THE FUTURE FLIP BOOK

5 MILLION INNOVATIONS FOR A BETTER TOMORROW

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Background Paper

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PREFACE

Welcome to this background paper for the Future Flip Book, for its German edition (Ebersberger, 2024a) and for its English edition (Ebersberger, 2024b) . In this paper, I will guide you through my thoughts and share where the inspiration for the Future Flip Book came from.

> "If you want to teach people a new way of thinking, don't bother trying to teach them. Instead, give them a tool, the use of which will lead to new ways of thinking."

With this quote by Buckminster Fuller in mind, I developed the the Future Flip Book as a tool.

When you look at the Future Flip Book, you will undoubtedly realize that this is not the first book that uses the unique combinatorial properties of this particular format. Other books on the German and English book market use the same format. For instance, in the kids and entertainment section Ball (2010) combines parts of dinosaurs, Frey (2015) produces inspirations for moral discussions, or Frey (2019) helps lovers to express their feelings. In the field of psychotherapy Bohne & Ebersberger (2024) and Bohne & Ebersberger (2022) help therapists and clients to find empowering affirmations. These books inspired me.

However, I felt that there is potential in this combinatorial format to unleash creativity and inspire sustainable innovation. Once I started exploring the academic literature, a lot pointed towards inspiring ideators with combinations of words and supporting their sustainable innovation activities. The Future Flip Book, with its more than 5 million

inspirations for sustainable innovation, is the result of this journey.

This journey led me through various fields of social sciences: innovation and management research, psychology, and cognitive science. This text does not claim to be exhaustive in the fields it covers. Instead, it documents my thoughts and ideas inspired by academic literature that can be seen as the basis of the approach, the content, and the design of the Future Flip Book. In the appendix, you find a diagram where I mapped out the major lines of thought that went into the development of the Future Flip Book.

I will also share the process that led to the generation of the building blocks in the four stacks of cards in the Future Flip Book. This text is not an empirical analysis, and in that regard, it differs markedly from most of my scientific work.

I hope this text helps you to see how, based on scientific insights, this book came about.

Enjoy the Future Flip Book and enjoy innovating for a better tomorrow.

Yours.

Bernd Ebersberger

SUSTAINABILITY INNOVATION

Research and practice widely accept that innovation is essential for business success (e.g., Geroski, Machin, & Van Reenen, 1993; Hult, Hurley, & Knight, 2004). Additionally, sustainability will be a crucial factor in supporting companies' bottom line or companies' survival in the future (e.g., Lloret, 2016).

Now, let us step back: The whole catastrophe of the climate crisis is the result of externalities, that is, indirect consequences of production and consumption activities (Nordhaus, 2021). I think this assessment also holds for other crises, such as health, poverty, and inequality. If we now think that we can simply fix the problems by positive external effects of production and consumption, I think we are misled. In this case, production and consumption are still the main activities, and the crisis is addressed as a side effect or a positive collateral.

I feel that we must tackle the crises intentionally and head-on, and we must include their solutions in all our consumption and production decisions.

So, I focus on innovations that are intentionally sustainable, not innovations that have sustainable characteristics purely by chance.

Although there are multiple definitions of what innovation is, I like to refer to an accepted definition in the innovation research com-

munity (OECD, 2018) that carries a robust Schumpeterian heritage (e.g. Schumpeter, 1942): Innovation is the commercialization of new products such as goods or services, the implementation of novel business processes, or the establishment of new business models (OECD, 2018).

To be sustainable innovations or to be innovations for sustainability how Bocken, Ritala, Albareda, & Verburg (2019) call them, innovations have to support the triple bottom line (Elkington, 1997) generate income and, at the same time, create significant social or environmental value (Orellano, Lambey-Checchin, Medini, & Neubert, 2021). Hence, sustainable innovations have a positive impact on people, the planet, and prosperity over their lifetime. For sustainable product innovation, this concept is easy to understand: sustainable product innovation has a contribute to the three dimensions of the triple bottom line during manufacturing, packaging and distribution, use and maintenance, and at the end of their life (Hansen, Grosse-Dunker, & Reichwald, 2009).

Sustainable innovations at the micro-level trigger system-wide change by cumulatively affecting institutions, trends, and culture, affecting the meso- or macro-level (Eller et al., 2020). At the same time, these innovations are not only a source for dynamics on the meso- and macro-level. Changes at these levels also, in turn, inspire innovations (Manson, Mattin, Luthy, & Dumitrescu, 2015). To support the creation of sustainable innovation at the micro-level contributes to supporting sustainability transitions bottom up.

