CENTER FOR INFORMATION INTEGRITY RESEARCH

Delhi Center: B-64 (FF), Gulmohar Park, New Delhi-110 049
Pune Center: Flat A-2, Nikash Skies, Someshwarwadi, Pashan-411 008

Question Bank

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Note: Marks given to questions are only indicative. While studying the question bank, the learner effort should be to see that the question is properly understood and that the correct answer is identified.

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1. "Information exists in three discrete domains – biology, culture, and man-made information systems. Accordingly, the information, which is transmitted, may generally be classified as genealogical communication, in which conservative structures are transmitted down through different channels. These are information flow lines and are described by term "genotype". Genotype can 'mean a matrix, a structure, a mechanism, a rule by which to play the game'. It is not necessarily a genome of a living being, it could mean a network of neurons or artificial intelligence devices, information processing hardware and software. These categories of the 'genotype' when considered over long time periods correspond to information flow lines. In the process of 'flowing', information exhibits certain characteristics".
    a. D**escribe following information flow characteristics**: [Marks 10]
        i. Interaction with environment resulting in Time Continuity (in information flow lines), interaction with environment resulting in Bifurcation and Speciation (in information flow lines),
        ii. Interaction with environment resulting in information continuity planning,
        iii. Conservation resulting in cognizing in respect of environment by information flow lines and in information flow lines' "egocentricities",
        iv. Novelty creation,
        v. Nestedness,
        vi. Varying reaction times of different nests,
        vii. Differing flexibilities in the nests,
        viii. Differing survival times of information in different nests,
        ix. Co-evolution, and
        x. Time-directedness.
2. What are the existing approaches to integrity? [Marks 10]
   Hint: Approaches are Security based approach as in Computer Science, Auditing practices as in accounting science, Quality paradigm as coming from manufacturing engineering, Noise reduction technology as discussed under Communication Theory, and Savage (Subjective) Expected Utility (SEU) Theory as in Decision Theory.
3. Analyze existing approaches to integrity to show that the main limitation of these approaches is that the *IS* models considered do not address:
    a. The issue of "economic" processing of information (*information* economics), which is the central point in integrity emerging as the key issue in the study of *IS* for competitive advantage. [Marks 6]

b. The requirement of individual decision situation in the presence of uncertainty as the IS models considered do not account for the costs of analysis and evaluation of the searched flexible information decision, which in fact is the cost of I*I. [Marks 4]

4. "As the employment (recruitment) market develops in complexity, the examination information takes on increased importance."
    a. Explain by taking recourse to a candidate comparison and selection (recruitment) mechanism in combination with a universal medium of marks in examination and (by taking recourse) to the role of examination system in a recruitment market. [Marks 10]
5. "The practice is the more efficient the available information technology, the more is its *use* and, consequently, more reliance and dependence on it. Assumption is more efficient information technology should result in, among other things, a greater concern (benefit) with I*I, not least accounting information integrity".
    a. Develop a simple economic argument to show that, in violation of common practice, I*I has indeed become more important as information technology has advanced. [Marks 8]
    b. Show that in a system it is by controlling integrity of information (I), and particularly that (integrity) of information (I_1), that the competitive advantage is achieved. [Mark 1]
    c. "Integrity of a set of information is defined as the inverse amount of distortion and noise present."
        i. What do you understand by terms "*correctness*" aspect of information and "*exactness*" aspect of information? What is the difference? [Mark 1]
6. "What is significant is all through its tasks of information origination, i.e., cognizing decision, the business process *IS* view involves decision stages. And each of these decision stages is also an information origination situation".
    a. A**nswer following questions**:
        i. Why is an information origination process a core *IS*? [Marks 2]
        ii. What are the elements of the information origination process? [Marks 2]
        iii. Discuss the uncertainties in the elements of information origination process and the information errors in elements they give rise to. [Marks 6]
7. "Given the reality that systems (businesses) are required to perform in environments, which are ever changing and growing in complexity, it is recognized that information and Information Integrity are increasingly becoming more and more important. This brings in the need to study certainty, risk, uncertainty, information value and value of I*I".
    a. What are the existing perceptions about certainty, uncertainty and risk? What is the theory of uncertainty avoidance, i.e., risk aversion? What is its implication for decision-making? [Marks 3]
    b. Why is risk aversion a costly activity? What implication does it have for information? [Marks 3]
    c. What are the perceptions of information value under Traditional IS, Quality IS and SEU Theory? Indicate why they fail to account for value of I*I. [Marks 4]
8. Compare Traditional IS, Quality IS and Integrity IS with respect to following parameters:
    a. Parameter: Paradigm – *Technology* factor, [Marks 2]

b. Parameter: Paradigm – *Change* factor, [Marks 2]
c. Parameter: Paradigm- *Cost* factor, [Marks 2]
d. Parameter: Approach, [Marks 2]
e. Parameter: Process factor of Maintenance. [Marks 2]

9. "In the presence of 5 Cs, the business process IS view is ridden with complexity and uncertainties. This complexity and consequent uncertainties introduce at the operational level hitherto unknown complex error mechanisms coming from system development and implementation life cycle phases and that, too, coming with delay."
    a. **Write short notes answering following**:
        i. What is meant by an "accident" and an "error"? Give definitions only. [Marks 2]
        ii. What is the difference between "error" and "accident"? [Mark 1]
        iii. What do you understand by the term "unobservable" error? Under the impact of the complex and changing market environment, does the business process exhibit unobservable errors? Explain with example (s). [Marks 3]
        iv. Briefly compare different error taxonomies.[Marks 2]
        v. Discuss what is meant by the term "error' in application setting. [Marks 2]

10. **State following definitions in brief**: [2 marks]

"The problem of defining information lies not so much with the lack of a single definition as with a failure to use a definition appropriate to the level and purpose of the investigation".

a. Given above observation and if the research investigation concerns theory and practice of I*I control for the objective of information continuity planning, what is a useful, acceptable, and workable definition of information?
b. What is a closed system? Give definition only.
c. Define an open system.
d. Define an exosomatic system.

11. **Fill in the blanks.** [3 marks]

a. All open systems, if they are to postpone for a time their inevitable heat-death, must ---------- the extraction and processing of matter, its internal distribution and storage, continuous conversion into energy, and elimination as by-product wastes.
b. The essence of a genetic, a social, and an exosomatic system is their continuous processing of ---------- throughputs, <u>from</u> their respective inputs <u>to</u> their respective final consumption and output as waste.
c. The genetic, social, or the exosomatic system is ---------- system as it is made of relatively autonomous components that can act for different or even cross-purposes.
d. Systems theorists and economists argue that the ---------- of an organization is ultimately limited by the amount of ---------- (it) can (economically) process and transfer. This holds for the open system as a whole, for part systems, and for components. The degree to which higher efficiency through increased specialization (it *can* include I*I) is feasible is

governed by the means that are available to control the ensuing complexity, that is by the -------- and ---------- of the available information flow systems. What kind of information system that will, in different cases, turn out to be the most ---------- one depends on the ----------.

e. The proper subject matter of the genetic, social and exosomatic system studies, if they are to complement studies of the flow of matter (input-output economics) and energy (ecology), ought to be ----------: its ----------, processing, and ------ to effect control.

