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CONCEPTUAL FRAMEWORK TO GUIDE THE APPLICATION OF ARTIFICIAL INTELLIGENCE IN PROJECT MANAGEMENT DECISION MAKING

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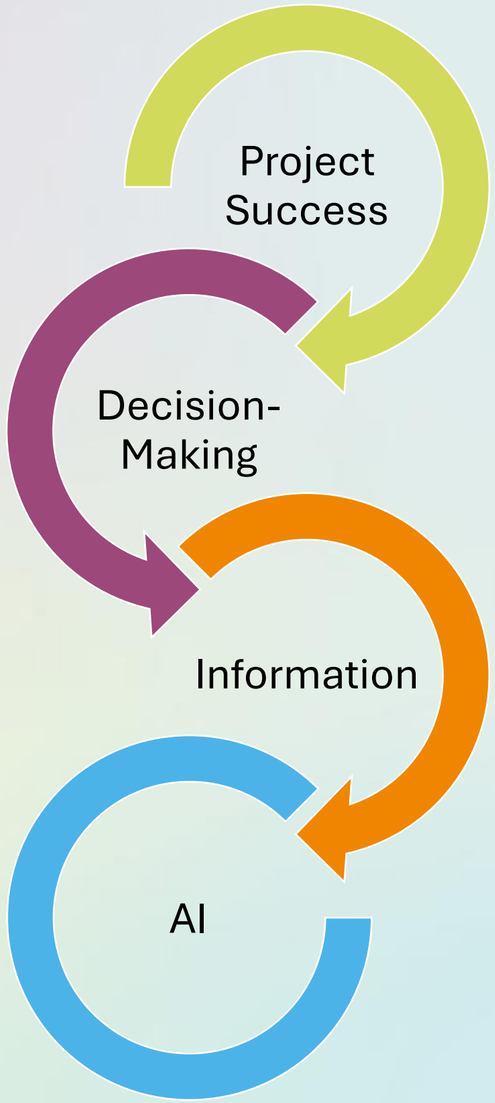
INTRODUCTION

- Integral to **success**
- Project **decision-making** (PDM)
- **Limitation** of effective PDM

- Potential as a **DM tool**
- AI in **PM** (e.g. SPMIS)
- **Improve** success rates



- Competitive **advantage**
- **Failure** rates (±50% over 20 years)
- **Pressure** to deliver

- Require high-quality **information**
- Project **Intelligence**
- Information System (e.g. **PMIS**)

[1-5]

INTRODUCTION

Research Problem

- **Lack** of guidelines and frameworks to assist **implementation** of **AI** to aid **PDM**

Research Objective

- Develop a conceptual **framework** for project managers to **guide** the potential **implementation** of **AI** as a tool for **PDM**

Research Questions

1. What **factors** should be considered to apply AI in PDM?
2. Are certain factors more or less **important** than others to consider when applying AI in PDM?

