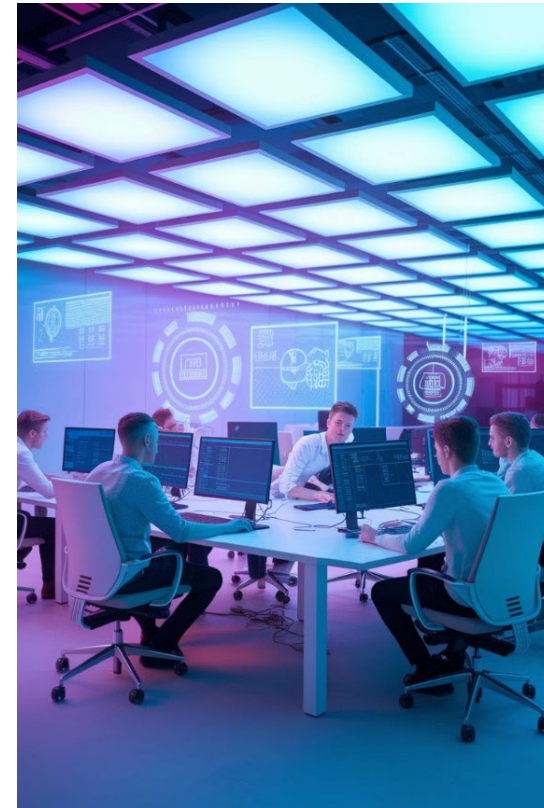


Estimation in an AI - Enabled development environment

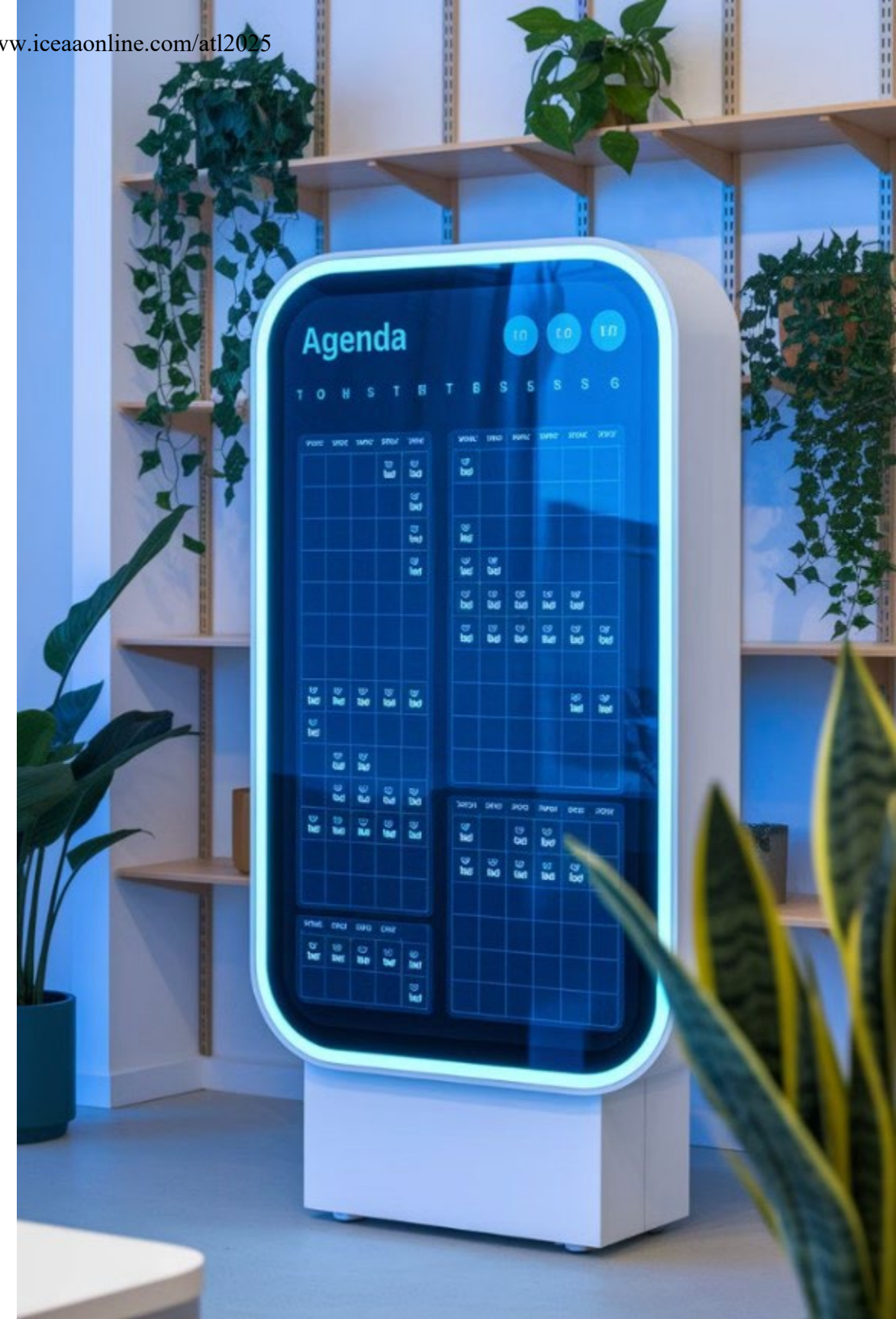
Eric van der Vliet / Raghav Kumar / Bhawna Thakur

