**Topic:** Info Tech in Global Economy

**Question:**

**Chapter 15** – From the week's chapter reading, we learn from the author's case studies that, despite the alleged importance of scientific advice in the policy-making process, its evident that scientific results are often not used.  Why? The authors proposed a science-policy interface that would be realized by the inclusion of information visualization in the policy analysis process.  That way, the gap between both fields can be addressed based on the current challenges of science-policy interfaces with visualizations.

**Chapter Q#1**: According to Shneiderman and Bederson (2003), information visualization emerged from research in human-computer interaction, computer science, graphics, visual design, psychology, and business.  With this revelation in mind:

* Identify and name the benefits associated with information visualizations?

**Chapter Q#2:** According to Abdou et al., (2012), the term social simulation can have several types of simulation and modeling of which agent-based modeling (ABM) is the most popular one.  For the same reason, the ABM can be described as a what?

**Instructions:**

* Need 3 Responses for other student posts with APA references
* Minimum 150 words for each response (use uploaded document to see other student posts)
* Textbook attached
* No plagiarism please.

**Initial Post 1:**

**Q1:**

Information visualization helps experts and nonexperts to read the results of complex models with ease. Various fields like scientific research, data mining, digital libraries, financial data analysis, manufacturing production control, market studies, and drug discovery sees information visualization as a vital component (Shneiderman and Bederson 2003).

The latest increments of data that are collected and produced contain a vast range of hidden knowledge that needs to be considered in decision making. Visualization can be of less application/ used due to the large volumes of data and complex information. Visual analytics new research methods are introduced in information visualization. Visual analytics can be defined as " the science of analytical reasoning facilitated by interactive visual interfaces" ( Thomas and Cook, 2005).

The main goal of this research is to help users by creating tools and techniques to achieve four important factors.

1. Analysis of data that is massive, dynamic, ambiguous, and conflicting to extract the information that can be understood.

2. Recognize the normal and determine the unpredictable.

3. Produce assessments that are logical, understandable, and timely fashioned.

4. Share the results of the assessments effectively for proper action.

Visual analytics adds interactive visualizations along with automated data analysis techniques to provide support with scalable interactive decisions.

**Q2:**

Agent-Based Modeling (ABM) can be defined as a "computational method used by researchers to create, analyze and experiment different models that are based on agents and interact with an environment" (Abdou et al. 2012). Firstly, ABM consists of many individuals that have different properties and follow different decision-making rules. Secondly, the individual agents are always able to take the situation in hand and proceed with actions that can affect the environment. Lastly, in ABM, interactions are simulated over time since this is a computational method. Also, in this model, questions like "what if" can be tested fastly, with fewer budgets and without facing any challenges for setting up any experiments. All the key interactions can be represented properly using this model, which in turn helps with the simulation to explore the outcome consequences for different actions. From a policy perspective, all policies can be well explored and understood using this model, which in turn helps with the initial step to create a system that needed to be modeled.

The results of simulation runs are not suitable for forecasting (Antunes et al. 2008); all the key relationships that exist in the world can be represented in a simple manner using this model. The useful knowledge I the real world and it is consequences can be captured and understood using the model, but the model does not provide enough details to support specific claims. As per Heath (Heath et al. (2009), the model is a mediator "used primarily to establish the capability of the conceptual model to represent the system and to then gain some insight into the system's characteristics and behaviors." This helps with understanding the potential implications of different scenarios.

One of the issues, when compared to different stakeholders in social simulation, is to help them with identifying and understanding the pros and cons of the simulation and its results in a better way. It makes it easy for developers to communicate the limitations and outcomes of the simulation to the policy analysts and decision-makers by use of visual representation along with easy user interaction with the social simulation.

**Initial Post 2:**

**Q1:**

Information visualization is defined as “the use of computer-supported interactive, Visual representations of abstract data to amplify cognition” (Card et al. 1999). Information Visualization is beneficial in the analysis as well as in the presentation processes, it depends on the tasks, data and the users involved (Janseem, Wimmer & Deljoo, 2015, p. 324).

Visual decision support system: this is one of the benefits of information visualization, this helps to bridge the knowledge gap between stakeholders and policymaking process.