12. "As market economy develops in complexity, the accounting information takes on increased importance."

Explain by taking recourse to a market price (pricing) mechanism in combination with a universal medium of exchange, i.e., money and (by taking recourse) to the role of capital markets in a market economy.

[4 marks]

13. "With environment valuing the system products, production factors and system itself in terms of information "I_1", it (i.e., information "I_1") about the players in the environment would turn out to be an important source for information "I_2" and "I_3". This makes information [(I) ={I_1, I_2, I_3}], and particularly information {I_1} of increased importance as environmental complexity increases".

    a. What is meant by information (I_1), (I_2), and (I_3) here? Please define them only.

[1 mark]

14. "The practice is the more efficient the available information technology, the more is its *use* and, consequently, more reliance and dependence on it. Assumption is more efficient information technology should result in, among other things, a greater concern (benefit) with I*I, not least accounting information integrity".

    Develop a simple economic argument to show that, in violation of common practice, I*I has indeed become more important as information technology has advanced. [4 marks]

15. Show that in a system it is by controlling integrity of information (I), and particularly that (integrity) of information (I_1), that the competitive advantage is achieved.

[½ mark]

16. "Integrity of a set of information is defined as the inverse amount of distortion and noise present".

    What do you understand by terms "*correctness*" aspect of information and "*exactness*" aspect of information? What is the difference? [½ mark]

17. "Information should be seen as a composite good; a bundle of interrelated attributes. Given that information is for *use*, one attribute is relevance, i.e., usefulness, second is usability, and third is integrity, i.e., freedom from distortion and noise".

    What do you understand by this? Explain briefly.

18. "From an economic point of view, the problem facing, say, an information system designer is, in principle, a familiar constrained optimization problem: to maximize total utility, in this case with respect to I*I, by selecting the most efficient combination of inputs, in this case I*I mechanisms, subject to budget and other constraints".

    If one is desirous of improving integrity of information system and of information there from, what is the significance of information economic framework? [2marks]
19. What is the difference between information *economics* and *information* economics? [1 mark]
20. "Information processing is a decision process".
    - **a.** List multiple decision stages comprising business process *IS* view, which is a continuous individual information origination situation in the presence of uncertainty. [½ mark]
    - b. "Each decision stage in business process *IS* view is also an information origination process". [½ mark]
    - **c.** List elements of this information origination process**.** [½ mark]
21. List broad categories of the current approaches to integrity mechanisms. Do they have the benefit of information economic framework? Briefly explain. [½ mark]
22. Give single most important reason as to why increased use of information technology leads to shift in cost benefit equilibrium in information system? [½ mark]
23. "Hospital environment is expected to be **a**n aseptic hospital environment - a closed environment for admitted patients. A burn victim is admitted in a hospital. The victim suffers nosocomical infection (disease from hospitalization) traced to bacteria present in the unremoved stalk remnants of vegetables served to the patient."
    - a. With the help of the example explain difference between an observed error and an information error. [1/2 mark]
    - b. What is the information-processing flaw *here*? [1/2 mark]
    - **b.** Is there a loss of decision integrity in this case? Where and how? [1 mark]
    - **c.** Is there a loss of goal integrity? Explain. [1 mark]
    - **d. F**or satisfactory patient care what was needed? [2 marks]
24. Answer following questions:
    - a. State the significance of "information work system" from the point of improved system performance for competitive advantage? [Mark 1]
    - b. Draw a Business Process IS view Model depicting *process controls and information control* and describing a generic business process as integral to an information and control system for a business environment characterized by uncertainty and its Information Integrity implications. [**Mark 1**]
    - c. "A generic business process *IS* view comprises multistage decision stages."
        - i. Define these decision stages. [Marks 1]

ii. Draw a system's view of a generic business process *IS* view as a continuous individual information origination process in the presence of uncertainty. Further, show integrity implications for the *IS* view. [Marks 2]

25. Discuss uncertainties in the multistage dynamic decisions characterizing the business process IS view. [Marks 5]

26. "Given the reality of ever changing environment, it is more workable to see information as a composite good; a bundle of interrelated attributes, namely, usefulness (relevance) attribute, usability attribute, and integrity attribute".

    Answer following questions:

    a. **W**hat is the "Usefulness-Usability-Integrity paradigm? How does it facilitate defining integrity objective uniquely? [Marks 1]

    b. Develop Cost Benefit Analysis Equation of I*I. Show how it is by controlling I*I that competitive advantage is achieved. [Marks 2]

    c. State equation for value of additional information. From it analytically show how improved integrity of additional information leads to increase in value of information. [Marks 2]

27. Answer following questions:
    Compare Traditional IS, Quality IS and Integrity IS with respect to following parameters: [Marks 3]

    a. Parameter: Paradigm – *System's Concept* Factor
    b. Parameter: Model factor,
    c. Parameter: Paradigm – Reliability factor,

28. Conceptualize I*I Technology Design basis for achieving system development and implementation integrity. [Marks 2]

29. "Given the reality that systems (businesses) are required to perform in environments, which are ever changing and growing in complexity, it is recognized that information and Information Integrity are increasingly becoming more and more important. This brings in the need to study certainty, risk, uncertainty, information value and value of I*I".

    a. What are the existing perceptions about certainty, uncertainty and risk? What is the theory of uncertainty avoidance, i.e., risk aversion? What is its implication for decision-making? [Marks 1]

    b. Under the integrity information system, what is the risk perception? What is its implication for decision-making? [Marks 1]

    c. What are the perceptions of information value under Traditional *IS*, Quality *IS* and SEU Theory? Indicate why they fail to account for value of I*I. [Marks 2]

30. A real life structural failure case is described here.

"When people, i.e. clients, decide to construct a house or a structure, above all, they expect a safe, secured and reliable shelter or facility.

The roof of the cafeteria of a Junior High School in Charlotte, N. C. had stood for some four years. In January 1968 during a storm it experienced accumulation of four in. of snow and ice (system environmental factor) resulting in the collapse of 4200 ft^2 of roof. Subsequent

investigation into the structure failure showed that the roof framed with open web steel joists (supported on intermediate line of girders) had two of the columns under the girders *omitted* when the construction plans were finalized to incorporate fireproofing (change) requested by the insurance division during state review.

The architects publicly admitted the drafting error (a case of ballistic approach to making changes wherein errors are not anticipated) when they checked the plans following the accident, which came after the cafeteria had been in use for over three years (note the on-going risk the structure carried through). It is inconceivable how such an omission was not detected in checking of structural plans by various agencies or how the steel could be erected without the necessary number of supports (cases of assuming information decisions correct as validated in earlier stages and not anticipating error)".

