

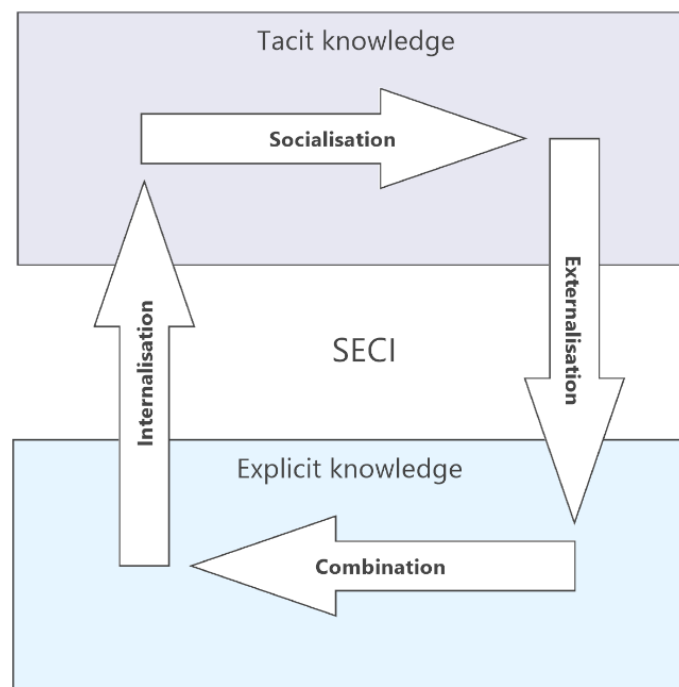
“Mind Mapping” software and the SECI knowledge model

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The way that “mind mapping” software works can usefully be described in terms of Nonaka and Takeuchi’s “SECI” model of knowledge creation, also called the “spiral” model. The SECI model and observations of mind mapping software illuminate and enhance each other and point the way to a modified version of SECI that reflects a more inclusive process of knowledge development, and to a better understanding of what mind mapping software really is.

Nonaka & Takeuchi’s SECI model

The SECI model describes four “transactions” that develop and transfer knowledge: socialisation, externalisation, combination, and internalisation. Knowledge is strengthened by iterating around these transactions, and is often drawn as an expanding clockwise spiral, suggesting the incremental growth of knowledge at each iteration. Two of the transactions reflect translation of knowledge from tacit to explicit and back again, and the other two represent processing within the same domain.



