

Systems Intelligence (SI)

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Systems Intelligence

- Intelligent behaviour in the context of complex systems involving interaction 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**

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) and Goleman (Emotional Intelligence) **in linking 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:

- Systems Thinking (Churchman 1968, Senge 1990, Checkland 1999, Flood 1999)
- Philosophical Practice and Dialogue (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)

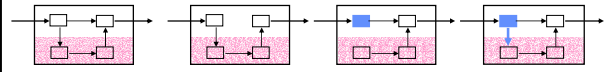
The Fifth Discipline (Senge 1990)

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.

Systems Thinking



- 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 being an active part of them

Systems Intelligence Basic ideas – wholes and parts

- Whole is more important than parts
- “Part” and “Whole” are relative abstraction
- Always subject to potential redefinition by changing the perspective
- Human agents can influence entire systems
- Systems evolve over time producing complex often non obvious responses

Systems Intelligence Basic ideas - systems approach

- Human beings perceive themselves as independent individuals - yet most often they are encompassed in systems
- Systems approach starts when you **want to** perceive the world through the eyes of another person
- Systems approach looks beyond isolated linear cause-and-effect chains for interconnections and interrelations

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

Characteristics of systems

- A system is characterized by the interconnections of its elements, as well as the internal nature of those elements (physical, emotional, social...)
- A system has **generative power**. It produces effects beyond the modes and functionalities of its elements
- A system has primacy over its elements while at the same time the elements influence the system
- Dynamics is essential. It is generated and related to delays, accumulation, inertia etc. both in the human and organizational elements

Examples of human systems

- Group
- Lecture
- Meeting
- Family
- Friendships
- School
- Village
- Administration
- Society
- Organization
- Company
- Industry
- Traffic
- Internet

Systems can take over

- People can get caught in systems 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

Moral of Systems Intelligence

- Systems Intelligence is about the betterment and improvement of human life
- Takes the ancient promise of Good Life philosophy seriously
- In systems thinking tradition, the work of C. West Churchman had a strong moral motivation
- This has not received due credit (see e.g. Churchman 1982).

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
- Yet wholes are abstractions
- They are mental constructs, which are relative to the perspective adopted
- Boundaries of a system can always be redrawn

... to Systems Intelligence

- Like Systems Thinking, Systems Intelligence wants to see wholes and account for change
- Unlike Systems Thinking, Systems Intelligence involves driving change and **actively embracing change**
- Unlike Systems Thinking, Systems Intelligence is primarily **outcome-oriented and not a descriptive effort**
- It is **intelligence-in-action** on its way to create successful systemic change

Systems Intelligence is

- Philosophy of life
- Situational awareness
- Common sense
- Basic form of intelligent behaviour
- A way out of egocentricity
- Aiming at achievements reachable by common effort

Systems Intelligence

- **Becomes a challenge for personal learning**
- Involves instinctual, intuitive, tacit, subconscious and unconscious and inarticulate aspects that cannot be straightforwardly reduced to a full-fledged and transparent cognitive dimension
- **The theoretical understanding of Systems Thinking need not increase Systems Intelligence**

Four dimensions of change

- Mental change
- Perceptual change
- Individual behavioural change
- Change in the system

Mental models

- Systems Intelligence begins when the 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

Thinking about thinking

- Key to learning Systems Intelligence
- Acknowledging that one's action and behaviours are a function of one's thinking (mental models, beliefs, assumptions, interpretations, etc.)
- In order to act more intelligently in the holistic systemic environment, I need to mirror mental models and engage in **meta-level thinking** regarding my own thinking
- Re-framing is a key to new opportunities, higher productivity and to creativity

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 impact of everyone's behaviours, 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

A Systems Intelligent Person

- Avoids "shifting the burden" –behaviour (see Senge 1990) i.e. avoids reactive behaviour and focusing on the removal of symptoms
- In problem situations and their solutions – **do I try to remedy the cause or the consequence** – what is the outcome?
- Dealing with the consequences often systemically escalates the problem via systemic secondary effects

Systems Intelligence in Everyday Life

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

Systems Intelligence in human interaction

- **"Inquiry-mode"** in the sense of Senge, as opposed to "advocate mode".
- Dialogue techniques.
- Listening to – techniques.
- Facial expressions and bodily gestures that express openness and human acceptance, rather than prompt out fear.
- Meta-level techniques that reinforce the subject's awareness of the interpretative nature of her images and internal representations of the people around