The 17 SDGs, formulated in 2015 and listed in the Appendix, are a framework intended to guide development until 2030 to attain the sustainable development objectives. In doing so, they also influence sustainable innovation across economies and sectors by aligning individuals', organizations', and institutions' principles and targets with sustainable development (Rosati, Rodrigues, Cosenz, & Li-Ying, 2023). And innovation is an essential driver of sustainable transformation

(Rosati & Faria, 2019), requiring "...new technologies and new ways to organize human activity to combine improving living standards and ecological imperatives." (Sachs, 2012, p. 2211)

It is clear that the SDGs can inspire the innovation process and provide criteria to distinguish sustainable innovations from non-sustainable ones.

Mitigation vs. Adaptation

In the context of climate change, mitigation attracts more attention than adaptation (Kuntsi-Reunanen, 2021). This is probably why we think of mitigation when addressing climate change by searching for innovation. However, tremendous innovation efforts are needed to adapt to changing climate situations.

Here, we need a change of perspective.

Incremental Innovation vs. Radical Innovation

Sustainable innovation is how firms do environmental or social good while at the same time improving their competitive advantage: New products and services that radically differ from existing goods and service offerings are to make harmful incumbent products obsolete (e.g., Schaltegger & Wagner, 2011). This assumption is critical to the positive prospect of sustainable innovation (Kennedy, Whiteman, & Ende, 2017). It means not just continuing to make bad things a little less bad, but doing the right thing and doing it in a radically transformative way. We need more radical ideas in business and politics to respond to climate change and to respect planetary boundaries.

Just incremental improvements will not cut it. An additional feature here, some resources less there, will not do the trick. Sustainability transitions require radical innovation (Rotmans & Loorbach, 2010).

Firms often have more than incremental ambitions but fail to innovate more radically (Tura, Mortimer, & Kutvonen, 2019).

Creating sustainable innovations is obviously different from creating ‚just another' modification of what already exists, although the latter would perfectly qualify as innovation in an academic sense (OECD, 2018). We need more innovations on the more radical end of the spectrum (Dewberry & De Barros, 2009).

NEED-SOLUTION PAIRS

Need-Solution Pairs to Address Wicked Problems

Innovations always consist of solutions to specific customer needs, where I define 'customer' as being broadly defined as users, patients, clients, and individuals directly and positively affected by successful innovation. It should be apparent from the outset that innovation always addresses a customer's need and solves a problem. Without addressing a need, there would simply be no willingness to pay for the innovation. In this case, the innovation would not be viable.

Typically, the development of an innovation is preceded by a clear and concise assessment and formulation of the problem that the innovation should address. When I write about 'problems' here, I mean problems and opportunities. The former are items that—if not addressed—create trouble. The latter are items that—if attended to—may create profit or value in some sense (Simon, 1988).

Problem formulation precedes the search for solutions in standard decision-making. However, usually, there is not only one single correct way to formulate a given problem. This might be detrimental to the search for a solution as the formulation of the problem directly affects how easy or hard it is to find one (Simon, 1988; Volkema, 1983, 1988). Even worse, some problems defy the very idea of being cor-

rectly described. Those are wicked problems (Rittel & Webber, 1973), and sustainability issues are among them. "This wickedness of sustainability problems still does not mean that there is nothing we can, or should, do to solve them." (Willamo et al., 2018, p. 3).

Wicked problems have numerous causes, are hard (or impossible) to describe, and do not have a single correct solution. Formulating a wicked problem is not possible until a solution to the problem is found (Rittel & Webber, 1973, p. 161).

Challenging the conventional wisdom in decision-making, one might ask: Is it necessary to devise a problem formulation in advance? Hippel & Krogh (2016) suggest that identifying the need-solution pairs simultaneously without prior identification of the problem is possible and done more often than conventional decision-making theory even dares to imagine. Identifying need-solution pairs is particularly beneficial when solutions for wicked problems are sought (Hippel & Krogh, 2016, p. 210).

By searching for need-solution pairs, we can simultaneously search the whole set of needs and the set of solutions. Hippel & Krogh (2016) speaks of the 'needs and solution landscape'.