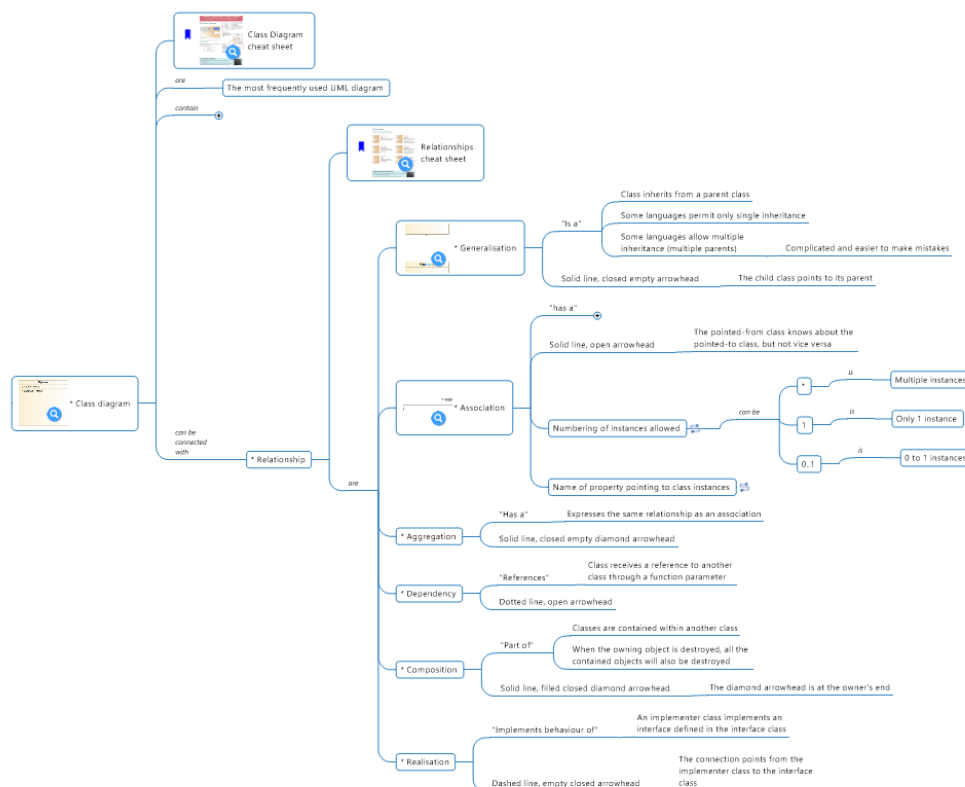
The four transactions in the SECI model

- **Socialisation** describes a person-to-person transfer of tacit knowledge in a dialogue, working in a team or in a master/apprentice relationship. This is learning through discussion, copying, and coaching.

- **Externalisation** describes the conversion of tacit knowledge into a persistent and explicit format, so that it can be transferred without person-to-person interaction. Writing, printing, and other technologies have made huge differences to the transferability of knowledge that was formerly passed down through folklore in songs and stories – so much so that folklore is now merely a pastime in many cultures. An alarming quantity of hard-won knowledge has been lost on the way. The SECI model often identifies this transition as “publishing” but does not really explore how tacit knowledge can be translated into written words. Note that storytelling as a technique in corporate settings is very much alive and well.
- **Combination** refers to the processing, structuring, and combining of explicit information to put it into context and make it more usable. Technology is often cited as enabling this process.
- Lastly, **Internalisation** refers to the translation of explicit knowledge back to tacit knowledge when an individual internalises it, or “takes it on board”. In theory, the recipient recreates the same mental model that the cycle began with, but in practice this can often be different.

The SECI model has been the subject of academic criticism, but its lasting message is that knowledge is strengthened by *any* transformation or transfer of tacit or explicit knowledge. There is a saying that the best way to master something is to teach it to others. SECI describes a working model for this.

Mind mapping software and the SECI model



A typical software mind map

It is helpful to describe the behaviour of mind mapping software in terms of the four SECI transactions before considering how everyday experience with mind mapping software leads to elaboration of the model. We will discuss only computer-based mind mapping software and not paper & pen methods here.

The **socialisation** transaction is active when a map is collaboratively developed as a record of a discussion. Here we can observe that conversations around visual information are significantly more productive than an abstract discussion or trying to use linear text as a reference. It is easier to describe and debate a picture that we can all see, because we do not need to construct and verify our own mental model from scratch. Errors, omissions, and assumptions are exposed in a tenth of the time. Knowledge and insights are exchanged and their externalisation in the shared map can be immediately evaluated. An external reference point also de-personalises issues, enabling people to indirectly express their real views, much like some couples communicate with each other through the cat.

The **externalisation** transaction reflects the capture of ideas and information in a map. Here we can see that externalisation in a diagram is more concise and compact than linear text, especially when dealing with larger amounts of information, relationships, and complexity. A diagram has multiple dimensions with which to capture meaning without needing to translate it into literal words. The primary example is a visual hierarchy, where we can “see” contexts and membership in the position and connecting of ideas. Other helpful dimensions are shape, size, position, and colour. However, you must always remember that a mind map is a **shorthand** format that achieves conciseness by glossing over the tacit knowledge behind it. This has a major impact on the effectiveness of the internalisation transaction described below.

