ISYS 2160 Information Systems in the Internet Age

Week1 Systems Approach/Socio-Technical Systems

**What’s a system**?

* A ‘system’ is made up of inter-related components that work together to achieve the overall objectives of the whole system

Software system

– A software system has many more components such as specification, programs, configuration files, test results, user documentation, etc

**Process** view of system:（系统模型：输入， 处理， 输出， 反馈， 分析）

– Inputs to the system (from the ext. envt.)

– Throughput processing/Transformation

– Outputs of the system (to the ext. envt.)

– Feedback Mechanisms

– Modelling of the overall system with a view to developing optimal solution.

**Key System Principles**

– 1. Openness:

- System behaviour can only be understood in relation to the external environment

- Distinction between the system and the environment – systems boundary

- Controllable and uncontrollable variables

- Role of leadership and managing upward in purposeful systems

– 2. Purposefulness:

– Value-guided systems

– Role of understanding (why actors do what they do)

– Rational, emotional and cultural dimensions

– Reaction- response- action

– 3. Emergent Property:

– Property of the whole that cannot be deduced from the properties of the parts

– Emergent properties as the product of complex interactions among several elements

– Interactions among five basic processes:

throughput, decision making, learning and control, membership, and conflict management.

– Measurement system

– 4. Multidimensionality:

– Multiple interacting dimensions

– Seemingly opposing tendencies not only co-exist to form a complementary relationship

– Plurality of structures and processes.

– 5. Counter-intuitiveness:

– Actions intended to produce certain outcomes may generate opposite results.

– Beyond certain point, quantitative change can lead to qualitative change

– difference in degree versus difference in kind

– Inflection Points

**The Systems Approach(Systems thinking)**

**Definition**: analysing complex systems from the perspective of the total system, the goals of the overall system, the individual components or subsystems, and the inter-relationships and inter-dependencies between the components.

**System Theory**: investigates both the principles common to all complex entities, and the (usually mathematical) models that can be used to represent them.

Types of Systems:

– Teleological vs. ateleological systems

– Open vs. closed systems

– Mechanical Systems

– Biological/Living systems

– Social Systems

– Socio-technical systems: a technical component and a social (human/organisational/societal) component which interact with each other in multiple ways.

Structure of Systems

– Overall objective represented as concrete measure(s) of performance,

– Inputs and Resources

– Process(es)

– Feedback Mechanisms

– Outputs

– System Boundary

– System Environment