Above case details a chain of events spread over the drafting-*cum*-construction-plan-checking-and-finalization-*cum*-structure-erection-*cum*-facility-delivery-*cum*-facility *use* phases of a construction project, which on *that* day at *that* time under *those* particular conditions rendered the delivered structure unsafe, unsecured, and unreliable. Consider this structural failure case form the angle of requirement of Information Integrity control for delivering safe, secure, and reliable structure, and answer following questions. [9 Marks]

a. What was the "change" factor that affected implementation of the construction project phases?
b. In the wake of the "change" factor, what type of information error was introduced at the drafting phase?
c. Construction project had the goal to deliver structure, which clients find safe, secure and reliable. How did the drafting error affect the Goal Integrity of the structure delivered under the construction project?
d. Following the drafting phase, what type of information error was made at the construction-plan-checking-and-finalization phase? What was the effect of this error on integrity of structure design, which was approved for construction?
e. Following the construction plan approval phase, what was the type of information error at the phase of erection of steel? How did it affect the integrity of the project implementation phase?
f. Explain how, in the course of project implementation, the project information got processed as function of source, process, and *the condition of the recipient, i.e., as function of recipient*?
g. What was needed for construction of a safe structure (roof in this case)?
h. Describe the event of collapse of roof structure as a complex error mechanism coming with delay.
i. Looking back why did the "change" factor arise? Was it due to loss of integrity? If yes, at which phase?

31. Given the complex and changing environment in which systems need to perform, discuss briefly, drawing on the above case example, the implication of treating information as a product and not a by product.
32. "A decision making process experiences *ex ante* risk, which comprises (a) Usability risk and (b) Information Integrity (I*I) risk, which consists of: Information Correctness Risk

(ICR) and Information Exactness Risk (IER). By itself Usability risk is irrelevant with respect to determining which action to choose."

Answer following questions:

a. Discuss components of *ex ante* risk that a decision process experiences. From the decision process angle, why does the Usability risk represent the limits it (decision process) has to its capacity to determine the realization of outcomes over and between which it has preferences. Develop the informational nature of ICR and IER, which can be controlled by controlling I*I. [Marks 2]

b. Discuss why risk aversion has a requirement for additional information and is a costly activity. [Marks 2]

c. An information system (*IS*) processes information "I" for decision-making. Further the integrity concern of the *IS* is in terms of the Accuracy (A) attribute *only*. In this particular case, the information "I" is processed with {A(I)=0.6}. As the *IS* experiences I*I risk, the *IS* originates additional information {I_{ADDI}}. Information IADDI has accuracy {A(I_{ADDI})=0.7.

i. What is the nature of I*I risk experienced by information "I"?
ii. What is the value of I*I risk?
iii. After the information (I_{ADDI}) is originated, what is the net improvement in I*I value? [Mark 1]

33. Write short notes on any four of the following: [Marks 5]
    a. Ever changing environment
    b. Information as function of recipient
    c. From *material & energy is given* to *information is given* to *information integrity is given*
    d. Collective vs. Individual Decision Situation
    e. Information as a product
    f. Open systems are system boundary seeking and informational errors are their efforts to adapt effectively to system environments
    g. Team as defined in an informational context; how does it differ from a group
34. Match "*Event resulting in loss of competitive advantage"* with "*Information error and resulting loss of integrity*".

(Note: You may answer the question by writing down the [number-alphabet] pairs only.

[Marks 10]

	Event resulting in loss of competitive advantage (or otherwise)		Information error and resulting loss of integrity
1	The *Mariner IV* satellite was to be packaged in a rocket. After launch the satellite was to spin so that the solar panels would unfold by centrifugal force and to be locked in a straight-out	A	Loss of Ergonomic Design Integrity; Loss of Planning Integrity.

	position. Because these panels were quite large and very fragile, there was a concern that they would be damaged when they hit the stops that determined their final position. To address this problem, the major aerospace firm that had Mariner contract initiated a design project to develop a retarder (dampener) to gently slow the motion of the panels as they reached their final position. The constraints on the retarders were quite demanding. Millions of dollars and thousands of hours were spent to design these retarders, yet after extensive design work, testing, and simulation, no acceptable devices evolved. With time running out, the design team ran a computer simulation of what would happen if the retarders failed completely; to the team's amazement, the simulation showed that the panels would be safely deployed without any dampening at all. In the end, they realized that there was no need for retarders, and *Mariner IV* successfully went to mars without them.		
2	Many companies took action to guard against the risk of terrorist attack only after September 11th, even though it was present long before.	B	Loss of Rule Integrity.
3	During the boom years, some companies put as much effort into planning their festival party as into considering strategic mergers.	C	- Loss of Process Integrity, loss of Reviewing Integrity, and loss of Output (Reporting) Integrity; - Loss of Goal Integrity.
4	1992 Cricket World Cup Semi Final game in New Zeeland had a bizarre climax. Batting first, England had set a tough target for South Africa of 252 for a tie and 253 to win after rain interruptions had reduced their (England's) allocation to 45 overs. Batting second, South Africa, however, were not intimidated, and were well up with the run rate throughout their innings. McMillan and Richardson were at the wicket, and looking comfortable when rain fell after 5 balls of the 42nd over with South Africa needing 22 to win off 19 balls. Two overs were lost, but the target	D	Limited focus on present resulting in recognition of only observable error, which is functional error, and not recognizing unobservable error.

	did not change. South Africa were faced with the impossible task of scoring the remaining runs off one ball, and England advanced to the final in circumstances not even they were happy with.		
5	After the September 11th attacks, Lehman Brothers, an investment bank, which had offices just across the road from the World Trade Center, thanks to careful advance planning, was able to set up shop elsewhere in New York almost immediately. Its computer systems allowed many of its staff to work from home, and others to set up shop in hotel rooms and rented space overnight. As a result it came through the period after September 11th better than some of its competitors that suffered much less physical damage and disruption.	E	Malfunctions that come with delay resulting in Loss of Operable Goal Integrity
6	Egypt lacked sufficient electricity, so the Egyptians built the Aswan hydroelectric dam. The power from the project allowed them to supply new industries with electricity and create new jobs. The Nile below the dam, however, no longer carried mud with it or flooded the fields. Because this source of natural fertilization was removed, increased use of chemical fertilizers was required. That raised the cost of agricultural production. The clear water below the dam was able to carry more silt and accelerated erosion of the river banks. Because it also carried fewer nutrients, it provided less food for the marine life in the waters off the Nile delta than was needed.	F	Loss of Software and Hardware Integrity.
7	Eileen Allen, 56, learned hard way. Earlier in 1999, Eileen Allen, the self-described stay- at-home mom in maple valley, Wash., purchased 13 shares of Amazone.com through online broker Ameritrade at 186, it's all time high at that time. Ameritrade's computer system then converted her order into 186 shares at 190. She quickly tried to unwind the trade but couldn't get through to Ameritrade by e-mail or phone. Over the 10 days, Amazon nose-dived to 104. Allen and her husband had to cash in an IRA, liquidate other savings, and sell the Amazon stock-for a net loss of more than $15,000.	G	Ballistic processing of product information resulting in loss of Product Integrity
8	A News Item USA Today dated Monday, July 29, 2002:	H	Incorrect goal prioritisation leading to loss of operable