THEORETICAL FRAMEWORK

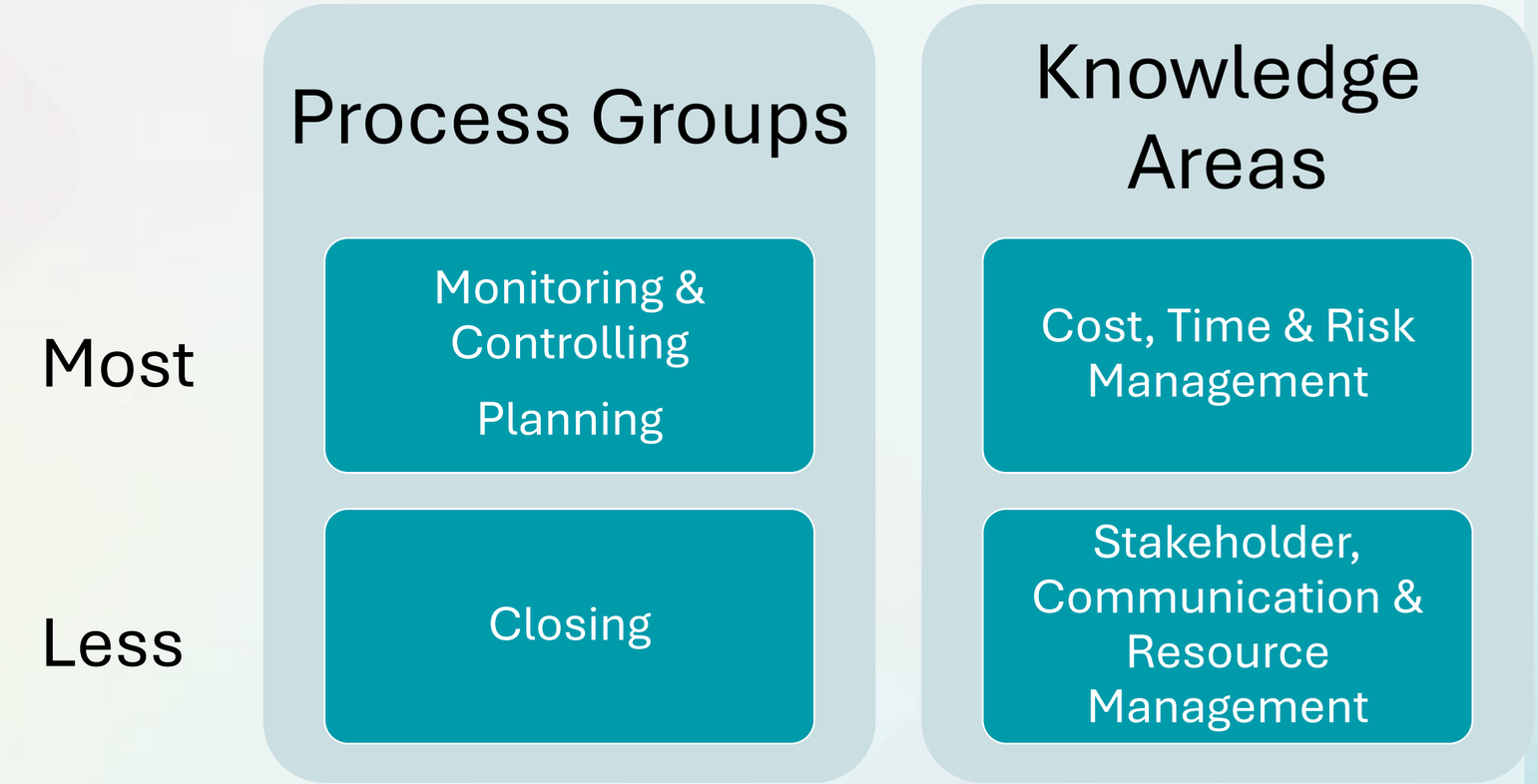
More **complex** projects

Decision-making in PM

AI **application** in PM:

Process Groups

Knowledge Areas



THEORETICAL FRAMEWORK

7 x Success **Groups** (with **Factors**) of AI application in PM:

Success Groups

- Data
- Model and Algorithm
- User Interface and System Development
- Safety and Security
- Project
- Organization
- Human-related aspects

EXISTING CONCEPTUAL FRAMEWORK

To understand **relationships** between factors

Structured practical **instrument** for organizations to **design** and **apply** AI solutions for PM

Important concepts:

- AI requirements for **PM application** domain
- PM requirements for **AI solution** domain

6 x components

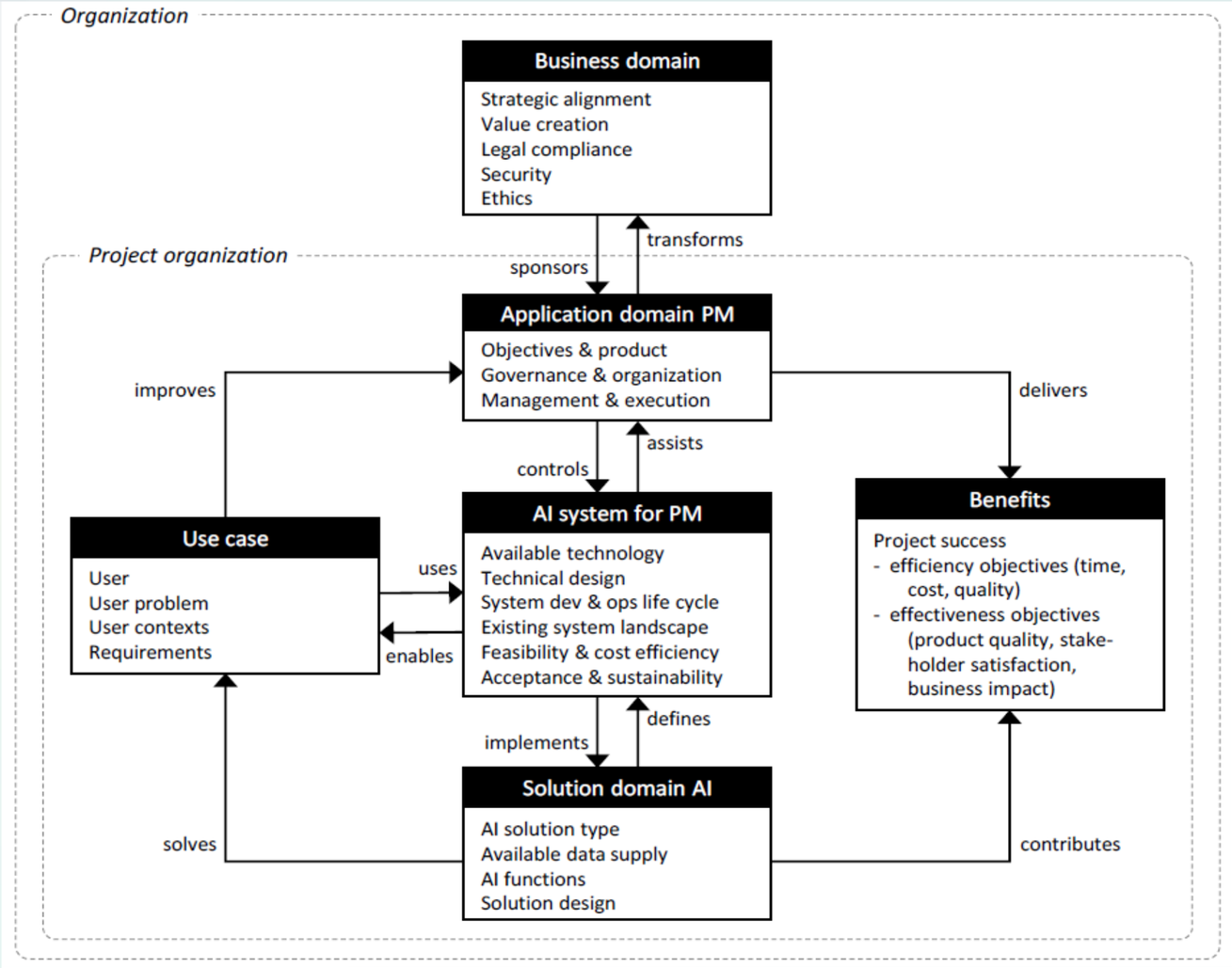
Shortcomings:

