AGILE SOFTWARE DEVELOPMENT MODEL

Blockchain-based skill credentialing system

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1. **Introduction to Agile Model**

   The Agile software development model is an iterative and incremental approach that emphasizes flexibility, continuous feedback, and rapid delivery of working software. Unlike traditional development models, Agile supports evolving requirements and encourages close collaboration between stakeholders and the development team throughout the project lifecycle.
   For the **Blockchain-Based Skill Credentialing System**, the Agile model enables efficient handling of complex blockchain integration, changing regulatory requirements, and continuous validation of system security and usability.

2. **Suitability of Agile Model for the Project**

   The Agile model is suitable for this project for the following reasons:
   - **Dynamic Requirements:** Credential standards and verification policies may evolve over time.
   - **Incremental Development:** Core modules such as credential issuance, verification, and revocation can be developed independently.
   - **Early Risk Mitigation:** Blockchain-related risks can be identified and addressed early.
   - **Stakeholder Feedback:** Continuous feedback from institutions, learners, and employers improves system quality.
   - **Faster Delivery:** Functional modules are delivered at the end of each sprint.

3. **Agile Roles and Responsibilities**

   3.1 Product Owner

   The Product Owner represents stakeholders such as training institutions and regulatory bodies. The responsibilities include defining system requirements, prioritizing features, and maintaining the product backlog.

   3.2 Scrum Master

   The Scrum Master facilitates Agile practices, ensures adherence to Agile principles, and removes obstacles faced by the development team.

3.3 Development Team

The Development Team is responsible for designing, developing, testing, and deploying the system. The team includes frontend developers, backend developers, and blockchain developers.

3.4 Stakeholders

Stakeholders include training institutions, learners, employers, and regulatory authorities who provide continuous feedback.

4. Agile Process Workflow

The Agile development process followed in this project consists of the following steps:

Requirement Analysis → Product Backlog Creation → Sprint Planning →
Sprint Execution → Testing → Sprint Review → Sprint Retrospective → Increment Release

This cycle is repeated until the complete system is developed.

5. Product Backlog

The Product Backlog is a prioritized list of system requirements expressed as user stories.

Backlog ID	User Story
PB1	An institution wants to issue digital skill credentials
PB2	A learner wants to store credentials securely
PB3	An employer wants to verify credentials instantly
PB4	An institution wants to revoke invalid credentials
PB5	A regulator wants to audit issued credentials
PB6	A user wants secure authentication and authorization
PB7	A system wants immutable blockchain-based storage

6. **Sprint Planning**

The project is divided into multiple sprints, each with a duration of two weeks.
During sprint planning:
- High-priority backlog items are selected
- Sprint objectives are defined
- Tasks are assigned to the development team

7. **Sprint-wise Development Plan**

Sprint 1: Requirement Analysis and System Design

Duration: 2 Weeks
Objectives:
- Finalize functional and non-functional requirements
- Design system architecture
- Select blockchain platform

Deliverables:
- Software Requirements Specification (SRS)
- System architecture diagram
- Product backlog

Sprint 2: Authentication and User Management

Objectives:

- Implement user registration and login
- Apply role-based access control
- Initialize digital identity and wallet setup

Deliverables:

- Authentication module
- Authorization policies

Sprint 3: Credential Issuance Module

Objectives:

- Enable institutions to issue digital credentials
- Deploy smart contracts for credential issuance

Deliverables:

- Credential issuance module
- Credential hashing and blockchain storage

Sprint 4: Learner Wallet Module

Objectives:

- Provide secure credential storage
- Enable credential sharing functionality

Deliverables:

- Learner dashboard
- Wallet interface

Sprint 5: Credential Verification Module

Objectives:

- Implement instant credential verification
- Validate credentials using blockchain records

Deliverables:

- Employer verification portal
- Verification smart contract integration

Sprint 6: Revocation and Audit Module

Objectives:

- Enable credential revocation
- Maintain audit logs

Deliverables:

- Revocation smart contract
- Audit and logging module

Sprint 7: Testing, Optimization, and Deployment

Objectives:

- Perform integration and security testing
- Optimize performance
- Prepare deployment-ready system

Deliverables:

- Final tested system
- Test reports
- Deployment build

8. **Agile Ceremonies Followed**

   8.1 Sprint Review

   Demonstration of completed features to stakeholders and collection of feedback.

   8.2 Sprint Retrospective

   Evaluation of sprint performance and identification of improvement areas.

9. **Agile Artifacts**

   9.1 Product Backlog

   Contains all prioritized user stories.

   9.2 Sprint Backlog

   Subset of backlog items selected for a sprint.

   9.3 Increment

   A working version of the system delivered at the end of each sprint.

10. **Advantages of Agile Model**

    - Faster delivery of functional software
    - Improved stakeholder satisfaction
    - Better risk management
    - High adaptability to change
    - Continuous testing and integration

11. **Conclusion**

    The Agile software development model provides a flexible and efficient framework for developing the Blockchain-Based Skill Credentialing System. Through iterative development and continuous feedback, Agile ensures early delivery of critical features, effective risk management, and high system quality. This model is well-suited to address the technical and regulatory challenges associated with blockchain-based credentialing systems.