# RESPONSIBLE AI

**BEST PRACTICES** for Creating Trustworthy AI Systems

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# RESPONSIBLE AI

## Benefits

Here are the benefits of the customized agile process pattern:

- **Human-centric view:** The customized agile process pattern places a strong emphasis on AI ethics principles and human values.

- **Improved responsiveness:** Integrating ethics into the agile process enables the development team to respond quickly to emerging ethical concerns.

## Drawbacks

Here are the drawbacks of the customized agile process pattern:

- **Incompleteness:** Some extension points may be overlooked.

- **Burden on organizations:** Customizing agile processes may place an additional burden on organizations, particularly if it requires significant changes to existing processes.

## Related Patterns

G.21. Continuous documentation using templates: Specific documentation templates for AI systems could be considered as new artifacts in a customized agile process.

## Known Uses

Here are the known uses of the customized agile process pattern:

- Microsoft's Azure DevOps allows the customization of inherited processes.[64]

- Atola Technology provides customized agile methodology that contains different development practices.[65]

- Apptio Targetprocess is a web-based visual tool for managing projects with flexibility at various levels.[66]

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64. https://docs.microsoft.com/en-us/azure/devops/organizations/settings/work/inheritance-process-model?view=azure-devops&tabs=agile-process.

65. https://www.airtable.com/universe/exp4OppRObzXbhOQE/custom-agile-methodology-by-atola.

66. https://www.apptio.com/products/targetprocess/.

## G.18. Tight Coupling of AI and Non-AI Development

The AI and non-AI development sprints and stand-up meetings need to be closely coordinated.

### Context

In AI system development, both AI and non-AI components are rapidly iterated. This process requires more frequent integration of AI and non-AI components. The development of AI components is supported by the AI model pipeline and mostly done by data scientists and data engineers who are not familiar with software engineering. Compared with non-AI components, the development of AI components is more experimental and with less methodological support. The methodological gap between AI and non-AI development can affect the frequent integration of AI and non-AI components.

### Problem

How can we ensure that the integration of AI and non-AI development goes seamlessly in a responsible manner?

### Solution

To ensure a clear understanding of project deliverables and progress, it can be beneficial for the AI and non-AI development sprints and stand-up meetings to be closely coordinated. The deliverables include both AI components that produce AI models and non-AI components that utilize the outputs of the AI models for overall system functionalities. To ensure tight coupling between AI and non-AI development, including effective communication and data sharing, the two teams can share sprints and use a common co-versioning registry to manage artifacts and track progress. Stand-up meetings provide an opportunity for the AI and non-AI team to confirm the current sprint is on track to meet planned objectives, while also considering both system-level and model-level (ethical) requirements when making design decisions.

### Benefits

Here are the benefits of the tight coupling of AI and non-AI development pattern:

- **Effective communication:** The close alignment of AI and non-AI development results in stronger trust among the project team and improved communication regarding both system-level and model-level ethical requirements.

- **Improved traceability:** When the development of AI and non-AI components is closely aligned, it is possible to track the progress of both teams throughout the project lifecycle.

*Drawbacks*

Here are the drawbacks of the tight coupling of AI and non-AI development pattern:

- **Dependent relationship:** If the non-AI team heavily relies on the AI team to provide the models, their work may be delayed due to the AI team's progress or any technical issues with the AI models. Similarly, the AI team may experience similar delays if they depend on the non-AI team for functionalities or inputs.

- **Scalability concerns:** As the project scales, managing the tightly coupled AI and non-AI development may be challenging.

*Related Patterns*

Here are the related patterns of the tight coupling of AI and non-AI development pattern:

- D.3. Co-versioning registry: Using a common co-versioning registry can be an effective way for the AI and non-AI teams to manage the coordination of AI and non-AI components. The teams can easily track versions of data, model, code, and configurations through a co-versioning registry.

- P.17. Multi-level co-versioning: The AI and non-AI teams can utilize a common co-versioning registry to manage and track different levels of co-versioning of AI system artifacts.

*Known Uses*

Here are the known uses of the tight coupling of AI and non-AI development pattern:

- The Microsoft Team Data Science Process supports continuously integrating the AI model with the rest of the software.[67]

- The Amazon SageMaker Pipelines is a continuous integration and continuous delivery (CI/CD) service for machine learning, which can help automate different steps of the ML workflow.[68]

- Azure Pipelines can be used to build the CI/CD pipelines for a machine learning project.[69]

## G.19. Diverse Team

Building a diverse project team can effectively eliminate bias and promote diversity and inclusion in AI systems.

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67. https://docs.microsoft.com/en-us/azure/architecture/data-science-process/overview.

68. https://aws.amazon.com/sagemaker/pipelines/?nc1=h_ls.

69. https://www.azuredevopslabs.com/labs/vstsextend/aml/.