Unclear factor **importance**

AI system **factors** and **solution** domain is unclear

AI and PM requirements and **barriers** not addressed

AI to support **decision-making** is not presented



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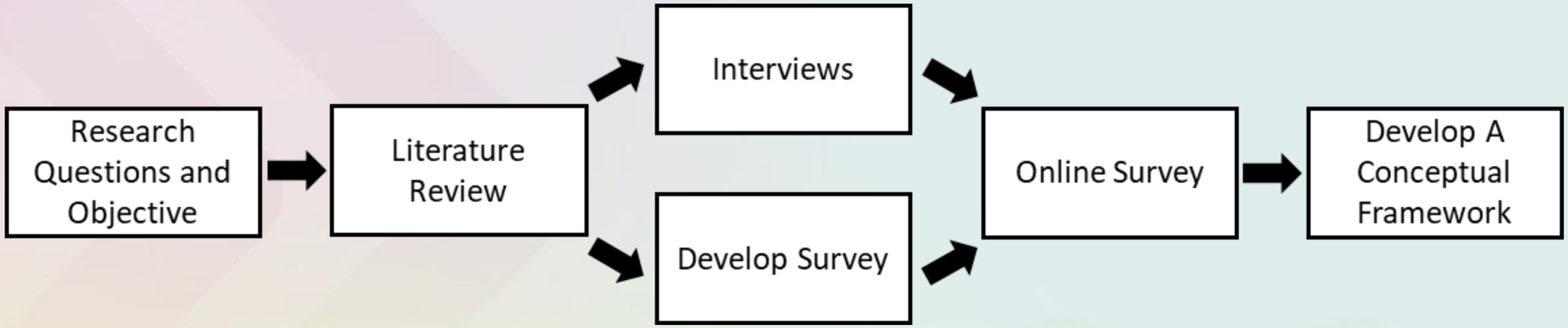
RESEARCH METHODOLOGY



Qualitative

Semi-structured focus group **interviews**

7 interviewees from a SA project-based engineering **company**

Transcribed and coded in ATLAS.ti using **thematic** analysis

To **identify** and confirm **factors**

Quantitative

- Online **survey**
- **34** participants from **MEM** students and alumni
- **Descriptive** statistics using MS Excel and SPSS
- To **determine** factor **importance**

QUALITATIVE RESULTS

Critical factors to consider to apply AI in PDM

- Data and Model
- Human

Category/ Factor	Code/ Subfactor	
Data and Model*	**Data accuracy***	**Digitalization***
	Data quality	Establish rules
	Data quantity*	Feedback procedure
	Data relevance	Define data to capture
	Data reliability	Reinforcement learning
	Data uniformity	**Traceability***
	Generate data	
Human*	**Human & machine collaboration***	Understand limitations
	Critical thinking	**User technical understanding and ability***
	Openness to change	
	Trust in AI*	
Organization	Standardized products	Digitalization
	Standardized processes	Company platform programs
Project	Project complexity	Project type
	Project repeatability	Product novelty
Safety	Ethical DM	-

