

Systems Intelligence (SI)

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Topics for Discussion Could it be that ...

- SI is a hidden/ignored innate capacity in all of us
- SI is an iconic concept stimulating thinking and action
- Becomes a personal learning challenge
- Is an essential prerequisite for future leadership
- An asset in personal and organizational life
- Can be a wisdom when negotiating and resolving complex global conflicts and environmental problems
- Can be introduced and trained in schools
- SI manifests itself in many ways in our everyday life

Definition of Systems Intelligence

- Intelligent behaviour in the context of complex systems involving interaction, dynamics and feedback
- A subject acting with **Systems Intelligence** engages successfully and productively with the holistic feedback mechanisms of her environment
- She perceives herself as part of a whole, the influence of the whole upon herself as well as **her own influence upon the whole**
- By observing her own interdependence in the feedback intensive environment, she is able to act intelligently

Systems Intelligence

- Combines human sensitivities with engineering thinking with the idea of making things work
- **Systems Intelligence** is a mirror that helps to identify productive forms of action one already follows intuitively
- Our conviction is that **Systems Intelligence is a key form of human intelligence**
- A fundamental element in the adaptive human toolbox
- It is a competence that can be improved by learning

The Fifth Discipline (Senge 1990)

Cornerstones of learning organizations:

- Personal Mastery
- Mental Models
- Shared Vision
- Team Learning
- Systems Thinking

Systems Intelligence is the fundamental link between Personal Mastery and Systems Thinking.

Multiple Intelligences (Howard Gardner 1983)

- Linguistic Intelligence
- Musical Intelligence
- Logical-Mathematical Intelligence
- Spatial Intelligence
- Bodily-Kinesthetic Intelligence
- The Personal Intelligences – intra / inter
- Gardner: These do not yet explain higher-level cognitive capacities e.g. common sense, metaphorical capacity or wisdom

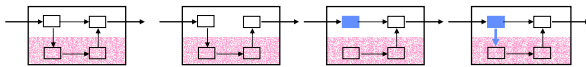
SI and Multiple Intelligences

- SI points beyond the forms of intelligence of Gardner (Multiple Intelligences), Goleman and others (Emotional Intelligence, Social Intelligence)
- **Links intelligence with the concept of system**
- **Systems Intelligence is another important higher level human cognitive capacity**
- Inspiration from the work of Peter Senge (1990)
- **Systems Intelligence** is a survival asset we have as a species

Systems Intelligence links with...

- **Systems Thinking** (Churchman 1968, Senge 1990, Oshry 1996, Checkland 1999, Flood 1999,)
- **Organizational theories and learning, Action research, Philosophical Practice and Dialogue** (Argyris&Schön , Schein ,Bohm 1980, Isaacs 1999,)
- **Socratic tradition in philosophy** which emphasises conceptual thinking for the purposes of the good life (Hadot 1987, Long 2002)
- **Therapeutic thinking, positive psychology and situation analysis** (Bateson 2000, Goffman 1974, Seligman 2002)
- **Theories of Decision Making and Problem Solving** (Simon 1956, Keeney 1992, Kahneman, Tversky 2000)

Systems Thinking - the common understanding



- Observes interdependencies and wholes
- Views matters from different perspectives
- Especially through the eyes of others
- **Becomes Systems Intelligence** when a person takes active personal responsibility for her actions within the system

Systems Thinking is only the first step

- Emphasizes the importance of wholes and perspectives as it **conceptualises and models** systems of interaction and feedback **from outside**
- **Can become a trap when one only sees systems from outside** and does not recognize herself an active part of them

Systems Intelligence Basic ideas – Structures

- Structure produces behaviour
- **Beliefs** regarding structures produce behaviour
- **Beliefs regarding the beliefs** others have regarding structures, produce behaviour
- Structures of co-operation are fundamentally based on the assumptions and meta-assumptions people make of others involved in that system of co-operation
- Structures determine the patterns and dynamics of interaction

Systems can take over

- People can get caught in systems (organizations) that serve nobody's interest
- There does not need to be an external reason for the particulars of a system
- Yet people in the system can feel helpless regarding their possibilities of changing the system
- In most systems, each subject separately reacts to the system without seeing the cumulative overall effect of the reactive behaviours on the others

From Systems Thinking ...