The **combination** transaction is supported by mind mapping software in many ways. Technologically, it can bring together information from a wide range of sources and share it with minimum effort. Value is also generated by the ability of software to *transform* explicit information into alternate formats. Converting a visual diagram to a linear format, filtering it to view selected information, or pivoting the structure so that information is seen from a different perspective (e. g. ideas reorganised by category) are powerful ways to deepen understanding. Visualising the structure also compels us to seek patterns, inconsistencies, and gaps, and resolve them. Mind mapping software creates substantial value in this phase by enabling the *mutability* of explicit knowledge. Changing the meaning of something by moving it to a new location is the cornerstone of mind mapping software and is responsible for much of its value.

The **internalisation** transaction is where we use the knowledge encoded in a software mind map to help make predictions, take decisions, or act. This relies on users having enough tacit knowledge to successfully interpret and use a map, which is the Achilles’ Heel of mind mapping software in an organisational setting. A mind map is often a key to unlocking what is in the author’s heads, rather than the actual contents. This aspect is invisible when you are the only user. It becomes evident when the map is shared with non-authors, although it is still difficult for map authors to recognise and accept. Ever since the first mind mapping software made it easy to share maps, it has been well known that the best way to understand a map is to have taken part in its creation. This is not a new phenomenon; students have always known that reading someone else’s lecture notes is no substitute for having been present and engaged at the lecture itself. The SECI model implies that productive knowledge transfer takes place **within a cohort that shares all four transactions**. This becomes a significant challenge if we want the cohort to include an unknown future audience. It affects all externalisation to some degree; for example, jargon that is known to a small group can render materials almost unusable by others. The tacit knowledge needed to interpret and fully use a map includes:

- The author’s intentions and objectives for creating this map,
- the way that the chosen structure delivers these intentions,
- how to work out what is important in the map,
- the jargon and keywords used,
- the process by which the map is kept up to date, and
- the use of technical features to enable access to and transformation of the information in the map.

If these elements are not agreed within and understood by the cohort that creates a map, nobody will really know what is going on. One advantage of working alone is that you do not need to negotiate and explain these protocols to anyone else. You can work in any way that you like, but unless you are systematic about the above, you may find it harder to pick up your train of thought again if you return to it a year or two later.

Typical solutions to this issue can include:

- Restricting the audience to those who are willing to accept and engage with maps,
- Converting maps to more universally recognised formats such as linear text, tables, outlines, or well-known diagrams,
- Elaborating in painful detail all the tacit knowledge required to fully engage with a map. This might be resisted by those who have invested time and effort to learn a software tool and technique, as they will perceive a loss of efficiency, or
- Providing extra induction for users who are unfamiliar with the format. This may lead to a cost/benefit decision where the value of using native maps is offset by the cost of training up users who are less interested and do not really see the benefits. But if you accidentally place key stakeholders on the wrong side of the fence, your approach is risk-laden anyway.

Issues with the SECI model

Evaluating the relationship between the theoretical SECI model and the practical use of mind mapping software also highlights some issues, leading to a variation of the SECI model.

First, many authors define tacit knowledge as knowledge that *cannot* be directly transferred and can be truly learned only by *doing*. Nobody can learn to swim competently by reading books or by having swimming explained to them. Nevertheless, the SECI model describes a tacit-to-tacit transfer in the “socialisation” transaction. I think that socialisation is a rich form of externalisation. A direct brain-to-brain transfer of tacit knowledge is unrealistic. Externalisation is not limited to writing; we can express ourselves in speech, song, dance, art or through our actions. Socialisation is a powerful form of translation and transfer (externalisation, combination, and internalisation) because it is *interactive* and has multiple dimensions including body language, expressions, gestures, context, and reactions. It is a far richer

medium than written words. You can steer a dialogue to explore interesting topics, test your understanding and get immediate corrective feedback.

