

**HIGH
TECH XXI**

 **NAZARBAYEV
UNIVERSITY**



Recombinant Innovation in the Technological Startup Ecosystem: A Case Study on High Tech XXI

CAPSTONE PROJECT

Supervisor:
Dr. Mariza Tsakalerou,
Associate Professor

Aida Ualiyeva
Aizhan Umerbayeva
Gaini Khassenova
Sayazhan Assainova
Yevgeniy Lukhmanov



April, 2024



Meet Our Team

Our team members have different backgrounds and work experience in a variety of fields. This helped us to look at the company's problem holistically, taking into account different perspectives.



**Aida
Ualiyeva**



**Aizhan
Umerbayeva**



**Yevgeniy
Lukhmanov**



**Gaini
Khassenova**



**Sayazhan
Assainova**

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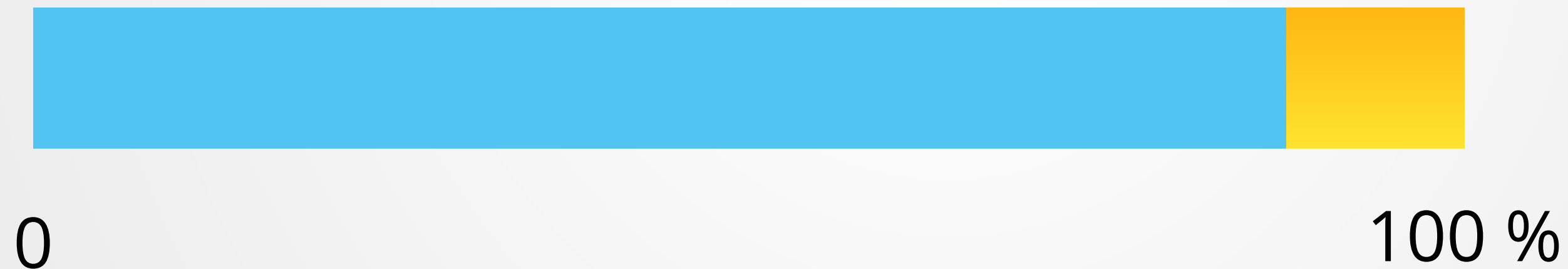
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Tech Startups Statistics

**90% of startups fail
within the first 5 years**



(Source CB Insights. (n.d.). Startup failure post-mortems: Top reasons startups fail.
<https://www.cbinsights.com/research/startup-failure-post-mortem/>)



Research Aim and Objectives



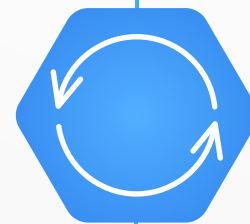
Analyze the **innovation dynamics** of High Tech XXI within the **startup ecosystem**.



Examine **internal** and **external factors** shaping High Tech XXI's **ecosystem**.



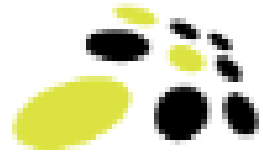
Assess the company's innovation system using a **maturity model**.



Develop a **causal loop diagram** illustrating factors influencing innovation.



Evaluate **factors driving employee motivation** and engagement.



Company Overview

- High Tech XXI is a local *startup* specializing in *automated monitoring systems* for buildings;
- Strategic alliance with Italian company facilitated *adaptation of European technologies*, leading to certified and localized products;
- The company use *recombinant innovation process*, combining existing knowledge or existing technologies to create new products.
- Core services include geotechnical products, hardware/software complexes like "AMS HT" and in-house calibration and verification.