Visual representation of data: information visualization helps with the interactive visual representation of data that means information visualization makes it possible for the users to interact with the graphics generated by the software (Janseem, Wimmer & Deljoo, 2015, p. 323)

Information visualization is also useful to amplify cognition; cognition is the acquisition of knowledge and insight about the world (Card et al. 1999).

With information visualization, the user is enabled to gain knowledge about the internal structure of the data and causal relationships in it (Janseem, Wimmer & Deljoo, 2015, p.323).

**Q2:**

An ABM (Agent Based Modelling) “is a computational method that enables a researcher to create, analyze, and experiment with models composed of agents that interact within an environment (Abdou et al. 2012).”

 Janseem, Wimmer & Deljoo,2015  have discussed few important elements of agent-based modelling, initially, the model is composed of heterogeneous and autonomous agents, this means that the model contains many simulated individuals with diverse properties and decision-making rules.  These heterogeneous and autonomous agents interact within in the environment, this means the individuals will be able to recognize the circumstances  in which they find themselves take that circumstances  into consideration and then action will be taken according to the environment (Janseem, Wimmer & Deljoo, 2015, p. 341). Finally, ABM is a computational method that simulates interactions over time (Janseem, Wimmer & Deljoo, 2015, p.34). “Applications of agent-based modelling span a broad range of areas and disciplines. Applications range from modelling agent behaviour in the stock market and supply chains  to predicting the spread of epidemics   and the threat of bio-warfare, from modelling the adaptive immune system to understanding consumer purchasing behaviour, from understanding the fall of ancient civilizations to model the engagement of forces on the battlefield or at sea and many others’ (Macal & North, 2005).

**Initial Post 3:**

**Q1:**

Through information visualization, even a non-expert can access results of complex models and understand, which will not limit to intrinsic application fields (Deljoo, Janssen, & Wimmer, 2015). Visual analytics is defined as “the science of analytical reasoning facilitated by interactive visual interfaces” (Thomas and Cook 2005). Information visualization enables users to

1. synthesize information and derive insight from massive, dynamic, ambiguous, and often conflicting data. With the increasing digitalization in different sectors like healthcare or finance, the data is growing rapidly. If we want to effectively analyze the data and design policies, the size of data can be a barrier. Through the visualization of the statistics, it is easier to reach a conclusion in the decision-making process.
2. detect the expected and discover the unexpected. Amongst the humongous amount of data, it is almost impossible to recognize any deviation from normal behavior from a bare eye. When the flow of the process is depicted in the form of a graph or chart, any unexpected peaks or flow can be identified. Such capability makes the course of action also robust.
3. provide timely, defensible, and understandable assessments. The reports regarding the system statistics can be created by running a job for every time interval set. This will also help in the timely analysis and not bulk data being analyzed at once.
4. communicate assessment effectively for action. When the information to be taken action upon is presented in a pictorial manner, it makes it easier to decide the next steps.

**Q2:**

An agent-based modeling (ABM) “is a computational method that enables a researcher to create, analyze, and experiment with models composed of agents that interact within an environment (Abdou et al. 2012).” In agent-based modeling (ABM), a system is modeled as a collection of autonomous decision-making entities called agents. Each agent individually assesses its situation and makes decisions based on a set of rules. Agents may execute various behaviors appropriate for the system they represent—for example, producing, consuming, or selling. Repetitive competitive interactions between agents are a feature of agent-based modeling, which relies on the power of computers to explore dynamics out of the reach of pure mathematical methods.

            According to Bonabeau, 2002, in many cases, ABM is most natural for describing and simulating a system composed of “behavioral” entities. Whether one is attempting to describe a traffic jam, the stock market, voters, or how an organization works, ABM makes the model seem closer to reality. For example, it is more natural to describe how shoppers move in a supermarket than to come up with the equations that govern the dynamics of the density of shoppers. Because the density equations result from the behavior of shoppers, the ABM approach will also enable the user to study aggregate properties. Another dimension of flexibility is the ability to change levels of description and aggregation: one can easily play with aggregate agents, subgroups of agents, and single agents, with different levels of description coexisting in a given model. One may want to use ABM when the appropriate level of description or complexity is not known ahead of time and finding it requires some tinkering.