- The environment and one's place in it are perceived in terms of interconnectivity and interdependence
- The systems perspective wants to see the world as composed of systems, to examine these entities as wholes

But also:

- "Part" and "Whole" are relative abstractions
- They are mental constructs, which are relative to the perspective adopted i.e. subject to redefinition
- Boundaries of a system can always be redrawn

... to Systems Intelligence

- Unlike Systems Thinking (in its narrow meaning), **Systems Intelligence is primarily outcome-oriented and not a descriptive effort only**
- Unlike Systems Thinking, Systems Intelligence involves driving change and actively embracing change
- Becomes a challenge for personal learning
- **The theoretical understanding of Systems Thinking does not need to increase Systems Intelligence**

Thinking about Thinking

- Systems Intelligence begins when a **person starts to re-think her thinking** regarding her environment and the feedback structures and other systems structures of that environment
- Identifying one's favoured framing patterns, challenging them and adjusting them accordingly
- **A Systems Intelligent person** will acknowledge the limitations of her thinking and mental models particularly through **challenging her own thinking**

Seeing oneself in the system

- The impact of one's behaviours and interaction patterns upon the behaviours of others
- The impact of other agents' feedback on my behaviour
- The impact of the current system on all of us is in the long run
- The modes of conformity I have already adopted as a result of established practices
- The modes of conformity the others have already adopted as a result of established practices
- The desired ideal state I would like to reach with the others

SI Connects Engineering Thinking with Emotions

- From reactive behaviour into the intelligent management of situations, feelings and the whole
- Human emotions are essential – they cannot be ignored – their systemic effects need to be taken into account intelligently
- **A systems engineering perspective to the systemic impacts of emotions**

Simple acts of Systems Intelligence in Everyday Life

- Appreciation
- No judgements
- Interest
- Humor
- Listening
- Thanking
- Encouragement
- Friendliness

Managing the invisible

- In most human systems and organizations the true system often includes **hidden subsystems** such as **fear and trust** generation or **belief** formation
- It is very easy to forget to use behavioural input variables controlling such invisible parts
- To understand the system, **it can be more important to know what is not produced than what the standard output is**
- A Systems Intelligent approach acknowledges and aims to identify and understand both the visible and invisible part of the system and find inputs to impact their behaviour in a positive way

Optimism for change

- Systems Intelligence focuses on changes as leveraged by the human mental world and the systemic nature of life around us
- Systems Intelligence acknowledges that **beliefs influence actions and actions influence beliefs**.
- There might be a systematic flaw in the way a group of agents perceives the way others think and what they truly want
- **A relatively small change in my behaviour might trigger a chain of changes in the actual behaviours in each of us**

Systems Intelligence Archetypes

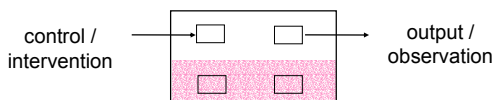
- **“Fixes that Fire”** – triggering systemic change, resonance, bifurcation/chaos with positive long term impacts
- **“Sharing Away the Burden”** – we have a dream, open source philosophy
- **“Miracle of the Commons”** – evolution of co-operation through reciprocity

Systems Theory and Systems Intelligence

- A system is defined by identifying the **system inputs** i.e. control, intervention, decision or stimulus variables and **system output** variables i.e. the observed responses or reactions
- The **state of a system** consists of the variables representing the elements in the system which determine its future behaviour
- Systems can have many different state representations

Complexity

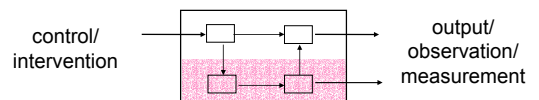
Well known parts – unknown interactions



- The interdependence of subsystems is unknown
- Sometimes a minor intervention can trigger unexpected, chaotic or bifurcating responses in the system
- **The most essential part of the system may be one that was never intentionally built into it**

Observability

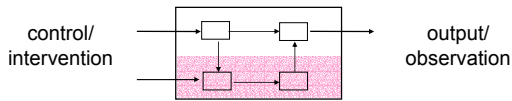
The observability of subsystems



- A system is observable if one can derive the values of all the states by a sufficiently long observation of the outputs
- **Without a sufficient set of observation (measurement) variables one can remain unaware of important active subsystems**
- **You cannot manage systems which you do not see**

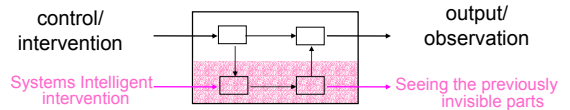
Controllability

The controllability of subsystems



- A system is controllable if it can be driven to any state value by sufficiently rich controls
- In addition to the seemingly controllable visible system there can be an uncontrollable subsystem – human or technical
- You must have a sufficient set of inputs to cause an impact on all the states

Systems Intelligence



- SI looks for ways to observe and address the invisible subsystems and interactions of emotions and beliefs
- Without the management of the whole the structure starts to produce uncontrollable behaviour – we have systems dictatorship