	Somerset, Pennsylvania, US: With mining permit issued to the company, nine coal miners broke through an abandoned mine by accident Wednesday and had to flee 50 million gallons of frigid water that rushed into their mine in a 4-foot wall. They tired to overturn it, but it was too fast. They remained in the water for about five hours. When they tried to break through a wall to drain the mineshaft, the water level instead rose. They swam until they reached a spot above the water about 4-feet high 18-feet wide. The miners, who gasped for air as floodwater rose to their chins, tied themselves together so all of their bodies would be found if they drowned. Rescuers above anticipated the miners would seek high ground if they were to be alive. They picked the most likely spot and drilled a small shaft. A tapping from below told them they hit the spot. All the nine miners were saved and they were in good shape Sunday after spending three days in a flooded mine shaft. Meanwhile, investigators were trying to find out why maps indicated the miners were a safe distance from a flooded 1950s mine.		goal integrity.
9	An electrocution occurred at Los Alamos (a National Laboratory in US) when a manufacturer's representative was providing service to the electrical system of an industry x-ray machine. Although a safety watch was present during work on energized circuits as required by Laboratory policy, the trouble-shooter was operating in very limited space, and his head contacted a live circuit as his arm pressed against a grounded support. The path of electron flow through his body and the amperage was such that it proved fatal instantly. Medical attention was administered, but revival was not possible.	I	Integrity includes security.
10	Ref. The Wall Street Journal, October 8, 1997: Bre-X Minerals Ltd., the scandal-plagued	J	- Cost from Loss of Process Integrity and of Information

	mining company, says private investigators it hired uncovered a history of tampering with gold samples at the company's Busang deposit in Indonesia, which they blamed on geologists at the site. Shares of Bre-X, based in Calgary, Alberta, became worthless after claims of a huge gold find at Busang turned out to be fraudulent in May. Bre-X is in Canadian bankruptcy-court protection from creditors, as it fends off numerous lawsuits filed by disgruntled investors.		Integrity; - Benefit from Origination of Information with Integrity.

35. Critically analyze based on an illustrative example of your selection the business transformation, which is taking place in the wake of rise of convergence technology. [Marks 8]
36. "System Dynamics modeling uses causal-loop diagrams. The diagrams are referred as influence diagrams, or, more mathematically, as directed graphs. This is because the individual links (giving variable influence or graph direction) in such diagrams are labeled to show whether the nature of the causal-link is "positive" (+) or "negative" (-)".

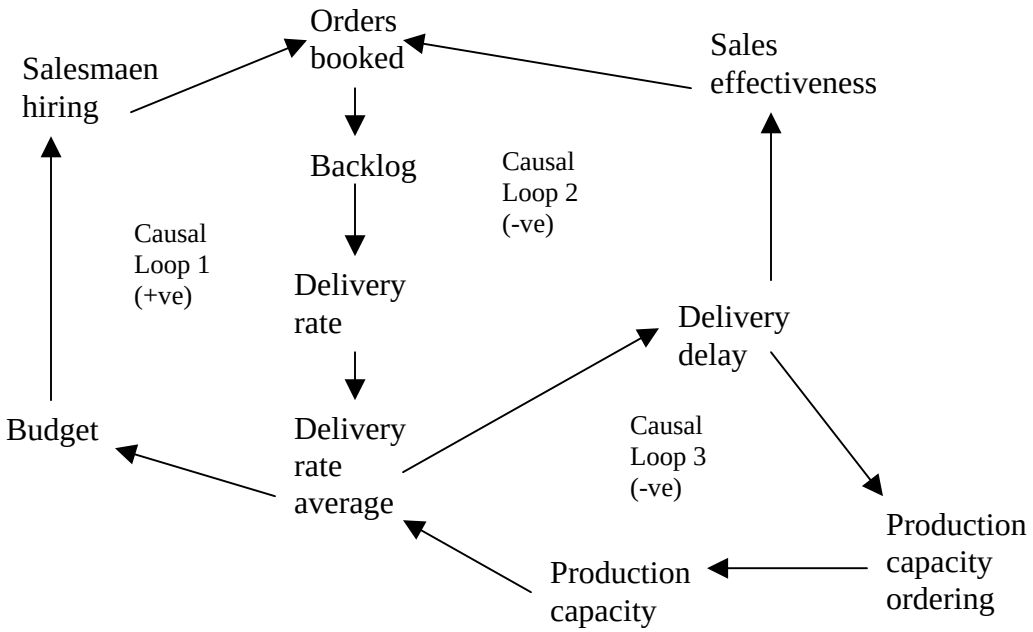

Figure (1): System Dynamics Modeling of a Business giving Causal Loop Structure for Sales Growth, Delivery Delay and Capacity Expansion

Analyze the business model in Figure (1) and show the nature of each link if the business is experiencing stagnation in sales growth even in the presence of an unlimited market. [Marks 8]

37. “In the wake of implication of rise of convergence technology, what emerges is a business process IS view, which integrates business process with technological operation. This, for competitive advantage, requires dynamic strategic (decision) effectiveness between (and within) the elements of the business process IS view, which all have specific resources, capabilities and objectives”.

    Analyze the business IS view so as to explain criticality of Information Integrity control for system effectiveness and economy in a changing market environment. In the process also explain how Integrity Information System is an improvement over Quality information System. [Marks 8]

38. Equation (1) gives Cost benefit Analysis Equation of Information Integrity.

$$\Delta IU(I)\,|_{Si} = [\{[\alpha(I) \times \beta(I) \times IUUB(I)]\,|_{s_i}\} \times \{A(I)\,|_{s_i}\}] - [COST_{OI}(I)\,|_{Si} + COST_{ANALY}\{A(I)\}\,|_{Si} + COST_{OPPORT}\{A(I)\}\,|_{Si}]$$

    ….. Equation (1)

    a. Define each term in Equation (1). [Marks 4]
    b. What is the significance of this equation for the objective of business competitive advantage? Explain analytically. [Marks 4]

39. “System dynamics is a methodology for understanding certain kinds of complex problems. Its focus is not a system, whatever that is, but a problem. A problem in a system has two features, namely, first, it (problem) is dynamic and, second, it arises in feedback systems. Plants, industry, businesses are dynamic feedback systems.”

    A common problem of large development projects is threefold: (i) cost overruns, (ii) the need to hire and train additional personnel midway through the project, and (iii) overrunning the scheduled time allotted.

    For an product/system/service development firm, Figure (1) gives a “hiring (or firing) system” adopted by the development project firm for adjusting workforce, Figure (2) a system for “progress” measurement, and Figure (3) a system for assessing “the time required and the time remaining”.