Products



Digital interconnection module



Readout logger unit



Hydraulic load cell

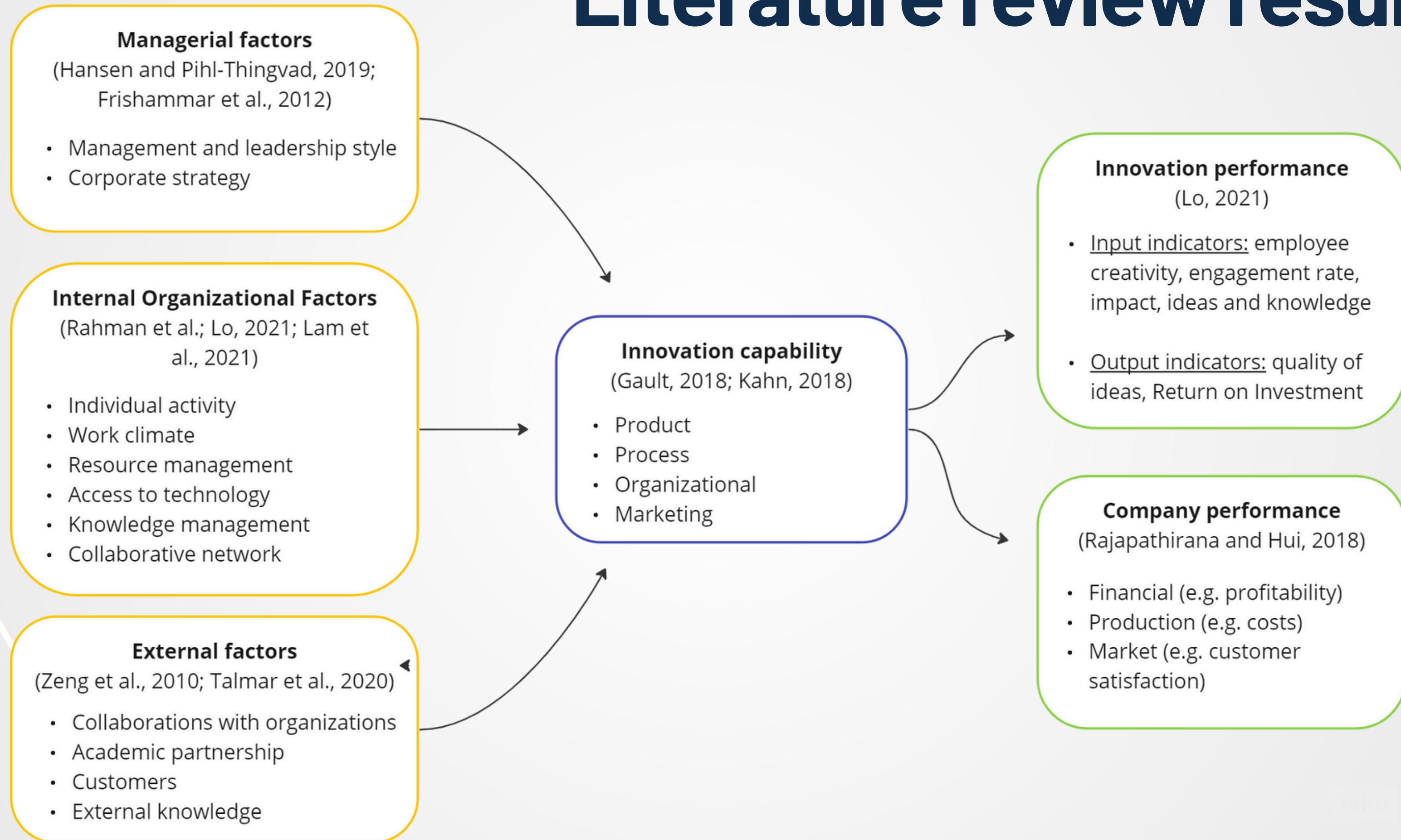


Soil pressure sensor



Innovation occurs when a **company has capabilities to innovate** (Bai et al., 2016)

Literature review results



Research
gaps



Identified problem of
the company



How does the *recombinant innovation ecosystem of technological startups*, exemplified by High Tech XXI, operate within the context of Kazakhstan, and what *factors influence its effectiveness*?

Research Approach

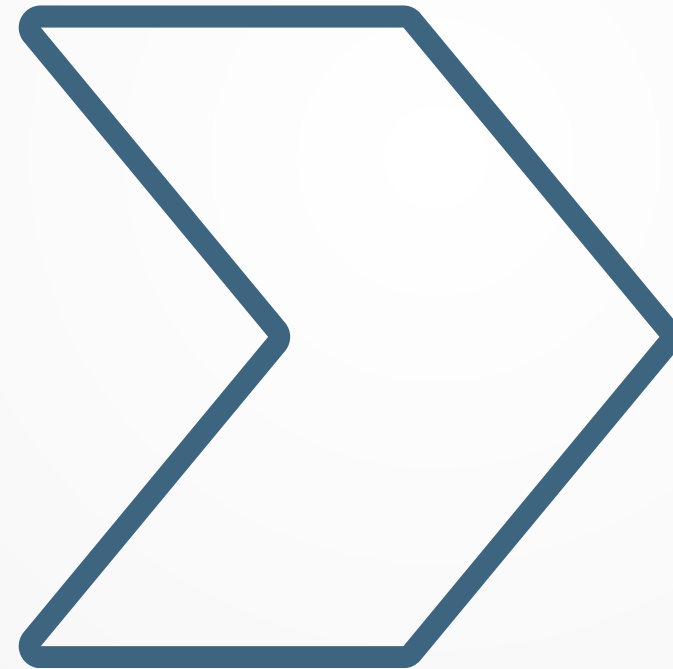
Qualitative

- Semi-structured interviews
- Open-ended questions



Quantitative

- Manager assessment survey
- Employee motivation survey



Causal Loop Diagram

Maturity Assessment

Employee Motivation Factors

Data Collection

Participant	Company	Job Title	Expertise / Role	Interview / Survey Aims	Interview	Survey
1	RoK Ministry of Energy	IT Architect	Standardization, construction industry, startups	External factors: government regulations	✓	
2	Astana-Technopark	Head of Technopark	Development of cooperation with NU, startups support	External factors: benefits and support from Technopark	✓	
3		Technical Director	Construction industry, supplier & customer relations, engineering solutions	External factors: partnerships, suppliers	✓	✓
4		Executive Director		Internal factors: maturity assessment, motivation	✓	✓
5	High Tech XXI	Senior Engineers (4 individuals)	Construction industry, engineering solutions, installation & maintenance of AMS	Internal factors: employee motivation		✓
6						
7						
8						
9		Technicians (3 individuals)				
10						
11						✓

Table 1. Summary of interview and survey participants

Data Analysis

Causal Loop Diagram



Phase 1: Factor aggregation (23 from literature review & 15 from interviews).

Phase 2: Structural analysis to quantify the relationships.

Phase 3&4: Development of initial CLD and further re-iteration.

Maturity Assessment



Survey with Technical Director: assessment based on six dimensions.

Insights into current state of innovation management practices.

Employee Motivation Factors



Analytic Hierarchy Process

Five motivation factors identified through literature review:

- Financial reward
- Promotion
- Recognition
- Avoidance
- Social (Peer pressure)

Dynamics of Innovation Ecosystem

Stakeholders Considered:

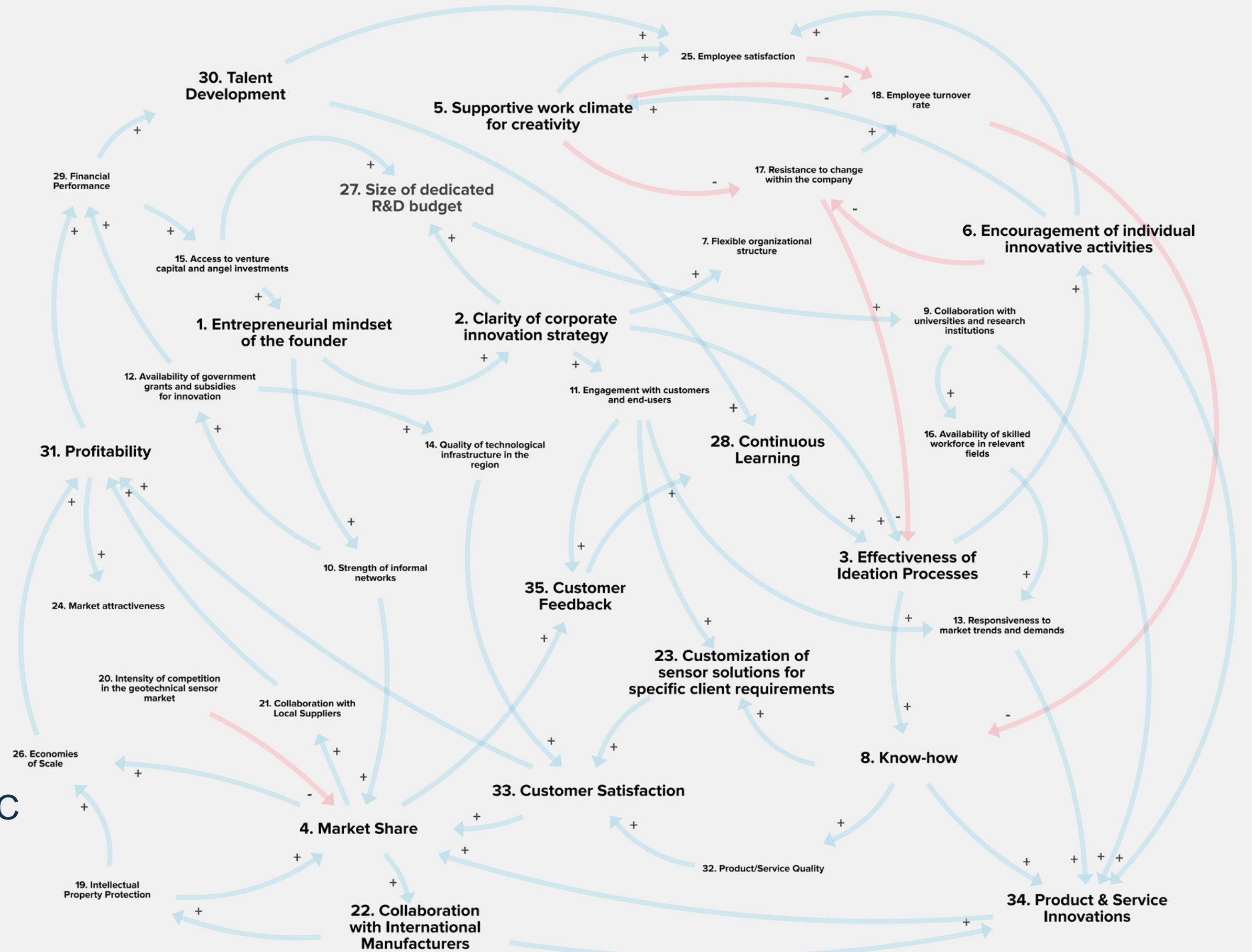
- High Tech XXI management
- High Tech XXI employees
- Local partners
- International partners
- NU and its Technopark
- Government
- Customers

Processes Considered:

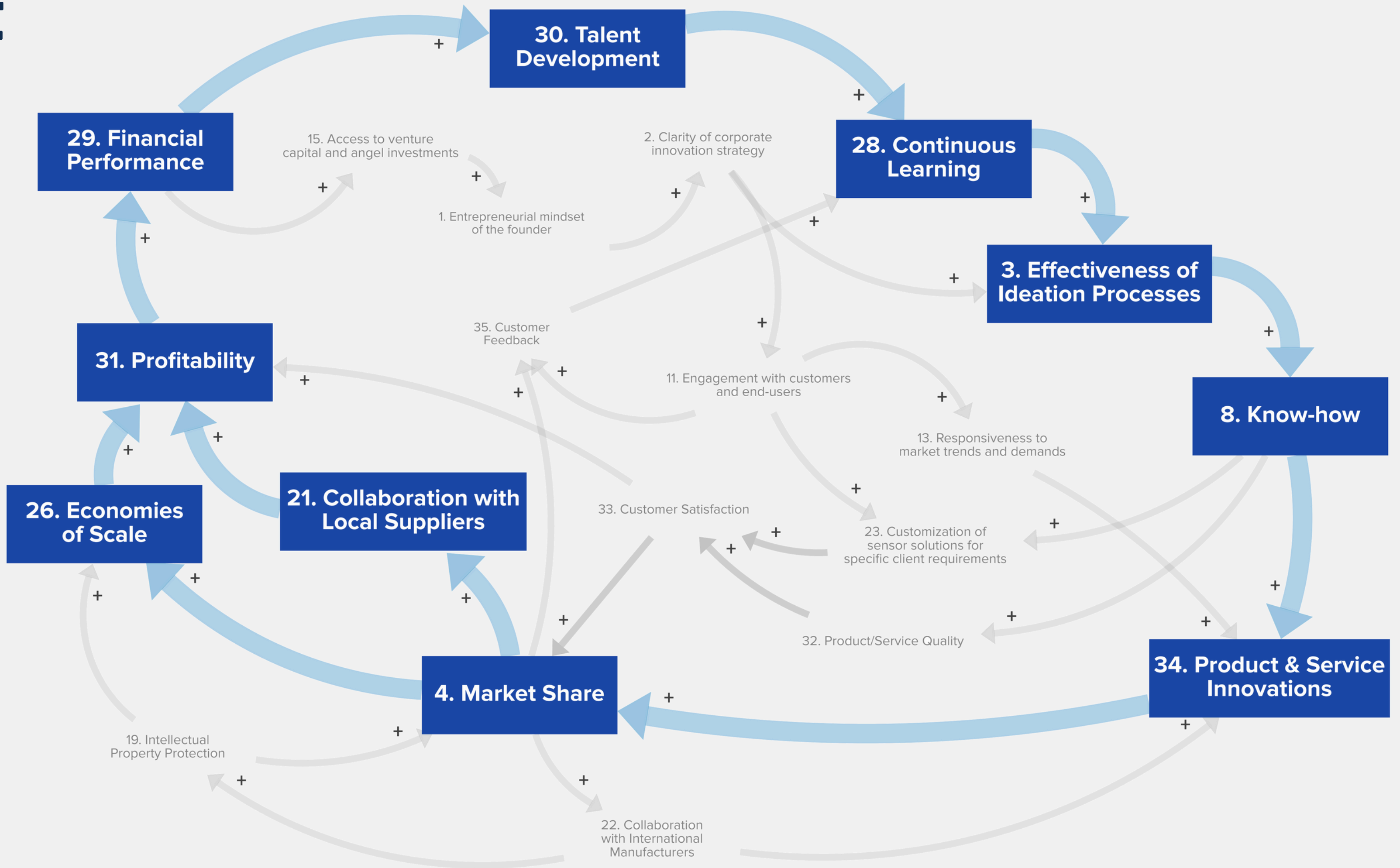
- Internal to the company
- External to the company
- Products and service improvements
- Performance indicators

