Viewpoint

Gaming the future: a practitioner's view

Stephen John Aguilar-Millan

Stephen John Aguilar-Millan is based at The European Futures Observatory, Ipswich, UK.

Introduction

In some circles, the use of games to rehearse the future has been a standard practice for a very long time. For example, in military circles, the case of the Schlieffen Plan for the German invasion of France in 1914 provides an object lesson in how to conduct detailed planning through gaming; and how detailed plans do not always survive contact with events. The important point to note here, from the perspective of practice, is the process of developing a vision, gaming through alternatives, and then selecting a strategy based upon the outcome of the games. It is with this middle part of the process – the gaming through alternatives – that we shall be concerned[1].

In many ways, the practice of developing strategies through gaming is very close to the process of developing strategy using futures techniques. Both are concerned with developing a systemic representation of the world. Both adopt a non-deterministic approach to the world. In addition, both use the agency of choice to develop a range of possible future outcomes from a relatively fixed set of inputs. In the next section, we shall give fuller consideration to the common points between gaming and the practice of futures.

Having discussed the common points between futuring and gaming, we need then to examine the uses to which games can be put. Games are a tool to be used, but the selection of the correct tool depends upon the purpose to which the tool is to be put. We shall focus on the use of gaming in economic and political circles because this is the area in which the use of games is most advanced. In this case, gaming is a method to help the various actors reach their preferred future. We shall look in more detail at a variety of purposes of games, which vary from forcing us to acknowledge the assumptions we are making in our representations of the world, to allowing us to rehearse a variety of possible future options. Games often can be a very inexpensive and effective way of looking at problems arising from within a volatile, uncertain, complex and adaptive world[2].

Within this framework, we need to note that there are games, and then there are games. Not all games are the same, but they can be distilled into a number of types. We shall examine four of the more important generic types of game. Each has a specific purpose, a specific structure to the way in which they are organised, and each has a different implication in terms of the staffing and monetary cost. This is useful information to have in the process of selecting the right tool for the job in hand.

By the end of this piece, we intend to have established the commonality between gaming and futuring, to have demonstrated the utility of gaming as a futures technique and to have outlined the bare bones of a typology of gaming. We hope to stimulate the reader to find out more about gaming, to become a gamer themselves, and to then go on to develop their own games. This can only be a basic introduction to the world of gaming for futurists.

Received 18 March 2019
Revised 29 May 2019
Accepted 2 June 2019

The common points

A good deal of futures work in practice involves thinking in terms of systems. This allows us to take an organised entity, break it into its constituent parts, examine how those parts work together, and then consider if those parts could work together differently under different circumstances. The key feature of thinking in terms of systems is to have participants within the system, who have agency through the exercise of choice. For example, if we think of the economic system, there are a number of constituent parts – consumers, producers, financial institutions, and so on – each of which have a large number of actors. They all exercise choices in their roles to produce an aggregate outcome for the economic system. The economy is a good example of a system because we know intuitively the roles that the actors play within the system – we live these lives every day.

To this analysis, we need to add the question of temporality. It is easy to think in terms of a system as it currently stands, but that does not quite yield interesting results. What would make the analysis more interesting would be to chart how the system might progress over time. How we could alter the relationships within the model to see if we can yield different results. The vehicle by which this happens is feedback. The concept of feedback is very simple – what is happening now is partly determined by what happened in the past. Feedback within a gaming environment can be captured by running a number of iterations of the game to determine the impact on the results of the game derived from varying the inputs and parameters of the game.

The introduction of temporality to a system means that it has gone from a question of statics to one of dynamics. A dynamic system with many actors and many relationships is usually a complex system. However, as the actors have agency within the system, it can also become adaptive – the actors learn from their successes and failures, and that influences their future choices. In many respects, this charts our movement away from a mechanical universe towards a more chaotic universe. Once a system becomes dynamic, complex, and adaptive, it tends to be seen as chaotic.

