

## ***Interactive comment on “A new model for intra- and inter-institutional soil data sharing” by José Padarian and Alex B. McBratney***

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Thanks for your feedback.

Regarding your comment:

**It [the paper] could however take a bit more time to explore some of the specific aspects laid down in section 4. In particular, the immutability is brushed off quickly as a great feature, but there need to be explanations of how one could, for example, implement data versioning in such a scheme (in the case of a transcription error that has been spotted, and needs correction, for example)**

We mentioned that very briefly at the beginning of Section 3 but we agree that it is not enough. It is possible to create a new transaction to transfer an asset to the same

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owner and make changes during that process. Then both versions are permanently linked. We will add extra details on how that works.

**The structure is good too, although I'd argue that section 2 and 3 should be merged.**

We will merge both sections.

**The part about data ownership is very short and vague, and implementing a technological solution like blockchain does not preclude from having a reflection about data licensing, in my view: blockchain is a technological tool, but the license data is shared under should be acknowledged as the way the rules of engagement between data sharing parties are laid.**

We completely agree. License is important in any system, decentralised or not. We will expand the data ownership section to talk about the importance of data licensing and what a public ledger can offer in that sense.

**I also have an issue with the brush statement in the “Data Governance” subsection, which states that “in practice, control and governance over the data are ceded to the central node”. This is simply untrue, if you consider eg federated data management. And one could argue that when the data governance gets decentralised, there is a risk that no governance is going on at all.**

In that paragraph we are specifically talking about a traditional centralised system, that is why we start the paragraph with “In a centralised network, ...”. Blockchain is a type of federated data management system, that is why we compare it with the centralised case.

The logic of not providing decentralised data governance because it might fail is interesting. We prefer to stay positive and promote participation.

**... while the integrity of an asset can be tracked, there is nothing in blockchain that can verify the original certification - in other words, when an actor signs an**

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**asset and puts it into the blockchain, there is no mechanism to check whether that asset is legitimate or not.**

We omitted topics that are true for any system. The problem you mention is also true for a centralised solution. Adding to the comments of the other reviewers, we will add a few paragraphs to explicitly clarify that this is a technological tool that does not solve human or technical (lab) problems to avoid “overselling” the system by omission.

**There are hard questions to ask about the use of blockchain in general, and for soil data in particular: is it not completely overkill? Do we want, as a community, to implement a solution we know has a consequent environmental cost, and one that increases with the number of transactions? Is it scalable enough? Integrating a section showing more discussion is, I think, a requirement in this paper to get away from the technological “buzz”.**

Regarding the question if using a public ledger is an overkill, we do not think it is. Technological solutions are developed to be used. At the moment we share soil data using email and (poorly formatted) Excel files. We need to make a technological jump at some point. The technical part is simpler than it sounds and soil scientist that are closer to those technologies should help to implement them. Of course, there human and institutional factors to consider, but some soil scientist also work closer to those areas. We can see it as a team effort where we are proposing a solution in the technical part.

Regarding the environmental impact, that is a valid concern. Blockchain is a very diverse technology. You mentioned Bitcoin, but that is only one of many public ledgers available to date. The environmental problem is derived from the consensus algorithm that Bitcoin uses (proof-of-work) which is very energy consuming and not scalable. We omitted highly technical details like using a better consensus algorithm (proof-of-stake) that does not require long calculations and high amounts of energy. We will add a paragraph to Section 3 to help dissipate those concern.

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**Lastly, with all due respect, I think there are more established papers as a reference for the use of statistical modelling of spectral data than your 2019b paper.**

That is a review where we referenced many established papers. We will add some of those references to the text.

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