**Most frequent categories or codes from the transcript*.

QUANTITATIVE RESULTS

Decreasing **Level** of **Importance**

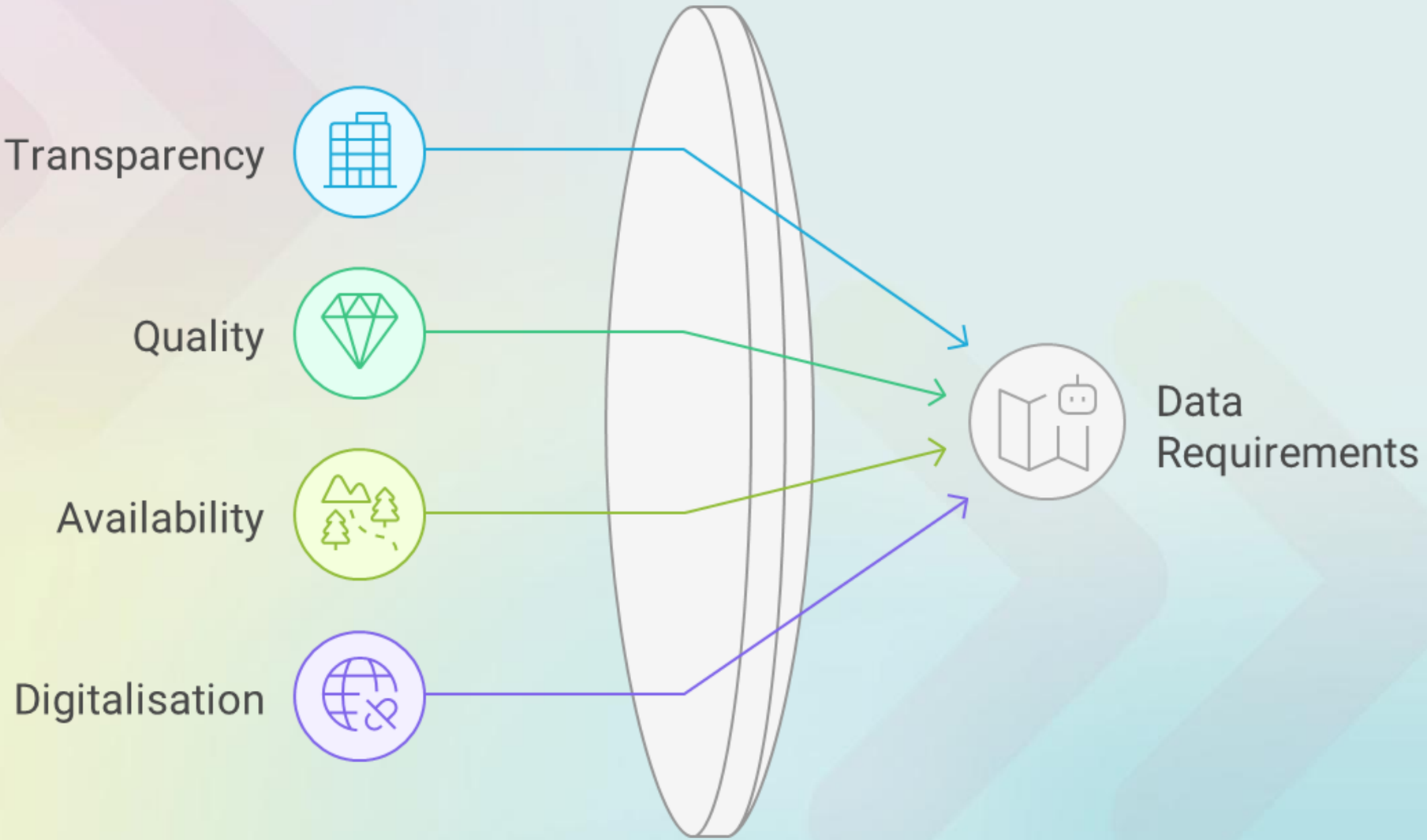
1) Data	2) Safety & Security	3) Model & Algorithm	4) Human	5) UI & System Development	6) Organization	7) Project
1. Transparency 2. Quality and Relevance* 3. Accessibility/ Availability* 4. Digitalization* 5. Quantity* 6. Storing* 7. Automatic data capturing	• Confidentiality • Data and Model Security* • Policies and regulations* • Privacy Safeguards* • Ethical concerns* *(in no particular order)*	1. Transparency 2. Accuracy* 3. Interpretability* 4. Consistency* 5. Validation* 6. Renewal and retraining 7. Automated analysis 8. Selection and development* 9. Predictive model	1. Bounded rationality* 2. Technology understanding and skills* 3. Change management* 4. Critical thinking	1. Interoperability* 2. Simplicity* 3. Flexibility and adaptability 4. Standardized processes* 5. Natural language processing 6. Establish the operator's knowledge base 7. UI Front-end transparency	1. Digital strategy* 2. Strategic alignment* 3. Available funds* 4. Type* 5. Product development strategy	1. Complexity and Uniqueness* 2. Scope 3. Goal 4. Product maturity 5. PM Method* 6. Size* 7. Industry Type

