

# Black Swans need not be Black: Preparing the RSAF to Succeed in Spite of Future Uncertainties

By LTC Goh Sim Aik, ME4 Soon Yi Xiang, Andrew & CPT Lim Peixian, Vanessa

In Nassim Taleb's seminal work, *The Black Swan: The Impact of the Highly Improbable*, he argued that almost all major historical events are Black Swan events—events that are highly improbable yet have massive consequences and can be rationalised only with the benefit of hindsight.<sup>1</sup> Since Taleb's work, the term Black Swan has become vernacular amongst military and civilian organisations alike. The question however is whether organisations, having embraced the Black Swan theory, have put in place measures to prepare themselves to deal with the inevitable Black Swan events.

Entrusted with the mission of defending Singapore's skies, the Republic of Singapore Air Force (RSAF) must succeed in spite of Black Swan events. Failure to achieve mission success shall undo everything that the RSAF, as well as Singapore, has achieved over the last five decades. The consequences of a 9/11 type of attack on Singapore's Central Business District or a Crimean-like annexation of Singapore are unthinkable but not impossible. Given Singapore's lack of strategic depth and nature of our economy, not only must the RSAF be capable of preventing and dealing with such remote events, we must also be able to handle these events on our first attempt, as there may not be a second chance.

Given the unpredictability and devastating effects of Black Swan events, it will be insufficient for the RSAF to merely forecast these events and develop specific contingency plans to deal with them. Rather, to achieve mission success in spite of Black Swan events, the RSAF must have the capacity to cope with and the capability to adapt to them. To develop the capacity to cope and the capability to adapt, the RSAF must focus on mechanisms to identify and guard against Black Swan events. The RSAF must also focus on building a strong organisational culture and developing her people

to be adaptable in times of crisis. The essay will open with a discussion on the theory of Black Swan and its relevance to the RSAF. The essay will argue that the first step in dealing with Black Swan events is to acknowledge their inevitability. The essay will go on to argue that while traditional scenario planning and stress testing mechanisms can help identify and prepare the RSAF for Black Swan events, these mechanisms are inadequate and must be enhanced through the Reverse Stress Testing methodology. The essay will also argue that since it is impossible to Black Swan proof the RSAF, the RSAF must therefore develop the capability to adapt to Black Swan events. To develop the capability to adapt, the RSAF will need to focus on developing an organisational culture of innovation, as well as training and educating our people to acquire the ability to adapt.

## **THEORY OF BLACK SWAN**

The theory of Black Swan was popularised following Nassim Nicholas Taleb's book, *The Black Swan: The Impact of the Highly Improbable*. According to Taleb, a Black Swan event has three characteristics. First, it must be an 'outlier'—something that cannot be convincingly predicted. Second, it must create an extreme effect upon occurrence. Third, it is possible to "concoct explanations for its occurrence after the fact", making it seem predictable only in retrospect.<sup>2</sup> Notably, Taleb has argued that it is our human mind's apparent blindness to randomness and large deviations that makes Black Swan events black, i.e. unpredictable.<sup>3</sup> Given the unpredictability of Black Swans, Taleb suggests that organisations should learn to adapt to their existence rather than to naively try to predict them.<sup>4</sup>

The events of 9/11 provide useful illustrations of the three characteristics of a Black Swan event. Prior to 9/11, the concept of a large-scale, debilitating and catastrophic terrorist attack was generally inconceivable. Just two months prior to 9/11, The New York Times carried an article stating that the terror threat was actually on a decline and that "politically inspired terrorism, as opposed to more ordinary criminality motivated by simple greed, is not as common as most people may think."<sup>5</sup> Although the downplaying of a potential terrorist threat by a journalist does not necessarily mirror the United States' (US) foreign policy, there is evidence that the Bush administration was warned of a potential hijacking by Al Qaeda via two Federal Bureau of Investigation's (FBI) memos, highlighting suspicions of Arab students at flight schools in Phoenix and Minnesota wanting to fly planes into the World Trade Centre.<sup>6</sup> These could have been indications of what was to come in 9/11, and the White House and the FBI on hindsight

could have been on high alert, potentially preventing or at least reducing its impact. The fact that on hindsight the 9/11 attacks seemed conceivable makes it a useful case study for Taleb's Black Swan theory.

