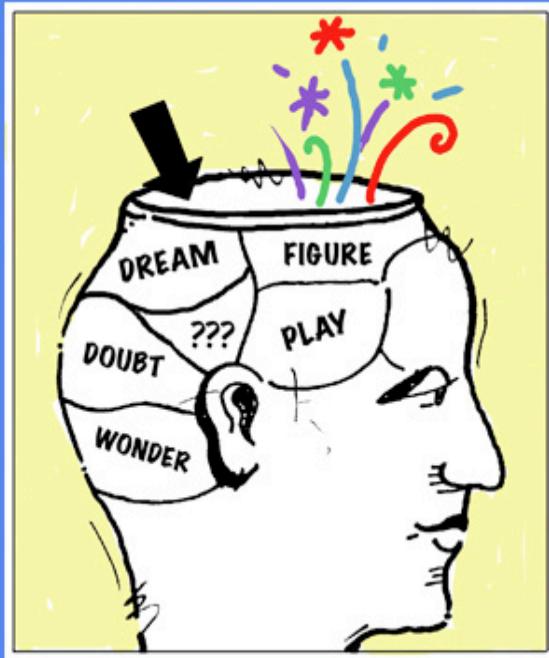


THE INGENARIUM

How To Build A CREATIVITY WHIZBANG



ALAN ROBBINS

The Ingenarium

How to Build A Creativity Whizbang

Alan Robbins

Published by
Alan Robbins
575 West End Avenue Suite 9D
New York, NY 10024

Copyright © 2009 by Alan Robbins

This version of Secrets of Gizmology is published in the United States of America, for free download via the World Wide Web site www.alanrobbins.com

All rights reserved.

No part of this book may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording, or by any information storage and retrieval system, without the written permission of the Publisher, except where permitted by law.

Also by Alan Robbins

Sci-Fi Mysteries

Following the Trail of Blood
Stories at the Edge of Time
A Small Box of Chaos
An Interlude in Dreamland

Interactive Mysteries

The Secret Of The Gold Jaguar
On The Trail Of Blood
A Call For Murder
Murder In A Locked Box

Puzzle Books

The Puzzicles Series
3D Puzzles
Inspector Cross (with Henry Slesar)
Cut & Construct Your Own Brontosaurus

Humor Books

The Dieter's Coloring Pad
Presidential Role Call
The 'Toon Book

Non-Fiction

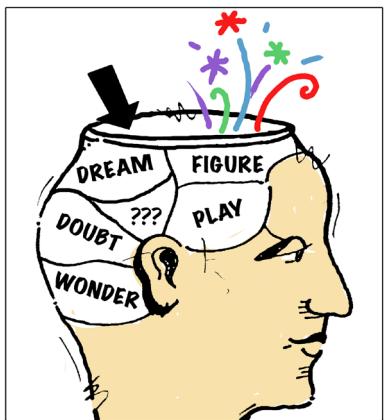
Grandma's Pantry Cookbook (with Trudy Smoke)
The World of the Image (with Trudy Smoke)

CONTENTS

Mindstorms & Brainbows	6
Craftwork	8
Projectivity	10
Leaping	12
Mules Rule	14
Wishcraft	16
Practice Practice	18
Misteaks	20
Dim Brilliance	22
Stealmill	24
Crackpotting	26
Butting	28
Explosing	30
Revisioning	32
Doodledo	34
Stopwatch	36
Dumbbell	38
Playability	40
Questclamation	42
Win Fail	44
Forgetability	46
Innerstanding	48
Wonderment	50
Luckmaking	52
Phases	54
Take Care	56

Mindstorms & Brainbows

"Not the kinda thing you
should be thinging about..."
James Joyce, Finnegans Wake



Creativity is obviously no thing.
Despite the fact that people keep trying to
package it.

Psychologists hunt for factors, brainiacs
search for locations in the cortex, engineers
formulate it for insight chips, innovation
routines, inspiration nets. But they have not
bottled it yet because there really is nothing
very thingy about creativity.