A chaotic system does not operate without limits. These limits are placed by the boundaries to the system and are governed by the relationships within the system. It is not uncommon for the boundaries of one system to be bounded by the boundaries of another. A simple economic system might attempt to abstract away from the political system but a quick review of the situation might show the impossibility of this. For example, public action, mandated by the political system, needs to be financed. Generally, the public sector is financed through taxation or by public debt. The ability to tax or to raise finance is not unlimited. They are bounded by the capacity of an economic system to carry a certain tax burden and for a given debt market to sustain a certain level of public borrowing. The economic system constrains the political system and the political system constrains the economic system. We will have bumped into the respective boundaries of the two systems.

It is possible to run a system over a number of iterations, just to see how it develops if none of the key relationships change. The result of this exercise would be what we would think of as a baseline scenario – how things would look over time if not a lot changed. We can then go on to chart the prospective impacts of changes by altering key relationships within the system. To continue our example, having set a baseline scenario over a specific time period, we could alter a key relationship – for example, the ability to finance public works through overseas borrowing – to chart how that policy change would affect the key relationships within the system, what the outcome is likely to be, and how this compares with the baseline scenario. It is likely that we would have two different future outcomes, from which we could decide the more preferable outcome for us. This introduces a key concept in practical futuring – determining the preferable future from the possible future. We shall lay aside a discussion of this issue of practical futuring because it is outside the scope of this piece.

An important aspect of developing a systems approach to the future is defining the key relationships within the system. It is customary to bundle these relationships into a model

that represents the system being studied. By definition, a model does not completely represent the entire system being examined. The model can be very detailed, but it does need to simplify the vast complexities of reality. It needs to focus on the important aspects of the system being examined. Every model nests upon an accumulated set of assumptions. These assumptions are an abstraction away from reality, which can both help and hinder the usefulness of the model at the same time.

To continue with our example of the economic system, this has been subject to the development of many models that attempt to explain, and then predict, the behaviour of the actors within the system. In doing so, a number of simplifying assumptions, generally about human behaviour, have been made. For example, why do people forego the certainty of a current income in order to improve the likelihood of an enhanced future income through study? One potential reason would be to enhance their lifetime earnings profile. Another could be as a response to social pressure from within their family and friendship group. A further could be the dispassionate pursuit of knowledge. Yet again, it could be the fashionable thing to do. There are a variety of motivations behind this single decision, each of which could be the subject of a gaming exercise.

The model builder needs to develop an ability to know when an assumption is useful and when it is unhelpful. We might think of this as a reality check. If the model yields results that are helpful and insightful, then there exists the basis to use it further to generate insights into the future. If the model proves to be unhelpful and of little use, then perhaps it would be best to review some of the key assumptions that underpin the relationships described in the model.

The game provides a vehicle through which fundamental assumptions can be tested. It allows actors to question and distort the assumptions underpinning the model, it allows actors to change the relationships within the model, and it allows new actors to be introduced to the model. Gaming is a vehicle through which we can examine these actors and relationships within a system.

The uses of games

Gaming has a variety of uses that have developed over time. At the most basic level, to produce a game is to conduct an examination of reality for the purpose of representing it in a simplified version. To take a very basic example, if incomes rise, will people want more education? Intuitively, we would think so. However, will all of the increase in income translate into increased demand for education? Experience suggests not, as some of the income will be used for other purposes. We have the basis of a very simple game here, in terms of calculating, say, the impact on demand for education resulting from, say, an increase in a minimum wage.

We could complicate this game further by introducing changes in the level of pricing of education, so we introduce the factor of real – as opposed to nominal – incomes rising or falling. The introduction of the feedback loop – that today's demand for education can affect tomorrow's cost of education – allows us to game our policy change in a dynamic setting. We can then extend the model to allow for expectations of tomorrow's cost of education. These can be derived from observing today's level of demand and the consequential impact on tomorrow's cost. If prices are likely to rise tomorrow, and if income is relatively fixed, then there is an incentive to consume today rather than tomorrow[3]. This is a very simple game that establishes a set of relationships, it introduces a category of actor, and it facilitates a policy choice. The point is that by gaming the system we can conduct an examination of reality by identifying and questioning the assumptions we hold about the way in which the world works.

