

Matthew's Book Club Summary #11

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Title: Thinking in Systems

The book club started as an informal, fun way to explore and consider business ideas relevant to our work with colleagues. The format consists of one person (usually Matthew) reading a book and writing a summary for discussion during team meetings. This allows the other team members to benefit from the book's insights, without carving time in their schedule to read the full volume.

The idea was to summarize *an interesting part* of each chapter in a paragraph or two, and where applicable, note how these could be relevant to the workplace. This provides the reviewer with practise condensing a mass of data into a few pieces of key information: an underappreciated skill. The reviews are meant to be accurate but light-hearted, on the assumption that people learn more when they're having fun.

Matthew's company gave permission for these to be distributed to non-employees as long as the employer-specific content was removed, for which he is sincerely appreciative.

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About the author / book:

The author, Donella Meadows, was one of the lead authors of The Limits to Growth, a strongly controversial book that argued that growth had, well, limits. Many people think that book predicted oil would run out by 1992, but the authors actually said would only happen *in the absence of any new discoveries*. (In a similar manner, despite the expression, Captain Kirk has never said "beam me up, Scotty".)

Most problem solving is deductive reasoning: eliminating extraneous factors to find a single, simple cause and effect. But most Big Problems usually have lots of factors at play, so you need *inductive reasoning*. Systems Thinking is essentially the study of feedback loops, coupled with inductive reasoning.

Ch	Title	Summary
	Introduction: the system lens	<p>Not all problems can be solved with reductionism – some problems are so multi-faceted and complex, you need a holistic, <i>systems</i> approach.</p> <p>The fable about the blind men and the elephant, riffs on this theme.</p>
1	The Basics	<p>At their core, systems consist of stocks (inventory) and flows. And feedback loops. Lots and lots of feedback loops.</p> <div data-bbox="827 591 1759 906" style="text-align: center;"> </div> <p>There are two types of feedback loops.</p> <p>reinforcing loops: more people → more babies → <i>even more</i> people</p> <p>balancing loops: too many people in too little space → optimal pandemic conditions → fewer people</p>
2	A Brief Visit to the Systems Zoo	<p>Feedback loops <i>always have delays</i> (they're reactive, not proactive). It's important to match responses with the <i>lag time</i>. Too slow or too fast, and you won't get the desired result.</p> <p><i>Japan has reacted way too slowly to falling birth rates – its population is declining. If your CEO changes strategy to daily changes in the</i></p>

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		<p><i>stock price, the company will probably do worse than if they only check it occasionally.</i></p>
3	Why Systems Work So Well	<p>Dynamic systems work well when they balance three characteristics: resilience, self-organization, and hierarchy.</p> <p>- resilience is the ability to survive change, usually due to a thick web of feedback loops. Efficiency often comes at the expense of resilience.</p> <p><i>Because Toyota used the same accelerator pedal for many models, they saved money (efficiency). But when a problem did occur, it became catastrophic because that pedal was in so many cars (less resilience).</i></p> <p>- self-organization is the ability for new subsystems to emerge within systems, often with unexpected consequences.</p> <p><i>"Feather cells" seem to have developed in dinosaurs as a superior skin-insulation feature; they unexpectedly turned into tools for flight. IT departments have suddenly become indispensable parts of big companies.</i></p> <p>- hierarchy is a form of self-organization that attempts to optimize the health of the system by regulating the subsystems. It doesn't always succeed.</p> <p><i>Hierarchy in bodily processes ensures that hormones are only released when appropriate (e.g. during a teenaged growth spurt) even if the individual organs are capable of releasing different quantities at different times. Hierarchy in organizations can sometimes prevent new opportunities from being explored / exploited.</i></p>

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4	Why Systems Surprise Us	<p>A common mistake when trying to change systems you're part of, is to assume that everyone sees the same data; they don't. Different opinions usually come from different people seeing different information, and having conflicting goals / motives.</p> <p>To change a system, you have to "improve" the information, incentives, goals and constraints available for the participants.</p>
5	System Traps... and Opportunities	<p>Several solutions for systems traps are offered. I'll discuss a few:</p> <p>resistance to policies: stop fighting over the steering wheel long enough to get everyone's goals aligned.</p> <p><i>According to David Wardrop (whose wife was CEO) the Canada Line Vancouver/airport rapid transit line came in early because every contractor got incentives to finish ahead of schedule.</i></p> <p>tragedy of the commons: plead for better behaviour, privatize the commons (this essentially privatizes any damages onto the abusers), or police the resource.</p> <p>drift to low performance: make standards absolute, or measure everyone against the best performer (not the median performer).</p> <p>addiction: study carefully to find the root causes. Drugs may be an unhealthy solution to deeper personal problems (poor self esteem?). Bureaucracy may be an unhealthy solution to deeper company problems (poor work practises?).</p>
6	Leverage Points – Places to Intervene in a System	<p>All systems have leverage points, where changes can have a huge impact. For overtaxed city roads, the leverage point is urban planning (build density and transit, and you won't need more and more roads).</p>

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		<p>A few examples given in this chapter are:</p> <ul style="list-style-type: none"> - reduce the delay time for feedback - strengthen feedback loops by making more information available (e.g. labels for ingredients or GMO foods, public filings of political contributions) - defining the most appropriate goal (e.g. Toyota expanded production fast enough and long enough to become the world’s biggest automaker, but as a result of the wrong focus, quality got left behind)
7	Living in a World of Systems	<p>This chapter has several recommendations for people trying to effect changes in systems:</p> <p>get the beat of the system: people often try to make changes before developing an in-depth knowledge of the system. Companies sometimes hire outsider CEO’s who make big changes – despite not knowing the firm’s culture, core business, or customer needs! The more you know the system, the better your solution is likely to be.</p> <p>distribute information widely: you can harness more innovation if more people know about the challenges you face. And if people know their behaviour is being noticed, they behave better (this is “social proof” - why blue box programs work)</p> <p>count what’s important, not what’s easy to quantify: part of our environmental challenges are due to the fact GDP doesn’t quantify natural services, but includes things like heart attack treatments, etc.</p> <p>locate responsibility in the system: ideally, consequences should feed back quickly and directly to the system actor. If Vancouver had a landfill in each neighborhood, rather than in Delta / Cache Creek, citizens would probably generate a lot less garbage.</p>