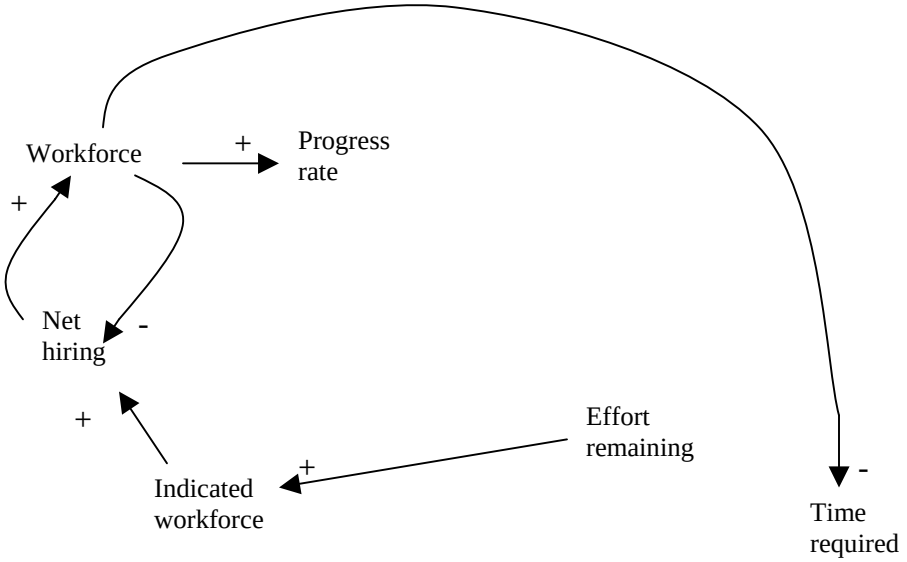

Figure (1): Hiring system

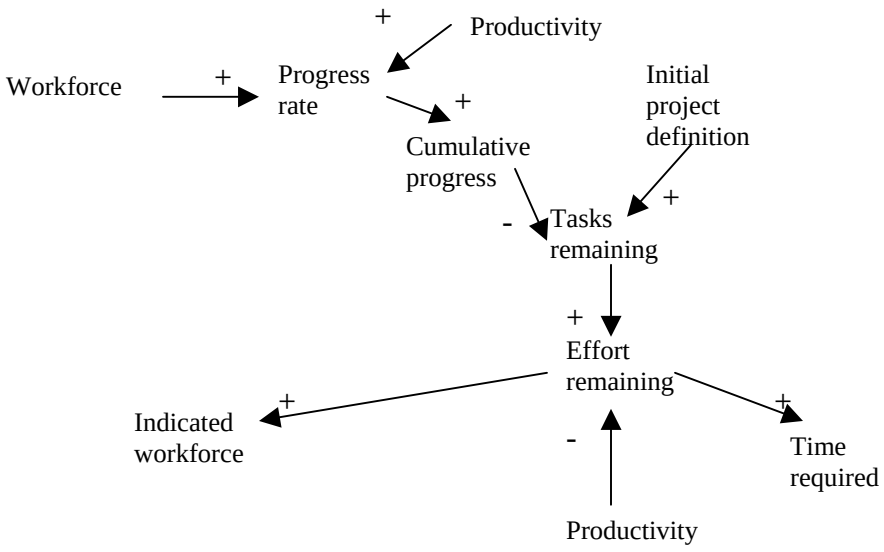

Figure (2): A system for “Progress” measurement

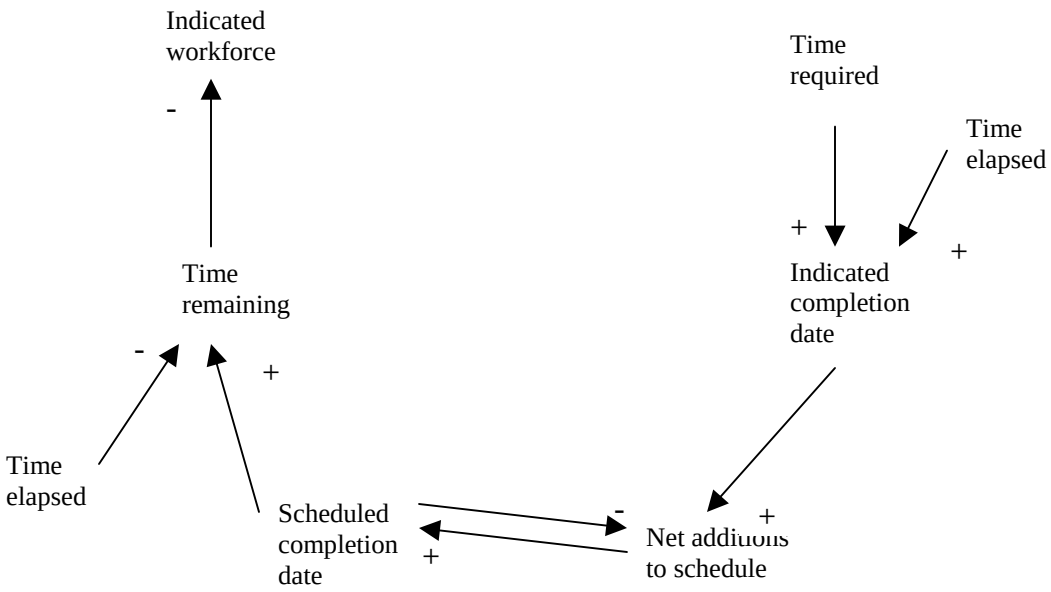

Figure (3): A system for assessing "the time required and the time remaining"

a. Describe in your own words the project development system structures conceptualized in Figure (1), (2) and (3), respectively. [Marks 10]

b. Develop a causal-loop model showing an overview of a development project structure. What more can you say about the causal –loop model and the structure? [Marks 5]

c. Identify feedback loops in the project structure and explain their nature. Do these feedback loops control the system problems? Explain. [Marks 5]

40. Develop a systems view of Integrity Information Technology Development System. In the process explain the significance of System Dynamics modeling for Integrity Information System development. [Marks 10]

41. Answer following questions:

a. "Information flow occurs when a system recognizes an environmental anomaly." Explain. Further, briefly state what is the significance of this information modeling for business competitive advantage? [Marks 2]

b. "Information exists in three domains- biology, culture, and exosomatic information systems".
List any four information flow characteristics. [Marks 2]

c. Define an open system. How does it differ from a closed system? [Marks 2]

d. "Integrity of a set of information is defined as the inverse amount of distortion and noise present".
What do you understand by terms "*correctness*" aspect of information and "*exactness*" aspect of information? What is the difference? [Marks 2]

e. "Business processes are increasingly experiencing ***shift*** <u>from</u> computing for information storage and retrieval <u>to</u> computing for information evaluation, storage and retrieval".