Look at the cases and you find that creativity
is wildly inconsistent: Michael Faraday had a
lousy memory, John Stuart Mill had a formi-
dable one; Goethe was a star student, Edison a failure; Mondrian painted like a
mathematician, Kepler thought like a poet. Darwin spent years piecing together
the details of a theory that Alfred Russell Wallace seems to have seen in a flash.

The social, political, and financial particulars of time and place argue against
thingness too. Degas was rich, Van Gogh was poor; Picasso was healthy, Proust
was not; Kant lived a simple life, Hugo a tumultuous one. Freud was an only
child, Bach the last of fourteen children. Keats died at 26, Coco Chanel was active
until she died at 88. Dickinson was unrecognized in her lifetime, Dickens famous.

There really does not seem to be any neat set of factors that encapsulates creativity
– that thingify it. The more you look, the more variations you find. The very idea
of creativity seems to morph depending on our focus: innovation, intelligence,
dumb luck, cleverness, whimsy, hype, craziness, courage, stubbornness, even im-
becility. Any of these can be part of the creative process.

So if it does not come in a bottle, has no sharp edges, and cannot be easily de-
fined...what is this unthinglike thing that makes paintings, gizmos, symphonies,
and cathedrals possible? How should we think about it? One approach is not as a
thing at all but more like a system. Like the weather, for example.

Storm systems, warm fronts, temperature loops, cloud covers...the news now gives

us a global view of something we used to only get in snatches. Onscreen and all at once, you get a sense of the whole system not just the local commotion. We see weather now as a kind of mega-thing...a system of atmospherics that surrounds us with its 1800 thunderstorms at any given moment, lightning striking 100 times a second, massive energy in every single photon of sunlight. More power in ten minutes of a single hurricane than in all the nuclear weapons on the planet. An interactive, roiling, unendingly dynamic system of solar heat, wind turbulence, earthbound pressures, and the cycles of moisture, all around the planet, all the time.

That is creativity in no nutshell, where untethered interacting forces act as a kind of meteorology of the imagination. A wily mix of chaos and pattern, noise and melody, all constantly changing and transforming. And like the weather itself, creativity is also full of expected surprises...mindstorms and brainbows, floods of ideas and dry spells, sudden clarity, flashes of insights, bolts from the blue. A whoopdedoo of whooping activity...whether hugging the planet or lining the inside of the mind.

If we want to make a working model of it, we need to avoid plans for a thing like a machine, so constricted by dry components and neat subroutines. Instead we need a whizbang of some kind, like a big fat bin with the right ingredients. Set it all in motion and then study the forces at work, notice the patterns, improve our predictions, accept our limitations, and harness the energy.

Like one of those self-contained ecosystems...a desktop terrarium. You do not build it finished or run it done. Instead, you start it up and watch it grow. Some things you control, others you merely admire. Some you cheer, some you rue.

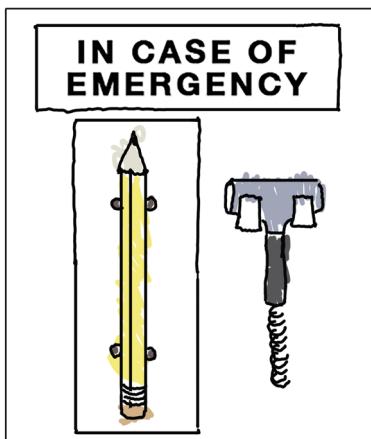
An Ingenarium let's call it, an eco-system of the mind and no thing worth thinking about. We will toss in some moist urges, a few kernels of cognition, flakes of forgetting, cultural media, quirks of personality, gene pools, sprigs of innate talent, and pure blind luck. Sparks of insight. Under the right conditions, we should get a nice growth of creativity that we can nurture and play with.

If it works, it won't work perfectly. Only dull devices do that. This is dynamic and bound to be unruly, unreliable, unpredictable. A permanent work in progress and a permanent process...not without pitfalls. The chance of being thunderstruck is perfectly countered by the likelihood of being swamped. Just like the weather. Expectations balanced by unknown repercussions. Plans countered by rowdiness.

But what the heck. It should be fun to try.

