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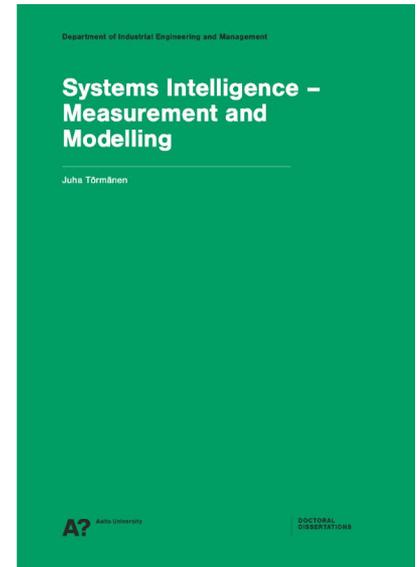
# Systems Thinking & Systems Intelligence

*Juha Törmänen, 29 March 2022*

Startup Philosophy

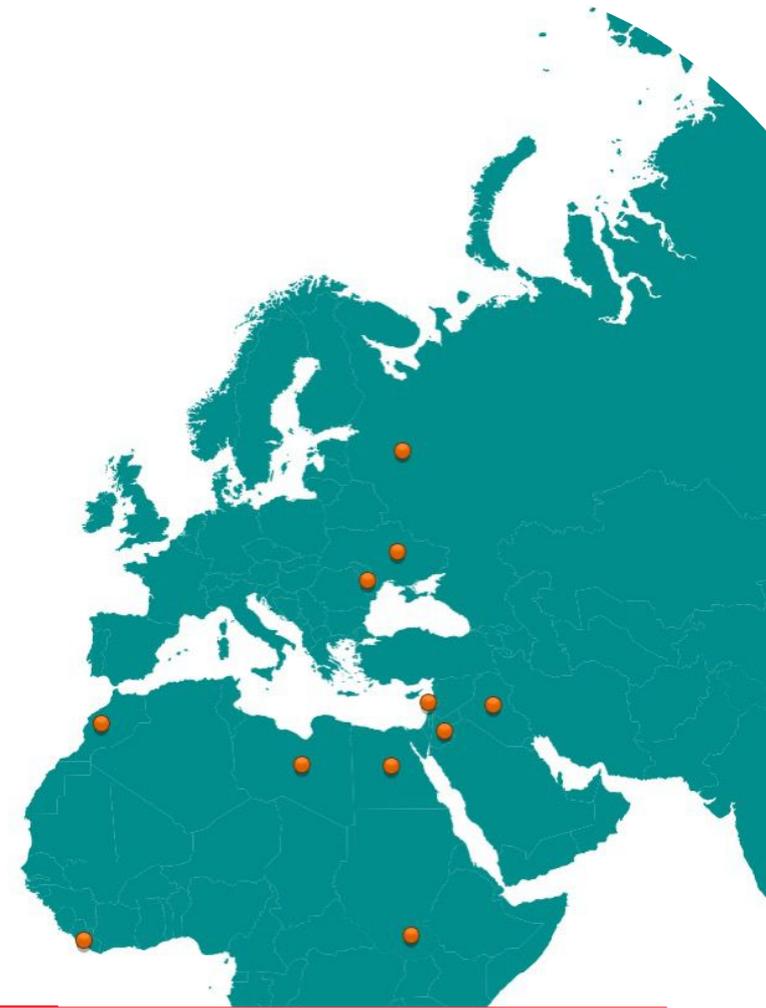
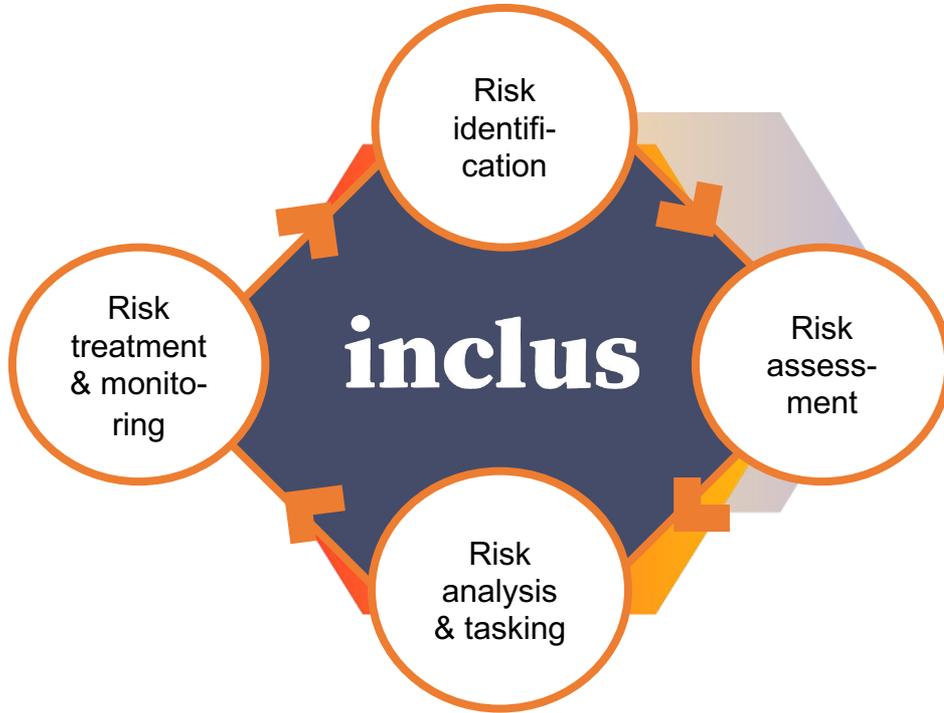
# Juha Törmänen