As we develop this representation of reality, we also start to identify the key actors within the system. In our simple education model, there were two key actors at the start – the students and policy makers. As the model developed, we tacitly introduced a further actor – the educational institution that makes decisions about the pricing of education. In a game, it is

quite usual for the actor to be a representational character. A “typical” or “average” member of a certain class of persons. Into this representation, we bundle a range of assumptions about the motivation of people within this class of actor. These assumptions are manifested in the rules of the game.

The purpose of rules within a game is to provide a set of behavioural boundaries within which the actors can operate. In one respect, they are created to constrain the behaviour of the players within a game to what the game designer believes are the behavioural boundaries of the representative actor. In our simple model, we constrained the potential student by providing a binary choice of either spending their increased income on education, or not. We ruled that they could not give the money to charity, or they could refuse a salary increase, or they could be unaware of the pay increase, and so on. The point is that, of all the myriad of possibilities concerning the extra income, we narrowed it to two possible outcomes. We identified the actors, we provided a set of behavioural assumptions, and we limited the choice in doing so.

The limitation of the choices of the actors within the game helps to simplify their relationships. The construction of a game means that not only do we have to identify the key actors, but also that we have to state the relationships between them. In our simple game, we stated by assumption that the policy makers wished to increase the minimum wage. We did not make explicit why they wanted to do this because we did not make explicit the relationship between the potential students and the policy makers.

If we were to establish some form of democratic relationship between the two, then we would make explicit that aspect of the game. We could state that relationship to be that the policy makers seek the democratic approval of the potential students, which motivates them to devise policies of which the potential students – in this case as electors – approve. This introduces a fresh assumption that all potential students are workers and electors, which is an abstraction within the game because not all potential students are workers (some might be retired or unemployed), and not all purchasers of education are electors (some education will be funded by companies, which tend not to have a vote). However, the assumption does allow us to link policy makers with potential students, which is an important aspect of the game. When engaged in game design, not all of reality will be represented, and part of the skill and experience of the game designer is to know when to include a relationship, and when to leave it out.

By retaining a focus on the important and abstracting away from the unimportant, the game can be used in the development of strategies by decision makers within the system. If a particular game is run a number of times, varying the inputs and relationships between the actors on an incremental basis, we can derive a heat map that highlights the potential consequences of various choices. It established a framework in which informed decisions can be made.

The game provides a link between choice and consequence. In our simple game, if there is an increase in minimum wage, by how much will demand for education increase? That depends upon the decisions of potential students concerning how to spend their windfall. In turn, that will be influenced by the decision of the policy makers of the extent to which the minimum wage should be increased and the decisions by the educational institutions of by how much prices should increase. Each actor can game the response of the other actors.

This gaming of responses allows us to see the final, and possibly the most important, use of gaming. It allows us to wind-tunnel alternative strategies for the future. From the perspective of practice, this aspect of gaming is the one that clients value the most highly. Gaming provides a framework by which a client can develop a range of potential strategies, look at their potential consequences, and select one or more that best suits their objectives. In devising the game, we would have outlined the system we are gaming, identified the key actors within that system, stated the relationships between the actors within the system and

provided a framework for strategy development within that system. The client can then use the game to construct a set of alternative strategies, from which a dominant one will emerge. Gaming provides a mechanism by which we can move from possible futures to preferred futures[4].

A typology of games

There are many types of game that can be used to unlock insights about the future. Indeed, one could almost say that there are as many types of game as there are game designers. In practice though, the range of games that clients find of use distil into four broad categories – decision games, committee games, matrix games and megagames. We shall outline each of these in turn.

