MY OTHER SKETCH IS A PORSCHE
CHANGING THE PARADIGM OF VISUAL THOUGHT PROCESSING THROUGH GENERATIVE SKETCHNOTING

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1. INTRODUCTION: A NEW VISUAL FRAMEWORK

This paper explores the potential of *Generative Sketchnoting* as a visual framework for faster problem framing and leaner high-level concept development. Differentiating traditional sketchnoting from generative sketchnoting. The former is a re-active method of visually capturing spoken content through words and simple shapes. The traditional sketchnoter tends to listen more actively because she must interpret (visualize) what is being said using text, image, and diagrammatic marks. The method forces compression of content and speed of execution. Generative sketchnoting, on the other hand, relies on many of the same strategies and techniques but is generated by the individual or team. There is no external domain expert delivering content through a talk or lecture. The team is 'generating' content on-the-fly while simultaneously capturing it. It is a more pro-active form of visualization where individuals or teams talk and think on paper together. Thus, the real power of generative sketchnoting is its ability to transform a discussion into a 'visualized' set of conversational trails that can be viewed, reviewed, and revised quickly. This happens because the content and the resulting sketchnote are generated from within. Whether to conduct a meeting on paper, or a quick brainstorming session, generative sketchnoting has a low barrier entry allowing diverse stakeholders to join the visual conversation. Nevertheless such low-fidelity sketches are often viewed with skepticism as to their ultimate worth in a profession that places a high value on 'classic product sketching'.

This paper argues that generative sketchnoting is a valuable contribution not only because it is ideally suited to address the increasingly complex problems designers face but also because it is a low-stakes introduction to a much deeper and richer approach to the full design sketching spectrum so necessary in design schools. As a result of these claims, the co-authors decided to sketchnote significant portions of the paper as ideas were batted back-and-forth over the past nine months of ongoing explorations conducted both synchronously and asynchronously.

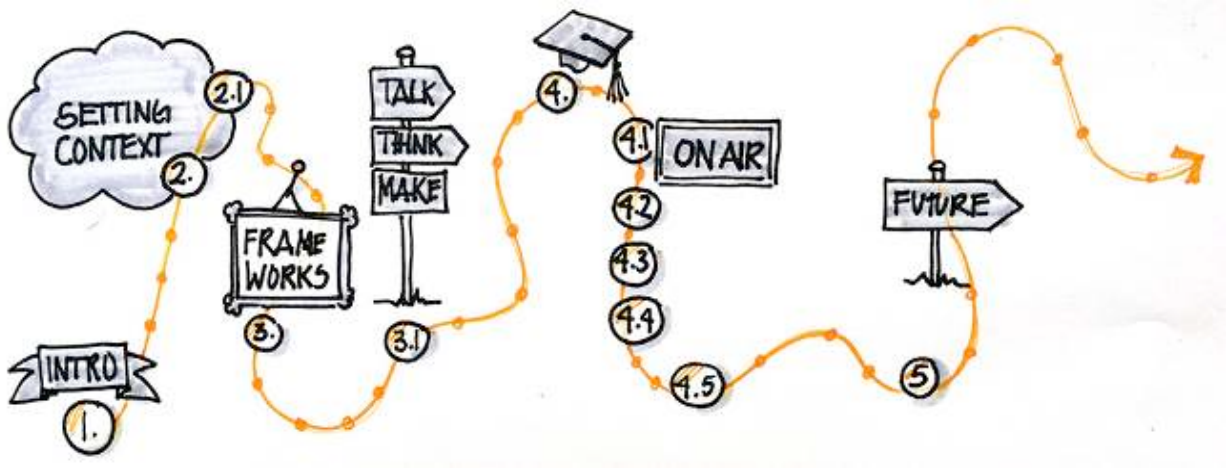

Figure 1. Visualizing processes is a major element in this research. We've employed iconic imagery, common metaphors, and compositional strategies (the 'space of the page) to convey meaning as quickly and clearly as possible.