Problem formulation is sometimes associated with significant efforts and costs. Problems might not be formulated completely (see Kühberger, 1995), and how problems are expressed might constrain the solution space through framing (Euchner, 2019). Developing need-solution pairs prevents both costs and bias (Hippel & Krogh, 2016). In addition, solutions that are found by recognizing the need-solution pair occur more frequently, are more creative, and have a higher level of novelty than solutions resulting from the traditional process of defining the problem first and searching for a solution afterward (Stock-Homburg, Heald, Holthaus, Gillert, & Hippel, 2021)

Search Process for Need-Solution Pairs

I opt with Stock-Homburg et al. (2021) and believe that finding need-solution pairs is not as serendipitous as suggested in Balzano (2022). To search for need-solution pairs, as a **first step**, you trigger the search for need-solution pairs by asking broad questions (Hippel & Krogh, 2016).

For established firms, this could be: what can we do with our core competences that would qualify as an innovation in the sustainability space? An entrepreneur can start with a question like: What would be a viable offering in the sustainability space?

As a **second step** you test the need-solution pairs against viability and sustainability criteria. A free downloadable canvas (see: www.future-flip-book.de or www.future-flip-book.com) facilitates the generation of need-solution pairs with the Future Flip Book and supports checking the viability and sustainability of the innovation.

Generally, when searching for need-solution pairs, you must start with a broad problem statement. You should treat this initial problem statement as a disposable, changeable part of a need-solution pair. It is not fixed (Hippel & Krogh, 2016). Finding a need-solution pair for the initial problem statement may spark your creativity, and you may start to extend and change the problem statement. Then, this may give rise to an entirely different need-solution pair, sparking your creativity to change the problem statement again... and so forth (Hippel & Krogh, 2016).

The experiments of Stock-Homburg et al. (2021) suggest that finding need-solution pairs is more than an activity that highly trained scientists and R&D personnel can do. Instead, their analysis shows that what they call 'everyday individuals' (Stock-Homburg et al., 2021) can arrive at need-solution pairs.

Let me assure you at this stage, that the Future Flip Book is designed to

nudge you into a process of searching for and finding need-solution pairs to address sustainability issues with an innovative solution. Before I start laying out the concept of the Future Flip Book, I have to discuss the role of intuition in the process.

THE VALUE OF INTUITION

Stock-Homburg et al. (2021) illustrate the finding of need-solution pairs by George de Mestral's velcro invention, which is attributed to his intuition when picking sticky burrs from his pants (Weintraub, 1998).

"Innovation begins within the embryo of intuition, is nourished by imagination, and breathed into life with ingenuity and hard work. In the beginning, there is intuition." (Weintraub, 1998, p. 10)

Even though the definitions of what 'intuition' is, are largely divergent across the scientific literature, most would agree that intuition relates to a form if information processing that markedly differs from analytical reasoning (Epstein, 2010).

Intuition is a rapid, spontaneous, and a-logical process; its outcomes are holistic ("Intuition is our faculty to grasp wholes of a certain sort" (Zantwijk, 2013), paragraph 1), tacit (It "involves a sense of knowing based on unconscious information processing." (Epstein, 2010, p. 296)), and made with high confidence. This is in stark contrast to finding solutions logically and analytically (Pétervári, Osman, & Bhattacharya, 2016).

The two stage process behind the identification of need-solution pairs resembles what we know about intuition. Intuition is a gradual process that starts with the first impression of a complex and vague input. It develops towards a more explicit thought that one can verbalize and state why and how the individual chunks of the (semantic) information belong together. Clues activate more or less unconsciously

and automatically relevant mnemonic networks (Volz & Von Cramon, 2006). They guide our "thought tacitly to an explicit hypothesis or hunch" (Bowers, Regehr, Balthazard, & Parker, 1990, p. (p.94)). Regardless of whether intuition is governed by a continuous or by a discontinuous process, research shows that intuitive problem-solving is highly dependent on the individual's previous experience and accumulated knowledge (Maldei, Baumann, & Koole, 2020).

Although the connection between intuition and creativity mandates more research (Sinclair, 2011), there seems to be a consensus that intuition plays an important role in guiding creativity in a promising direction (Çizgen & Ulusu Uraz, 2019; Pétervári et al., 2016). Creativity "is the interaction among aptitude, process, and environment by which an individual or group produces a perceptible product that is both novel and useful as defined within a social context."(Plucker, Beghetto, & Dow, 2004, p. 90), which resembles the Rhodes' 4P creativity definition (Rhodes, 1961).