The decision game is perhaps the easiest to understand. In this game, each agent is faced with a range of possibilities and interacts with other agents to determine a dominant course of events. This type of gaming occurs at a point that is very close to the formation of strategy and describes a process by which the range of possible futures is reduced to a dominant preferred future. The key to the success of the game lies in the possibility of compromises being achieved by the agents. If a compromise is not attainable, then the resulting stalemate rather suggests that the parameters of the game ought to be changed to allow for an alternative course of action to be followed.

Decision games are relatively simple to put together and are relatively inexpensive to run[5]. They provide a framework to explore non-binary and nuanced futures and give rise to a multiplicity of futures that can be used to hone a dominant strategy. For example, in the game "The euro Crisis: Who Will Help" from 2013[6], the players were exploring the possibility of a disorderly exit from the euro by Italy with the objective of exploring how their companies could profit from the resulting turmoil in the financial markets. Actual events turned out reasonably close to the events suggested in the game, which allowed the game participants, having pre-positioned resources in advance of events, the ability to act ahead of the markets, to their advantage.

Closely associated with Decision Games are Committee Games. The layout and resource costs are broadly similar. However, the main difference is that whilst Decision Games allow for actors representing different agencies, a Committee Game is designed for a set of actors within a similar agency. They are all on the same side, nominally, at least. In Committee Games, the agents are playing against the problem rather than against each other. The levels of co-operation are far higher in Committee Games than in Decision Games.

Committee Games share the features of Decision Games in that they are relatively simple to put together and are relatively inexpensive to run. They allow the participants to develop a common approach to a given problem, which means that they are particularly good at wind tunnelling a collective response to a potential future situation. For example, the Clade X simulation run by the John Hopkins Center for Health Security[7] was a performative scenario that allowed professionals in health security to wind-tunnel a response to a pandemic resulting from an act of bio-terrorism.

Both Decision Games and Committee Games deal with relatively near term futures. To that extent, the imaginations of the participants are limited by the boundaries of near term plausibility. By way of contrast, Matrix Games allow the imagination to run freely. These games are best suited to a longer-range future, where the players are not entirely constrained by the present, and can achieve any outcome, as long as they can argue in favour of its plausibility[8].

We could take as an example the High North Matrix Game[9]. In this game, the assumption is that the Arctic ice cover has largely melted. Although the game was designed with the geo-strategic implications in mind, it could be readily adapted to include such features as

commercial fishing rights, the rights to commercial transit routes, and the exploitation of commercial mineral rights. The game provides a framework through which Arctic futures can be explored.

One of the problems in designing a gaming framework is which actors to include, and which to exclude. This can present a problem when modelling the real world because there are a very large number of key actors in the real world. One gaming format that seeks to work around this problem is the Megagame. Megagames are, by definition, games involving a large number of players. Typically, for a Megagame to yield useful results, we would expect in excess of 50 players. It is not uncommon for a megagame to involve a hundred players. As can be imagined, these are expensive to run. For the greatest benefits to be accrued, it is important for each player to have a detailed knowledge of their respective roles in the real world. This makes megagames hard to arrange and require detailed planning long in advance.

One example of a Megagame is provided by Dire Straits, delivered at the Connections UK conference in 2017[10]. In this game, over a hundred participants examined the near term geo-political futures of the western edge of the Pacific Rim. The emphasis was geo-political, but the game could easily be adapted to cover the commercial dimensions of a Cross-Pacific trade war, involving various commercial and financial interests. It demonstrated the sheer complexity of policy formation in the near future.

In deciding which type of game is suitable, the game designer will have to balance the question to be examined against the resources that could be committed to this examination. If resources are limited, then perhaps a Decision Game or Committee Game might be the better format. If the game is less programmed and more imaginative, then perhaps a Matrix Game is what is called for. If, on the other hand, the problem is fiendishly complex, and resources would permit, then perhaps a Megagame might shed insight into the complexity of the future to be considered. It is really a question of choosing the right tool for the right job.