Explain why increased use of information technology leads to ***shift*** in cost benefit equilibrium in information systems. [Marks 2]

42. **Read carefully the business view described to answer Question (42) that follows.**
(The view is based on the write up titled "Computing: Work-life balance", *in Section on Business, The Economist* December 23rd 2006, pp. 99-100).

Business View described through Sections (i) and (ii)

i. *<u>Case of an emerging startup business model from consumer technologies invading corporate computing</u>*

Unlike the university's old system, which stores e-mails on its own servers, the new accounts at Arizona State University now reside on Gmail, Google's free web-based service. Over 65000 students now have new accounts. Many were already using Gmail for their private-mail and they are voluntarily migrating to the new service at a rate of 300 an hour. Crucially, they can take their "asu.edu" e-mail address with them.

The service, part of a business bundle called "Google Apps for Your Domain" that also includes instant messaging (IM) and a web-based calendar, has not even been officially launched yet. It began running in a test (or "beta") form in August. But Dave Girouard, the boss of Google's small but growing enterprise division, says that "tens of thousands" of organizations have already signed up to use Google's web-based tools in place of traditional in-house e-mail systems and other software.

Using Google's services has several advantages for companies.

- Most employees already know how to use web-based software, and thus need no training.
- They can access the services through any web browser, regardless of what kind of computer (or telephone) they use.
- Like the consumer service, the corporate product is free.
- And in-house IT staff need do absolutely nothing, since data and software reside on Google's sever computers.
- For the university, a bigger reason than money for switching from traditional software to web-based alternatives has to do with the pace and trajectory of technological change.
    - Using the new Google service, for instance, students can share calendars, which they could not easily do before.
    - Soon Google will integrate its online word processor and spreadsheet software into the services, so that students and teachers can share coursework.
    - Eventually, Google may add blogs and wikis-it has bought firms with these technologies.
    - IT head at Arizona State University finds it "absolutely inconceivable" that he and his staff could roll out improvements at this speed in the traditional way-that is by buying software and installing it on the university's own computers.
- Most IT bosses, especially at large organizations, tend to be skeptical of consumer technologies and often ban them outright. Employees, in return, tend to ignore their

IT departments. Many young people, for instance, use services such as Skype to send instant messages or make free calls while in the office.

ii. *Startup business model implications for industry*

Emerging trend suggests an organization's software and data may reside on the service provider's machines. This trend could cause problems for traditional software firms such as Microsoft, Oracle and SAP. Already, start-ups such as Salesforce.com and NetSuite provide "software as a service", supplying sales-force automation, accounting, payroll and other features via the web. Other firms, including Google, provide web-based e-mail, word processing, spreadsheets and databases.

Big companies will probably keep "mission critical" systems in-house. But as everything else migrates to web-based services, software will increasingly resemble the web technologies of the consumer market, says Mr. Marc Benioff, the founder of Salesforce.com. Those enterprise firms, such as his own, that follow the lead of consumer-oriented websites will do well in this environment, he argues.

Security concerns, Mr. Benioff implies, are red herrings thrown by ageing IT bosses trying to justify their salaries. They will, after all, be out of a job if companies no longer maintain their own data centers.

The trend seems inevitable and business decision and business model challenge will be to get on top of it.

Question (42) - Based on the Business View developed through Sections (i) and (ii) above,

Discuss:

a. Implications of rise of convergence technology for business model. [Marks 5]
b. Implications of convergence technology and emerging business model for information system design for business competitive advantage. [Marks 5]

43. Draw a systems view of a business process represented as a generic business process *IS* view and as integral part of a closed loop information and control system characterized by continuous information origination and processing situation in the presence of uncertainty. [**10 Marks**]
44. For a business process IS view answer following questions:
    a. "Business process IS view comprises multiple decision stages".
       List these decision stages. [Marks 2]
    b. Briefly discuss the uncertainties in the decision stages leading to decision errors and hence business process errors. [Marks 2]
    c. "Each decision stage is also a continuous information origination situation in the presence of uncertainties"
        i. List the elements of the information origination process. [Mark 1]
        ii. Further, for any one element, indicate the uncertainties therein, which lead to information errors (and hence to decision errors and therefore business process errors). [Marks 1]
    d. Write short note on "Complexity of organization versus Complexity of order". [Marks 2]
    e. Write short note on "information errors are unobservable, they far exceed functional errors that are observable". [Marks 2]
45. Figures (1), (2), and (3) conceptualize popular, public recreational area.