A NEW TOOL FOR IDEATION

Change of Perspective

Changing the perspective greatly facilitates idea generation (Sutton, 2001). At the start of a typical innovation process, one thinks about an innovation, looks at what problem it solves, specifies what it does, designs how it works, and so forth. A relatively common process to start thinking about new products or services is to start with the Value Proposition Canvas (Osterwalder, Pigneur, Bernarda, & Smith, 2014) which is tightly linked to the Business Model Canvas (Osterwalder & Pigneur, 2010). This may, however, limit creativity as ideators, particularly those with a business school background, tend to be biased towards the existing business model and matching innovations (Weissbrod, 2019). This bias limits the ideators' capacity to envision more radical innovations.

Only in the later stages of the process, does one start thinking about what to call it and how to summarize the key features of the innovation.

The Future Flip Book changes this perspective. It puts the innovation process upside down. You start with a four-word summary of the innovation and then work backward from there. It starts with words rather than problems.

Words Trigger Creativity

Words trigger creativity. This is why psychology researchers use the Remote Associates Test (RAT) developed by Mednick (1962) to measure creativity (Wu, Huang, Chen, & Chen, 2020).

During the RAT participants see three remotely associated stimuli words. In the tests, individuals have to think of a word that can be linked to all three words. For instance, 'opera,' 'hand,' and 'dish' can be associated with the word 'soap.' The more of these associations an individual completes correctly, the higher the creativity score of this individual will be. Making associations is a crucial task in creativity (Kajić, Gosmann, Stewart, Wennekers, & Eliasmith, 2017). "An aspect of creativity is … captured by subjects generating solution words that are only remotely associated with the problem cues, requiring subjects to relate familiar words in a novel way." (Kajić et al., 2017, p. 2)

The RAT validly measures creativity by measuring the capacity to develop novel associations (Lee, Huggins, & Therriault, 2014). Lee et al. (2014) found that the RAT validly captures creative thinking, particularly convergent thinking processes. Based on these insights, I feel safe to assume that exposure to stimuli words can trigger creative processes.

During the RAT, the creative process goes through two phases.

The first, the divergent stage, focuses on idea generation. The test subjects begin thinking creatively here to develop various associations for the three stimuli words. In this phase, individuals use different strategies to try different solutions and think outside the box (see. e.g., Wu et al., 2020).

Following the divergent stage is the convergent stage, where the focus shifts to solution matching and evaluation. In this phase, individuals assess the ideas generated in the previous stage, looking for connections and relationships between them to identify the most appropriate solution to the problem presented. This stage requires critical think-

ing and the ability to discern the most effective and relevant solution among the options considered (see. e.g., Wu et al., 2020).

These two phases of the creative process, as triggered by the RAT, align with the broader understanding of creativity as involving both idea generation and evaluation. The RAT serves as a tool to assess an individual's capacity for creative thinking by measuring their performance in these two essential phases of the creative process (see. e.g., Wu et al., 2020).

Zander, Horr, Bolte, & Volz (2016) modify the RTA test and show participants word triples that have a remote associate (coherent triads) and triples where there is no remote associate word (incoherent triads). They find that intuition helps individuals rather successfully in deciding whether there is a common associate, or not.

THE FUTURE FLIP BOOK

I use the insights of RAT research (see Wu et al., 2020) and the findings of Zander et al. (2016) to trigger associations by providing words and to facilitate creativity. Hence, I stress the role of intuition in the Future Flip Book when you have to decide which word combination you will continue to work on and start analyzing.

The Future Flip Book inspires creativity by providing numerous (more than 5 million) combinations of four words. You can browse the combinations of four words until you find one that resonates with you and generates a feeling of coherence. This process unites the two-stage process of intuition (Bowers et al., 1990; Zander et al., 2016) with the one for finding and evaluating need-solution pairs (Hippel & Krogh, 2016).

In contrast to the RAT, I present four words to the ideator that have structure and already provide meaning. You can interpret the four words as a rudimentary description of an innovation: The first word is an adjective describing how the innovation is. The second and third words are a noun and a present participle capturing what the innovation does. The fourth word is a noun pointing to the type of innovation.

This approach obviously borrows from the creativity technique called 'semantic intuition'. Users rate this method of triggering imagination and creativity through stimuli words as fun and beneficial for group discussions. It leads to more radical innovations than any of the other ten creativity techniques analyzed by Wöhler & Reinhardt (2021).

