we can, maybe, guarantee that the single parts will work as expected, or we can, even, guarantee that there will be a better sensitivity, but not in a reasonable time (ie, too late). For illustrating purpose, we made a small exercise to look

at the different activities involved to get from the idea up to operation of stable recycling cavities and see how it would work according to the current reorganisation proposal (See table below). Looking at the table, the same people will set the requirements, make the design, build the parts and make the quality check: the same people are, basically, judging their own work.

→ Already with the current procedure in place, our view of the process would look as follows:
The Project Coordinator sets up the project structure.
Within the Detector Upgrade project, there is a Work-Package concerning the cavity suspensions.
This Work-Package has coordinated the input from different groups concerning the possible technologies for the suspensions.
Different propositions have been presented and have been discussed, including the necessary resources, the timeline of the suspension project, the interfaces with other sub-detectors, the risks involved etc. (this is typically the level of a CDR).
Finally, a review including external reviewers is organised by the Project Coordinator and evaluates the proposed solutions and makes a recommendation to the Project Coordinator..
The decision of the Project Coordinator is presented to the EB for final endorsement and reported to the Work Package.
The Work-Package is then organising the different tasks in order to move forward with this project, including different groups participating in the Work-Package and reaching out to the Technical Teams to discuss specific problems, that may even interest groups from out-side the Work Package to participate.
Once the whole project is mapped out, including design, assembly, commissioning, tests and installation, the Project Coordinator sets up a review including external reviewers (level of a TDR). In order to receive the final Production Readiness Approval an implementation plan is presented and reviewed.
The progress of the project is then monitored by the Project Office, which is also taken care of ensuring that the necessary documentation is provided and the connection with other subsystems is as expected.
The Project Office calls for regular reviews, the outcome of which are shared with the Work-Package and the EB, and if necessary, measures are taken to keep the project on track.
Adequate staffing of the Project Office is mandatory for this process to work efficiently and correctly.

Example 2: Optical Simulation and Design and Nikhef:
We pick this example because Nikhef is currently leading this subsystem (OSD), and Nikhef is the one of the few groups in the collaboration to actively develop the required software tools for this task. Some time ago we sent a proposal with an outline for necessary changes in OSD to the Virgo management, which included amongst other things the request for a more professional management of simulation tools and simulation results and addressing crucial gaps in the relevant expertise. The receipt of our document was acknowledged but no changes were implemented. We suspect the reason was that implementing our suggestions would have required significantly more person power by experts (several FTE as a rough guess). An important point related to this topic: we believe Virgo failed because of a mistake in the optical design (marginally stable cavities) and we are proposing a new expensive update (stable recycling cavities) to fix that. However as of today we cannot do the optical simulations to prove this. Looking at the reorganisation document, we don't see any effective change, just a renaming exercise of the management structures. Will the new organisation help us deliver optical designs or simulation support in a more professionally managed way so that upgrades can be successful and on time? We think not.

→ This is a very good example of the added value of Technical Teams: there should definitely be a "Simulation" Technical Team within a VirgoLab bringing together the people working on simulation in the different labs, scattered over different subsystems, generating pletore of solutions. This TT should also be reaching out to LIGO and KAGRA and in the future to IGWN,

for a coordinated effort and a common framework to have a full fetched simulation of the gravitational wave interferometer. Instead of a Technical Team, Simulation could also deserve to be a dedicated structure (project with dedicated resources, technical team).

An underlying question is how feedback on critical missing items can be brought up and discussed. It is clear that the EB is ultimately in charge of ensuring that a raised issue is taken care of. In principle there are two ways to bring an issue to the EB: either through the Project Coordinators or the Technical Team Leaders giving their assessment. Once such a topic is brought to the attention of the EB, the EB has to give a response. If the EB decides the topic has to be followed up, it should mandate either a TT or a Project to work out a proposal including the timeline, resources and risks, that could be reviewed. The EB would then take the decision if this project would go on or not, and if necessary and possible, add additional resources.

General remark:
We already provided detailed input at the beginning of this reorganisation process, which was based on the following:
a. Increase the EGO personnel and the know-how of it to have people able to set requirements and make the quality checks (first and last steps of the chain);
→ We don't have the power to hire people. But these personnel are not necessarily new, it can also be already people from the collaboration that acquire the necessary competences and engage in this task.
b. Project management should collect different solutions for the particular upgrade (more or less what happened for the stable recycling cavity suspensions);
→ Absolutely this should happen in the relevant Work-Packages and in link with the competent Technical Teams.
c. Sign a contract with the lab/institute that should deliver the components of the upgrade (with deadlines, penalties, etc);
→ Deliverables should be well defined in the MoA and the annual resource review procedure and where appropriate be organised as a collaborative effort between different groups, with reviews and quality controls, also from external experts, embedded in the project.
d. Experts at EGO should do the quality controls on the delivered parts before the installation on the experiment and approve them;
→ Quality control should not only happen on delivery but all along the project realisation. Currently already, regular presentations about the status of the work are given in the Work-Package with the feedback from the entire group.
e. Last step of the delivery should be the transfer of the know-how (including all relevant technical drawings, operational manual) from the lab/institute to the expert at EGO to run, maintain, repair, etc the delivered components.
→ Absolutely and this should also include the transfer of property and be overseen by the Project Office, which does not exclude the Member Labs to be in charge of maintaining and operating the equipment provided.

In our discussions now, we find that we are again trying to explain that the above points are critical, and that the proposed new organisation, just like the old organisation, is not addressing these at all.