Craftwork

“The vitality of thought is in adventure. Ideas won’t keep.
Something must be done with them.”
Alfred North Whitehead



Everyone is creative with a small c through dreaming and language. But Creativity with a big C is more than that. Not just thinking out of the box but making a better box or maybe even a meta-box. It is the making that matters and that transforms an insight from a private fiction into a public fact. It is in actually manifesting our dreams that we become a human doing not a mere human being.

Of course, it would be nice if the activity of creating were only a matter of translating thoughts into objects. A simple transcription...as if Scott Joplin merely wrote down

the notes he heard in his head or Georgia O’Keeffe simply drew out her visions. Too bad it is not that simple. Creativity is work and sweat is the lubricant. Ingenuity is the mother of invention and that means hands-on working with the materials at hand.

The movie *The Agony and the Ecstasy* has Charlton Heston as Michelangelo seeing the images of the Sistine Ceiling in the clouds. Nice and breezy but as anyone who has struggled to make a thing knows, it is never just a matter of jotting down visions. Michelangelo toiled on his back for years, fixing, changing, reworking. O’Keeffe did not dream like that...she painted like that. And painted and painted. The creative idea – the concept – is crucial but only the beginning. Making a new thing has to happen in the hard world with all its gravity and grime. To be creative is to understand the materials you must craft in order to turn your dream into your project.

Even dreaming itself, our common creative talent, requires a craft...namely, storytelling. Telling your dream to someone else turns it into a creative outcome and the simple use of the word and to tie together dream images is part of the craft of making the dream a reality. The word and becomes the needle and thread of the storytale and the separate images of the dream become a coherent project includ-

ing organizing the elements, keeping the listener's attention, giving a performance in voice and gesture. In other words, the oral craft of narration.

Creativity with a big fat C requires craft as well.

Painters, for instance, face the daunting challenges of the painting craft - the laws of color, the graphics of shape and line, the qualities of the canvas, society's expectations, the evolution of pictures up to their own time and place. Each painting is a struggle – win, lose or draw – with the laws of the universe of painting.

Everything has its craft and anyone making anything must be aware of it. The ceramicist throwing a pot is limited by the physics of clay, the laws of force and gravity, and the geometry of structures. Not to mention cultural, religious, financial and a host of other influences. With all this weighing down, it is a difficult and noble effort to make a new thing. On the other hand, as history shows, human ingenuity is a fair match for all of it because within these limits, marvels are born.

Creative work is, in large part, the mastery of the methods of making a thing and that takes time. It is seldom as swift as a vision in the clouds. A journey of a thousand miles may begin with the first step but the real challenge is the thousands of other damn steps.

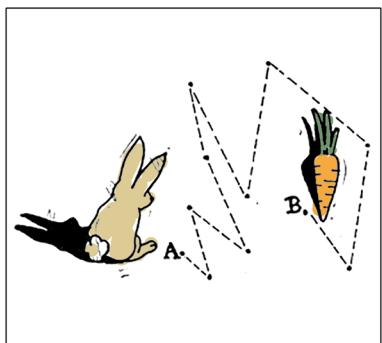
Arthur Rubenstein at the age of 80 said that after seventy years of performance he was just now learning how to really play the piano. And the great Japanese painter Hokusai said that having mastered flowers, birds, and mountains he was hoping to soon learn to paint people. He was 90 years old at the time. The good news is that craft is ageless and so is creativity.

So a sprig of craftwork goes into the Ingenarium, the ability to be aware of and work within the rules of a medium, the urge to know your materials, to understand their limits and their potential. And while we are at it, with a nod to how long it takes to learn a craft, we should also toss in a nice sprig of longevity.

Projectivity

"If you have the time to whine about something,
then you have the time to do something about it."

Anonymous



Everybody complains.

But one trade secret that creative people know is that there is a crucial step after complaining. That is when you turn your complaint into a challenge. In ordinary life, we focus on the problem but in creative life we go beyond that to turn the problem into a project. Joan Baez, the singer and activist, said that action is the antidote to despair and we could add that it is also the cure for gripes. It relies on a creative habit we can call Projectivity.

Projectivity is the art of turning a whine into a how.