- **Doctor of Science (Tech.)  
Aalto Industrial Engineering and  
Management (2021)**
- **Startup entrepreneur, co-founder and  
CTO of Inclus Oy (since 2016)**



# inclus

# Inclus



# Lecture contents

1. **Systems thinking – what is it?**
2. **Five Disciplines of a Learning Organization**
3. **How to approach systems in practice?**
4. **Eight Dimensions of Systems Intelligence**
5. **Systems Intelligence in practice**

# Discussion

- What comes to your mind from the words **systems thinking**?
- Or/additionally, **systems sciences**?

# Systems sciences (as categorised by Wikipedia)

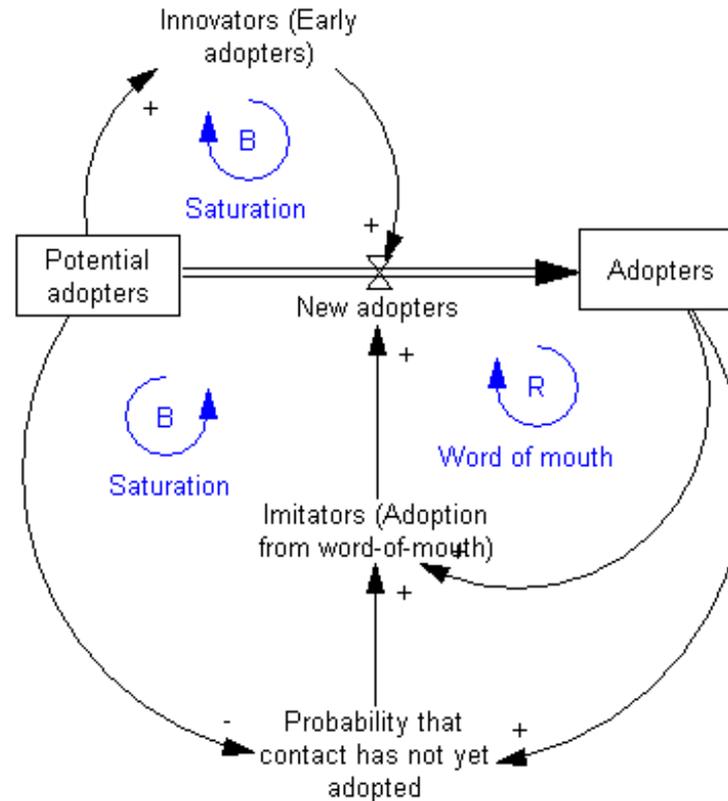
## Theoretical fields

- Chaos and dynamical systems
- Complexity
- Control theory
- Cybernetics
- Information theory
- General systems theory
- Hierarchy Theory