QUANTITATIVE RESULTS | DATA

Decreasing **Level** of **Importance**

1) Data

1. Transparency
2. Quality and Relevance*
3. Accessibility/ Availability*
4. Digitalization*
5. Quantity*
6. Storing*
7. Automatic data capturing



**Barriers*

QUANTITATIVE RESULTS | SECURITY & SAFETY

Decreasing Level of Importance

2) Safety & Security

- Confidentiality
- Data and Model Security*
- Policies and regulations*
- Privacy Safeguards*
- Ethical concerns*

(in no particular order)

↑Barriers

Building Trust in AI Adoption

Confidentiality

Ensuring data is protected from unauthorized access

Privacy

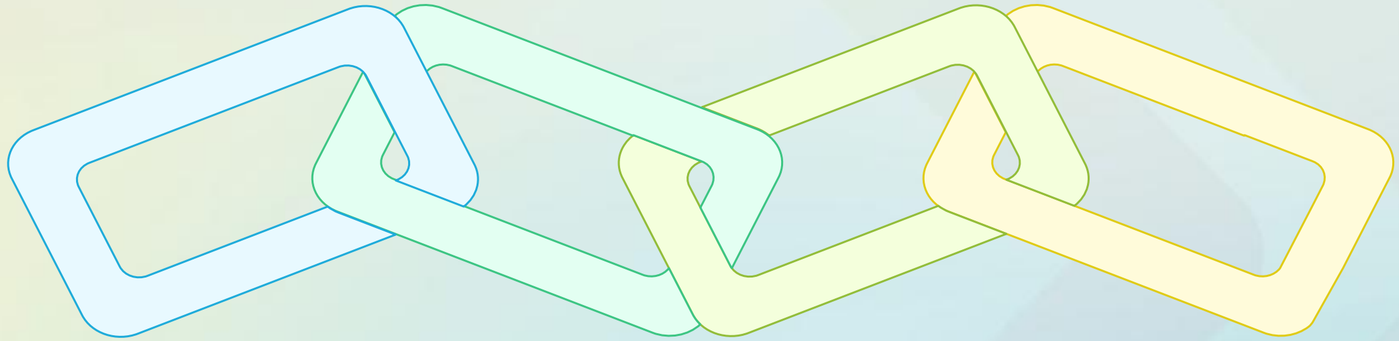
Respecting individuals' rights to control their data

Ethics

Adhering to moral principles in AI practices

Regulations

Complying with legal standards for data handling



QUANTITATIVE RESULTS | MODEL & ALGORITHM

Decreasing **Level** of **Importance**

3) Model & Algorithm

1. Transparency
2. Accuracy*
3. Interpretability*
4. Consistency*
5. Validation*
6. Renewal and retraining
7. Automated analysis
8. Selection and development*
9. Predictive model

*Barriers

AI Model Improvement Cycle

Perform Retraining

Update the model with new data and insights.

Conduct Validation

Confirm the model's performance and consistency.

Ensure Accuracy

Verify the model's precision and reliability.

Enhance Interpretability

Make the model's outputs understandable.