2. A NEED FOR AGILE SYNTHESIS AND A COMMON VISUAL DENOMINATOR

The Design Collaborative responsible for drafting the DesignX manifesto (Friedman, K., Norman, D. LOU, Y. Stappers, J.P., Voûte, E., Whitney, P., 2017) warns that the problems designers face increasingly involve complex systems and multiple stakeholders all impacted by technologies- in particular computation, communication, and transportation. Reiterated in the manifesto is the need to build upon the design profession's history of thinking through doing, visualizing, prototyping, and testing- all combined with deep observational techniques and analysis of entire systems, in an iterative loop that provides time for reflection and modification. In response to these and other comprehensive design recommendations, the traditional ideation methods relied upon by designers have been rapidly expanding to include other iterative problem-solving modalities and merging traditional thinking/writing/sketching with visual and verbal storytelling, storyboarding, wire-framing, journey-mapping, and diagramming.

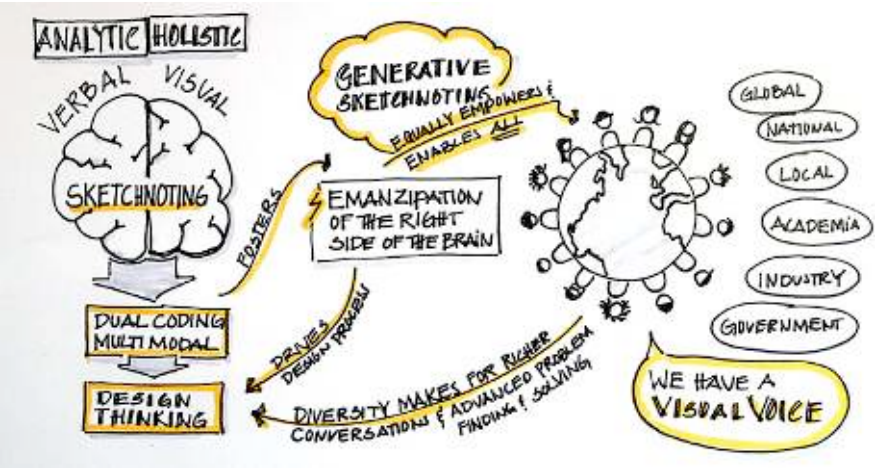

Figure 2. These explorations happen in 2D and are often iterated multiple times to increase clarity-of-vision and group cohesion.

2.1 FROM THEORY TO PAPER

Moving from theory to paper has been critical to help elevate generative sketchnoting beyond a mere step-by-step set of instructions or procedures. All sketching is an aid to cognition (particularly working memory). It's well documented that humans struggle to hold more than 3-5 items in working memory for longer than a few seconds (Cowan, 2000). As a result, we 'offload' information to external media (paper or screen) to help us recall, revise, or simply communicate. Whether in the form of a grocery list or schematic drawing, the process alleviates innate cognitive limitations. Designers today must constantly juggle more than three things for far longer than a few seconds. And we often do this across vast stretches of space and time. Nevertheless, design education continues to emphasize the generation of high fidelity, detailed static views of single artifacts perceived from various fixed vantage points- what we're calling the 'Porsche Sketch'. We are not suggesting that the well-executed 'classic' industrial design sketch be eliminated, but rather asking the more pressing question: how do we envision products or experiences that are embedded in complex systems and interactions that take place over long periods of time and involve multiple touch points and stakeholders? How do we teach sketching in a way that mimics the very manner in which we envision, explain, debate, and disagree in order to think?

Critical to the theory we are proposing is the artifact itself: the paper (or screen). Sketches leverage the physical 'space of the page' in ways that traditional, mainly linear, textual note-taking cannot. For example, text in an open book cannot be easily scanned. As psychologist Barbara Tversky describes it: "…visual communications abstract and schematize; unlike language, they use properties of the page (e.g., proximity and place: center, horizontal/up–down, vertical/left–right) and the marks on it (e.g., dots, lines, arrows, boxes, blobs, likenesses, symbols) to convey meanings" (Tversky, 2011). Reading has conditioned us with its own gravitational laws ('reading gravity') to move our eyes from left-to-right and top-to-bottom along what Edmund Arnold dubbed the Gutenberg diagram (Lidwell, W., Holden, K., Butler, J. 2003), Newspapers and now websites exploit the 'space of the page' to create clear hierarchies while 'chunking' out content to facilitate quick scanning. Even cities, as urban planner Kevin Lynch pointed out, are structured in ways to ameliorate the cognitive stress of navigating complex space. Lynch's simple