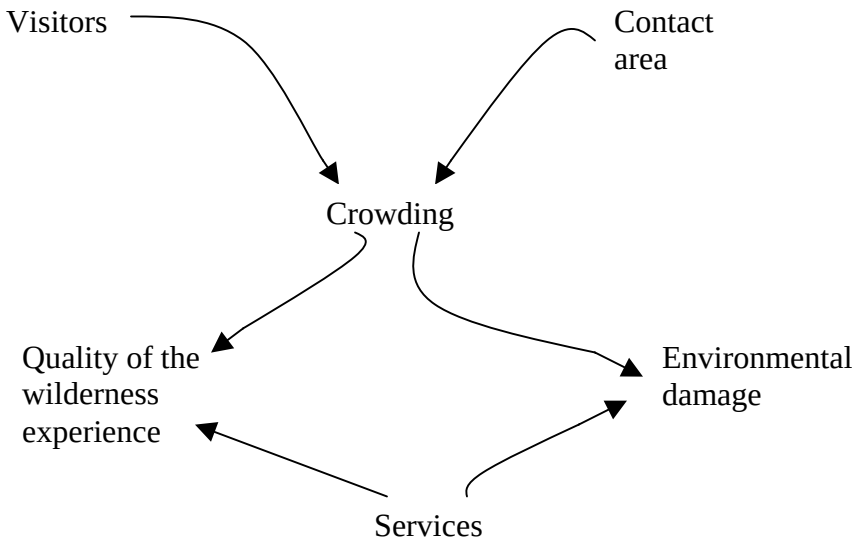

Figure (1): Open-loop view of problems in a popular public recreational area

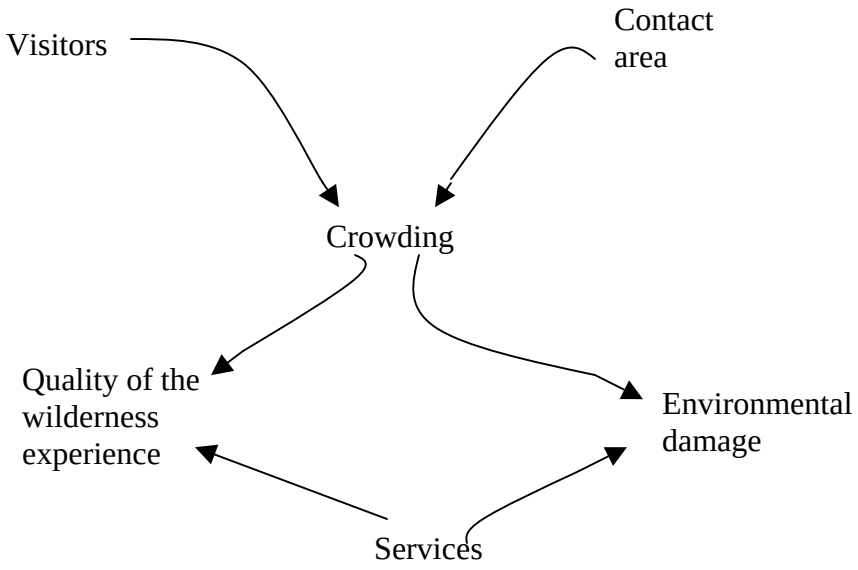

Figure (2): A feedback loop in a public recreational area system

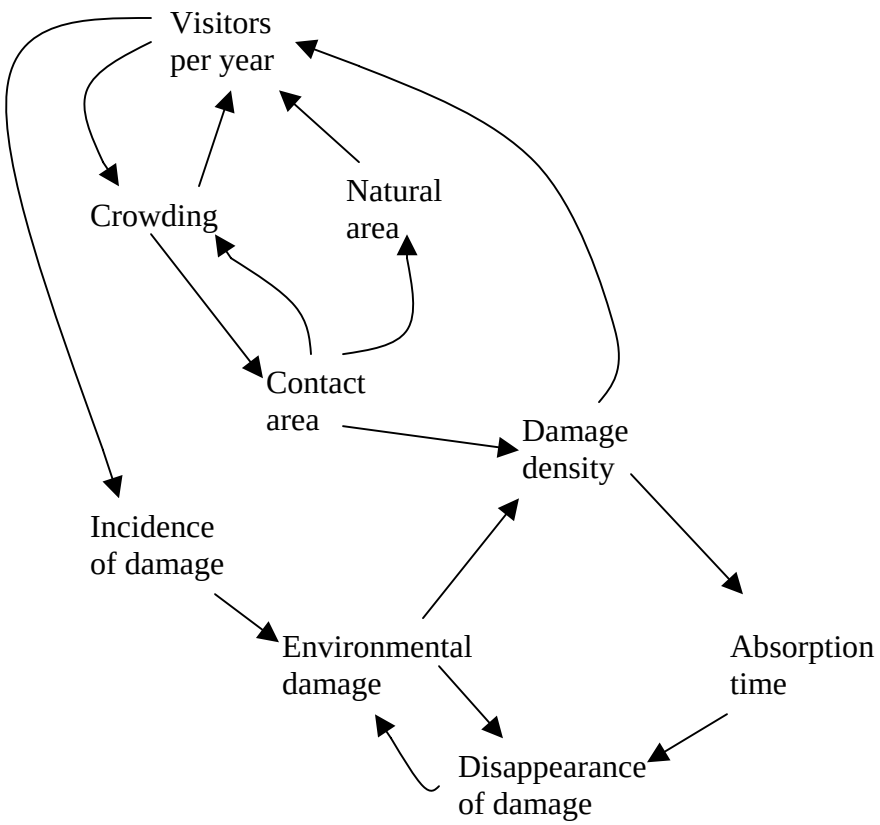

Figure (3): A public recreational area viewed as a feedback system

a. Describe in your words the conceptualized system structures.
b. Analyze and compare the system structures for long-term implications of the policy of increasing services.

46. A R&D firm delivers product/system/service development projects. Figure (1) give a conceptualization of a simple product (system/service) development project structure model, and Figure (2) gives a real world basic structure model of a simple product (system/service) development project.
    a. Describe in your own words the model structure conceptualization in Figure (1).
    b. Describe in your own words the model structure conceptualization in Figure (2).
    c. Further analyze complexity in Figure (2) over that in Figure (1) due to presence of feedback loops.

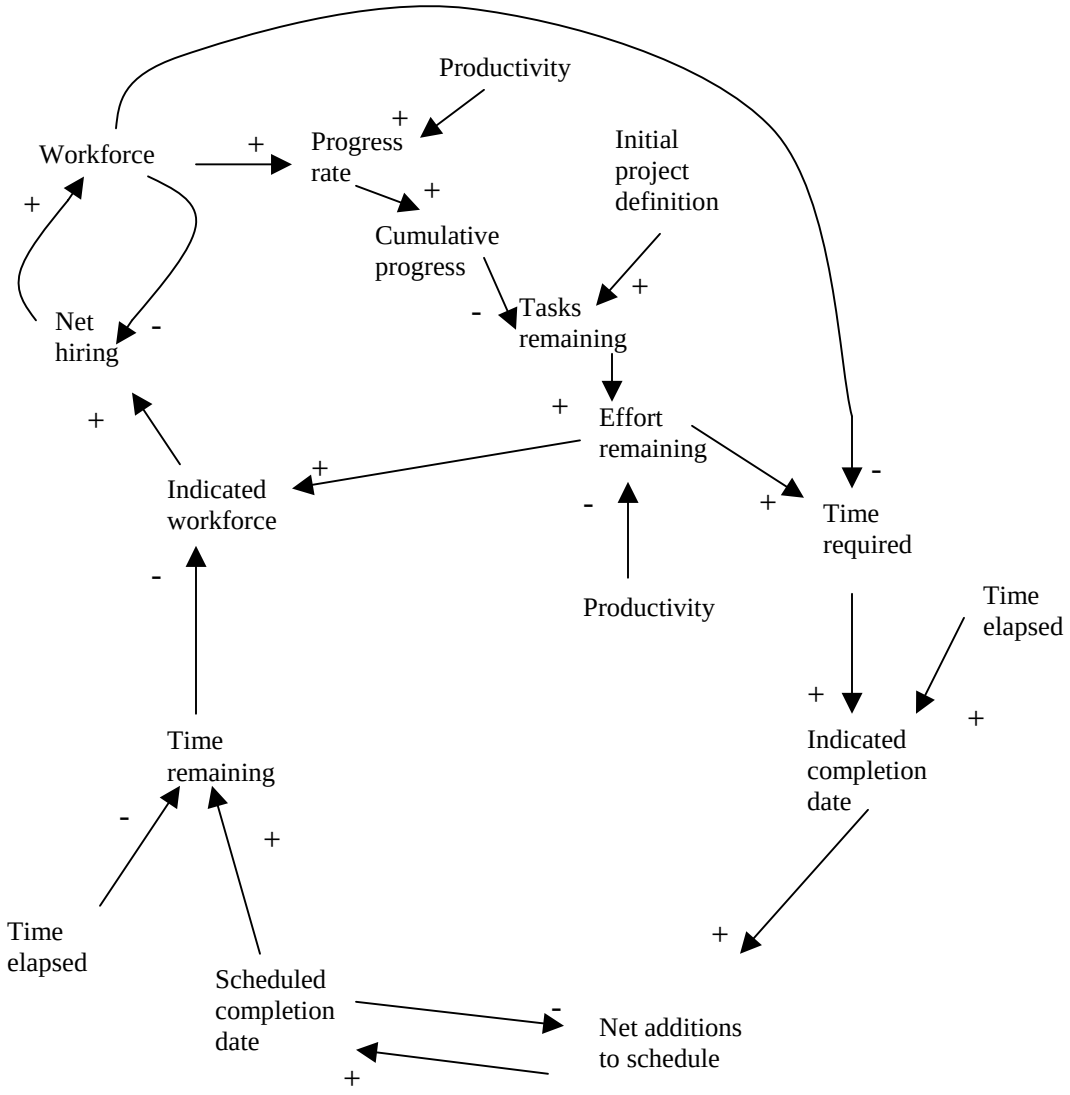

Figure (1): A simple product (system/service) development project structure model