Causal Loop Diagram:

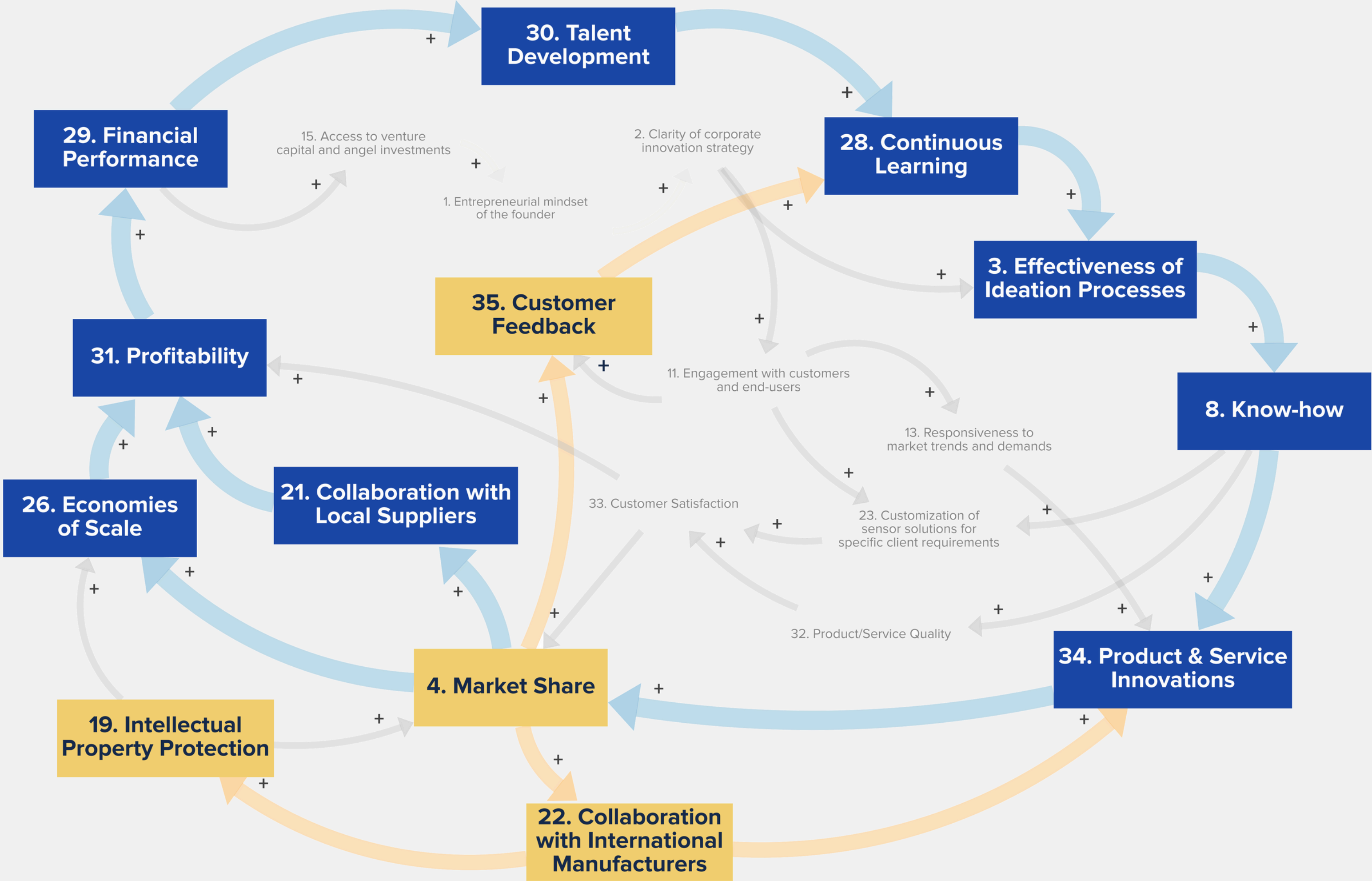
- 703 pairwise comparisons for MICMAC
- 36 elements and processes
- 64 strong direct casual relationships
- 413 causal loops