The RSAF is by no means immune to Black Swan events. The rapid withdrawal of the British forces from Singapore in 1974 following the East of Suez policy and the A4 crisis in 1986 can be seen as Black Swan events that the RSAF had experienced and fortunately survived through.<sup>7</sup> Nonetheless, that the RSAF has survived through Black Swan events in the past will not guarantee survival in future events. The world is constantly changing; the attributes that the RSAF possessed in 1974 and in 1986 that allowed her to survive both events may no longer be relevant. We cannot assume that the RSAF will continue to have the right attributes to cope with Black Swan events. To effectively cope with future Black Swan events, the RSAF needs to have an institutionalised mechanism to systematically develop the capability to deal with Black Swan events.

## **ACKNOWLEDGE THE INEVITABILITY OF BLACK SWAN EVENTS**

The first step in developing the capacity and capability to deal with Black Swan events is to acknowledge their inevitability. Only by acknowledging that Black Swan events are inevitable will the RSAF have the mandate to invest resources to deal with them. However, acknowledging and investing resources on what is meant to be an outlier can be challenging for all organisations. On one hand, "assessing the potential effects of wildcards may bring one to the point where imagination overtakes research," while on the other hand, if we do not consider these effects at all, we cannot "identify the alternatives against which hedging strategies may be appropriate."<sup>8</sup> The RSAF needs to first take into consideration Black Swan events in order to come up with possible contingencies and methods to prevent their occurrence or circumvent them when they occur.

Given the many successes that the RSAF has experienced over the years, it may be difficult for her to acknowledge the inevitability of Black Swan events. Not only has the RSAF survived previous Black Swan events, it has also leveraged on Black Swan events to demonstrate its capabilities to cope with such events. For instance, the RSAF's quick response in supporting Operation Flying Eagle in 2004 following the Tsunami in Aceh, Indonesia (it was the scale of damage that propelled the Tsunami to Black Swan status) demonstrated her credibility in being a ready and responsive Air Force. Having

experienced many successful years, the RSAF has to guard against complacency. That the RSAF has done well thus far and will continue to do well in spite of Black Swan events is a dangerous assumption to operate with. The RSAF must operate with the assumption that potential debilitating Black Swan events will eventually occur and must channel resources to develop the capabilities to deal with them. Without acknowledging that Black Swan events are inevitable, the RSAF may not invest scarce resources in measures that can help the organisation surmount future Black Swan events.



*A SAF medic seeing to an Indonesian child's injuries in the aftermath of the tsunami*

## **REDUCE ORGANISATIONAL IGNORANCE**

Having acknowledged that Black Swan events will occur, the RSAF must then build the capacity to cope with these events. The capacity to cope with Black Swan events can be enhanced by reducing the number of potential Black Swan events. In essence, the RSAF must seek to reduce her ignorance to disastrous events. Ignorance can be reduced via two main ways: first, by gleaning lessons from past Black Swan events and second, by identifying potential future Black Swan events.

To glean lessons from past Black Swan events is to not let the RSAF go down the path of other militaries that have failed in dealing with such events. It is often stated that those who ignore history are doomed to repeat it. Ironically, history continues to

be fraught with examples of nations and military forces relearning the same lessons in different times. For instance, history would have taught Kuwait and Ukraine that they must have a credible defence force to preclude an invasion of its country by Iraq in Kuwait's case, and the annexation of Crimea by the Russians, in Ukraine's case. Yet, Iraq's invasion of Kuwait and the Russian annexing of Crimea in recent history still turned out to be Black Swan events. The RSAF must draw lessons from other militaries and organisations in order to ensure that she does not fall victim to Black Swan events that have already occurred. Studying previous military Black Swans is therefore the first and necessary step in preventing their recurrence in the RSAF. Nonetheless, it must be emphasised that merely learning from history is insufficient. The RSAF must also assimilate the lessons and use the lessons to update her Concept of Operations (CONOPS).