QUANTITATIVE RESULTS | HUMAN

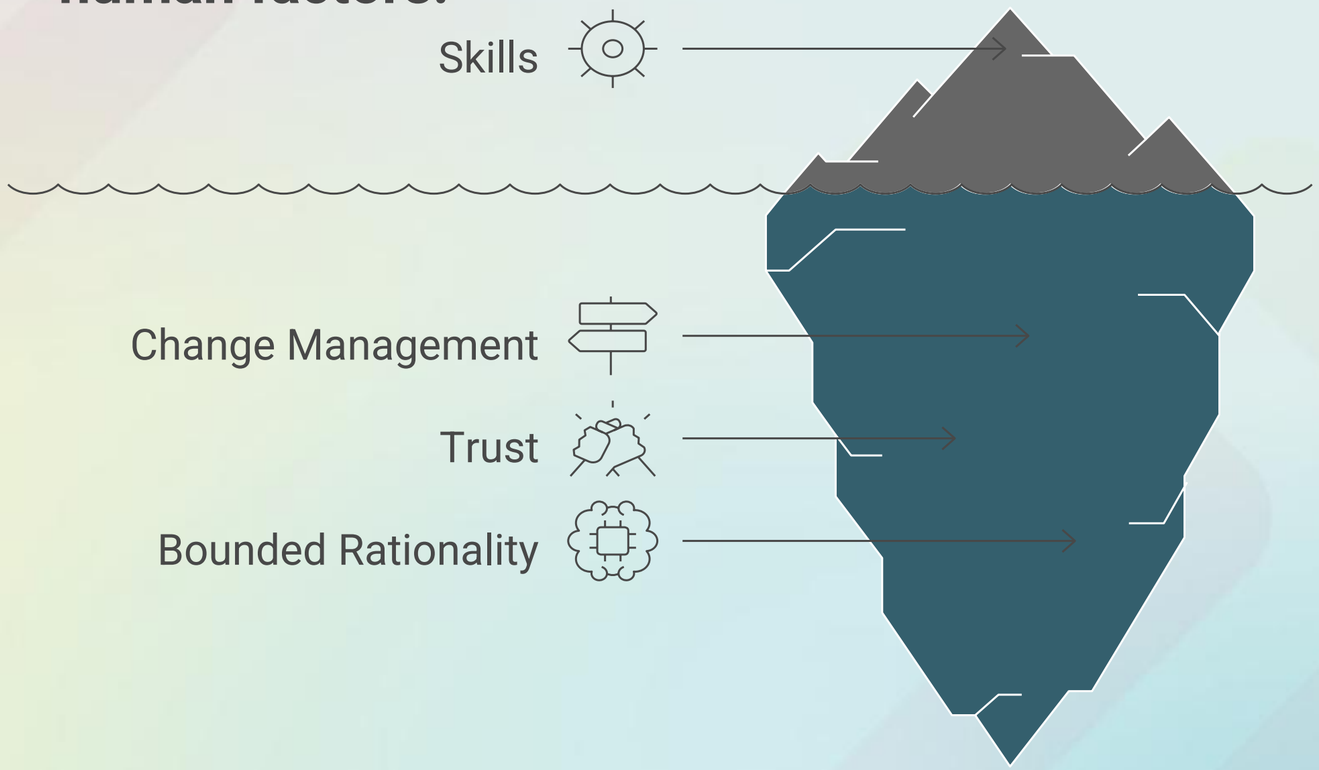
Decreasing **Level** of **Importance**

4) Human

1. Bounded rationality*
2. Technology understanding and skills*
3. Change management*
4. Critical thinking

*Barriers

Managing AI adoption requires addressing hidden human factors.



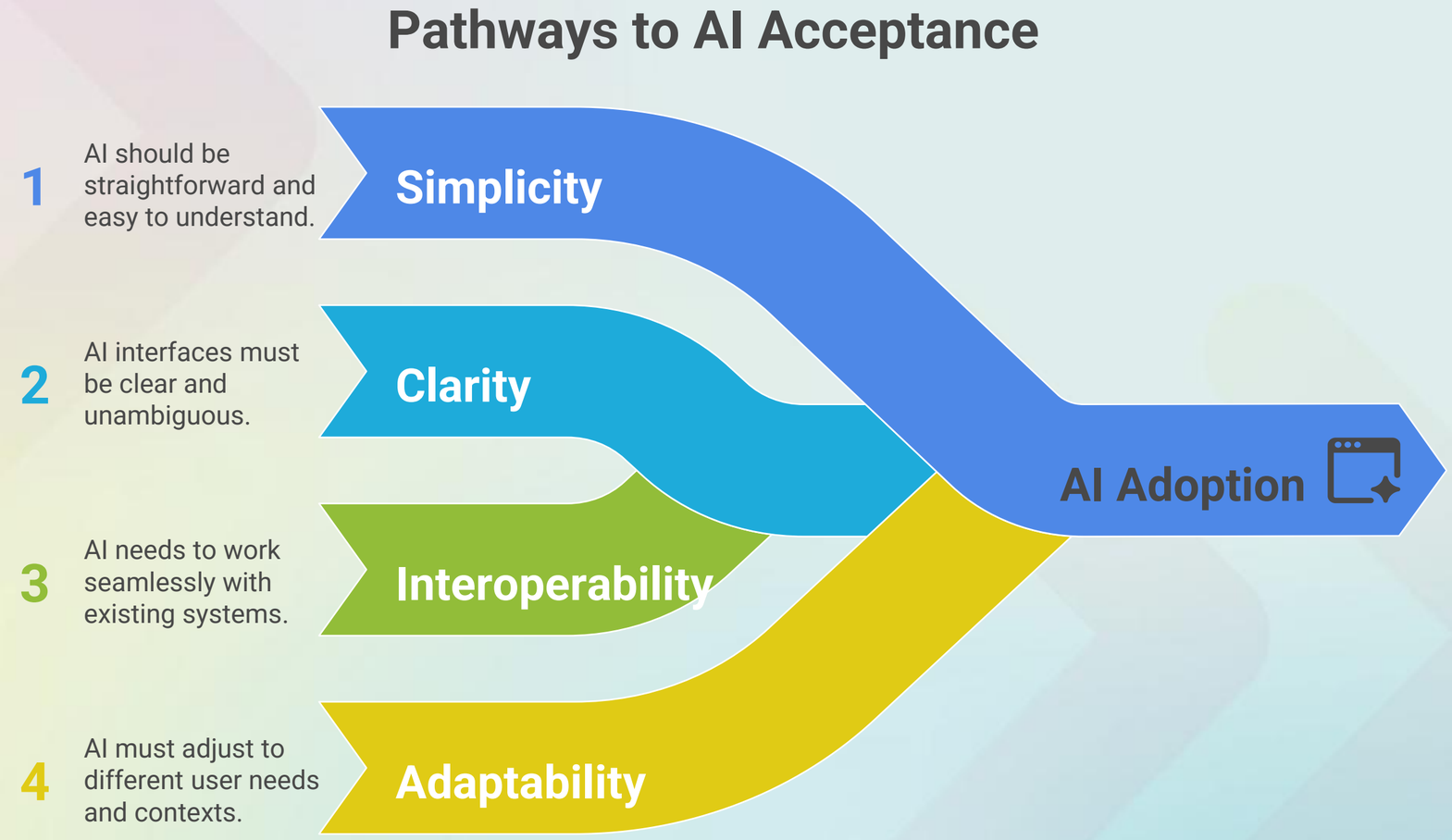
QUANTITATIVE RESULTS | UI & SYSTEM DEVELOPMENT