Talent Loop



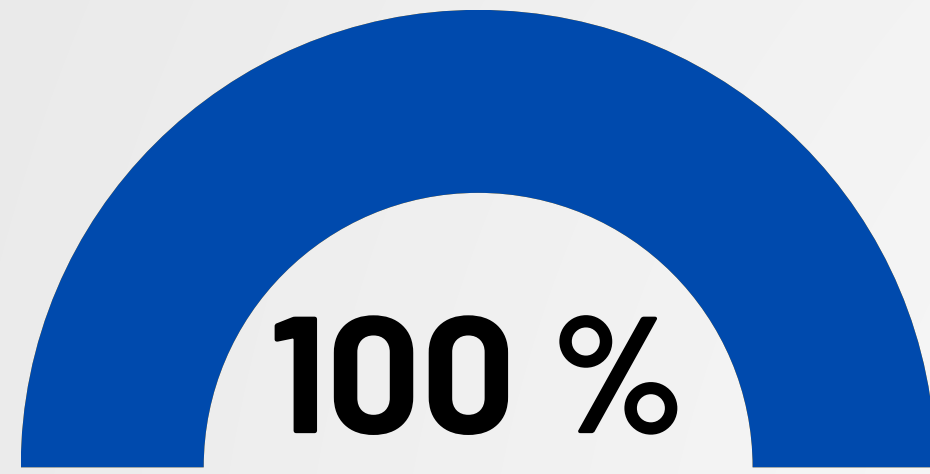
Role of Market Share



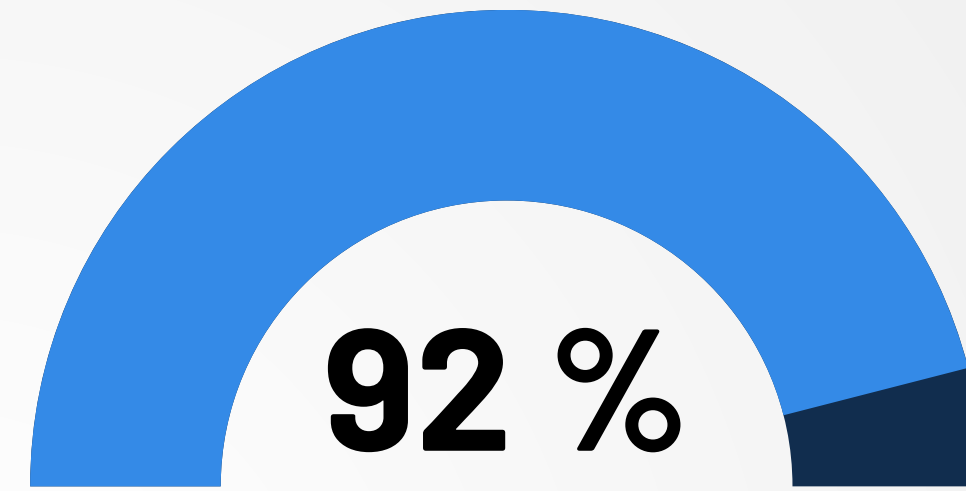
Assessment using a Maturity Model

Groups	Indicators			
Strategy	Alignment	Clarity	Flexibility	
Process	Formality and documentation	Ownership	Information sharing	
Performance evaluation	Criteria and timing	Structure	Accountability	
People	Leadership and team structure	Involvement and commitment	Training and development	Innovation culture and rewards
Portfolio management		Alignment and prioritization	Allocation and portfolio balance	
Market research	Integration and Proactivity	Competitive analysis	Testing rigor	