Apart from gleaning lessons from past Black Swan events, the RSAF must also put in place robust and effective scenario planning mechanisms to increase the number of crisis scenarios that the RSAF is aware of, hence reducing the number of Black Swan events left to occur. Today, the RSAF, like many advanced air forces, has in place a war-gaming system that allows us to exercise our forces in various operational scenarios. What is potentially lacking, however, is the exercising of our forces in seemingly unlikely



*The Heron-1 Unmanned Aerial Vehicle makes its debut at Exercise Forging Sabre 2015, bringing both sensing and cooperative lasing capabilities to the field for assets to take out multiple mobile targets within a single pass.*

scenarios. Realistic training is important to enhance the operational capability of the RSAF, but testing the extreme, albeit unlikely scenarios is necessary too. The RSAF needs to continually seek to expand the war-gaming scenarios from beyond the often tried and tested set-piece scenarios to scenarios that seem unlikely to happen to the RSAF. To this end, the RSAF can possibly adopt the process of Reverse Stress Testing.

Reverse Stress Testing is a relatively new method of scenario planning that is currently employed by corporations and financial institutions worldwide, most notably to preclude another financial crisis following the Lehman Brothers' collapse in September 2008. The Federal Reserve Board describes Reverse Stress Testing as a method where institutions "assume a known adverse outcome...then deduce the types of events that could lead to such an outcome."<sup>9</sup> The process starts out by identifying catastrophic outcomes first before determining the likely circumstances (or Black Swan events) that can lead to those outcomes. Unlike traditional war-gaming where the scenarios are determined and the exercise is run to determine the outcome and yield lessons learnt, Reverse Stress Testing will allow the RSAF to identify the factors and gain insights to circumstances that will lead to the RSAF's failure, supplementing traditional war-gaming scenarios.

Critics may argue that Reverse Stress Testing can lead to the RSAF pouring valuable and limited resources on solutions in the attempt to deal with highly improbable events. However, such argument misses the point. While the purpose of Reverse Stress Testing is to identify circumstances that will lead to failure, it does not mean that resources must be allocated to capabilities that can preclude those failures. Rather, Reverse Stress Testing seeks to help the RSAF overcome 'inattentional' blindness in scenario planning. Mack describes 'inattentional' blindness as how we "rarely see what we are looking at unless our attention is directed to it."<sup>10</sup> 'Inattentional' blindness in military scenario planning refers to a psychological lack of attention to events that are seemingly not military related. In traditional military scenario planning, outcomes are first pre-determined and follow a set of existing assumptions. The RSAF has to prevent inattentional blindness by challenging these assumptions and going beyond considering military-focused factors that will cause it to fail. Traditional war-gaming scenarios do not allow this to happen because the set-up ensures that the BLUE force always wins, and assumptions are often misconstrued as facts.<sup>11</sup> In addition, the RSAF can also explore cooperating with other ministries or external agencies to develop alternative scenarios to challenge existing assumptions and force the organisation to consider external and whole of government perspectives. In doing so, the RSAF

will be exposed to more potential Black Swans and avoid being blindsided by these unconventional scenarios should they occur.

The Yom Kippur War in 1973 illustrates the inadequacies of traditional scenario planning. While the Israeli Defense Force (IDF) did not neglect the possibility of war with Egypt and Syria, it had wholeheartedly embraced a series of assumptions that would preclude the start of the war, and based its war strategy on having sufficient forewarning from its intelligence sources.<sup>12</sup> Some of the assumptions turned out to be true, for example, Egypt would not go to war without Syrian support.<sup>13</sup> Others, however, such as the need for Soviet fighter-bombers to attain air superiority, proved to be incorrect. Although the IDF correctly identified that the Egyptian Air Force did not have the necessary aircraft to attain air superiority over the Israeli Air Force (IAF), they neglected the fact that delivery of cutting edge Soviet Surface to Air Missiles (SAM) would permit the Egyptians to establish small areas of air denial.<sup>14</sup> Reverse Stress Testing could have allowed the IDF to identify this threat, and hence realise that the necessary pre-conditions for war were present in 1973.

Reverse Stress Testing would also have helped with the other areas of IDF preparation. Among its other assumptions for planning for war, the IDF had assumed that it would receive sufficient (i.e., 48 hours) forewarning of war, which would allow it to mobilise sufficient troops and launch a pre-emptive strike on the adversary, with the effectiveness of the IAF not in question.<sup>15</sup> However, none of the assumptions held—warning of war was received only 6 hours prior to invasion, there were political considerations preventing the IDF from launching a pre-emptive strike and the IAF were ineffective over critical areas of the battlefield due to the SAMs.<sup>16</sup> Should IDF have conducted Reverse Stress Testing, it could uncover the many weak points of its war plan and would be more prepared for the outbreak of war. For example, at the start of the war, the ratio of artillery to mortar units at the Egyptian front was 40:1, and the ratio of tanks at the Syrian front was 8:1; more assets in the area could have potentially reduced the effectiveness of the initial Egyptian and Syrian attack.<sup>17</sup>