Uncontrollability – System Dictatorship

- The structure and limited input and observation variables can create a situation of uncontrollability – system dictatorship
- Even if a system mainly consists of human agents the overall behaviour can be determined by the non-human elements and dynamic structures such as time delays and sequential communication patterns (e.g. Beer Game, Senge 1990)
- Systems Intelligence is aware of structures: even if all the agents try to do their best the resulting system response can be bad due to the structure

Systems Intelligent Organization

- Empowers people to share their mental system models of the organization and to consider the effects of their own actions on the whole
- Fosters and sustains inquiry mode and reduces advocacy
- Keeps fear factors down
- Helps people to be responsive to flourishing initiatives
- Builds trust in the good will of others
- Sees that its production capacity is not restricted to the measurable variables but is extended to the world of emotions and well being
- Elevates innovativeness by an environment where emotional variables do not limit performance

5 Levels of SI for self-evaluation and measurement of SI

1. **Seeing oneself in the System** – Ability to see oneself and ones roles and behaviour in the system. Also through the eyes of other people and with different framings of the system. Systems thinking awareness.
2. **Thinking about Systems Intelligence** – Ability to envision and identify productive ways of behaviour for oneself in the system and understanding systemic possibilities.
3. **Managing Systems Intelligence** – Ability to personally exercise productive ways of behaviour in the system.
4. **Sustaining Systems Intelligence** – Ability to continue and foster systems intelligent behaviour in the long run .
5. **Leadership with Systems Intelligence** – Ability to initiate and create systems intelligent organizations

Systems Intelligent Leader

Strives to learn and reach Level 5

- Sees himself in the system with a mission to develop a Systems Intelligent Organization
 - Is aware of the human perspective
 - Operates within the visible system and manages the emotional system simultaneously
 - Is not held captive by the mechanistic perspective
 - Identifies and eliminates structural systems dictatorships
- Systems Intelligence has become an iconic personal growth challenge and a success asset

Ecological Systems Intelligence

- Evolutionary processes exhibit a **spontaneous emergence of co-operation** generating superior overall behaviour for all the actors (Axelrod 1984, Gintis et al. 2003)
- Human decision making does not follow the axioms of rationality assumed in economic theory.
- Bounded rationality: choice behaviour strongly reflects the systemic decision environment
- We can escape the Prisoner's Dilemma: a deviation from local status quo is not possible by self-interested rationality
- Can be interpreted as a manifestation of ecological Systems Intelligence?

Games People Play



In experimental games :
People do not take everything for themselves.
They choose co-operative strategies reflecting Systems Intelligence.

About SI

Esa Saarinen and Raimo P. Hämäläinen:
Systems Intelligence: Connecting Engineering Thinking with Human Sensitivity
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Downloadable at: www.systemsintelligence.hut.fi
Systems Intelligence Research Group
www.systemsintelligence.hut.fi/
Downloadable articles on SI:
www.systemsintelligence.tkk.fi/SI2004.html

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Defining and classifying intelligence is extremely complicated. Theories of intelligence range from having one general intelligence (g), to certain primary mental abilities, and to multiple category-specific intelligences. Following the creation of the Binet-Simon scale in the early 1900s, intelligence tests, now referred to as intelligence quotient (IQ) tests, are the most widely-known and used measure for determining an individual's intelligence. Although these tests are generally reliable and valid tools, they do have their flaws as they lack cultural specificity and can evoke stereotype threat and self-fulfilling prophecies.

intelligence definition: 1. the ability to learn, understand, and make judgments or have opinions that are based on reason. Learn more. Meaning of intelligence in English. intelligence. noun. uk. Your browser doesn't support HTML5 audio. /ɪnˈtel.ɪdʒns/ us. Your browser doesn't support HTML5 audio. Business intelligence definition. Business intelligence (BI) leverages software and services to transform data into actionable insights that inform an organization's strategic and tactical business decisions. BI tools access and analyze data sets and present analytical findings in reports, summaries, dashboards, graphs, charts and maps to provide users with detailed intelligence about the state of the business. Business intelligence software and systems. A variety of different types of tools fall under the business intelligence umbrella. The software selection service SelectHub breaks down some of the most important categories and features: Dashboards. The definition of intelligence is controversial, varying in what its abilities are and whether or not it is quantifiable.[7] Some groups of psychologists have suggested the following definitions: From "Mainstream Science on Intelligence" (1994), an op-ed statement in the Wall Street Journal signed by fifty-two researchers (out of 131 total invited to sign):[8]. Cephalopods appear to exhibit characteristics of significant intelligence, yet their nervous systems differ radically from those of backboned animals. Vertebrates such as mammals, birds, reptiles and fish have shown a fairly high degree of intellect that varies according to each species. The same is true with arthropods.[28].