taxonomy defined in his book *The Image of the City* established five clear 'chunks' (Lynch, 1960). In Paris, for example, one navigates along its paths (boulevards), edges (the river Seine), landmarks (the Eiffel Tower) regions (Montmartre), and finally connects with a friend at a major node (Champs Élysées). Sketchnoting, by its very nature, utilizes space in a similar manner to help viewers navigate the conversation along the various paths taken by the team, the nodal points of convergence, and the edges of defined categories or regions. Scanning a sketchnote is like reviewing a rich conversation visualized: the composition of the page takes on a tertiary meaning.

Figure 3. The 'space of the page' is of critical importance when creating generative sketchnotes because compositional strategies can add a tertiary layer of meaning. Positioning concepts in the center of the page, for example, helps draw the eye there especially when the image or text is scaled to create a clear visual hierarchy. Traditional ID sketching does not rely as heavily on compositional strategies to 'tell the story.'

And finally, the connection between words and images is crucial. Recent research led by cognitive scientist Maximillian Riesenhuber at Georgetown University has revealed just how quickly we turn commonly used words back into images or pictures making the reading process faster and more fluid. We 'see' commonly-used words rather than 'read' them (Riesenhuber, 2016). Our alphabets are the result of a four-thousand-year evolution as we moved from image to text (Fang, 2015). We are now witnessing that evolutionary shift back towards greater reliance on visual communication whether with the smart devices we carry or the interfaces we interact with daily. This pictorial turn is designed for speed and intuitive interaction. These developments make great sense when thinking about the fleeting nature of thinking in individual and group problem-solving settings. Generative sketchnotes act like geographical maps that can be quickly scanned like a 'landscape of ideas'. They can be zoomed in to view particulars and zoomed out to view the interconnections. Text-based notes, diagrams, or beautiful static sketches don't permit this kind of scaling and the cognitive bottleneck that results can slow a meeting to a crawl.

3. DIFFERENTIATING SKETCHNOTING, AND GRAPHIC FACILITATION, FROM GENERATIVE SKETCHNOTING

As previously mentioned, generative sketchnoting is based on many of the methods and techniques employed in traditional sketchnoting and graphic facilitation yet differs in one very significant way. Rather than capturing what someone else says (or sometimes shows) through text, iconic sketches, mapping, and diagramming techniques (Rohde, 2013), generative sketchnoting relies on the team to generate and capture their thoughts collectively in a visual mélange of text, image, and mapping/diagramming techniques. To do this quickly, the team must maintain a low-fidelity workflow generating ideas using simple forms, shapes, keywords, and short phrases. This leverages the brain's distinct channels for coding visual and verbal inputs separately (dual coding theory) while reinforcing recall (Paivio,1990). In what constitutes a kind of sketchnoting alphabet consisting of dots, lines, squares, triangles, and circles,

an entire world of ideas, places, scenarios, and actors can be rapidly created alongside key text. Related elements can be linked on-the-fly through simple graphic connectors keeping the process as close as possible to the speed of conversation and thought. This lo-fi workflow fosters a 'safe space' for diverse people, from various professions, to hone in on a problem-space, and generate ideas together on paper or whiteboard. The process and the outcomes help focus the team for the next phase of the project.