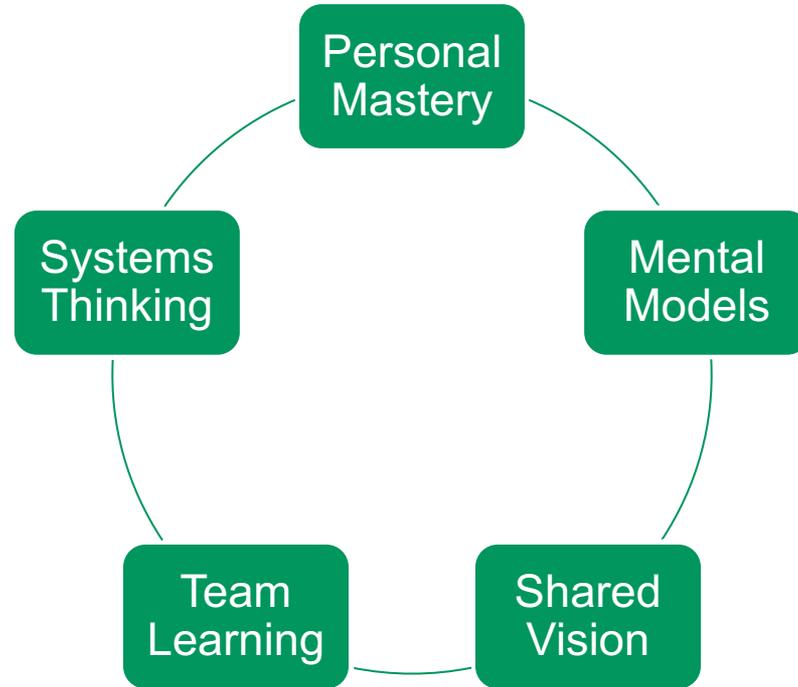
## Practical fields

- Critical systems heuristics
- Critical systems thinking
- Operations research and management science
- Soft systems methodology
- Systems analysis
- Systemic design
- Systems dynamics
- Systems engineering

# Systems dynamics



# Five disciplines of the learning organization (Peter Senge)



# Systems Thinking

**“Today’s problems come from yesterday’s solutions”**

**“Cause and effect are not closely related in time and space”**

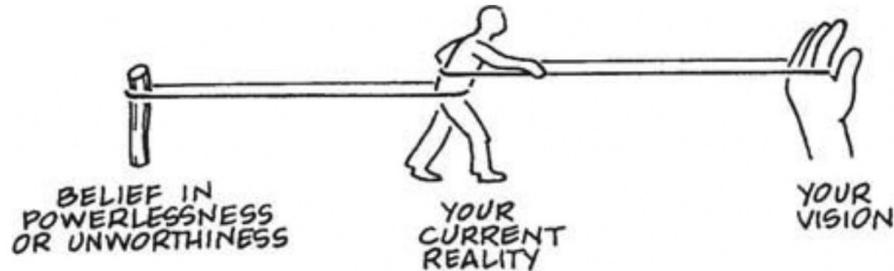
**“Dividing an elephant in half does not produce two elephants”**

**“The harder you push, the harder the system pushes back”**

**“Small changes can produce big results”**

# Personal Mastery

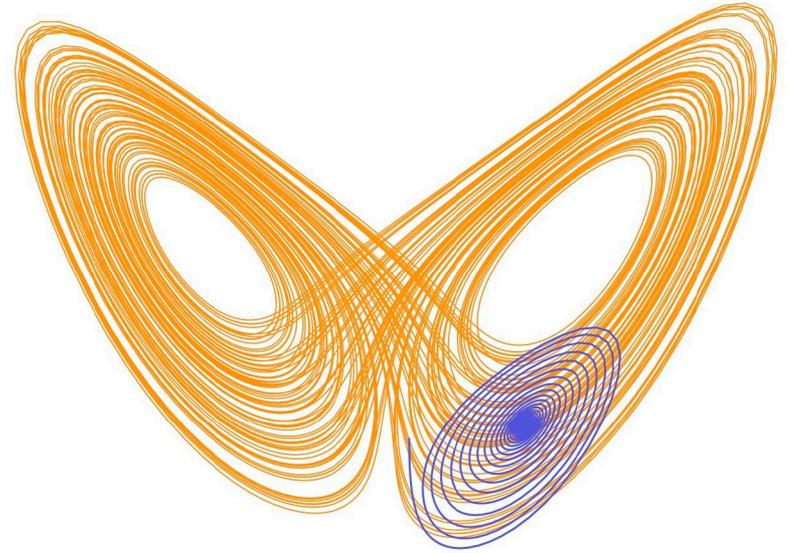
- Organizations learn through individuals
- Full personal development vs instrumental development
- Personal vision



Peter Senge / The Fifth Discipline

# Mental Models

- **Challenging theories and revealing hidden assumptions**
- **What I'm thinking vs what I'm saying**
- **Inquiry and advocacy**