To do it, you have to go from understanding the problem to figuring out how to fix it. The solution is in there, even if you cannot see it right away. This is the case because if you can understand a problem well enough to be frustrated by it, then you are that much closer to finding a solution to it. But you have to remember to try, not just complain. You have to turn the frustration into action.

The story of Bill Gillman demonstrates this.

Back in the 1970s he was having a terrible time learning tennis. He simply could not hit the ball in the middle of the racquet, that sweet spot that gives you the best shot. Most people frustrated like that would give up and move on to golf. But Gillman apparently knew this secret we call Projectivity. He turned his problem into a project by asking himself not why he couldn't hit the ball (what's wrong with me) but how he could make the ball easier to hit (what's wrong with the world). The answer he came up with was to make the whole racket head bigger. Bigger racket head, bigger sweet spot. That was the start of the Head Tennis Racquet company, which completely revolutionized the game of tennis. This is Projectivity in action...making the transition from not being able to do something to finding a way to do it. The stumbling block becomes a stepping-stone.

During World War II, the War Production Board asked General Electric to come up with a cheap substitute for synthetic rubber. After a great deal of research

one of their engineers named James Wright finally succeeded. But in tests, his substance had no advantages over ordinary synthetic rubber. Still, with a new product on their hands, in 1945 the company distributed samples of the stuff to other engineers. They were hoping someone would come up with a practical use for it. No one did, until Paul Hodgson got hold of it. Hodgson, it seems, had one advantage over the eggheads; he was not an engineer. He was a toy store operator and that made him look at the problem and think projectively...not why is this not working but what practical uses can I find for this useless material. And specifically, how can I make a toy out of this? The rest is Silly Putty history.

This kind of thing is not easy since it leads down the path of most resistance. Effort is required. It is the “if life hands you a lemon, make lemonade” approach but the real trick is an emotional one. You have to get into the habit of using frustration as an impetus, the starting point rather than the end point. And that means stepping back from the immediate problem to take a wider view. What is your overall goal, what are you actually trying to do, what is the answer to the question not being asked?

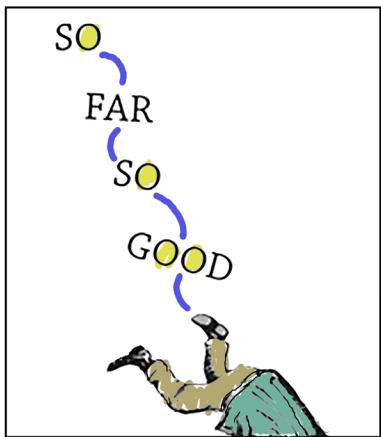
Like most creative secrets, Projectivity is a matter of habit and it is that habit that we put into the Ingénierium.

This does not mean that life will get simpler; in fact, the opposite is usually the case. But it does mean that you give yourself the chance to achieve where defeat seemed imminent. Perhaps not in exactly the way you planned but maybe in a better way. Gillman, after all, never became a Wimbledon champ. He simply revolutionized the game.

And that is what inventors, designers, and other creative people do...they don't blame themselves, they change the world.

Leaping

“A person who never made a mistake
never tried anything new.”
Colette



As a practical matter, creativity depends on a firm footing in the real world of making things.

The challenge, the research, the insight, the plan, the construction...all of that has to move towards a realizable goal. Otherwise we are just wishing. But behind it all is a leap of faith...the belief that the project will work in the world just as well as it does in the imagination. Or maybe even better.

To make a new thing is to leap into the unknown with only a concept to keep you aloft. Artists and designers get used to this as a habit. Or, if they are lucky, they have this

kind of trust as an innate intuition. That is why we have to include leaping in the Ingenarium.

As in leap before you look.

Which brings us to Abbas Ibn Firnas.

Never heard of him? No surprise. He is not on the A-list of history's makers even though an airport in Iraq and a crater on the Moon are named for him. Yet his life's work represents something essential, even quintessential, in the dreams of all creative people.

Abbas Ibn Firnas was a 9th century Berber inventor and scientist who lived in the Umayyad Caliphate of Córdoba in Al-Andalus, an area that is now part of Spain. By the early 820s, a new Caliph named Abd al-Rahman II, like any enlightened monarch, began to assemble a talented group of thinkers and dreamers to his court. Among them were an innovative and influential Iraqi musician called Ziryab who fostered the development of the sciences, and the young astronomer and poet Abbas Ibn Firnas.