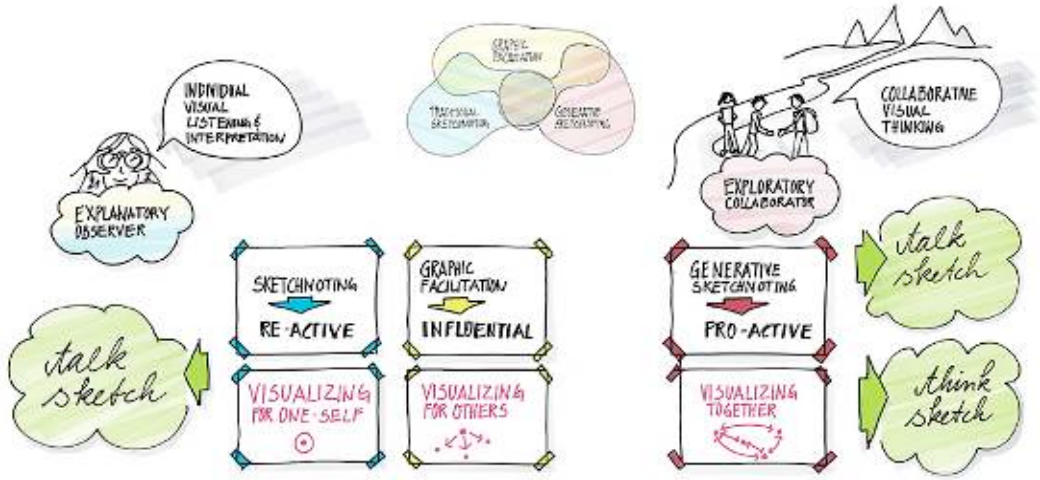

Figure 4. Explanatory observations vs. exploratory collaboration *Generative Sketchnoting*, as the name suggests, is generative rather than receptive. It is a more speculative and exploratory framework intended to help individuals and teams generate concepts on-the-fly together by literally 'visualizing the voice(s)' of the individual or group members to help everyone 'see' the emerging issues, map them in space and time, and continue iterating as needed. The map's clarity grows over time

3.1 TALK SKETCH / THINK SKETCH / MAKE SKETCH

Generative sketchnoting does not consist of a single activity. Like most iterative processes it consists of distinct activities meant to move towards greater clarity. We describe these as: 'talk sketch', 'think sketch', and 'make sketch' although this order is not the only sequence.

Talk Sketch describes the phase early in the problem-finding process, where diverse stakeholders can visually verbalize their points-of-view in a common visual language regardless of precision.

Think Sketch describes the conceptual phase where multiple ideas are further explored to weed out what has potential from what doesn't. This type of sketching remains in the low-fidelity spectrum to allow people with less developed ID sketching skills to participate in the discussion and development.

Make Sketch describes the more sophisticated visualization of ideas. It is situated in the mid-fidelity spectrum and strives for maximum clarity with clear overall structure pointing the team to the next steps.This activity involves more focused and intentional sketching and composing and builds on what's been previously learned.

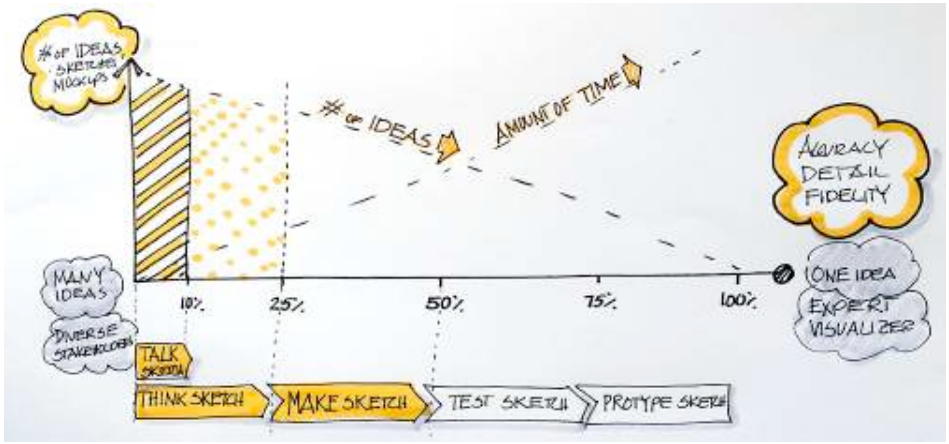

Figure 5. Low Fidelity Visualization Spectrum including the Talk, Think, and Make Sketch phases. There is a clear trade-off between the quantity of ideas and speed of generation. As key ideas begin to coalesce the quality and clarity of the visualization increases.

4. GOING LIVE: TESTING GENERATIVE SKETCHNOTING IN AN ACADEMIC SETTING

Over the course of 1.5 years both traditional sketchnoting and generative sketchnoting were introduced at the undergraduate and graduate levels to approximately 200 students in an Industrial Design program. Two courses fully integrated the frameworks: one graduate level class focused primarily on traditional sketchnoting while a junior-level course focused on generative sketchnoting. In addition the entire Industrial Design student body was introduced to both frameworks during two 3-hour hands-on workshops, the latter will be discussed in section 4.4.

