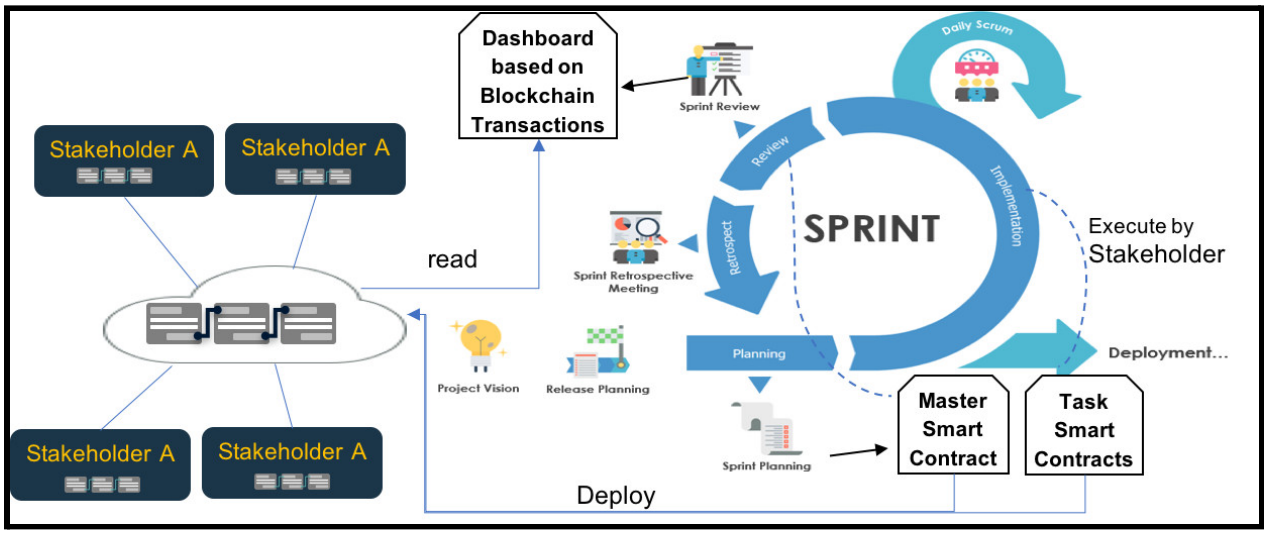
❖ Using smart contracts to solve Agile methodology challenges:

The proposed solution aims to model a smart contract system to manage Agile software development projects. Smart contracts are verifiable contracts that are the enabling technology of Blockchain. It automates the execution of agreements so that all the participants are certain about the outcome without any intermediaries' involvement. So basically, blockchain provides decentralization, cryptographic security, transparency, and immutability, thus solving some of the challenges in Agile. By using Blockchain, one can easily track the work done, trace the requirements, confirm the status of the issues, automatically accept certain tasks, aiding people in working more efficiently.

The improvements that we can provide are:

1. Validating the User Stories: Whenever the user stories are decided, they are stored in the master smart contract along with requisite conditions, then the stakeholders are notified, and upon their consensus and validation, the user stories are accepted for further development.

2. Verify fulfillment of conditions: The customer creates additional smart contracts where the product owner registers the validated user stories and specifies the acceptance test cases along with the endorsement parties and consensus protocols. So, once a task/user story is completely developed, its corresponding smart contract is executed to determine whether all the acceptance test cases are passed or not. Once all the tasks in the sprint are completed, the master smart contract is executed to validate all the conditions of the different stakeholders and after that, the particular software module is accepted.



3. Transparency: Using Agile methodologies, the complexity of the project increases, which requires the rate of communication to increase. So, the cultural differences, management of agreements/requirements, trust issues, and biases can be addressed using Blockchain. Blockchain creates a transparent platform wherein the communication of every modification or action required in Agile is reflected in the project's ledger. Due to its decentralized nature, it can be accessible to every project team member.

4. Team accountability: Blockchain keeps immutable records of all the developments from the beginning of the project, such as rejections, modifications, etc. The estimated time duration and efforts can be stored along with the sprints in the Smart Contracts. Viewing the task's status assigned to the developer, one can determine the dealy and decide upon the appraisals and penalties. So, if a task is estimated to be completed in two days and yet the task's status is not changed to "completed," then automatically, the developer will be charged a penalty through smart contracts. Thus it would create a more transparent procedure.

5. Reconciliation: Backlog elements from the teams can compare themselves against other elements from other programs/teams to ensure no duplicate work and time is saved. In the proposed system, we can assign certain tags to the user stories/task such as the "math function" tag for any calculation-related function. So whenever a team in the organization gets stuck in executing a particular user story, the developer can request the system to access the already developed feature with similar tags from all the teams. This helps them save time instead of reimplementing the same feature repeatedly.

6. Prioritization and preferability: Using smart contracts, we can create a reputation system that stores information about how the developers have performed in their previous tasks. So, the tasks with higher priority are assigned to those members who have greater relative reliability. It can also improve cross-functionality in weak areas of the team.

7. Reduce scaling challenges: By creating a decentralized system, each of the team members belonging to different sides/branches can get the update of the project automatically, reducing the mess of conducting update meetings. By tracking the work and the issues closed by each developer, the customer can be automatically informed of the activities being performed.

So thus, all these solutions show how Blockchain can add value to Agile methodology by making the process more transparent and enhancing the collaboration and trust between developers and stakeholders by removing the intermediary parties. It serves as a trustless technology but allows a spirit of mutual trust in the Agile manifesto since it doesn't eliminate trust but converts trust from one form to another.

❖ References:

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3. Base paper: document.pdf
4. Presentation: BTP-agile