CGI



Agenda

- 1 Introduction & Context
- 2 AI- Driven estimation
- 3 AI- Driven software development
- 4 Key takeaways

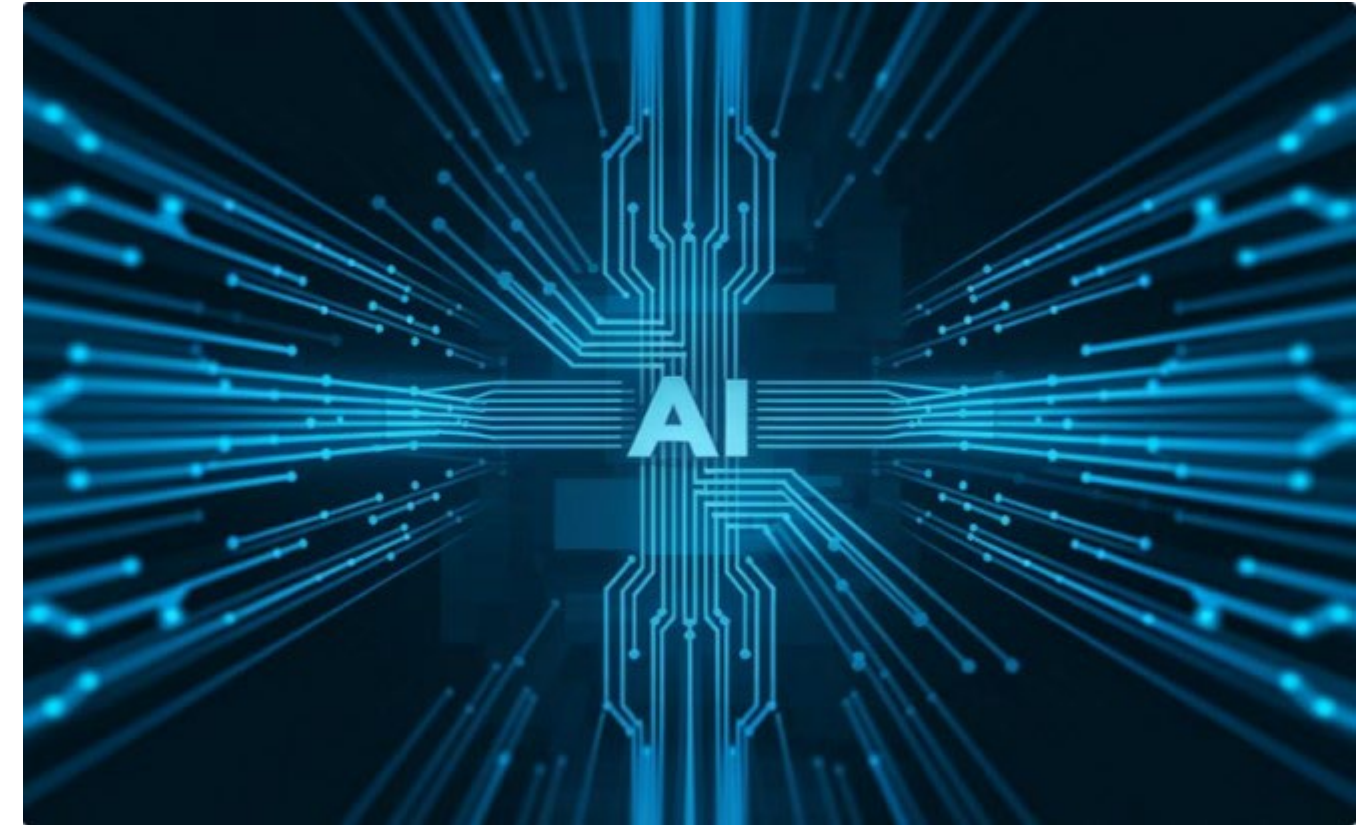


Introduction & Context



Traditional Estimation Methods

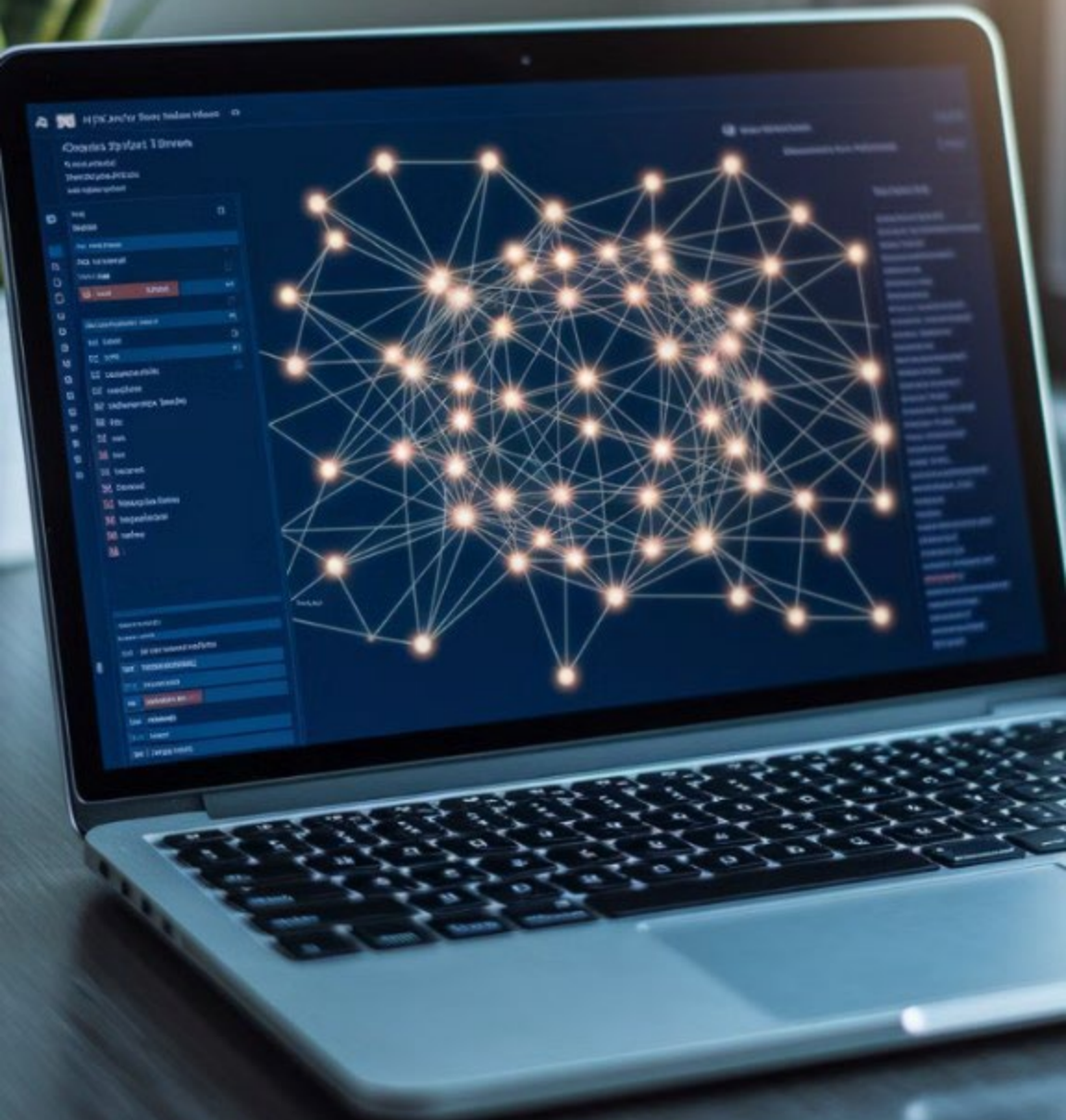
Software estimation historically relied on static formulas and historical data, often using fixed templates and manual calculations



AI- Driven Evolution

AI brings adaptability and dynamic decision -making to the estimation process, transforming risk assessment and resource planning

The importance of accurate estimation



Risks of inaccuracy

Inaccurate estimates can lead to missed deadlines, budget overruns, and project failures