The literature also holds some hints that can increase the level of creativity and that are transferable to the Future Flip Book: The level of creativity of the output can likely be increased by encouraging creativity and telling ideators that they should dare to be creative. I will do so in the Future Flip Book. In a research design not unlike the RAT this additional stimulus activates different regions of the brain and leads to more creative results (Tempest & Radel, 2019). Additionally, words with a higher frequency in a language generate more associations with higher levels of creativity (Vitrano, Altarriba, & Leblebici Basar, 2021). I will use this insight when curating the stimuli words.

GENERATING THE WORDS

The Future Flip Book contains four stacks of 48 words that you can combine to generate inspiring short descriptions of future sustainable innovations. I did not randomly collect these words from a Webster or any other dictionary. Instead, I used a structured process to derive the words from descriptions of existing sustainable innovations. In a broad sense, this is a Schumpeterian approach (Schumpter, 1923, p. 88): The inspirations for innovations that you have in front of you once you flip through the book are new combinations.

Collecting more than 3,000 innovations

Over the years, I collected descriptions and context information about 3,015 innovations from about 100 openly accessible sources that I regularly scan. The most notable proprietary source is an innovation database that we have also used in (Ebersberger & Kuckertz, 2021) and (Gaudig, Ebersberger, & Kuckertz, 2021).

Mapping the innovations on the SDGs

To ensure that my collected innovations relate to sustainability in a more objective way than just my impression that they do the collected innovations were then classified by the OSDG.ai algorithm (https://os

dg.ai) to match the 17 SDGs. 50 of the innovations could not be assigned to SDGs. I dropped these from the overall sample of innovations.

Discovering the topics of the innovations

I employ a topic modeling approach to identify all the latent themes that the 2,965 innovations in my sample cover. I feel that it is important that I search and collect broadly during the curation of the stimuli words. As an unsupervised machine learning procedure for topic clustering in textual data, topic modeling seems particularly suitable for my purposes (Maier et al., 2018) to reveal the topical breadth of my innovation collection. Although it has recently been used in innovation studies (Dahlke et al., 2021; Gebhardt & Bachmann, 2023; Tiba, Rijnsoever, & Hekkert, 2021), Lu & Chesbrough (2022) recommend a more frequent usage in the context of innovation research.

In particular, I employ a structural topic modeling approach (Roberts, Stewart, & Tingley, 2019) to extract 45 topics. Topic modeling is able to detect latent topics in the corpus of my innovation descriptions through an unsupervised analysis of word patterns (Blei, Ng, & Jordan, 2003; Phan, Nguyen, & Horiguchi, 2008). For topic modeling, I do not have to provide prior classification. It builds on distributional semantics (Turney & Pantel, 2010) to generate latent topics from innovation descriptions. Topic modeling analyzes the word distributions across the whole corpus and within the individual descriptions of the innovations (Grimmer & Stewart, 2013). Typically, topic modeling employs a Latent Dirichlet Allocation (LDA) (Blei et al., 2003). The structural topic modeling approach I use is a more recent development of this.

Describing the innovations using a predefined pattern

For each of the 45 topics, I select those seven innovations that score highest in this topic - this means that I select those seven innovations that cover this topic most intensively. I work through all 315 innovations and describe the innovations using the following predefined pattern:

- **How is the innovation?** -> adjective
- **What does the innovation do?** -> noun + present participle
- **What is it?** -> noun

I carried out the analysis in English. The English version of the Future Flip Book is the original. For the German adaptation, I had to replace some of the words, and I had to change the pattern of the stimuli words into nouns with relative clauses.

Curating the stimuli words for the inspirations

From these 315 different four-word descriptions of innovations, I curate 48 innovations to be included in the Future Flip Book: The four stacks contain 48 words each. In a final round of polishing, I checked whether the stem of each one of the words is among the 5,000 most frequently used words in the US English language corpus. If it is not, then I replaced the word with a synonym from the 5,000 most frequent words. This ensured that the insights from Vitrano et al. (2021) were appropriately implemented in the Future Flip Book.

Combining the stimuli words on the four stacks gives you 5 million ideas for innovations to contribute to a better tomorrow.