Similarly, the RSAF can apply Reverse Stress Testing to avoid catastrophic outcomes. For instance, the RSAF could find out in a Reverse Stress Test scenario that it cannot achieve its mission because the launch and recovery rate of aircraft is constrained due to severe haze conditions brought by a huge volcanic eruption in Indonesia (the

Black Swan event) that coincided with a major military operation. With the Black Swan event identified, the RSAF can then exercise the commanders and planners to derive innovative solutions to overcome constraints on launch and recovery rate due to the haze conditions. Even if solutions are impractical or prove to be too costly to implement, the very fact that debates and discussions have been carried out would already enhance the preparedness of the commanders and planners. This leads us to the next point of the need to develop the capability to adapt to Black Swans.

## **ADAPTING TO BLACK SWAN EVENTS**

Reducing the number of potential Black Swan events can enhance the RSAF's capacity to cope with Black Swan events to a certain extent, but cannot Black Swan proof the RSAF. That Black Swan events will still occur means that the RSAF must also develop the capability to adapt to them. The Yom Kippur War, again, provides a useful case study to demonstrate the importance of adaptability in the face of Black Swan events.

The fact that the IDF still won the war in 1973, despite being 'Black Swan-ed' at the strategic level, can be attributed to the ability of the IDF commanders and war-fighters to adapt in the face of Black Swan events. The adaptability is most visible in those who were operating close to the ground. For instance, when the IAF encountered the lethal effectiveness of the Egyptian and Syrian SAMs, the IAF fighter squadrons adapted their tactics accordingly. Some squadrons chose to fly higher to stay out of range, while others chose to fly low level in order to prevent radar from picking them up.<sup>18</sup> The IDF's army also adapted their tactics to nullify the effectiveness of the anti-tank missiles, by relying on infantry to first neutralise the anti-tank units before rolling the tanks in on the Egyptian armies.<sup>19</sup>

At the operational level, the IDF used an exceptionally risky but rewarding bridging mechanism to cross the Suez Canal and encircle the 3<sup>rd</sup> Egyptian Army. The IDF lacked any conventional bridging mechanism as they were not able to procure any before the war. As such, they had to make use of the World War Two (WWII) area pontoon bridging mechanism. This device was painfully driven across the Sinai to the Suez Canal and served as the only way to establish a bridgehead on the African side. In comparison, the Egyptian armed forces had established 7 bridges in its initial assault.<sup>20</sup> While the winning of the war does not diminish the importance of Reverse Stress Testing, it does strengthen the point that the capability to adapt is essential to survive a Black Swan event.

The Falklands War also brings across interesting Black Swan events that illustrate the importance of the capability to adapt. The British Ministry of Defence never really considered developing a contingency plan to defend the Falkland Islands. Indeed the Royal Air Force (RAF) and the Royal Navy's (RN) main preoccupation was a potential conflict with the Soviets in Europe.<sup>21</sup> The Falkland Island's garrisons were merely 42-men strong before the Argentinian Invasion.<sup>22</sup> However, when Argentina invaded the Falklands, the British were able to adapt whatever resources it had at its disposal to re-take a set of islands that were thousands of miles away, and in a very different operating environment than what it was prepared for.

In just three days, the RN was able to assemble a task force to re-take the Falklands. The fleet was greatly supplemented through requisitioned civilian merchant ships, amounting to 62 of the more than 120 ships in the Task Force.<sup>23</sup> The RN's two carriers only had a limited number of Sea Harriers to perform air superiority and ground attack missions. This was quickly supplemented by Harriers (of a different variant) from the RAF.<sup>24</sup> As not all the aircraft were ready when the Task Force set sail, the British used a combination of airborne refuelling, refuelling at one airstrip in the Atlantic and



*Royal Navy Fleet Air Arm Sea Harrier FRS1s of 899 Naval Air Squadron at Yeovilton Naval Air Station. The squadron provided many personnel for action in the Falklands.*

container transport in other vessels to ensure that the aircraft would arrive at the Falklands in time.<sup>25</sup>

The RAF's strategic bombing capability was downsized dramatically prior to the conflict, as it was deemed not to be necessary for a conflict in Europe. At the onset of the Falklands War, the RAF swiftly modified their Vulcan Bombers and Nimrods for air-to-air refuelling in order to perform long-range bombing missions.<sup>26</sup> To put things in perspective, the closest airstrip was in the Ascension islands, about 3,400 miles away from the Falklands.