Like Da Vinci or Benjamin Franklin, Ibn Firnas explored a variety of projects in chemistry, physics, and astronomy. He designed star tables, built a planetarium, and invented a chain of rings that could be used to display the motions of the planets and stars. He wrote poetry. He designed his own highly accurate water

clock, devised a way to make glass from sand, and invented a process for cutting rock crystal that allowed quartz to be cut more cheaply in Spain rather than being sent abroad.

In other words, and also like Da Vinci or Franklin, Ibn Firnas was one of those amazing makers and doers who inspire all of us to apply our skills to the whole wide world and all of its fascinations.

But the capstone to this stellar career did not occur until the year 875 when, at the ripe age of 65, Ibn Firnas designed, built, and tested his own flying machine. Shades of Da Vinci again...but keep in mind that this was 600 years before the Renaissance.

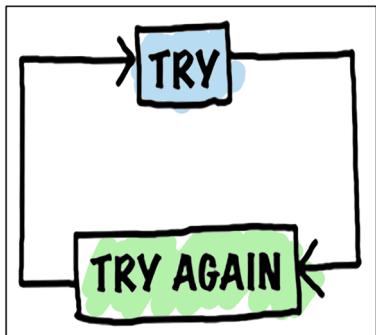
The device that Ibn Firnas built was really just a simple glider with little relationship to the graceful birds he so admired and studied. Yet he had enough faith in it that he promptly launched himself from a mountaintop towards a large crowd amid great fanfare. The flight went well except for the landing part. He injured his back so badly that many scholars think it may have affected his health and caused his death 12 years later. Historians who have studied accounts of the flight think that he probably did not pay enough attention to the way birds use their tails to adjust their landings. His glider had no tail and this accounted for a disastrous touchdown.

Nonetheless, it is the inspiration, the attempt, the hope that remains with us. It is his leap of faith that we should keep in mind as we present our sketches, introduce our projects, or even jump off our own creative mountains. Planning, working, re-working...all necessary parts of the creative endeavor. But there is always a moment, usually when our work has to be introduced to the public, that calls for a bold, risky leap of faith.

(Note for the Ingenarium regarding bird tails: creative work is about trust in the making of things and a leap of faith too...but don't forget to sweat the details.)

Mules Rule

“They say that I’m stubborn, and my wife says that, too, but it’s paid off so far.”
Sugar Ray Leonard



The Mules Rule rule of creativity has nothing to do with being an ass.

Creative people can or cannot be asses just like anyone else. The rule here is about being stubborn as a mule since innovation, in part, is about a kind of mulish brilliance, a slog through the mire that can often be mistaken for plodding.

Maybe a daintier way of saying this is that stubbornness is next to goodliness.

Successful authors know all about this but it is hidden from view because we only tend to hear about the outcomes. For example, Lord of the Flies by William Golding was rejected 20 times before it was published. Yet Golding ruled like a mule and never gave up. Gone with the Wind by Margaret Mitchell was rejected 38 times and Carrie by Stephen King 30 times. You have to ask yourself...what made them try it the second time, let alone the 30th time? Egomania perhaps or compulsion. Or just plain mulish rule.

Thomas Alva Edison's famous quote is that invention is 1% inspiration and 99% perspiration. He would know with his 1093 patents. But even Edison said that his greatest invention was not the phonograph or the movie projector but his own laboratory, the working environment he designed. This was the place where he and his staff plugged away at problems day after day. It was an invention factory, a stable of mules working, chipping away at solutions.

Like the light bulb, for example.

Edison knew that electricity could cause a filament in a vacuum to glow and not burn out. That would be a nice basis for a steady light and the search was on for the best material to use. Edison was practical so he did not chemically evaluate potential materials or look at atomic structures. Instead he and his staff stubbornly tested over a thousand materials – one by one – for months until he hit on one that worked. It turned out to be a piece of carbonized thread.