Decreasing Level of Importance

5) UI & System Development

1. Interoperability*
2. Simplicity*
3. Flexibility and adaptability
4. Standardized processes*
5. Natural language processing
6. Establish the operator's knowledge base
7. UI Front-end transparency

**Barriers*



QUANTITATIVE RESULTS | ORGANISATION

Decreasing **Level** of **Importance**

6) Organization

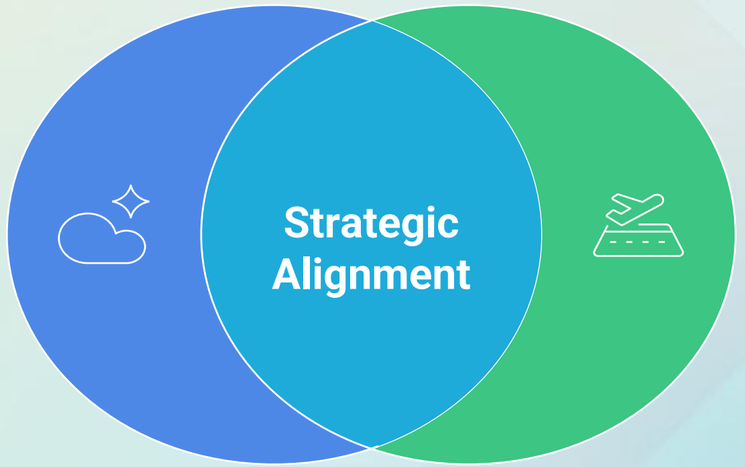
1. Digital strategy*
2. Strategic alignment*
3. Available funds*
4. Type*
5. Product development strategy

*Barriers

The Power of Organizational Synergy in AI Success

Digital Strategy
Clear AI vision and roadmap

Alignment with Business Goals
AI serving core objectives



QUANTITATIVE RESULTS | PROJECT

Decreasing **Level** of **Importance**

7) Project

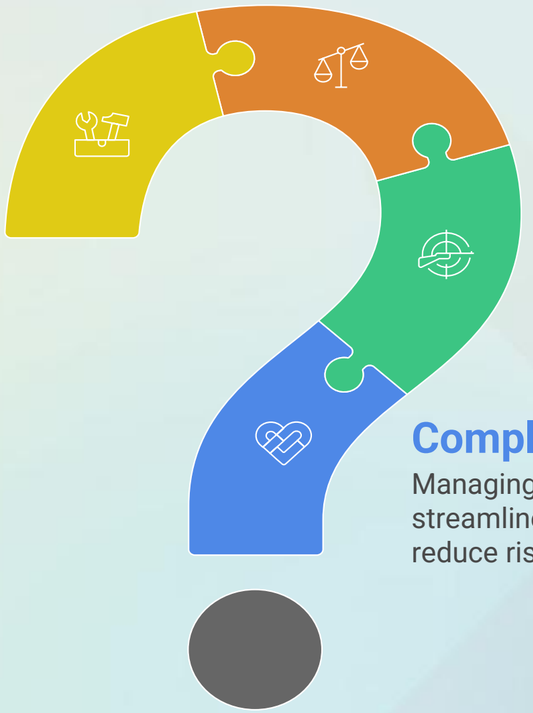
1. Complexity and Uniqueness*
2. Scope
3. Goal
4. Product maturity
5. PM Method*
6. Size*
7. Industry Type

*Barriers

Which project factors should be prioritized for AI project success?