Visible System

- We often perceive systems only through a mechanistic perspective
- Organizations are developed by focusing on the visible part and variables e.g. by savings and improving productivity
- Often human resources are also perceived only through these visible systems

Invisible System

- There is always a human system along the technical / economic organizational system
- Is generated by the human system of emotions
- Subjective variables are crucial
- The emotional system cannot be reduced to objective mechanistic variables
- **Controls the fate of the organization as much or more than the visible system**

SI Connects Engineering Thinking and Emotions

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

Change with System Intelligence

- Does the structure perceived allow a possibility for change? Is there a hidden subsystem?
- Changing the mental mode = innovation
- Inquiry mode
- Indirect influence – what would be your solution?

Managing the invisible

- In most human systems and organizations the true system often includes hidden subsystems such as processes of fear or trust generation
- It is very easy to forget to use behavioural input variables controlling the invisible part
- 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

Changing the system

- People adjust to systems instinctively. If a system is changed, people also change their behaviours. This leads to further change
- Interventions:
 - intervention by changing one's own behaviour: intentional new input, behaviour or structural change by a person in the system
 - disturbance from outside: organizational change, external catastrophe; major change in the environment

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

Minimal input - maximal output

- Possibility of systemic change on the basis of an input, sometimes minimal input
- Belief systems and meaning systems of the people are important
- A minimal change might symbolize something essential triggering an effect of potentially enormous proportions

Possibilities for co-operation

- People are more sensitive to ill-treatment imposed from outside upon oneself than to the ill-treatment oneself generates upon others
- As a result, most human systems generate ill-treatment upon its members, even when no intention to that effect exists
- All human systems have a tendency to slide towards the negative, unless a conscious and creative effort is launched

Collapse of Systems Intelligence

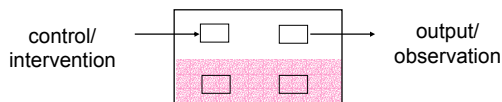
- Reactionary Midget - creates the System of Holding Back in Return
- Fear - feeds systems dictatorship and subservience to the status quo
- Static State Thinking - the world is not static.
- Command and Control Thinking - sees no need to seek out fresh perspectives
- Elementalism and Individualism - leaves out human processes
- Cynicism - assumes there is an upper limit to everything

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

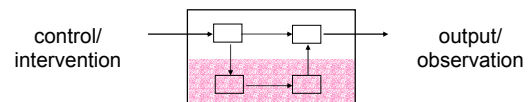
Well known parts – unknown interactions



- The interdependence of subsystems is unknown
- A minor intervention can trigger unexpected, chaotic or bifurcating responses in the system
- The most essential part of the system may be one that nobody has ever built into it

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 controllable system there can be an uncontrollable subsystem – human or technical – creating system dictatorship

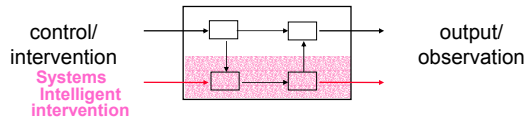
System state and feedback

- Negative feedback acts to decrease, i.e. stabilize, deviations from the goal
- Positive feedback reinforces deviations
- Systems can have triggering states or controls which lead to a completely new overall behaviour. Such phenomena are called chaotic
- A system is **controllable** if we can bring it with the available control variables from one state to any other state in a finite time

Uncontrollability – System Dictatorship

- The structure and limited input 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

SI in Emotional Systems



- SI looks for ways to address the invisible subsystem of emotional interactions
- Without the management of the whole the structure starts to produce uncontrollable behaviour – we have systems dictatorship

Systems Intelligent Leader

- Is aware of the human perspective
- Operates within the visible system and directs the emotional system simultaneously
- Is not held captive by the mechanistic perspective
- Breaks structural systems dictatorships

Systems Intelligent Organization

- In a systems intelligent organization people take into account the effects of their actions on the others
- The fear parameter is consciously kept to a minimum
- People are responsive to flourishing initiatives
- People are realistic and trust in the good will of others
- The relaxed atmosphere is extended everywhere
- The processing capacity is not restricted to the measurable variables recognized by the mechanism but is extended to the world of emotions and beliefs
- Innovativeness is elevated when emotional variables do not limit it

Systems Intelligence as a Form of Ecological Rationality



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

Ecological Systems Intelligence

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

**Thanks to evolution we all have
Systems Intelligence!**

Thank you.

Basic Reference

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