AI- Enhanced models

AI refines traditional techniques like COCOMO, function point analysis and parametric models

Real- Time analytics

AI-driven estimation integrates real -time data to determine the required effort, costs and resource planning



Estimation as a narrative: Beyond numbers

1

Story of a project

Estimation tells how a project unfolds, where risks lie, and what adjustments may be needed

2

Dynamic predictions

AI refines this narrative by adjusting predictions based on evolving project conditions

3

Informed decisions

Teams leverage AI -driven insights for more informed decision -making

Impact on processes



Predictive models

Usage of predictive estimation models learning from historical data by means of Machine Learning on categorial and non - categorial data

Real-time feedback

Continuous feedback loop to improve accuracy and determine adjustments. Actuals should flow continuously from operation to the estimation process.

Seamless integration

AI-assisted estimation tooling shall integrate with AI supported Agile and Dev(Sec)Ops work environments to exchange information.

Responsible AI (RAI): Principles & Significance

Responsible AI forms the foundation of trustworthy and effective AI -driven estimation processes. These principles ensure that AI systems enhance our capabilities while maintaining ethical standards and human values.

Transparency

- Ensuring transparency, accountability, and fairness in AI -driven estimation
- Teams must understand how AI generates its estimates and be able to explain the rationale behind decisions
- This includes maintaining clear documentation, audit trails, and accessible explanations of AI models used in the estimation process

Ethical Concerns

- Addressing bias and ethical concerns in AI -generated predictions
- This involves regular auditing of AI systems for potential biases, ensuring diverse training data, and implementing safeguards against discriminatory outcomes
- Teams must actively monitor and mitigate any emerging ethical issues in estimation practices

Human Augmentation

- AI should augment human decision -making, not replace it.
- Developers maintain final oversight, using AI insights to enhance their judgment while applying critical thinking and domain knowledge to validate AI suggestions.



Use Case: AI Enabled Estimation in Action

Cost Reduction

Reducing cost overruns by integrating AI -powered estimation

Refined Planning

AI-driven insights help refine sprint planning and resource allocation

Improved Success

Project success rate improved by 30% through better estimation accuracy



The current landscape of AI - Driven software development



Widespread Adoption

AI-powered tools like GitHub Copilot, MS Copilot and ChatGPT are widely adopted across industries



Shrinking Cycles

Software development cycles are shrinking due to AI-automated coding assistance



Improved Efficiency

The shift to AI - assisted workflows is leading to improved accuracy and efficiency



Understanding of AI

1

Code completion models

Development will be more based on code completion models resulting in a higher efficiency and quality

2

Team structure

The team structure will change when applying AI tools. Less focus on development, more focus on verification

3

Domain

Applicability of AI tooling need to be determined based on the domain, due to security and/or reliability requirements

Impact on People



Strategic Decision - Makers

AI shifts developers' roles from coders to strategic thinkers, emphasizing higher level planning and architecture decisions



Essential Skills

Data literacy, ethical awareness, and AI tool proficiency become crucial in the modern development environment



Human Oversight

Humans remain critical to validate AI-generated estimates and ensure quality, combining expertise with AI capabilities

Understanding code completion models

1 Completions

- While generating code, developers receive proposed code completions based on the input they provided
- The completions are the result of training the AI tooling based on actual code
- This makes that the quality of completions can differ depending on the technology

2 Quality

- AI tools provides the ability to review manually created code to help improving the quality
- The quality of code completions need to be reviewed to verify the usefulness of the code
- This means that the focus is shifting more from generation to verification

3 Productivity

- Using code completion models will in general result in a higher productivity
- Generated code does not always mean 'efficient' code and could result in more LOCs than in manual coding
- It's important to take this into account when using LOC based estimation methods

Understanding what code completion tools will be applied during the engineering process, and for what parts of the solution is important to determine the impact on the estimates.



Main impact factors on development results



Security

AI-Generated code need to be verified based on security rules to check for vulnerabilities



Quality

AI-Generated code doesn't mean automatically high -quality code. Quality reviews are still essential



Productivity

Development time can be reduced up to 40%. Studies shown that the most increase will be with junior developers

Impact of AI in the development process

AI-enabled development provides different benefits for a development team

AI-Powered Code Completion

- Real-time code suggestions (ghost writing)
- Predicts entire functions, and common patterns
- Reduces repetitive tasks and increases productivity

Context-aware code suggestions

- Analyzes comments and Function names
- Adapts suggestions based on the coding style
- Improves code consistency

Autocomplete functions

- Expertise in AI-augmented teamwork tools and facilitating effective communication between AI systems and team members.