Size
Balancing project size with resources ensures feasibility.

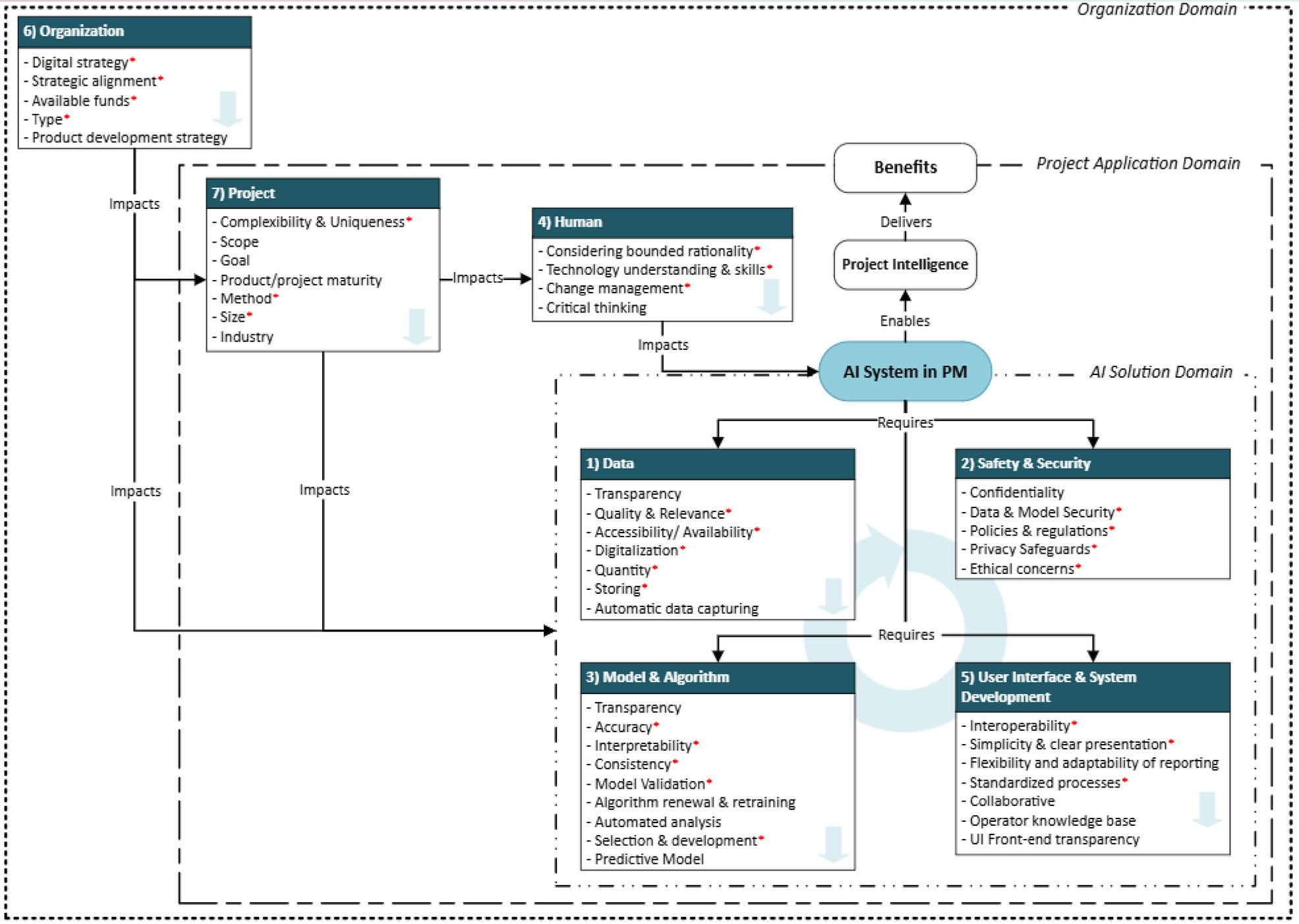
Methods
Choosing the right methods enhances efficiency and effectiveness.



Scope
Defining a clear scope ensures focus and prevents overextension.

Complexity
Managing complexity can streamline processes and reduce risks.

CONCEPTUAL FRAMEWORK TO IMPLEMENT AI IN PDM



Legend:

* Barriers for implementation

1) Groups numbered from most to least important

Factors listed from most to least important

CONCLUSION

✓Research Questions

✓Research Objective

Study limitations:

- Identified factors not exhaustive
- Limited qualitative data
- Limited quantitative data

Recommendations for further research:

- Application of the proposed framework
- Influence of an AI decision-making tool on bounded rationality and cognitive biases
- Ethical and legal implications of AI biases on PDM, cognitive biases and project outcomes

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THANK YOU FOR YOUR ATTENTION
QUESTIONS?

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