APPENDIX

The 17 Sustainability Development Goals

- SDG_01 No Poverty
- SDG_02 Zero Hunger
- SDG_03 Good Health and Well-being
- SDG_04 Quality Education
- SDG_05 Gender Equality
- SDG_06 Clean Water and Sanitation
- SDG_07 Affordable and Clean Energy
- SDG_08 Decent Work and Economic Growth
- SDG_09 Industry, Innovation and Infrastructure
- SDG_10 Reducing Inequality
- SDG_11 Sustainable Cities and Communities
- SDG_12 Responsible Consumption and Production
- SDG_13 Climate Action
- SDG_14 Life Below Water
- SDG_15 Life On Land
- SDG_16 Peace, Justice, and Strong Institutions
- SDG_17 Partnerships for the Goals

Examples for the Remote Association Test

The first three words are displayed and the forth word in capital letters is the solution:

Square / Cardboard / Open – BOX

Broken / Clear / Eye – GLASS

Coin / Quick / Spoon – SILVER

Time / Hair / Stretch – LONG

Aid / Rubber / Wagon – BAND

Sense / Courtesy / Place – COMMON

Flower / Friend / Scout – GIRL

Opera / Hand / Dish – SOAP

Wheel / Hand / Shopping – CART

Fox / Man / Peep – HOLE

Home / Sea / Bed – SICK

Fence / Card / Master – POST

Illness / Bus / Computer – TERMINAL

Wise / Work / Tower – CLOCK

Here is a list of word triples that can be used in the RAT: https://www.remote-associates-test.com

Concept Map

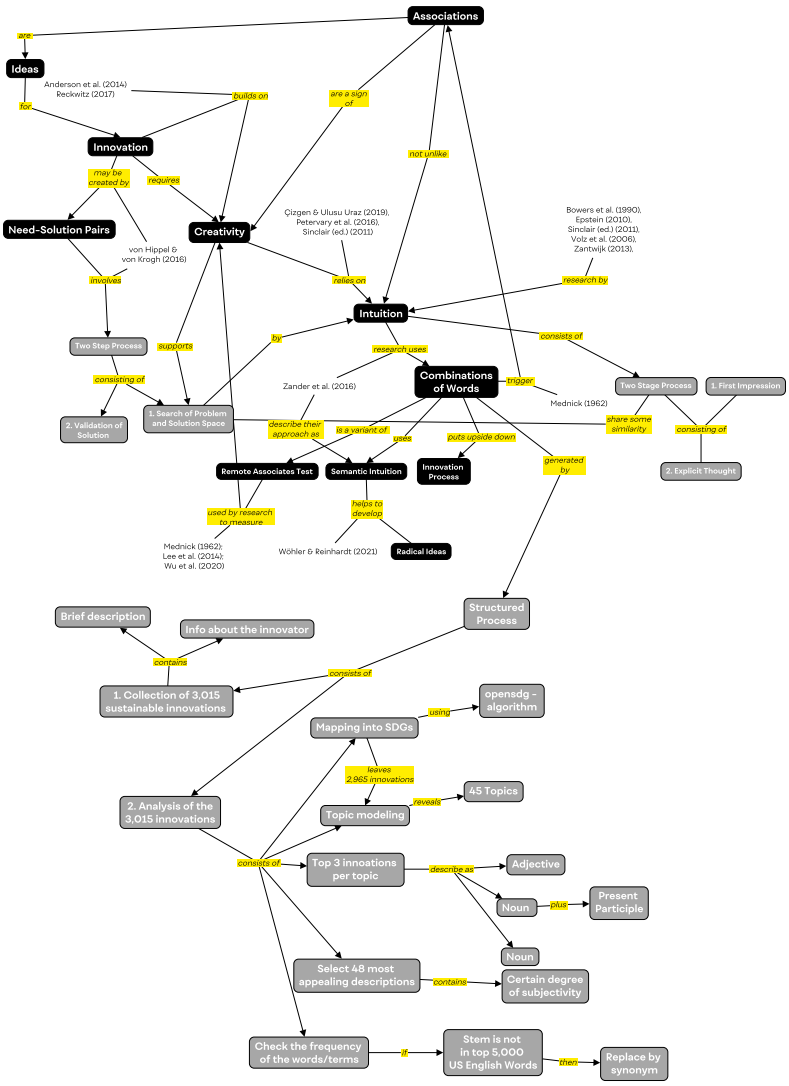

Figure 1: Thoughts behind the Future Flip Book

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