## Context

Humans are prone to make biased or questionable decisions. AI systems are often developed to assist or replace human decision-making to produce more impartial outcomes. However, the data used to train AI models is often generated or collected by humans. As a result, the trained models may produce results that imply bias (such as racism and sexism). Also, the code of AI systems is typically written by developers, who are primarily focused on technical aspects and may bring their own biases to the development process.

## Problem

How can we ensure that AI systems are developed with consideration for a wide range of perspectives and backgrounds?

## Solution

Building a diverse project team is critical to reducing bias and improving diversity and inclusion in AI systems. The diversity should include representation across various dimensions, such as gender, race, age, sexual orientation, and expertise. RAI challenges are multifaceted and complex, requiring the diverse expertise of individuals from a range of disciplines, including software engineering, machine learning, social science, human-machine interaction, and user experience. However, at the end, the final deliverable of an AI project is an AI system. Therefore, software engineering people are the key to building RAI systems, because they are responsible for implementing ethical considerations into the code of AI systems.

## Benefits

Here are the benefits of the diverse team pattern:

- **Diversity and inclusion:** A diverse team is crucial in identifying biases and ensuring the decisions made by AI systems are responsible. Representation of different backgrounds leads to a more thorough examination of ethical issues and a more responsible final AI product.

- **Innovation:** Diverse teams drive creative thinking and lead to more new ideas and greater innovation in AI.

## Drawbacks

Here are the drawbacks of the diverse team pattern:

- **Degraded communication:** Team members may come from different backgrounds and have different communication preferences. These differences can lead to a lack of understanding and confusion.

- **Decreased productivity:** Diverse teams may be more prone to conflicts, which could affect the productivity and motivation of the team members.

*Related Patterns*

G.17. Stakeholder engagement: Diverse teams are often better at communicating with stakeholders and understanding their concerns because they bring a wider range of perspectives and experiences to the table.

*Known Uses*

Here are the known uses of the diverse team pattern:

- Google published its 2022 Diversity Annual Report, which introduces the actions the company has taken to build a flexible and inclusive workplace.[70]

- Microsoft aims to integrate diversity and inclusion principles into its hiring, communication, innovation, and development of products and technologies.[71]

- Meta has been working on creating diverse and inclusive work communities.[72]

## G.20. Stakeholder Engagement

Keeping stakeholders engaged throughout the AI project is essential to building AI systems responsibly.

*Context*

Stakeholders in AI projects include individuals, groups, or organizations that may influence or be impacted by the project's outcomes. These stakeholders may have various ethical concerns regarding the development and use of AI systems, such as the trustworthiness of AI systems and the potential impact of AI on humanity.

*Problem*

How can we manage the needs and expectations of stakeholders?

*Solution*

Keeping stakeholder engagement throughout the AI project is essential to building AI systems responsibly. Stakeholder engagement allows AI systems to better reflect needs and expectations of stakeholders. There are various ways to engage stakeholders, such as interviews, online and offline meetings, project planning and review, and participatory design workshops. Choosing the

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70. https://about.google/belonging/at-work/.

71. https://careers.microsoft.com/us/en/diversityandinclusion.

72. https://www.workplace.com/diversity-and-inclusion.

most effective ways to encourage stakeholders depends on the project's scope, objectives, and the stakeholders' preferences. Possible methods to measure engagement may include the number of stakeholders involved, the frequency of their participation, and the quality of feedback received from stakeholders.

## Benefits

Here are the benefits of the stakeholder engagement pattern:

- **Improved trust:** Stakeholder engagement aligns the development of AI systems with societal expectations and helps build stakeholders' trust in AI projects.

- **Reduced risk:** Stakeholders may help the project team identify and mitigate potential RAI risks before they become threats.

## Drawbacks

Here are the drawbacks of the stakeholder engagement pattern:

- **Conflicting opinions:** There may be conflicting opinions from different stakeholders.

- **Increased cost:** Addressing the needs and expectations from the stakeholders may incur unexpected costs.

## Related Patterns

G.16. Diverse team: Project teams need to continuously engage in communication and collaboration with stakeholders throughout the entire project lifecycle. Diverse teams can improve the communication efficiency by increasing understanding toward the needs and concerns of different stakeholders.

## Known Uses

Here are the known uses of the stakeholder engagement pattern:

- The Association for Project Management (APM) has published ten key principles of stakeholder engagement.[73]

- The Australian Public Service Commission has published guidelines on effective stakeholder engagement.[74]

- Deloitte has published a report on stakeholder engagement.[75]

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73. https://www.apm.org.uk/resources/find-a-resource/stakeholder-engagement/key-principles/.

74. https://www.apsc.gov.au/initiatives-and-programs/workforce-information/taskforce-toolkit/stakeholder-engagement.

75. https://www2.deloitte.com/content/dam/Deloitte/za/Documents/governance-risk-compliance/ZA_StakeholderEngagement_04042014.pdf.