# Shared Vision

Commitment

Enrollment

Genuine compliance

Formal compliance

Grudging compliance

Noncompliance

Apathy

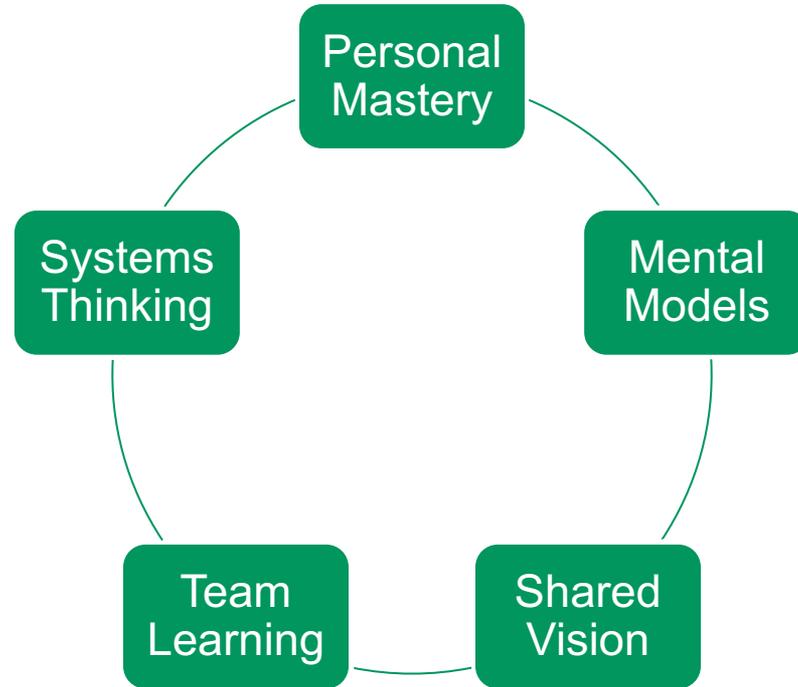
# Team Learning

**Dialogue and discussion**

**Promoting diverse opinions**

**Common understanding**

# Discussion: Has the world gotten anywhere in the five disciplines since 1990?



# Systems thinking: strengths and weaknesses

## Strengths

- Powerful tools
- Helps tackle difficult and unintuitive concepts
- Decades worth of research and practice available

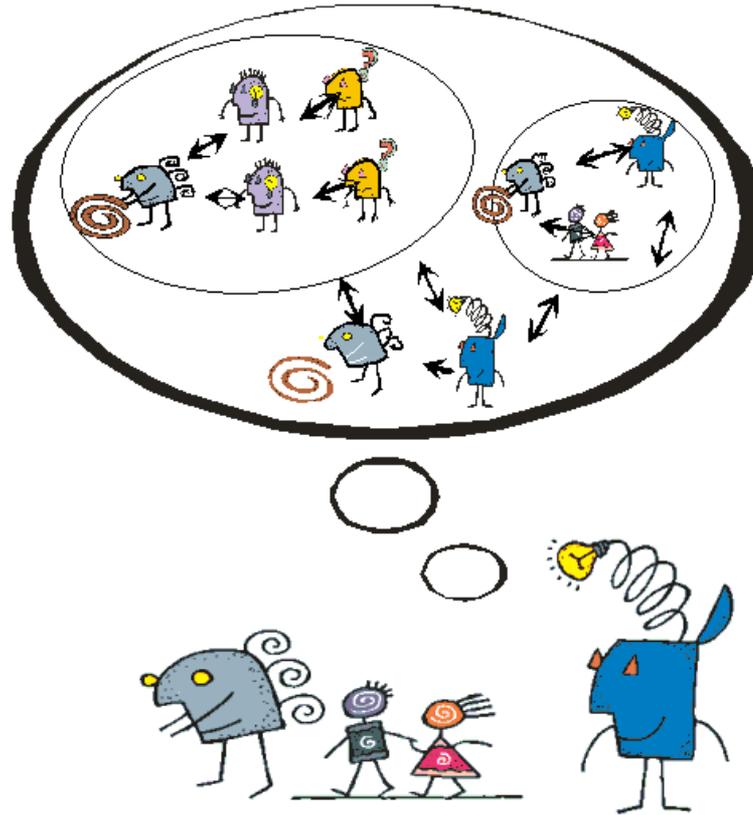
## Weaknesses

- Tools require care, concentration, and time
- Published literature often focused on big corps and consultants
- Challenging to reach an intuitive understanding in

# Burke's Serviceability

- **Language can be used purposively: what terms you use affects what results you get**
  - See e.g. Kenttä (2020): A Grammar of Interactional Wellbeing in Organizational Settings
- **Instead of making practitioners learn theory and tools, can we already achieve something by introducing useful terms?**
  - Systems Intelligence => “hey, maybe I could be smarter about these systems things and keep them in mind!”

# Systems Intelligence



# Systems Intelligence (SI)

- “Intelligent behaviour in the context of complex systems involving interaction and feedback”
- **Systems Intelligence Research Group**  
<http://systemsintelligence.aalto.fi>