The Edison lab never developed a theory about how materials burn, never got a grand understanding of how or why. But in the end, after being stubborn about it, they had a light bulb.

Tycho Brahe was another smart mule.

A Dutch astronomer in the 16th century, Brahe is best known nowadays for his nose famously bitten off in a barroom brawl. He wore a bronze replacement and that alone should earn our respect. But Brahe was not only metal-nosed, he was also pig-headed. He spent his entire life carefully and meticulously measuring the location of the planets. Night after night he climbed to his telescope and wrote down numbers. He could barely have known what use they would be except for a general insight that measurement itself – systematic notation – would be handy in the new science that was emerging.

Brahe did nothing with his findings during his lifetime. But 40 years after his death, Johannes Kepler studied the notations and measurements and used them to establish the elliptical orbits of the planets. Brahe's measurements and Kepler's use of them led to the revolution about planetary movement that was crystallized by Copernicus.

Brahe's work created a foundation – the measurements, the data – that became the basis for the breakthrough. Creativity, after all, is rarely the individual work of isolated talents but instead a social event involving collaboration, duplication, refutation, reinvention, and cross-pollination. Brahe was muling as he chipped away at his little section of it.

That is how stubbornness – which is not always such a pretty talent – gets tossed into our Ingénierium along with our other ingredients. It is the skill that forces us to push on, to pay attention to the details, and to not give up. No small contribution.

So be a mule and get things done; whether you are also an ass is completely up to you.

Wishcraft

“When you wish upon a star, your dreams come true.”

Jiminy Cricket



Dreams do come true, of course. It happens all the time. Some good ones, some miserable. The problem for creative types is that there is no vending machine. We can put the quarter in, but we cannot choose just which dreams come down the chute. There is a random selection at work or maybe an unseen hand.

Wishing on a star, enchanting though it may be, is therefore not the best way to proceed. Not because it does not work...who knows? Even now some brilliant physicist may be coming up with the definitive theory of wishicles, the subatomic particles that cluster around distant stars and dreams.

No, the real problem with wishing is that you have to be so careful. Every angle must be covered, every nuance of disaster taken into account. Or else you might end up with precisely what you wish for and live to regret it. Tales of genies thrive on the lessons of fools who wished recklessly. Like that wish for a long cruise that places you on the poop deck of the Titanic.

We do need to include some wishcraft in the Ingenarium, but not the sappy sort proposed by Jiminy's cricketary theory.

Instead, to wish effectively, you first you have to figure out exactly what you want. Exactly. You have to be as clear and precise as possible. Second, you have to plan out your wish, break it down into steps. You cannot shoot for the whole enchilada at once because nothing comes easily. Wishing takes work. You have to do your homework, your brainwork. Think it through, have a plan, take it step by step. This is the kind of wishcraft that turns wishes into goals and it is crucial to all creative work.

The difference between a wish and a goal is that while a wish may come true, a goal can come true.

Creative visualization is one way to manage this. Effective daydreaming is simply

reviewing and ruminating over the specifics of a wish. In doing this we are working out the details, though in a dreamy way. Jules Feiffer once said that he felt strange having an office to work in because every time someone barged in, he was staring out the window like a lazy bum. It's not that he wasn't working; he simply was not moving. Visitors took these moments of daydreaming for laxity whereas they were actually his most productive time.

So here is some good creative news...you do not have to feel bad about lazing about. Snoozing is not ideal but ruminating is part of the job of being creative. Feet up, jaw slack, droopy eyes...even better. Of course, there are also some guidelines worth keeping in mind.

Good wishcraft means focusing on possibilities not impossibles. The closer a vague wish is to a possible goal, the more likely your efforts are to make it come true. Keep in mind the distinction between things you can only affect by wishing (like getting rich quick) and those you can affect by doing something (like getting rich quick by inventing a new phone app).

Second, be precise. Think about all the ramifications, snafus, and errors that may result from the wish, and rework it to avoid problems. Use your daydreaming time, your visualizing time, to elaborate your wishes. Turn them into a movie in your head. Tell yourself the story. Every change you make to specify and focus turns the wish further into a goal.