Conclusion

There are many pathways into an emerging future. Gaming is a technique that can allow the exploration of these various pathways. The approach is very similar to the systems approach to examining the future, only it differs by including the dimension of agency and inviting the agents to change the parameters within the system. It can allow the trial and error aspect of strategy formulation to occur without the consequential errors of a strategic blunder.

The game designer needs to start with the problem to be addressed and the resources available to address it. This will determine the type of game to be developed and the way to approach the problem to be solved. The game designer will need to identify the key actors within the system and how they interact with each other. This will determine how the game will be played. The degree of latitude to be given to the actors is the next issue to be considered because this will determine the boundaries of the system. What is allowed in the rules of the game and what is considered to be beyond acceptable to the game. The game will then need to be honed to ensure that it can yield a result that is within the reference frame of the original question.

It is usually important to play the game more than once. A simple run through can be used to ensure the game mechanisms work. This is known as the play-test. Once the game has been play-tested, it can be played to determine a baseline scenario if the parameters of the system remain relatively unchanged. The game then needs to be played over a number of times with changes to the key parameters. These ought to generate a set of differing future outcomes. The different scenarios can then assist the client in selecting an appropriate strategy that better guides them towards their preferable future.

Gaming has been a powerful tool for use in strategy formulation in the past. It is sufficiently versatile to be of use in areas in which gaming has traditionally been absent. One such

sector is the public sector. The prospect of fundamental changes to public finances in coming years argues for rigorous gaming within the sector. Especially concerning resource issues. Gaming can help to uncover valuable insights into possible future courses of action and it can assist them in achieving the future they would prefer. For this reason, gaming ought to be a key tool in the futurist's toolkit.

Keyword:
Futures

Notes

1. For a discussion of the scientific foundation of simulation games, see Lukosch *et al.* (2018).
2. It is interesting to note that the concept of VUCA (Volatile, Uncertain, Complex, and Adaptive), much used by futurists in recent years, originates from the US Army War College, an institution that spends a great deal of time in gaming alternative futures.
3. Interestingly enough, the rise in student tuition costs in the UK, from £3,225 p.a. to £9,000 p.a. led to exactly this effect. Many potential students deferred their 'Gap Year' in order to avail themselves of a university course at the lower rate of tuition costs.
4. An interesting example of this in action, that is easy to learn but fiendish to master, is 'The Brexit Wargame'. The game highlights the internal contradictions of Brexit and demonstrates how each preferred position has some undesirable consequences. A simplified version of the game can be found at www.brexitgames.com/ (accessed 15 May 2019).
5. A manual of how to construct and run a Decision Game is published by the 'History of Wargaming' project. Details can be found at www.wargaming.co/professional/details/confrontationanalysis.htm (accessed 15 May 2019).
6. Details can be found at www.decisionworkshops.com/the-euro-wholl-help/4577832371 (accessed 21 December 2018).
7. Details can be found at www.globalhealthnow.org/2018-05/cladex-mock-yet-entirely-plausible-pandemic (accessed 21 December 2018).
8. A manual of how to construct and run a Matrix Game is published by the 'History of Wargaming' project. Details can be found at www.wargaming.co/professional/details/matrixgameshandbook.htm (accessed 15 May 2019).
9. Details can be found at https://paxsims.files.wordpress.com/2018/04/high-north.pdf (accessed 22 December 2018).
10. Details can be found at www.bbc.co.uk/news/world-41172485 (accessed 21 December 2018).

Reference

Lukosch, H.K., Bekebrede, G., Kurapati, S. and Lukosch, S.G. (2018), "A scientific foundation of simulation games for the analysis and design of complex systems", *Simulation and Gaming*, Vol. 49 No. 3, pp. 279-314.

Corresponding author

Stephen John Aguilar-Millan can be contacted at: stephena@eufo.org