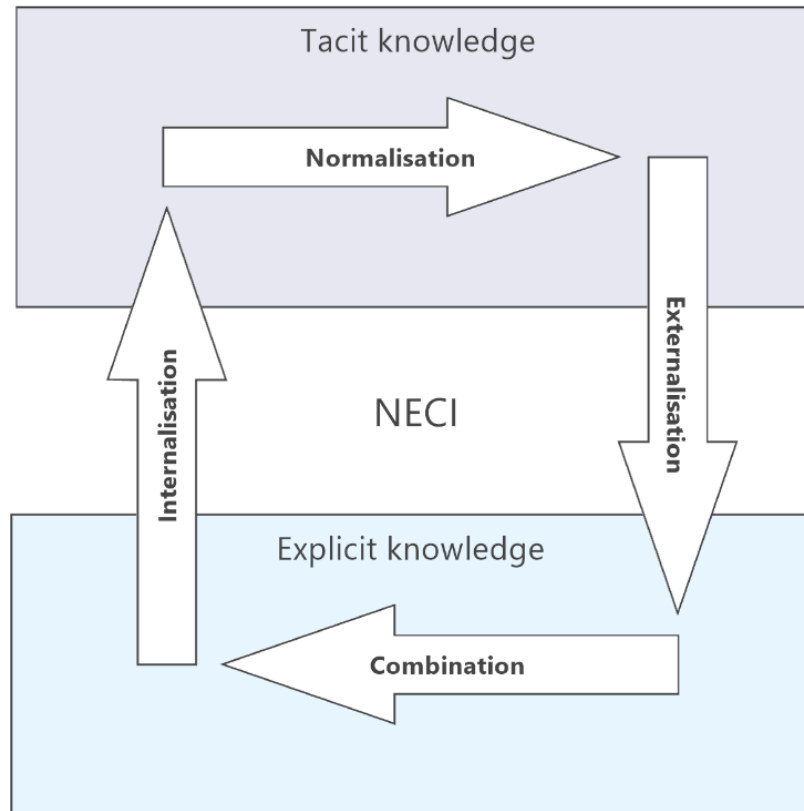
Second, you can learn a tacit skill through willpower, effort, and practice, without socialising. In theory, the SECI loop would be broken by omitting socialisation. But in practice, mind mapping software is a highly effective tool for individuals as well as social groups. Like most people, you have probably had the experience of realising that you knew the solution to a problem while you were in the middle of explaining it to someone else. Externalising an issue in any form will deepen your understanding of it. I have a friend who once told me that he only really knew what he thought when he heard himself saying it. Developing a map is a *conversation with yourself* and brings many of the benefits of interaction with another person. Psychologists suggest that one of the mechanisms behind this is the freedom from trying to hold too many ideas in mind at the same time; but being forced to organise ideas into a coherent sequence or structure also helps with clearer thinking. The SECI loop still works if you skip socialisation and *interact* with an externalised format. The map helps to de-personalise issues much like it does in a collaborative setting. Creating a software mind map is often a journey of discovery, in which you realise that you know more than first you thought you did. This all relates directly to Novak & Gowin's principles of constructivism, described in "Learning how to learn" (Cambridge University Press). As mentioned above, the ability to manipulate externalised ideas is the crux of mind mapping software and is one of the key differentiators when compared to paper and pen techniques.

Third, SECI understates the internal processing that takes place in your brain while you are doing other things, including sleeping. This incubation phase is where ideas and information are integrated to become the new "normal", changing your perceptions, decisions, habits, creativity, and capacity to act. "Internalisation" could be taken to include this activity, but in the SECI model, internalisation is the converse of externalisation and focuses on the translation from explicit to tacit format. There is a profound difference between knowing something and acting on it. Much has been written about this "knowing-doing gap" and we are experts at saying one thing and doing something else – we consume valuable information and claim to know it but fail to normalise it.

"NECI" – a variation of the SECI model

The above leads to a variation of the SECI model where "Socialisation" is replaced by "Normalisation", which is the phase in which you integrate (and not just memorise) new information and ideas into your mental model, linking them to what you already know and extending your capabilities. The new skill becomes "normal" and is the new level upon which you can continue to build. Much is written in knowledge management circles about treating knowledge as a valued asset, recording it, curating it, and transferring it. The benefits of doing this are greatly diminished if it is not normalised and does not change the organisation's capacity to act. It is helpful to distinguish normalisation from simply being exposed to explicit knowledge.