4.1 BEGINNING: INTRODUCING BASIC SKETCHNOTING AT THE GRADUATE LEVEL

As an introductory part of the graduate level visual communication course, students were exposed to sketchnoting through lectures and hands-on activities. They began by breaking down complex forms into abstract shapes using combinations of dots, lines, squares, circles, and triangles to develop speed while simultaneously simplifying objects to their essence.

The first in a series of assignments geared towards familiarizing students with low fidelity visualizations required them to develop a visual library related to their personal environment. They began in text-mode by writing a list of people, places, situations, aspirations, and other elements from which they chose 30 to translate into visual elements. These were then drawn approximately 50 times to help develop hand-thought coordination as well as to iteratively refine them. Next, these 'library elements' were used to help visualize their personal journey to academia (college).

Anecdotal observations from the semester work were:

- Some students immediately felt comfortable and embraced this low-fidelity method of visualization.
- Some students initially resisted creating the visual library but after some encouragement and practice they noticed their visuals significantly improving along with their visual communication skills.
- One student started to use sketchnoting for additional assignments, such as visualizing design criteria.
- Overall, however, students became more confident with sharing their sketches and ideas including sketching together on a single sheet (first steps toward generative sketchnoting).

4.2 MIDDLE: INTRODUCING GENERATIVE SKETCHNOTING AT THE UNDERGRADUATE LEVEL

Generative sketchnoting was employed in the problem-framing (talk sketch) and high level idea generation (think sketch) frameworks in a junior level studio course. In their sophomore year these students had been taught traditional rapid ID sketching and had been exposed to sketchnoting through the above-mentioned 3-hour workshop. The individual sketch levels and sketch confidence therefore spanned a broad spectrum. Some students had less command of perspective drawing on one end while others were able to quickly share thoughts with confident line drawings on the other end. However, as their confidence increased, students continuously used generative sketchnoting throughout all three projects. Examples show different styles and applications.

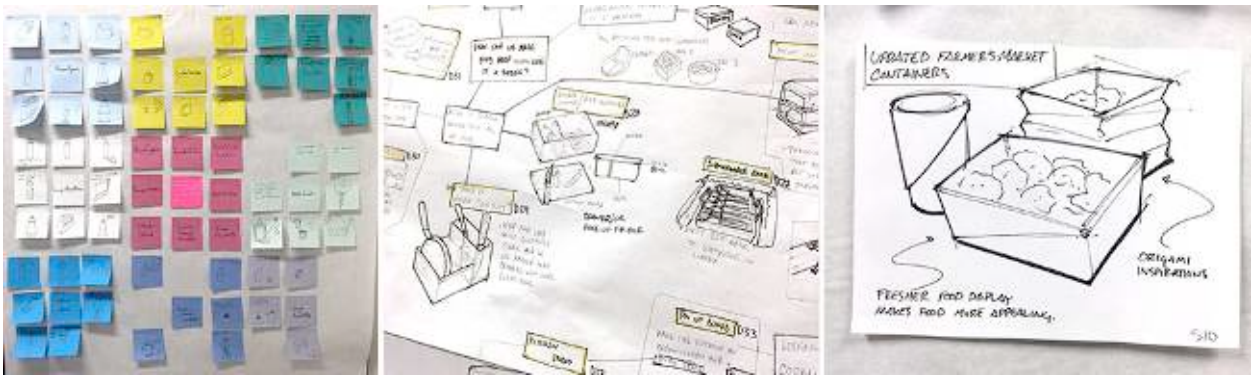

Figure 6. Different formats of generative sketchnotes exploring high-level concepts in class setting: on paper together in a team setting, on 4x6 index cards with added detail and call outs, and using the lotus blossom brainstorming technique on post it notes.

Observations:

- The low-fidelity approach of generative sketchnoting provided a simple way to communicate ideas regardless of the ability and skill level of traditional ID sketching.
- Students developed ideas faster and in greater quantities and when compared to the output of other courses, the ideas were generally more disruptive and/or novel.
- Transitioning from the low-fidelity generative sketchnoting mode to the more traditional form-giving mode was difficult and in some cases didn't happen.
- Concepts, overall, lacked detailed development. This may be due to inexperience, lack of time, lack of skill level to sketch out details, or an inability to transition away from the ease and speed of low fidelity.