Code refactoring suggestions

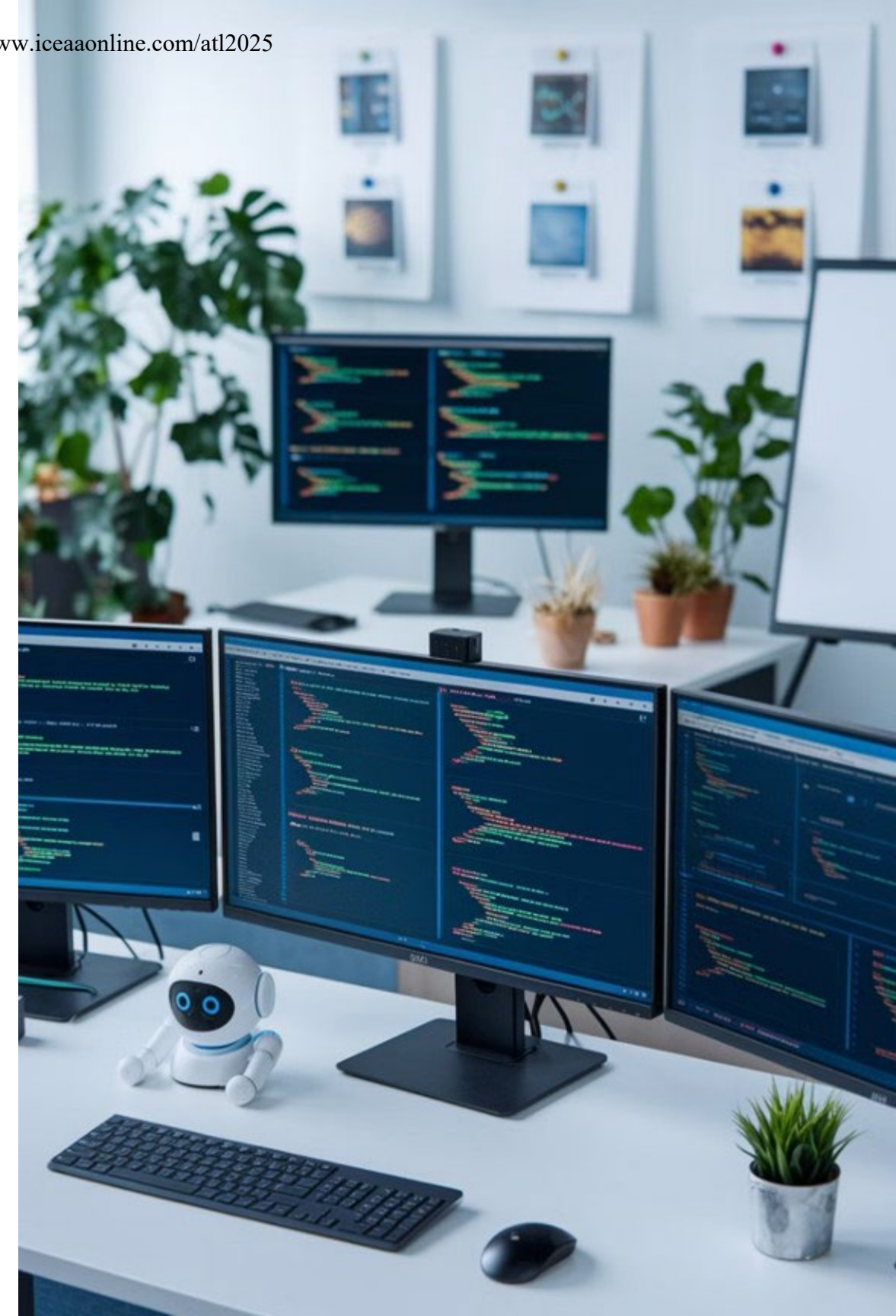
- Detects redundant or inefficient code
- Helps with better structuring of code
- Reduces technical debt and improves code quality

Test case generation

- Suggests unit tests for functions
- Helps improve code coverage with automated test case
- Reduces time spent on writing tests

Documentation assistance

- Generates docstrings for functions
- Helps maintain better code documentation
- Saves time and ensures code is self-explanatory



Integration of AI in the Estimation Process

1

Base estimate

Determine a base estimate without the use of AI; use unit - based estimation grounded in historical data