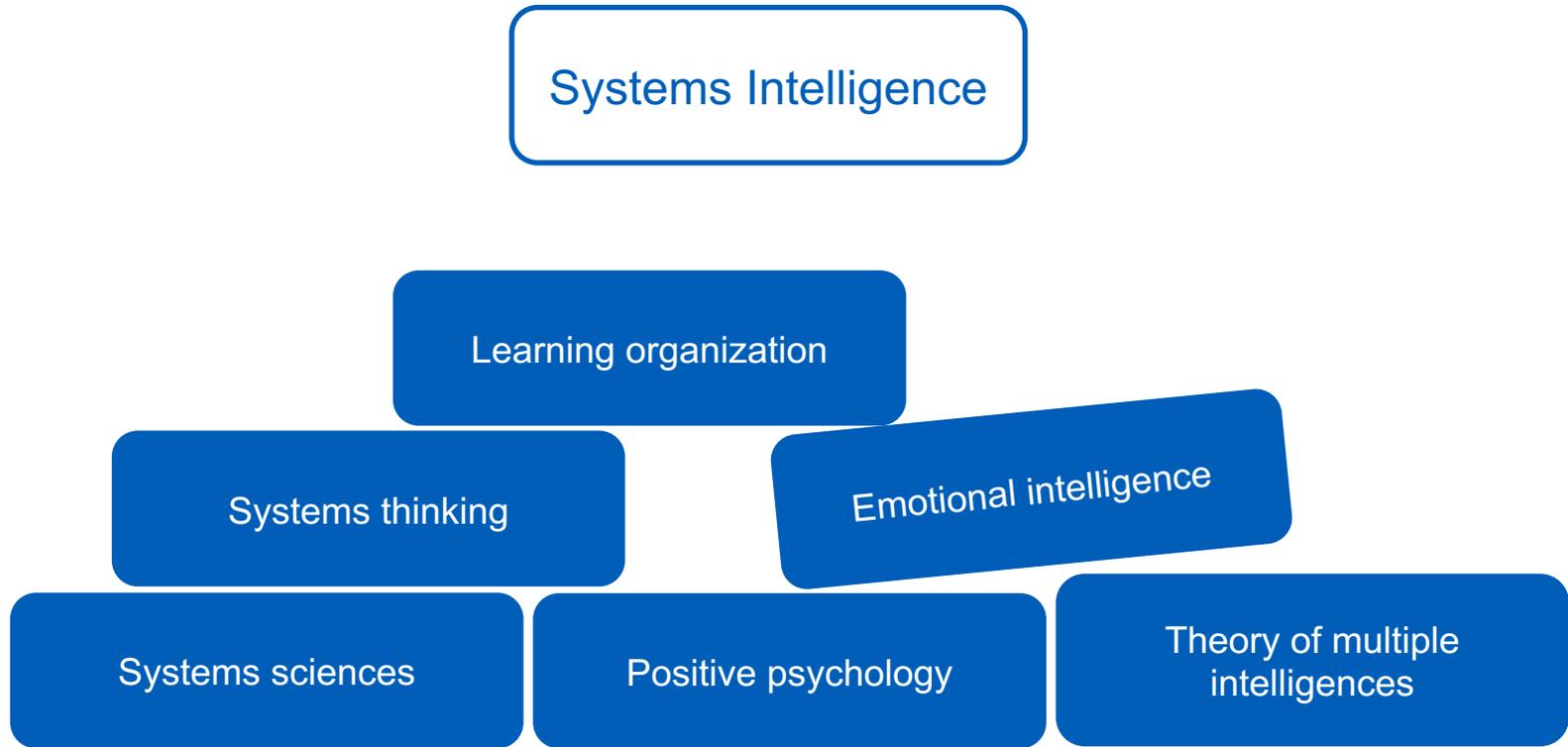
Raimo P.  
Härmäläinen



Esa  
Saarinen



# Background of SI

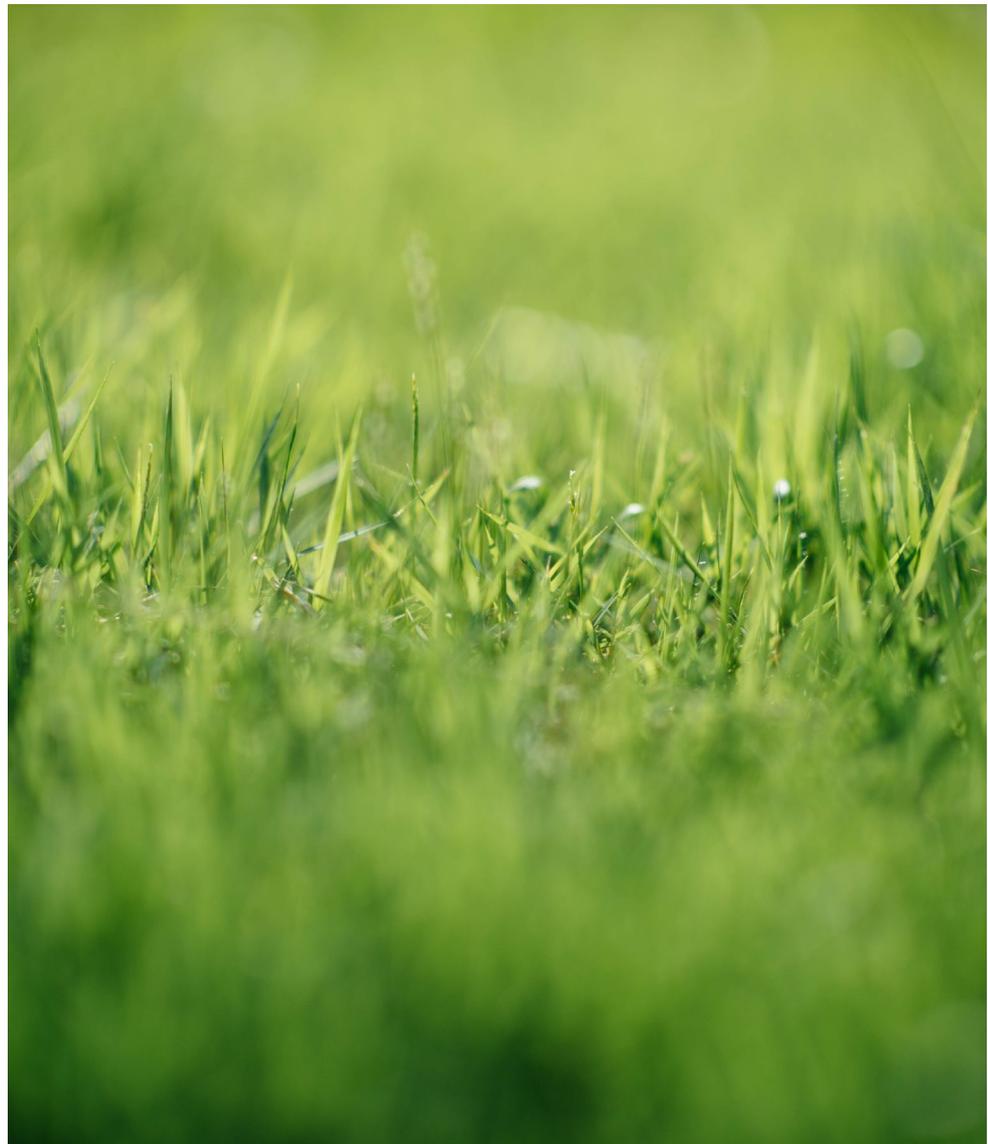




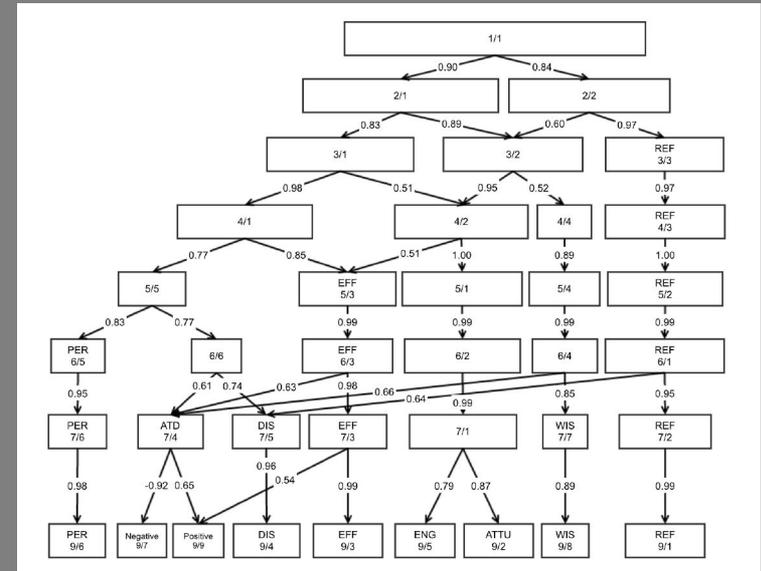
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**Up from the  
grassroots level,**

**from a practical  
perspective**



- 100+ phrases describing SI
- Initial pilot studies within the laboratory (N=15-30), revising and rewriting
- Large-scale study with students, day-care and industrial workers (N=1600)
- Exploratory analysis for identifying factors of SI
- Confirmatory analysis analysis for validating the inventory structure



# Eight dimensions of SI

perceiving	Systemeinen hahmotuskyky <b>Systemic Perception</b>	Sanaton yhteys <b>Attunement</b>
attitude	Positiivinen asenne <b>Positive Attitude</b>	Innostuva mieli <b>Spirited Discovery</b>
thinking	Ajattelevaisuus <b>Reflection</b>	Viisas toiminta <b>Wise Action</b>
acting	Rakentava toiminta <b>Positive Engagement</b>	Aikaansaavuus <b>Effective Responsiveness</b>