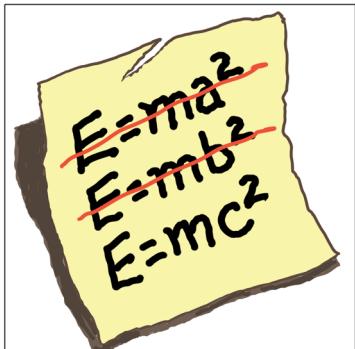
Third, rehearse the steps. Like an athlete, go over the plan of action to make the wish come true. Visualize the sequence, imagine the procedures, think about the pitfalls, rehearse the corrections. Envision and revise.

Jiminy Cricket's colleagues at Disney are called Imagineers and I am sure they know all about this. After all, they are not just dreamers but makers. But don't get me wrong; there is nothing wrong with wishing on a star too. You can always take the cricketary approach and hope for the best. Keep trying...why not? You might even find a star that works. And if you do, send the precise location to me.

The Ingenarium is a practical whizbang but like all of us, it could always use a little starry help.

Practice Practice

“Inspiration is for amateurs. The rest of us just show up and get to work.”
Chuck Close



In the classic tale of a creative breakthrough, Archimedes was asked by Hiero, the king of Syracuse, to find out if his crown was made of pure gold. Archimedes knew that a crown made of lesser stuff would be less dense but he had no idea how to compare the density of two differently shaped objects. In the legend, Archimedes hit on the solution when he got into a bathtub one day and noticed the water level rise over the rim. Aha! he thought. He could immerse the crowns and see which displaced more water. The denser one would make the water rise more and therefore would contain the most gold. Thrilled at the insight, Archimedes jumped out of the tub and ran naked through the street yelling “eureka!” The word means: I have found it.

Historians doubt the truth of the tale since Archimedes was notoriously lax in his bathing habits. Also, moments of sudden insight like that are actually pretty rare. Bolts from the blue, lightning strikes in the mind, and flashes in the brainpan are all notoriously elusive to anyone mucking around in creative waters. The link between new ideas and new stuff is more commonly a long road through trial and error, effort and frustration. Creative achievements or insights do not easily bob to the surface; they are the tip of an iceberg of hard work. Solutions often take time to work out and even quantum leaps tend to be the result of tiny steps added up. Edison’s famous equation of 10% inspiration and 90% perspiration says it succinctly.

In fact even creativity itself benefits from working at it or, to put it another way, from practice. The more you do it, the easier it becomes.

That is the ingredient we need to put into the Ingenarium....practice. Not in the sense of a rehearsal for anything but as a habit of working, working, and working at something. Practice, in other words, in the same way that an architect has a practice. Or a dentist for that matter. In other words, doing it. In the practice of

Zen, the masters say, “when you sit, just sit.” The goal is simply to be sitting right now. Not thinking, worrying, planning or trying...just sitting. You do it to do it. Same with creativity.

From this angle, the goal is not the final breakthrough – or that elusive Aha! moment – but the continual rehearsal of creative maneuvers like lateral thinking, leaps of the imagination, unexpected connections. You practice this, not to get better at anything or to achieve something in particular, but simply to do it. In this sense, being creative is nothing more or less than doing things in a certain way – a creative way – that becomes more natural with time.

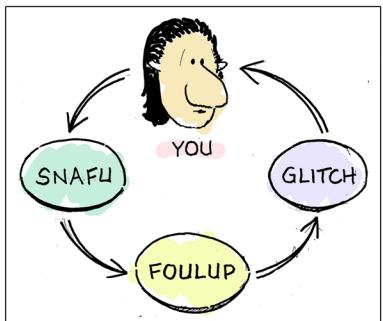
Epictetus, the Greek philosopher, had it right when he wrote that “No great thing is created suddenly, any more than a bunch of grapes or a fig. If you tell me that you desire a fig, I answer you that there must be time. Let it first bloom, then bear fruit, then ripen.”