2

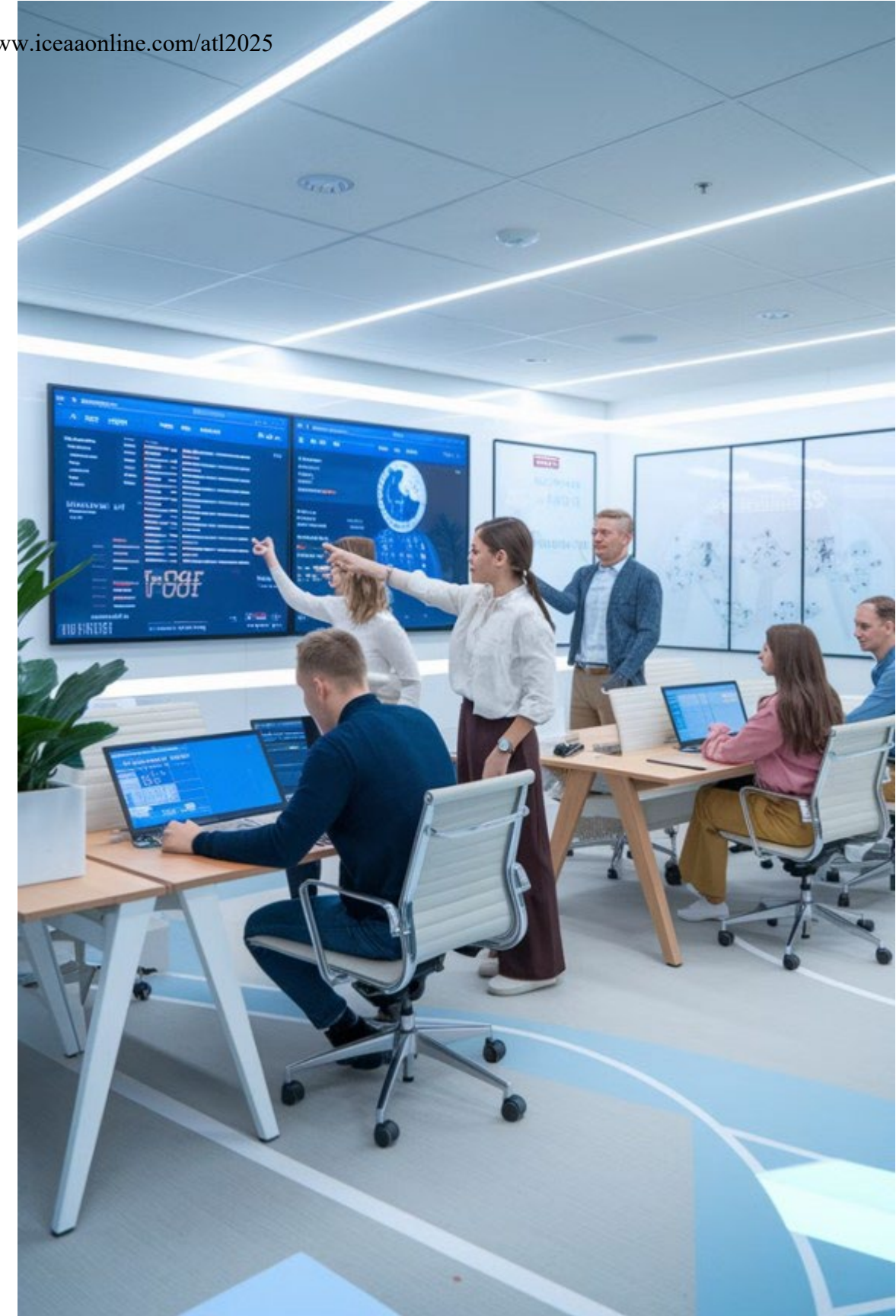
Efficiencies

Determine the efficiencies based on the applied tooling, and identify efficiency improvements based on lifecycle activities

3

Measurement

Measure the benefits of each activity by applying AI tooling, and separate the data based on technology



Measurements in an AI driven environment

1

Traditional measurements

A traditional measurement like size (e.g. Function Points) could be used but will be automatically generated based on provided input like Epics, Features or Stories that are also partly generated using generative AI. For productivity it depends on the level of Predictive AI that is applied what the impact is on the productivity for certain elements in the solution.

2

Alternative measurements

An alternative measurement is the 'Daily completions accepted per user (DCPU)'. This number could be combined with an acceptance rate. For GitHub Copilot this acceptance rate in one study was 27% with a DCPU of around 20. The higher the acceptance rate and the DCPU the more effective the predictive AI.