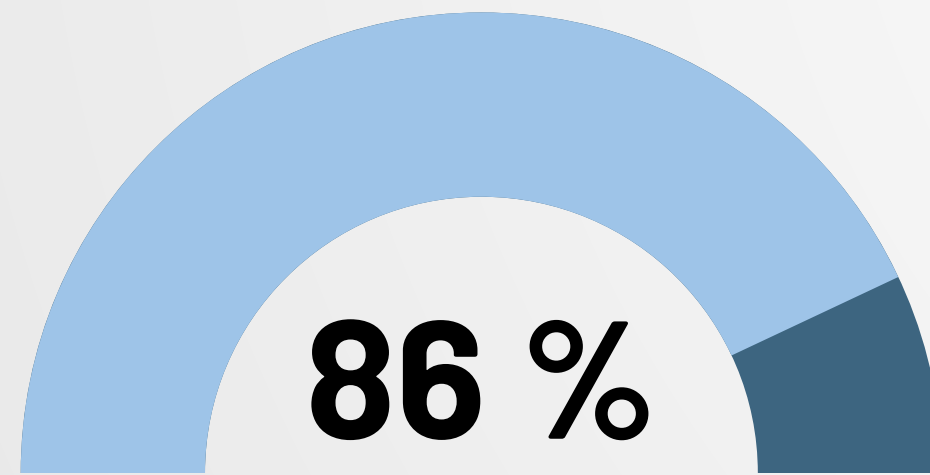
Assessment using a Maturity Model



■ Portfolio Management & Market Research

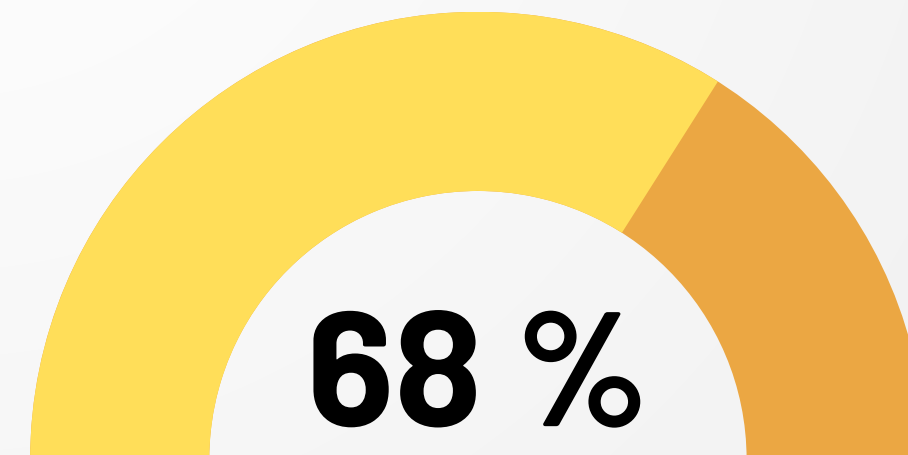


■ Strategy & Processes



■ People

Room for Improvement:
Innovative culture
Engagement
Learning

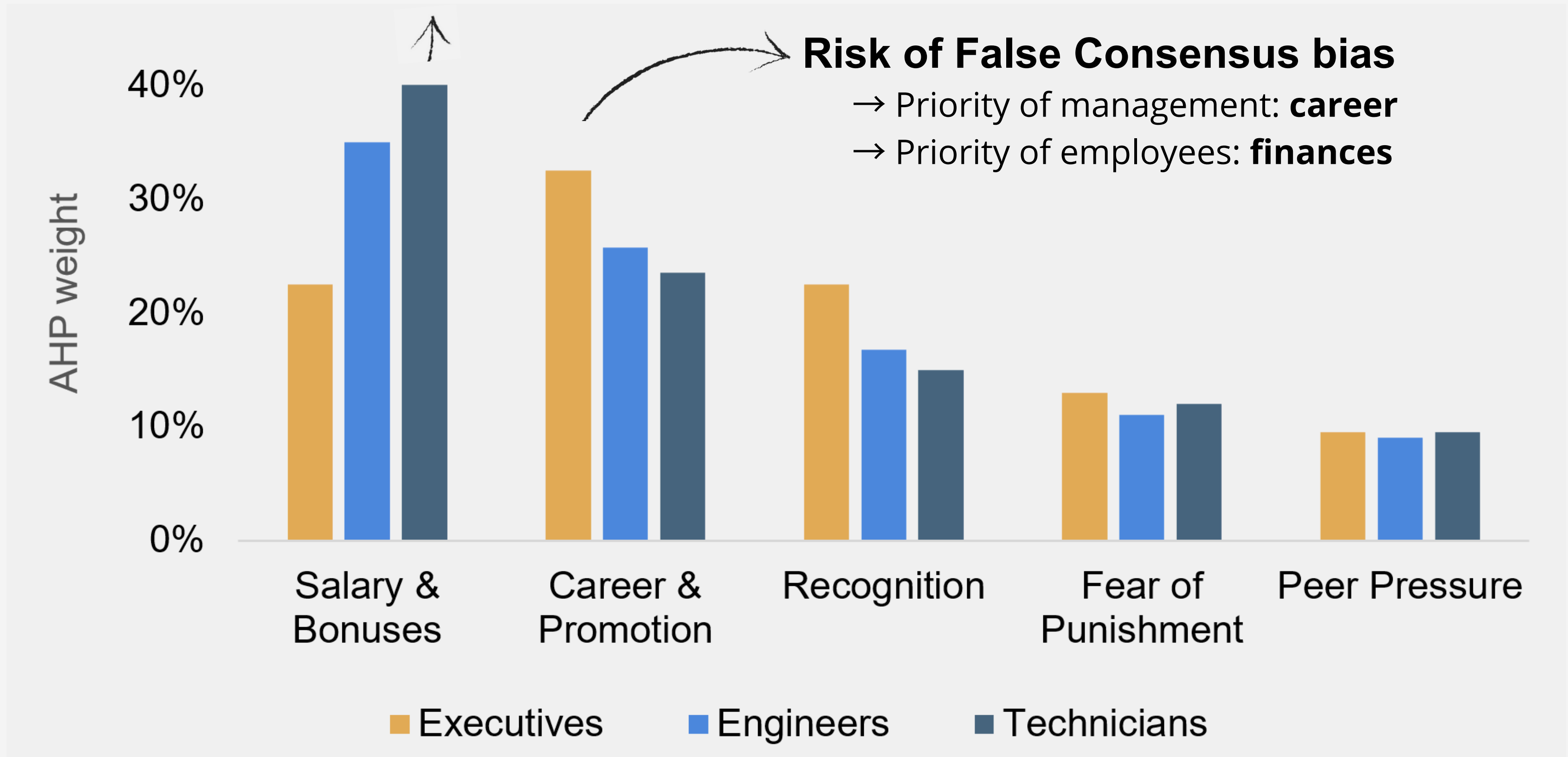


■ Performance Evaluation

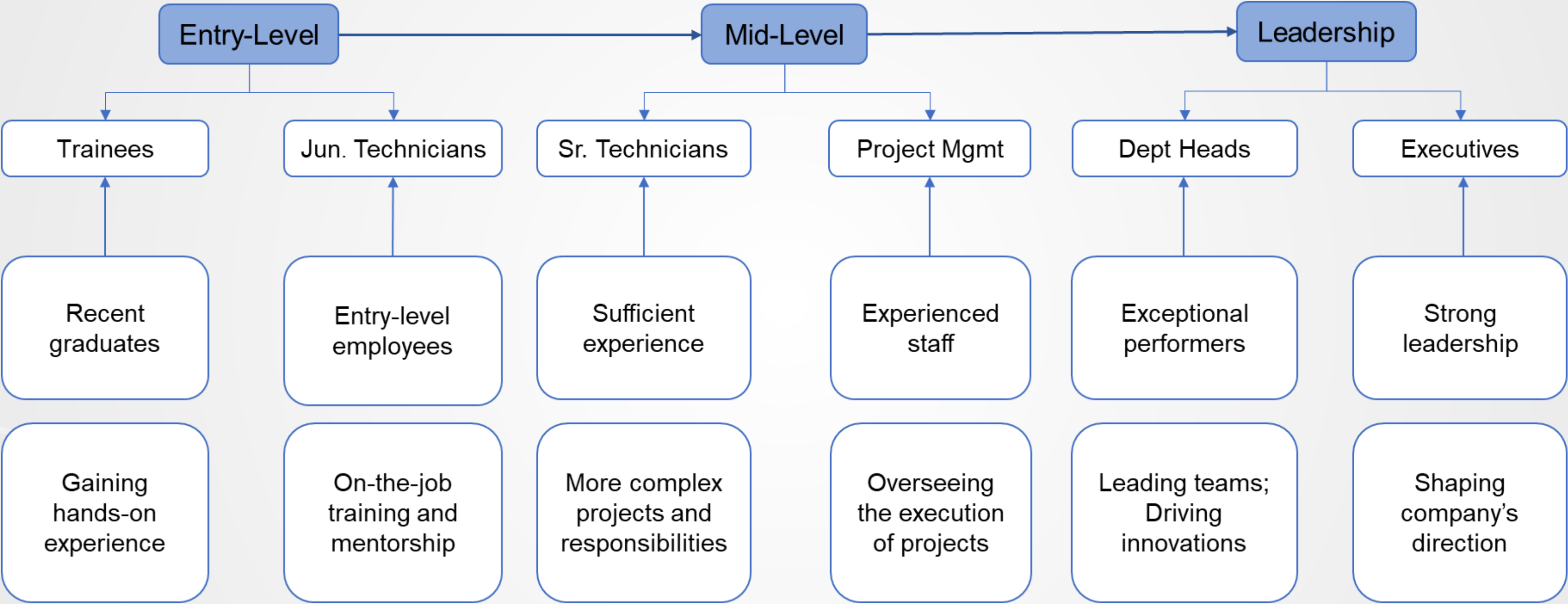
Room for Improvement:
Continuous data collection
Quality control team
External audit