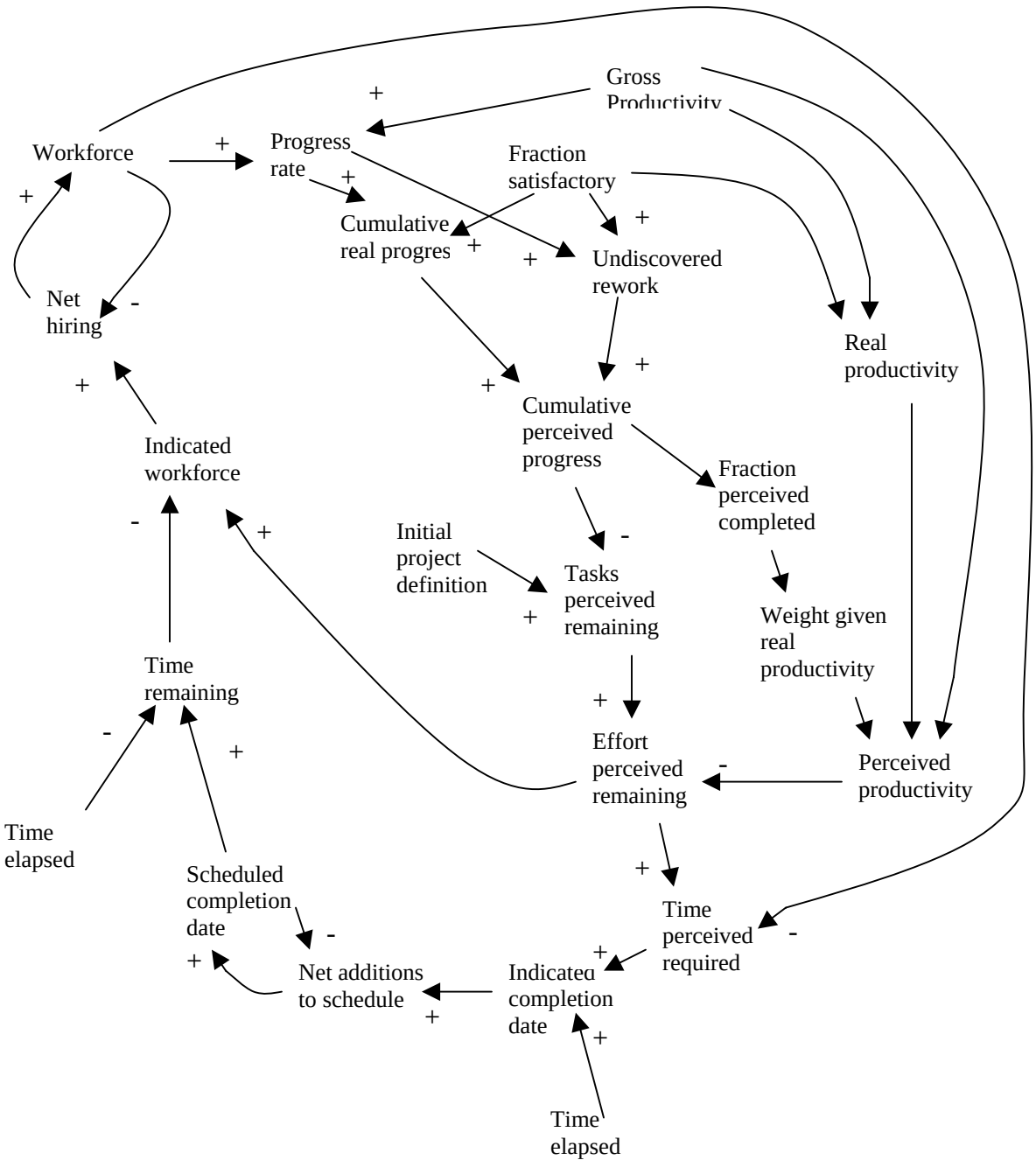

Figure (2): A real world basic structure of a simple product (system/service) development project model

47. Define MIS as it is generally understood and describe its components. Further analyze structural complexity that characterizes existing MIS.
    Note: At the advanced level, existing MIS would be a Quality Information System.
48. Develop an information system's (IS) view of an engineering business system modeled as an open system. Explain in brief its structural similarity with business IS view. Further, discuss uncertainties in an open system (engineering) business process IS view.

[Marks 10]

49. Describe following System Dynamics variables:
    a. Level variable,
    b. Rate variable,
    c. Parameters and input variable,
    d. Supplementary variable,
    e. Auxiliary variable.

[Marks 5]

50. Answer following questions:
    a. Define Information Integrity and its attributes.
    b. Based on principles of *information* economics, develop Cost benefit Analysis Equation of Information Integrity.
    c. Show analytically how optimum I*I would lead to business competitive advantage in a complex and changing market environment.

[Marks 10]

51. Based on Cost Benefit Analysis Equation of I*I, outline the development of:
    a. Equation for Value of Information. How does it differ from existing notion of information value? [Marks 5]
    b. Equation for improvement in value of I*I due to additional information. [Marks 5]
52. Answer following questions:
    a. An R&D organization contracting (delivering) turnkey projects has a requirement to improve project management integrity of such projects so as to eliminate or minimize time and manpower overruns. By applying System Dynamics methodology to the problem of development of a model of the dynamics of a R&D project construct a dynamic structure of a simple R&D project model for improved project implementation integrity, which is amenable for computer simulation using DYNAMO. [Marks 6]
       Hint: Refer Figures (1) and (2) in Question (46).
    b. Conceptualize I*I Technology Design basis foe achieving system development and implementation integrity. [Marks 4]
53. In view of growing importance of Information Integrity in information systems and information there from, analyze following shifts:
    a. Shift from collective design information decision to individual design information decision,
    b. Shift from economics of constraints to economics of opportunities,
    c. Shift from material and energy processing to information processing,

d. Shift from simple error to complex error,
e. Shift from designing for reducing observable errors to designing for reducing unobservable errors,
f. Shift from significance of service and functional errors to that of information errors,
g. Shift from significance of physical work system to that of informational work system,
h. Shift from information storage and retrieval to information evaluation, storage and retrieval.

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