One purported creative solution that the British used to overcome the lack of intelligence as there were no North Atlantic Treaty Organisation (NATO) satellites operating in the area was to supposedly obtain data from a Soviet Satellite operating in the southern hemisphere in that area, courtesy of a Norwegian listening post.<sup>27</sup> Although the authenticity of the statement cannot be confirmed, if true, it presents a remarkable display of ingenuity to overcome a problem. Evidently, the key to dealing with a Black Swan event when it arrives is not to berate oneself for a lack of foresight, but to tackle the issue immediately by adapting.

Conversely, Nokia's decline is illuminating of how organisations can fail if they do not adapt to a Black Swan event. Nokia started off as a humble pulp mill and rubber business in 1865 and made the switch to the mobile market in 1992. It was a strategic decision with a view to make Nokia the leader in the telecommunications market.<sup>28</sup> From 1996-2001, Nokia saw its turnover increase from 6.1 billion to 31 billion Euros, and was clearly the leader in the mobile market. However, things changed in 2007 when Apple launched the first iPhone. Sale of Nokia phones plummeted and the company reported a 30% fall in third-quarter profits in 2008. Despite finally getting out of the red in 2013, Nokia was still unable to regain its 20<sup>th</sup> century dominance and was eventually sold to Microsoft. Till now, the Finnish company and its products remain in the shadows of Apple and Samsung in the mobile phone market.<sup>29</sup>

The launch of the iPhone can be seen as a Black Swan for Nokia as they never predicted that consumers wanted anything more than a product that was first a mobile phone and secondly a lifestyle device. Yet, in retrospect, it is obvious why consumers will see mobile phones as a lifestyle device first, mobile phone second. The technology employed by Apple was already in existence. Ironically, Nokia was one of the first companies to introduce these now highly sought after functions like a built-in camera, email access and application downloads in their mobile phones.<sup>30</sup> Despite its head start in the smartphone market and possessing all the necessary technology to develop

something truly revolutionary, Nokia was unable to capitalise on its early success and allowed Apple and eventually, Samsung, to gain dominance of the mobile market.

Critics have analysed the decline of Nokia as a classic case of how stagnation, complacency and a failure to adapt can cause the downfall of a corporation. “Nokia even saw what was coming—what smartphones were becoming—sooner than most, but they failed to realise how quickly they needed to change or, that the time they had to prepare for their next business leap was shrinking exponentially.”<sup>31</sup> The failure to realise the need for change and to adapt in the face of the iPhone was a key contributing factor to Nokia’s steady decline. The Nokia management did not recognise the Black Swan soon enough and did not acknowledge that the iPhone would be a threat to its market relevance. In fact, they waited a whole year before they introduced their first touchscreen smartphone, the Nokia 5800, which was eventually unable to rival Apple.

## **DEVELOPING ADAPTABILITY**

Taleb noted that military people are good at adapting to Black Swan events.<sup>32</sup> While this is particularly true at the tactical level, where the reality is to adapt or to die, the history of adaption at the operational and strategic level is much more sobering.<sup>33</sup> The tactical adaptations in the Yom Kippur War clearly illustrate Taleb’s assertions. Adaptability, as defined by the Institute of Defense Analyses (IDA) in the US, is “the capacity to bring about an effective response to an altered situation, a metaskill that requires the integration of both cognitive and relational skills.”<sup>34</sup> To ensure that the RSAF is able to adapt at all levels in the event of a Black Swan event, the RSAF must promote an organisational culture that facilitates and encourages the development of the adaptability skill in its people and to provide robust training and education for its people to be adaptable.

## **THE RIGHT CULTURE**

To survive a Black Swan event requires the right culture to permeate through the organisation; a culture that recognises not all problems can be foreseen, that promotes adaptability in its people and that offers them the right environment to anchor their fundamentals whilst thinking on the spot. Without the right culture, the IDF would not have resorted to the exceptionally risky but rewarding bridging mechanism to cross the Suez Canal and encircle the 3<sup>rd</sup> Egyptian Army. Similarly, the RN and the RAF would not have pulled off the operational plans to retake Falklands.