# Systemic Perception

**OVERALL PICTURE**

We form a rich overall picture of situations

**SITUATIONAL AWARENESS**

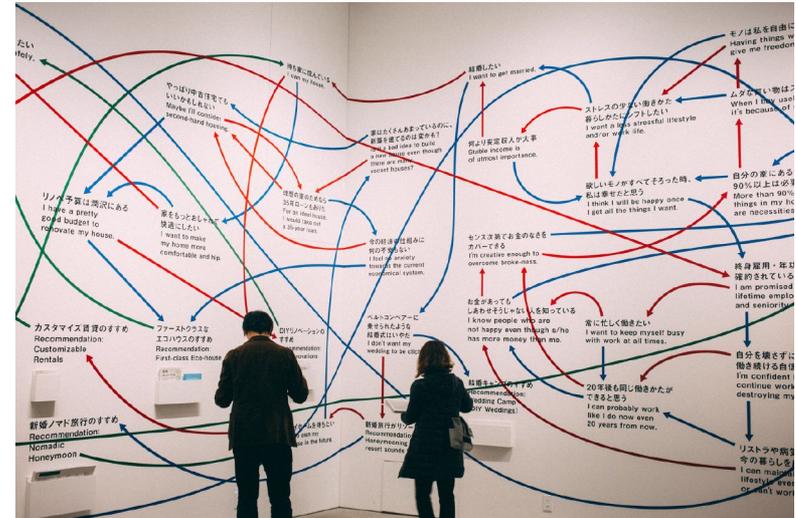
We easily grasp what is going on

**DETAILS AND BIG PICTURE**

We keep both the details and the big picture in mind

**SEEING THE ESSENTIALS**

We get a sense of what is essential to a given situation



# Attunement



## BEING CONSIDER- ATE

We take into account what others think of the situation



## APPROVING

We approach people with warmth and acceptance



## LISTENING

We let other people have a voice



## BENEVOLENCE

We are fair and generous with people from all walks of life



# Positive Attitude

**EXPLAINING AWAY**  
We do not explain away our mistakes

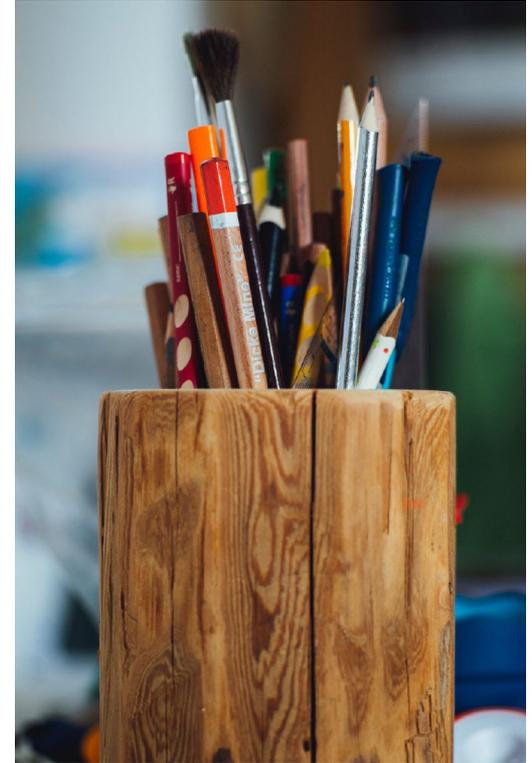
**OPTIMISM**  
We have a positive outlook on the future

**RESILIENCE**  
We do not let problems in our surroundings get us down

**COMPLAINING**  
We do not easily complain about things



# Spirited Discovery



# Reflection

## PERSPECTIVES

We view things from many different perspectives

## SELF REFLECTION

We pay attention to what drives our behaviour

## CONSEQUENCES

We think about the consequences of our actions

## PERSONAL GROWTH

We make strong efforts to grow as persons



# Wise Action

## HUMBLENESS

We are willing to take advice

## PATIENCE

We take into account that achieving good results can take time

## WISDOM

We are wise in our judgements

## SELF CONTROL

We keep our cool even when situations are not under control



# Positive Engagement



# Effective Responsiveness



## BEING PREPARED

We prepare ourselves for situations to make things work



## PERSEVERANCE

We do not easily give up when facing difficult problems



## PRIORITISATION

We are able to put the first things first



## TAKING INITIATIVE

When things don't work, we take action to fix them



# Discussion:

## How can the dimensions of SI support entrepreneurship?

perceiving

**Systemic Perception**

**Attunement**

attitude

**Positive Attitude**

**Spirited Discovery**

thinking

**Reflection**

**Wise Action**

acting

**Positive Engagement**

**Effective Responsiveness**

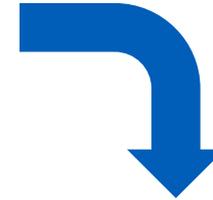
# Systems Intelligence Self Evaluation

The following phrases refer to characteristic ways of thinking, feeling, and acting. Please indicate as honestly and truthfully as possible how often you think, feel, and behave the ways described. Think of your current everyday life and then indicate the frequency which you think suits best. Please choose the response that feels most "natural" to you if you are uncertain as to what to answer.