4.3 CURRENTLY: GETTING THE BALL ROLLING || DEVELOPING THE WORKSHOP

In an effort to further explore the potential of generative sketchnoting as a new visualization framework, the research team developed a 3-hour hands-on workshop.

Figure 7. The workshop introduced the theoretical background and covered a traditional sketchoting warm up, before exploring generative sketchnoting as a problem finding and concept exploration framework with sophomores, juniors, and senior students.

4.4 IN THE TRENCHES || CONDUCTING THE WORKSHOP

A team of two faculty and four research assistants facilitated the workshop. After the introduction and warm up, students were broken up into teams consisting of sophomores, juniors, and seniors. The first round of generative sketchnoting, the *Talk Sketch*, began in silence. Students were asked not to talk during the first five minutes of the 30-minute time frame. The first awkward moments of sharing thoughts on paper were quickly overcome by this forced "handicap". All teams were able to share their existing knowledge, ask questions about the topic and develop a *'conversational trail'*. The second round of generative sketchnoting entailed a senior student introducing his or her project to the same team. The goal was to develop high-level concepts together on paper in form of a *Think Sketch*. It became immediately apparent that having the initiator of the project on the team hindered the creative process. Therefore, the facilitators quickly pivoted and moved this person to a different team after the introduction of his/her project. This worked far better.

4.5 WHAT WAS LEARNED

There were uncontrolled variables influencing the outcomes:

- Seating arrangements around the table. Viewing things upside down or sideways can influence the flow of the session
- Having an experienced sketchnoter can be both supportive as well as possibly intimidating

Observations:

- There is a learning curve to thinking on paper together. The first moments can add significant time to the process as well as an awkward social element. People are testing the waters and are very careful when putting thought to paper. This happens even with experienced teams.

- The paper needs to be a safe space so that everybody feels equally comfortable sketching. There should be a set of house rules that establish the paper as such a ‘safe zone’.
- Not talking in the beginning makes for a good conversation later (in some cases) despite the initial awkwardness. For the most part not talking helped the visual conversation, however, in some cases people waited out the five minutes to finally begin talking again.
- Having one person with the largest stake in the game can be a negative influence, however not Having a stake in the ‘game’ can be equally negative
- Generally less ownership of a project makes for broader ideas
- Some people are much more comfortable than others with sharing thoughts on paper

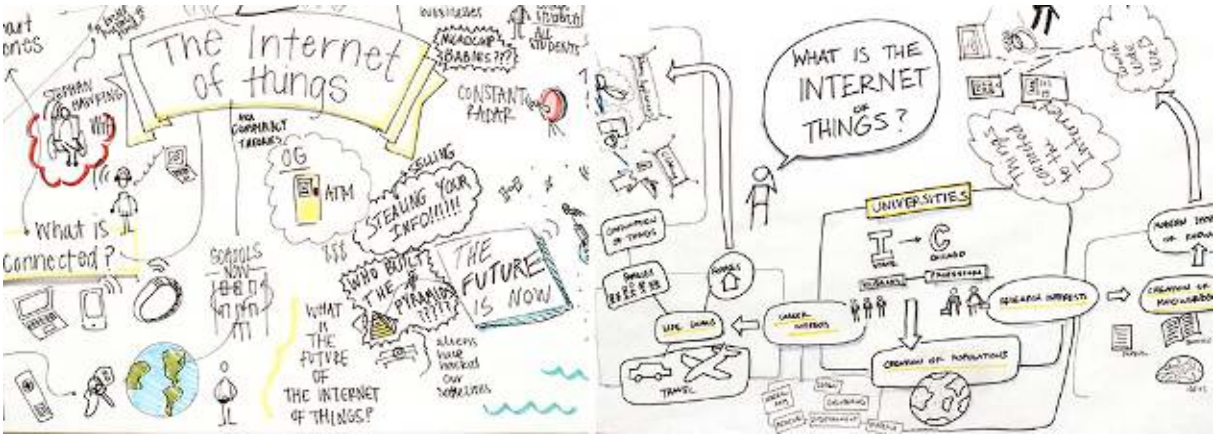

Figure 8. Internet of Things, two team generative sketchnotes clearly showing the differences of visual ‘signatures’.