The RSAF needs to value a culture of adaptability. Such a culture is necessary to counter the bureaucratic inertia that encourages people to adopt the ‘tried and tested’ approach for guaranteed success in the face of limited resources. Schelling summarises this fear of the unknown, stating that “(t)here is a tendency in our planning to confuse the unfamiliar with the improbable. The contingency we have not considered seriously looks strange; what looks strange is thought improbable; what is improbable need not be considered seriously.”<sup>35</sup> The RSAF needs to encourage our people to think out of the box and consider the improbable. To do so, there must be sufficient command emphasis to reinforce to our people that the organisation values people who are constantly trying new ways to do things on a day-to-day basis, and not just in the face of a Black Swan. This will encourage our people to go the extra mile and strive to constantly innovate and improve our daily work environment such that when a Black Swan event occurs, our people are sufficiently agile and nimble to adapt.

## **TRAINING AND EDUCATION**

Beyond culture, the people within our organisation must have the necessary skills and mindset to adapt when a Black Swan event occurs. Given that it is unprecedented, the solution to a Black Swan problem needs to be derived from scratch and cannot be found in previously developed methods. Our people must know when to adapt, and how to adapt. To be adaptive and to constantly innovate, one must possess strong fundamentals in the first place. The organisation must ensure that our people have the time and space to anchor their fundamentals, which is especially relevant at the junior level. Training and educating our people to ensure that they are well grounded in their fundamentals is essential.

Beyond possessing strong fundamentals, to adapt in Black Swan events, our people must be able to make good decisions. People in every field make decisions based on intuition.<sup>36</sup> “...what enables us to make good decisions is intuition, in the form of very large repertoires of patterns acquired over years and years of practice.”<sup>37</sup> The RSAF must identify the range and depth of experiences that commanders must have in order for them to be adaptable in crisis. The leadership development programme must then put future commanders through those experiences in a structured and deliberate manner. The programme must be institutionalised at every leadership level and not just focused on top leadership positions. Adaptability at every level of leadership is necessary for the RSAF to cope with and adapt to Black Swan events.

## **SURVIVAL PSYCHOLOGY**

Besides having the skills and experience required to adapt, the RSAF must also have the resilience to survive the onset of Black Swan events. Looking again at the Falklands War and the Yom Kippur War, in both cases, the military and civilian leadership focused on solving the immediate Black Swan event at hand. The British Government formed a War Cabinet that met on a daily basis to oversee the entire operation, similarly the Israeli unity government consulted frequently with the military leadership to discuss courses of action. In both cases, the issue of finding out what went wrong was left to parliamentary commissions after the war: the Franks Report for the Falklands War, and the Agranat Commission for the Yom Kippur War. Exposing people to experiences in the leadership development programme is the best way to gauge their Survival Psychology ability. During such practices, the RSAF can identify those with innate survival psychology ability and those without. For those without, there exists a possibility to coach them to develop a survival psychological response.

## **CONCLUSION**

Black Swan events can have a devastating impact and the RSAF is no less susceptible to them. While the RSAF already has robust scenario planning mechanisms to reduce the chances of a Black Swan occurring, more can be done, such as the institutionalising of Reverse Stress Testing. In spite of all the mechanisms put in place, a Black Swan event will still be inevitable. As such, the RSAF needs to be an organisation that has the capability to overcome Black Swans and can do this by engendering the right culture, skillset and mindset in our people. Our people need to acknowledge that we cannot plan for everything and that surprises do occur. Given this, new solutions will have to be formulated within a short span of time. It is important to be able to adapt fast enough to reduce the potential debilitating effects of a Black Swan. To do so, our people need to innovate and think on their feet. With the right command emphasis, our people will be more encouraged to innovate on a daily basis and constantly find new ways of improving their workplace efficiency such that when a Black Swan occurs, adapting and innovating will not be an unfamiliar concept. Our people also need to be anchored in strong fundamentals so that they are still able to perform their primary roles while constantly sourcing for better ways to go about their daily work in the face of a Black Swan event. Lastly, being prepared for a Black Swan event will strengthen the very resilience required to withstand it when it occurs.

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