In the NECI model, socialisation is no longer a step within the cycle, but exists as a parallel set of cycles. The NECI model applies equally well to the transfer of tacit information through social interaction, writing or other expressions, and works at an individual level as well as in social groups.



NECI: a variation of the SECI model

The interpretation of the externalisation, combination, and internalisation transactions in relation to mind mapping software are the same in the NECI and SECI models. The new “normalisation” transaction is something we all experience; it is well known that “offloading” by creating a mind map is a very effective way to initiate incubation and reflection. If you need to solve a problem, map it out in as much detail as possible, then sleep on it. By the morning, you will have a new set of insights and can tackle the issue with a fresh perspective.

The NECI variation also helps to model *learning by doing*, or by trial and error. The externalisation transaction is where you put your tacit knowledge into practice, and the combination and internalisation transactions are where you evaluate the results to help improve your technique. In terms of knowledge development models, Deming’s PDCA cycle (Plan – Do – Check – Act) from the world of quality management is a powerful knowledge-creation model, because the knowledge it develops is based on action and results, not on theory.

Where did Socialisation go? It is still there, but when working collaboratively, it enriches the externalisation, combination, and internalisation transactions. These transactions are more interactive and consist of multiple simultaneous threads – conversation, visualisation, context, and artefacts which all enhance each other. Interactive engagement and discussion significantly speed up the rate at which you can cycle around the NECI loop.

What can we learn from this?

What are the key points that we can take away from this little study of knowledge creation models in relation to mind mapping software? How does it inform our choice and use of the “right” tool?

- It is useful to think of mind mapping software as a *note-making tool* and compare it to other note-making tools rather than judge it in a standalone category. While many mind mapping software tools extend this activity significantly, this grounding sets more realistic expectations around collaborative note-making and scenarios where sharing maps is appropriate. The ability of non-authors to meaningfully engage with other people’s maps remains an under-developed challenge for mind mapping software. There are many obstacles to synchronising your mental models with someone else’s thinking if you are late to the party.
- The NECI model helps us to refine the adage about mastering a topic by teaching it. If you want to learn, understand, and master something, then *transform it between tacit and explicit formats* quickly and frequently. Mind mapping software provides a powerful workspace for doing this socially or individually.
- The **process** of creating a map is where value is created, rather than the final map. Mind mapping software vendors should focus on innovation in the process of creating and manipulating maps. The map is a snapshot taken on a journey, not a destination. Continual movement is more important than starting or ending in the “right” place.
- Productivity and effectiveness are a direct function of ergonomics. The faster you can iterate around the NECI model and manipulate your ideas, the better the quality of outcome. Avoid software that is cumbersome and will deter you from making hundreds of small changes as you think aloud. NECI does not represent a ponderous method for creating or acquiring knowledge. It needs to cycle many times to work.
- A shared mental model is a powerful thing. It is important to be able to keep maps in one place only, so that there is only one version of the truth. If you will be working collaboratively on maps, there are advantages in choosing a product that natively supports this. If your preferred software does not natively support simultaneous editing, there are many other low-cost virtual meeting technologies that will enable you to work collaboratively with others.
- Choose a software tool that can draw more than just trees. There are many other forms of visualisation, and hierarchies are not a universal solution – they favour complicated structures over complex ones. Especially consider Novak & Gowin’s Concept Maps, which are freely mistaken for mind maps and vice versa.
- Choose software that gives you plenty of ways to transform trees to and from other structures and formats. Changing the perspective on a situation can quickly lead to new insights.
- To close the gap between ideas and action, choose a tool that let you progress from theory to delivery. Mind mapping software is distinctive in this respect, being a combination of a tool for visualising models of complicated or complex situations, and for following them through to action. Doing is the best way to learn.