Lessons Learned:

- Everybody should have the same stake in the project
- Warm up is essential
- Having a visual library to draw from could be beneficial
- A template might help to steer the conversation

5. NEXT STEPS

This team will continue to work through the many issues confronting this approach. The first steps will be to build a more solid theoretical foundation to support the methods of generative sketchnoting in the design classroom (and beyond) as well as better assessment tools to evaluate the effectiveness of the outcomes. The team relied repeatedly on the generative sketchnoting process to ‘visually think’ through the many issues and record them for further refinement. What began in the classroom as a way to simply improve ‘active listening’ through sketchnoting, soon became an experiment in empowering students to develop a ‘visual voice’ through ‘generative sketchnoting’.

Figure 9. With this ‘formula’ we are hoping to empower people with their own visual voice, no matter their background.

The many conversations conducted over Skype relied on shared sketches that had been created prior to and during these exchanges. These brought clarity to the discussion often spawning new rounds of sketches. When in the same space, the team sketched and talked simultaneously. This indirect 'proof-of-concept' is further confirmation that the methods work. As the process grew and expanded, new areas of exploration such as sketchnoting lectures and technical demonstrations emerged. Some of the sketchnotes have been videotaped and speeded up 800% to create rich visual explanations (link to Vimeo here) suggesting that generative sketchnoting can be used to explain a range of issues in clear visual ways. Critical concepts students often struggle with can be explored through these frameworks of low fidelity visualizations while simultaneously emphasizing the power of visual thinking. But, perhaps most importantly, this team encountered serendipitous moments that have allowed them to expand the concept outward in both space and time providing many additional opportunities, some of them shown below, to pursue in the future.

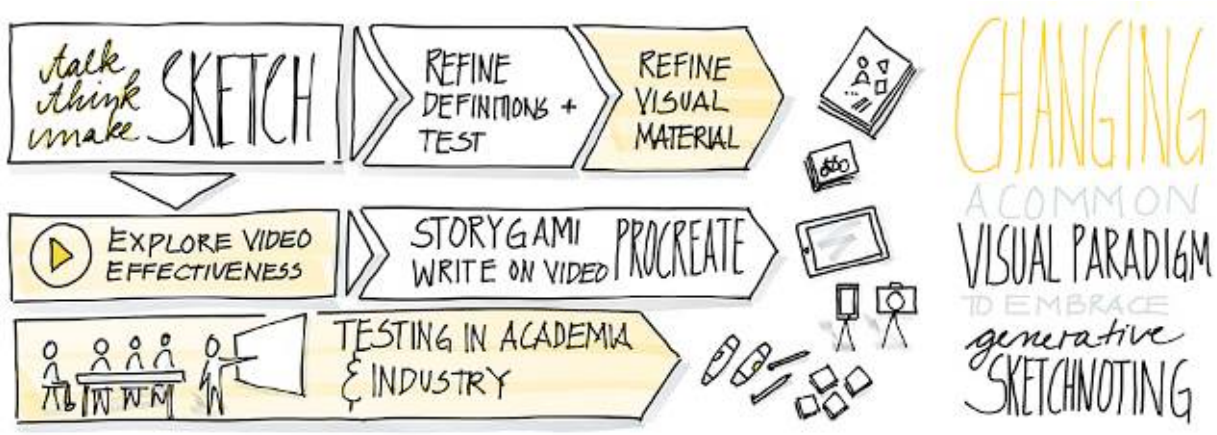

Figure 10. We are anticipating that this research might change the paradigm of visual thought processing, in academia and industry.

In closing, implementing generative sketchnoting as a new visual methodology into academia and practice will include a thorough development of the theoretical foundation. This will include an equal exploration of language and words, metaphors both cultural and visual, further refinement of the talk, think, and make sketches approach (figure 5) and the significance of truly staying in the low fidelity, low complex, non-polished, fast visualization spectrum as an equal opportunity communication tool.

6. REFERENCES

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