The questionnaire will take about 5 minutes to complete. Please answer all the 32 questions. After submitting your answers, you will immediately see an estimate of what factors of Systems Intelligence you are especially proficient with, and where you have the most possibilities for growth.

## Acting and living in systems

	never	very seldom	seldom	some-times	often	very often	always
1. I contribute to the shared atmosphere in group situations	<input type="radio"/>						
2. I easily grasp what is going on	<input type="radio"/>						
3. I approach people with warmth and acceptance	<input type="radio"/>						
4. I think about the consequences of my actions	<input type="radio"/>						
5. I am willing to take advice	<input type="radio"/>						
6. I'm able to put the first things first	<input type="radio"/>						
7. I bring out the best in others	<input type="radio"/>						
8. I have a positive outlook on the future	<input type="radio"/>						
9. I take into account that achieving good results can take time	<input type="radio"/>						
10. I am wise in my judgments	<input type="radio"/>						
11. I keep both the details and the big picture in mind	<input type="radio"/>						
12. I let problems in my surroundings get me down	<input type="radio"/>						
13. I am fair and generous with people from all walks of life	<input type="radio"/>						



Self evaluation available at:  
<http://salserver.org.aalto.fi/sitest/en/>

## Thank you for your answers!

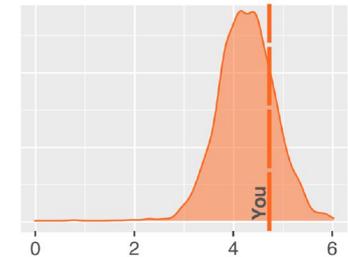
Based on your answers, we have estimated your strengths and possibilities for growth in the eight subfactors of Systems Intelligence:  
*Systemic Perception, Attunement, Attitude, Spirited Discovery, Reflection, Wise Action, Positive Engagement, Effective Responsiveness*

### Your strengths

- **Wise Action:** You can face things maturely and consider your actions. (92%)
- **Attitude:** Your positive attitude helps you to succeed and to open new doors in your life. (91%)
- **Attunement:** You have an open mind. You listen and understand other people. (81%)

### Possibilities for growth

- **Reflection:** Think how you think! Try to see your activities honestly and sincerely. (34%)
- **Systemic Perception:** Question if you have seen the bigger picture or if you have focused on one narrow aspect only. Try to see how human and non-human factors interact with one another. (46%)



On average, your SI score was higher than 72% of all participants

# Current inventories

## Self-report

Systems Intelligence Inventory

*The Learning Organization, 2016*

## Peer

Perceived Systems Intelligence  
and Performance in  
Organizations

*The Learning Organization, 2021*

## Organization

On the Systems Intelligence of a  
Learning Organization:  
Introducing a New Measure

*Human Resource Development  
Quarterly, 2021*

**I approach people with warmth  
and acceptance**

🇫🇮 Lähestyn ihmisiä lämpimän  
hyväksyvästi

**My colleague approaches  
people with warmth and  
acceptance**

🇫🇮 Kollegani lähestyy ihmisiä  
lämpimän hyväksyvästi

**In my organization, people  
approach each other with  
warmth and acceptance**

🇫🇮 Organisaatiossani ihmiset  
lähestyvät toisiaan lämpimän  
hyväksyvästi

# Practical applications

## Organizational development

Entire organization evaluates how systems intelligent they are – results are studied to see how the organization can be improved

## Training and education

Systems Intelligence can help students understand their skills better and learn modern work life skills

## Coaching

Supervisor or employee evaluates themselves and asks for peer evaluations from others – coach supports development based on results

## Everyday life

Learning SI concepts will hopefully help you be more systems intelligent in your personal and professional life!

# More reading

- **Senge – The Fifth Discipline**  
Doubleday/Currency, 1990
- **Meadows – Thinking in Systems: A Primer**  
Chelsea Green Publishing, 2008
- **Hämäläinen, Jones, Saarinen – Being Better Better: Living with Systems Intelligence (free e-book)**  
[http://systemsintelligence.aalto.fi/being\\_better\\_better/](http://systemsintelligence.aalto.fi/being_better_better/)
- **Törmänen – Systems Intelligence – Measurement and Modelling**  
<http://urn.fi/URN:ISBN:978-952-64-0468-4>
- **SI essay collections**  
<http://systemsintelligence.aalto.fi/publications.html#books>