

Defining a System

**A system definition**

A system is an organized, purposeful structure that consists of interrelated and interdependent elements, for example components, entities, factors, members, parts etc.

These elements continually influence one another, either directly or indirectly, to maintain their activity, the existence of the system, and to achieve the goal of the system.

All systems have:

* inputs, outputs and feedback mechanisms
* maintain an internal steady-state despite a changing external environment
* display properties that are different than the whole (called emergent properties) but are not possessed by any of the individual elements
* have boundaries that are usually defined by the system observer.

Systems underlie every phenomenon, and all are part of a larger system. Systems stop functioning when an element is removed or changed significantly.

Real world systems have boundaries that allow exchanges of energy, material and information with the larger external environment or system in which they exist.  **National Critical systems**

When choosing a relevant system for the NCRA questionnaire give consideration to:

* What business service is this system supporting
* How interconnected and vital it is to various other services or systems
* The scale on which it operates: from federated services to whole departments
* The purpose, features and behaviours that are being displayed
* How long it can be down before impacts start happening e.g. instantly, to weeks
* Whether the indirect consequences are interesting – e.g. social, business, welfare
* Whether this is a unique system or repeatedly similar to many others

**Some examples and reasons why:**

* Energy: National grid mimic system: Shows all the energy flows and distribution resources in real time. Cyber interference could display erroneous data to maintainers who then make bad energy distribution decisions.

* Energy: Power plant control system: Controls all the different valves, turbines, generators, and transmission gear. Cyber interference could cause machinery to work outside of designed for parameters causes voltage and current drops, or difficult to replace machinery failure.

* Finance: Real Time Settlement Systems: Ensure that monies traded between banks is always settled within a set period. Cyber interference could cause a bank to run out of money, a run on a bank or negative credit rating changes.

* Finance: Autoteller system: Allows people to get access to physical money: Cyberattack could result in inability to access or provide criminals with all the money in multiple units.

* Telecoms: BGP routers: Ensure that data is correctly routed around the internet enabling companies to do global business. Cyber-attack can enable DNS man in the middle attacks, sink holing of data, redirection of traffic past espionage sniffing point.

* Telecoms: Core data network control system. Used to manage the servers and routers needed to manage the flow of data around an internet provider. Cyber interference could cause major network outages and the inability for data to be sent or received.