Employee Motivating Factors

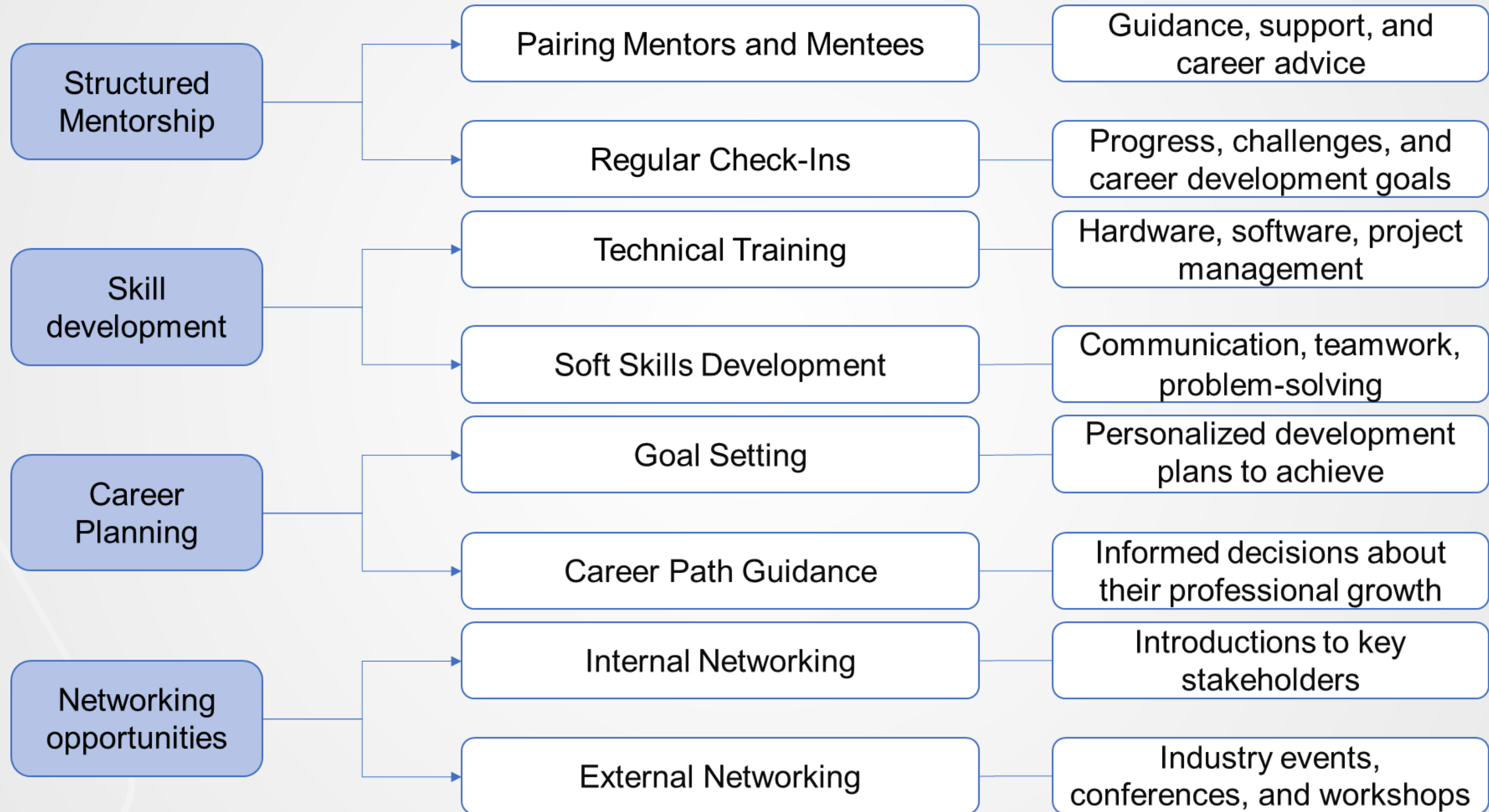
Main driver



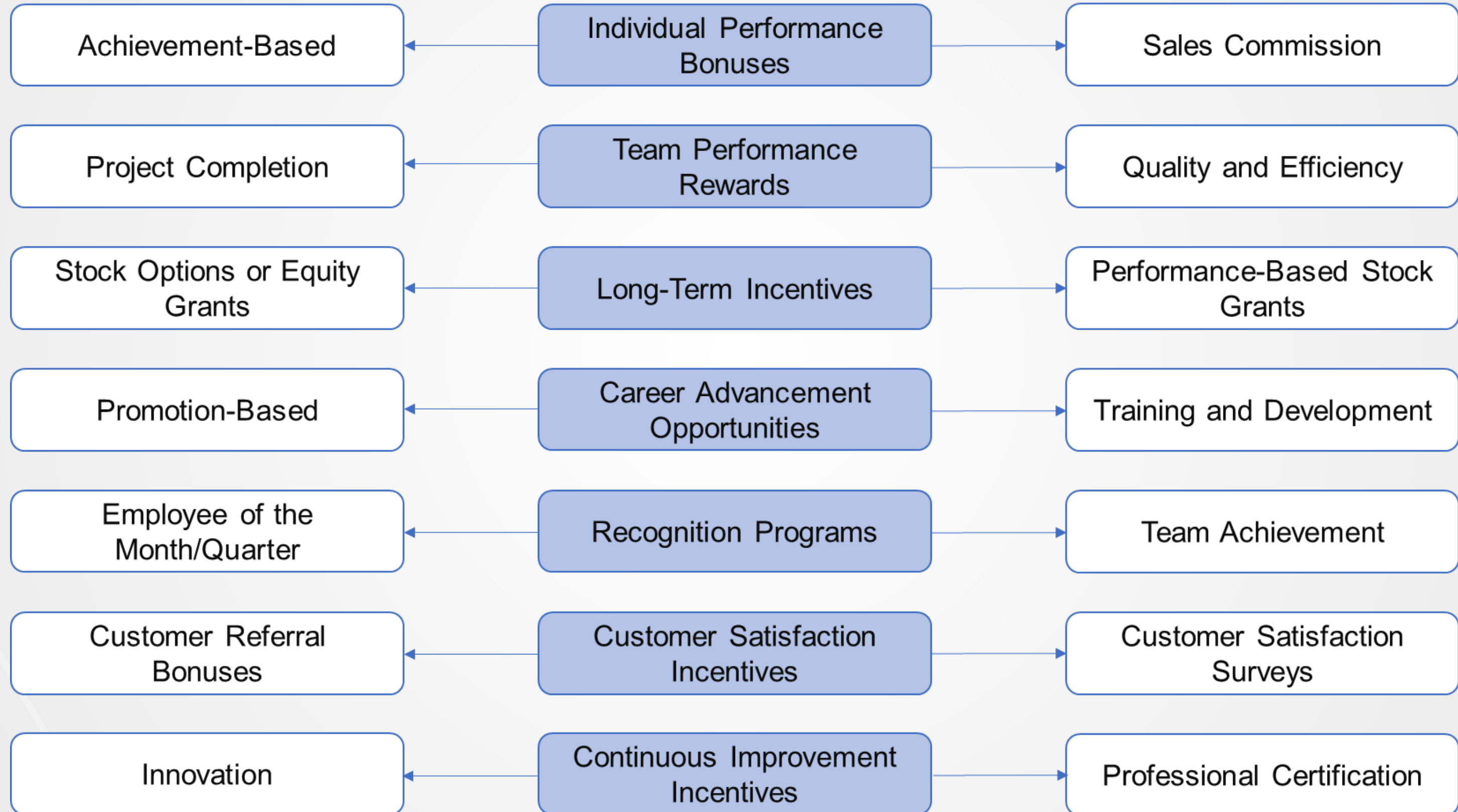
Career Path



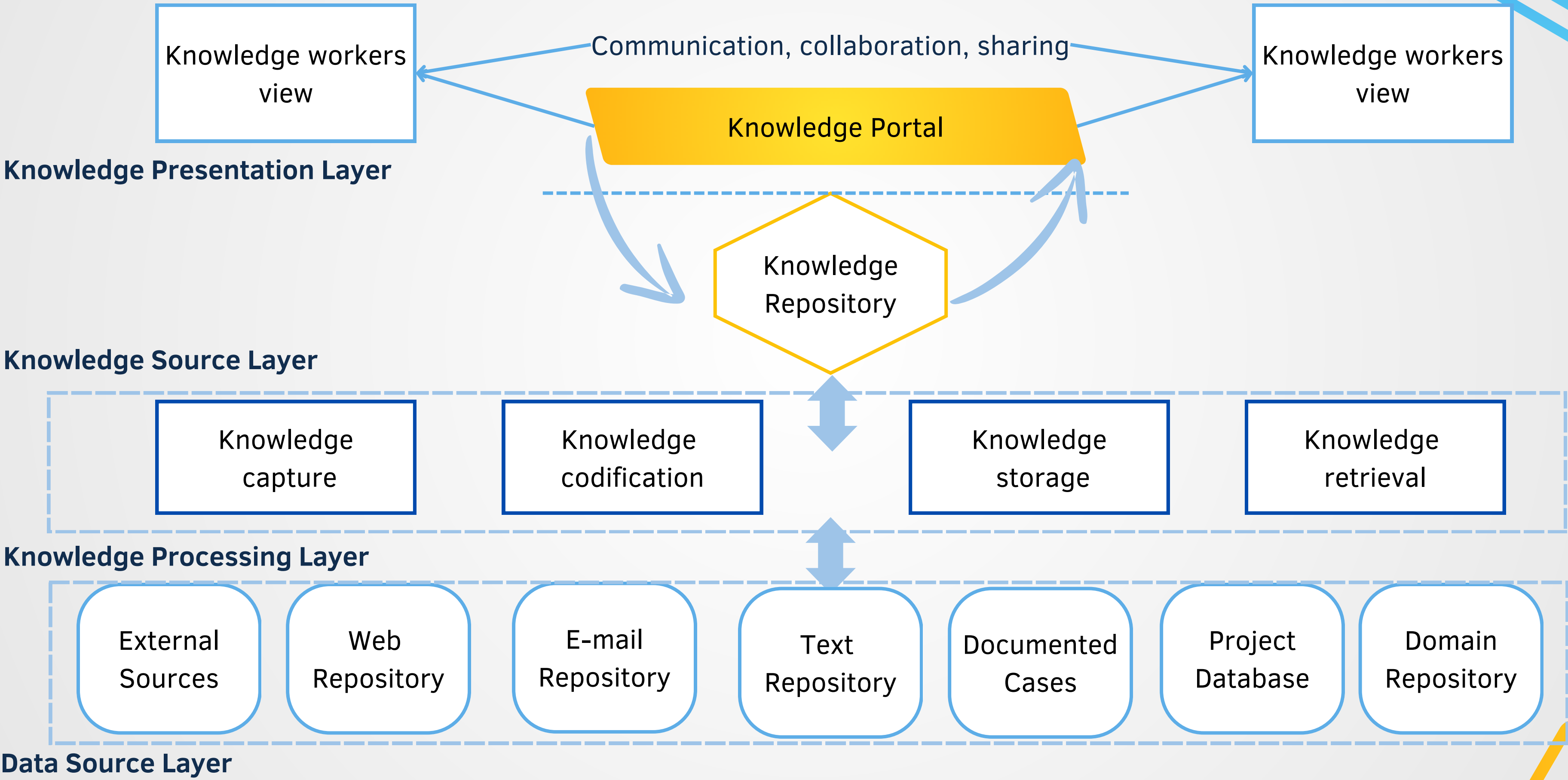
Mentorship Program



Performance-based Incentive Program



Knowledge Database Design



Conclusion

RQ (part 1): How does the recombinant innovation ecosystem of technological startups, exemplified by High Tech XXI, operate within the context of Kazakhstan ?

Semi-structured interviews
with different stakeholders

Literature review

Causal loop diagram



Internally, the company plays the
role of a hub for creativity

Externally, government incentives,
partnerships help quickly adapt to
changing market trends

Conclusion

RQ (part 2): What factors influence its effectiveness ?

Semi-structured interviews
with manager and employee
surveys

Causal loop diagram

Maturity model

AHP analysis of motivational
factors



Talent development

Effective ideation
process

Culture of innovation

Continuous learning



Conclusion

Four months of close cooperation with the company:



Applying management and engineering knowledge



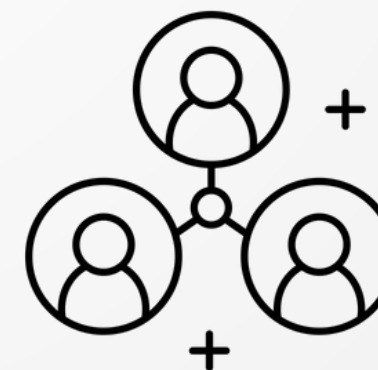
Main innovation processes of the company



Real-world challenges of the company



Innovation ecosystem of technological startups



Networking skills



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Thank You!

We express gratitude to our supervisor **Professor Mariza Tsakalerou** for constant support, motivation and guidance throughout the project.

We are grateful to **Timur Tursynbayev** of Ministry of Energy of RoK, **Serzhan Berdengorov** and **Elina Akhmetzhan** of Astana-Technopark, **Aidos Charizat** and his team of **High Tech XXI company** who provided us with valuable insights, facilitated the interviews and meetings, and supported our team during this project.

Special thanks to **Espresso Day** staff for delicious invigorating flat white.