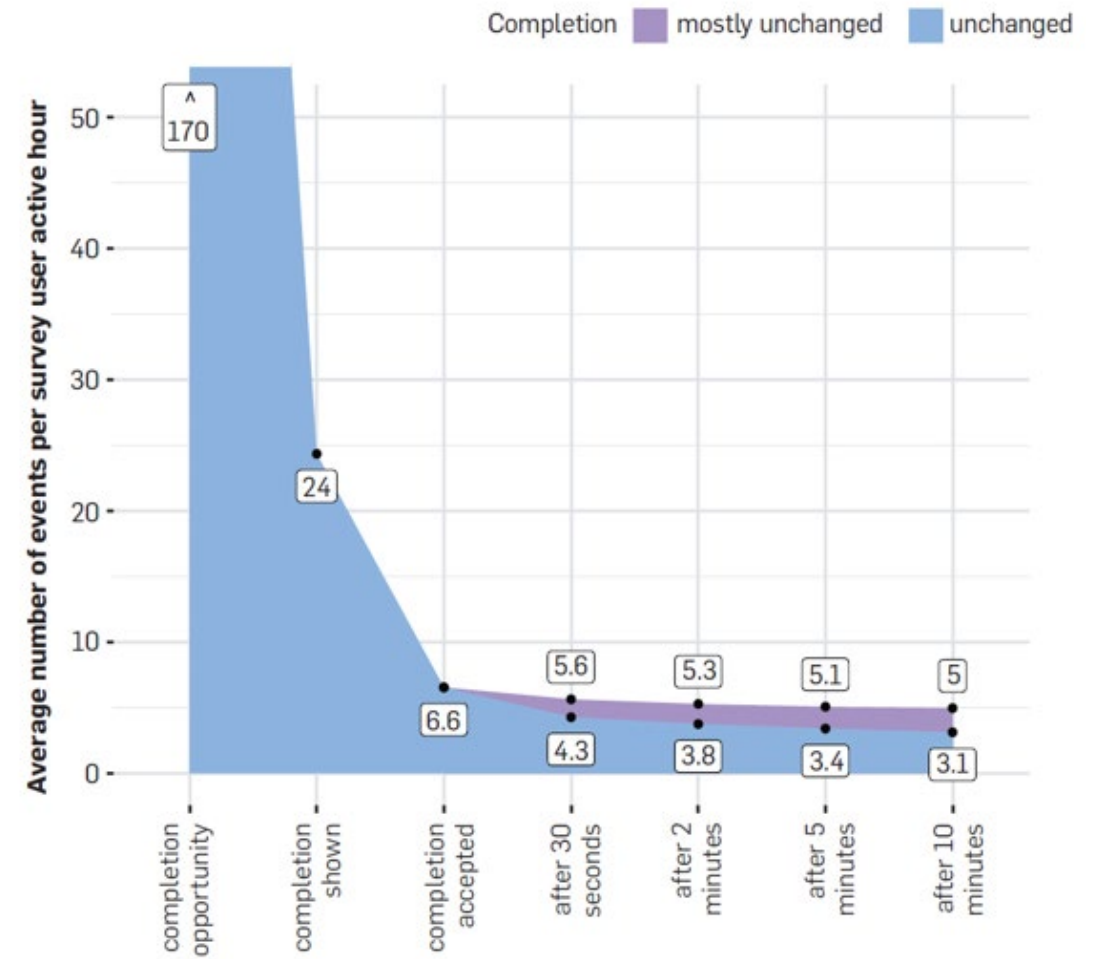
3

Changed / Unchanged completions

In addition to the DCPU can be measured if the proposed completions are accepted as is or changed by the user. If the completion is accepted or changed, in addition can be measured how long after the proposal this was accepted or changed what gives an indication of effectiveness. These measurements are normally provided by AI tooling like GitHub -Copilot.



Daily Completions Accepted per User (DCPU)



Upskilling: The irreplaceable role of expertise



Human Judgment

While AI provides powerful tools and suggestions, human expertise remains essential for making nuanced decisions and evaluating complex scenarios



Understanding AI

Modern developers must develop deep understanding of AI capabilities, learning to effectively validate and apply AI-generated insights to real-world problems



Continuous Learning

Ongoing education and skill development enable teams to stay current with AI advancements and maximize their potential in an evolving technological landscape

