

This book serves as the final report of the *Game Changers* project lead by **John Casti** and coordinated by **Leena Ilmola**. The project was established towards the end of 2009 as a part of the *Extreme Events in Human Society* initiative at **IIASA**, the *International Institute for Applied Systems Analysis* (Laxenburg, Austria).

# Extreme Events

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Startups  
conjunction



# Executive summary

The cover of Newsweek on 28 March 2011: *Apocalypse now: Tsunamis. Earthquakes. Nuclear Meltdowns. Revolutions. Economies on the Brink. What the #@%! Is Next?*

Yes, there will be more events of this nature due to a number of reasons, including **complexity, global networks, flat-world instability, paradigm shifts, global crises of maturity**, and several **in-built features** of modern societies:

- *Complexity* leads to a mismatch between the system and the mechanisms available to control it. Furthermore, complexity *per se* drops our ability to understand and control the system.
- *Flat-world instability* refers to the interdependence of individual actions *globally*, induced by instantaneous access to the same information. Instead of asynchronous and often balancing actions we previously had, this leads to *global* herd mentality and bubbles of various kinds.
- *Paradigm shifts* are major discontinuities in global socio-economic trajectories that typically take place in 40–60 year intervals. Such a shift is induced by a technological breakthrough. Arguably the world is current shifting to a new paradigm, which is a major source of turmoil.
- *Global crises of maturity*: There are more than half a dozen acute and inflamed global crises that are nowhere near to be solved. Reaching a *tipping point* in any these crises would have major consequences worldwide. The virtually complete lack of *effective* global governance exacerbates the risk of a meltdown of the global socio-economic system.
- *In-built features*: A modern society is lean, individualistic, specialized, just-in-time, and short-sighted. It excels in efficiency and dynamism. It also produces shocks internally and is quite exposed to external ones. Furthermore, these – coupled with a few other features – often lead to a situation where *no one* in the society has an interest to take a bird's eye view upon considering stability and responsiveness. As far as major shocks are concerned, a dynamic modern society is quite adequate *after* the fact; its performance is far worse as far as preventing, anticipating, or preparing for shocks is concerned.

No, we do not provide a list of disasters to come. The reason is twofold. First, the domain of *unknown unknowns* – the set of things we don't even know we don't know (more on this riddle in Chapter 1) – cannot possibly be completely exhausted. Second – even if the starting point may be an Act of God –, we are dealing with social randomness, which is inherently unstructured and untraceable. There is no overarching theory of surprise, but by employing a diverse set of approaches and tools one *can* get a better understanding of the future.

An **extreme event** (*Xevent*) is a rare incidence with potentially significant societal implications. While a *specific* Xevent has a low probability, due to the range of possible Xevents and due to a myriad of global networks acting as transmission paths, a small-open economy such as Finland experiences consequences of *an* Xevent quite frequently. The paradox thus is that everyone agrees that Xevents are possible and do happen but when the discussion moves to more specific Xevents, the consensus is that due to their rarity considering them is not worthwhile. Upon considering Xevents, we are easily captured by ‘*a failure of the collective imagination of many bright people*’.

The extreme events we have in mind tend to be *systemic* in nature. Their scope is often beyond any individual actor or organization within the society, which calls for emphasis on national-level action in preparing for them.

We insist on considering both positive and negative extreme events. Previous discussions have mostly touched upon the latter kind – for a good reason. It is simply a lot easier and quicker to destroy something than it is to build it – in part the X-ness of an event is related to its unfolding time.

The consequences of systemic Xevents are mostly addressed by taking decisive government action and by spending vast amounts of public money. Yet, the public willingness to devote resources for anticipation, planning, and preparation for Xevents *beforehand* is negligible. We argue that Xevents should be among central concerns of decision makers in the public and in the private sector.

Finland needs **resilience** – capacity to absorb and recover from negative Xevents as well as capacity to nurture and benefit from positive ones. A society’s ability to react on an Xevent crucially depends on its institutions and infrastructures as well as on the coordination and cooperation among its members. In these respects Finland compares favorably to virtually all other countries in the world. Finland’s challenges with respect to Xevents are different from the challenges of most other countries – Finnish focus should be more on having *adaptive* structures and on exploiting *opportunities* that might arise with Xevents.

Contingency planning should be considered as a part of good governance. We propose that Finland be turned to a model for an *anticipatory* society, which constantly prepares itself for contingencies of various kinds.