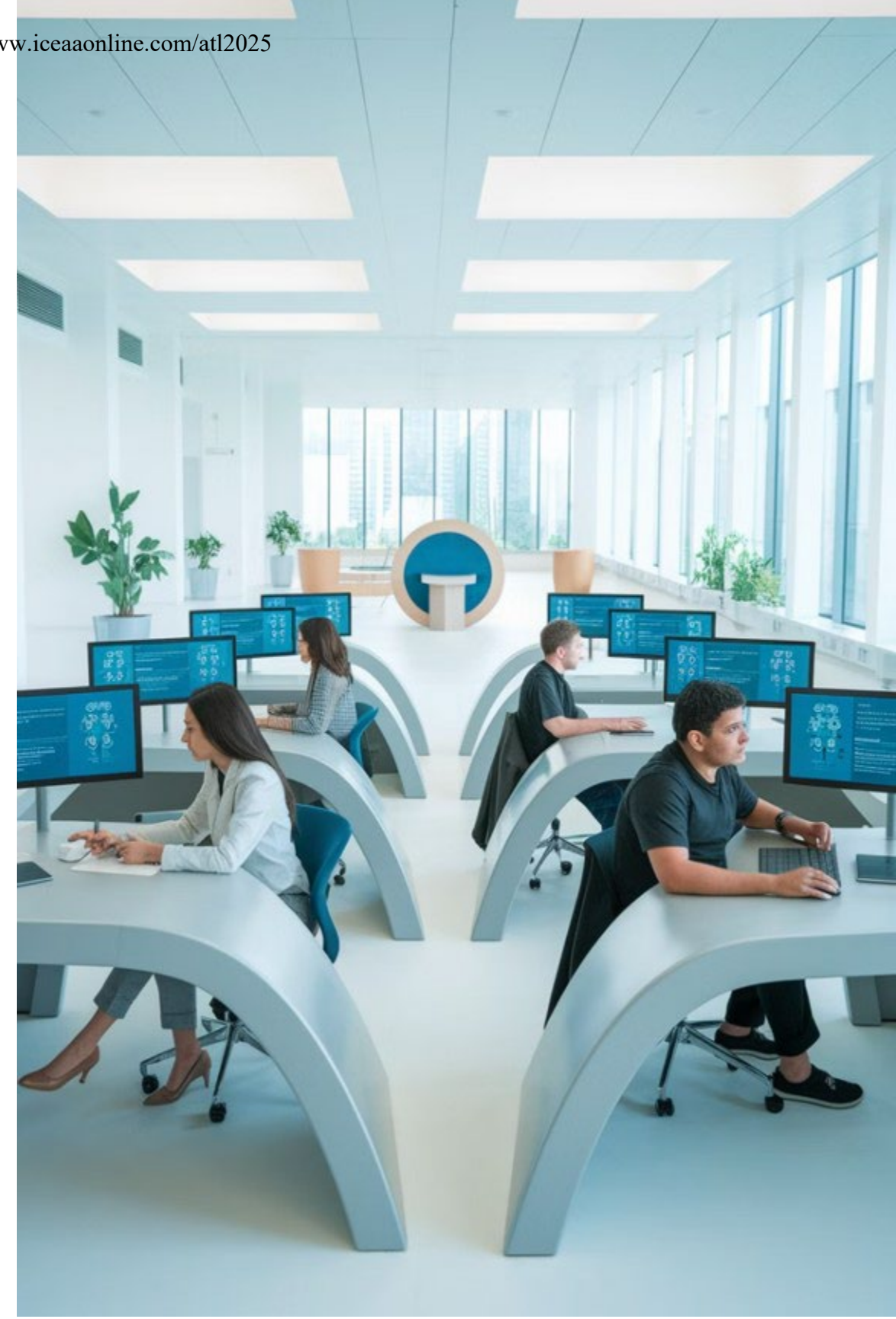
Strategies for ongoing Learning & Development

1 Cross-Disciplinary Training

Integrate software engineering, data science, and project management expertise through hands-on training with estimation expertise. Focus on the benefits of AI in both engineering and estimation processes

2 Tool integration

Integrate tooling for engineering, project management and estimation to create an integrated workflow of project control, monitoring and estimation during the project lifecycle



Integrate AI responsibility

1

Assessment

Assess your current estimation processes and identify AI driven improvement areas and use of AI in development

2

Governance

Build Public AI governance policies to ensure responsible AI adoption for development and estimation

3

Training

Invest in training programs to empower teams with AI knowledge and AI -enhanced estimation skills





Key Takeaways

1 AI Transformation

AI is transforming development estimation and metrics, but human oversight is essential

2 Ethical Governance

Ethical AI governance ensures AI remains a force for effective efficiency improvement

3 Upskilling

Upskilling in AI and data analytics is critical for future success

Q&A



Insights you can act on

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