In other words, it takes time, focus, and effort to have even an Aha! moment. Archimedes, bathing or not, had to have an understanding of density and displacement or he would have simply ended up with a nice spill to clean up. The fable is really a summary of a longer process of deliberation and experiment. Similar to Thomas Edison and his assistants, who tried thousands of types of material for the light bulb before they hit on carbonized thread and Mary Kay who researched her industry for a decade before hitting on the idea that led to her cosmetics empire. Ray Kroc worked in and studied the food industry for twenty years before the “sudden” insight that led to McDonald’s.

And so we toss a heap of practice into the Ingenarium...and of course, a dash of patience to go along with it.

Misteaks

“It was when I found out I could make mistakes
that I knew I was on to something.”
Ornette Coleman



You have to love Abel Tasman. He was the 17th century Dutch explorer who heard about exotic islands in the Southern Sea. In 1642, Tasman went on his first exploration to the South Seas to find them. He sailed south from Java and discovered a number of small islands, then sailed east and discovered a much bigger island that he promptly named for himself...Tasmania.

Then he sailed east and north and discovered more islands including the huge island that we now call New Zealand. Then back up to New Guinea, discovering even more along the way.

It was a stirring venture that won him great acclaim back in Holland, except for one little problem. Tasman somehow managed to sail completely around Australia without finding it. I mean Australia...only the largest island in the world.

I keep that story in mind when I think about trying to accomplish something because although it was a huge mistake, Tasman's journey did open up the South Seas to more exploration and trade. So in a way, the mistake was itself the breakthrough. This suggests that learning to accept mistakes is part of the process of success and being willing to fumble and bumble along matters because you never know when you might also stumble onto a creative shore.

The French writer Colette said that a person who never made a mistake never tried anything new and that is a good point. It is the trying of new things that is the engine of creativity. Thinking in new ways, exploring new ideas, trying new combinations. Pushing on in spite of errors, dead ends, stumbles. Most people run from mistakes, but to be creative you have to not only accept them but also love them, embrace them.

Accounting may not thrive on this but creativity does and that is why any decent

Ingenarium should include a healthy chunk of what we might logically misspell as...misteaks.

One reason for this is that you can never know ahead of time which new avenues lead to dead ends and which to gateways. So you have to pursue them all and see what happens. This is especially true because creative mistakes often lead to discoveries that can turn out to be more important than what you thought you were looking for.

Think Alexander Fleming.

He was the chemist who found bacteria growing where it should not have been in one of the petri dishes in his lab. Most people – probably most chemists too – would have tossed it into the trash but he started wondering what it was and why it had grown there and that led to the discovery of penicillin. Science is filled with these kinds of stories.

Percy Spencer in the 1940s noticed that the candy bar in his pocket melted whenever he was near a magnetron, the power tube in a radio set. Again, most folks with errorphobia – which includes most folks – would just have stopped carrying around candy bars. But Spencer became fascinated by the mistake itself and began to study why microwaves would affect food. That little snafu led to the invention of the microwave oven.

Teflon, nylon, Vaseline, x-rays – and most important of all Silly Putty – the list goes on and on. They were all the results of accidental discoveries, mistakes that led to creative breakthroughs.

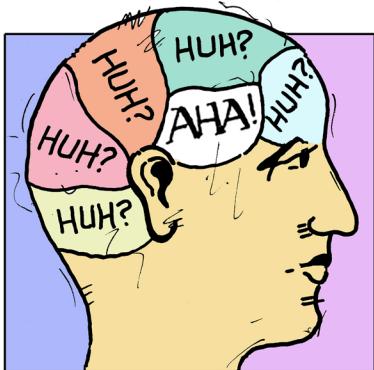
The trick is being alert to them and open to detours rather than annoyed by them and obsessed with the highway. This is not easy. Plenty of mistakes lead to breakdowns rather than breakthroughs and it would be nice to have a rule to tell the difference. But we never do. It is simply the ability to be fascinated by mistakes that our Ingénierium needs.

All we can lose is our dignity...which is a small price to pay in the grand scheme of things.

Dim Brilliance

“Discovery consists of seeing what everybody has seen and thinking what nobody has thought.”

Albert von Szent-Gyorgyi



Innovations are very often obvious, but usually only in hindsight.

It is hard to imagine, for example, what the world was like before any of our current technological innovations. Yet each of them involved a struggle for survival. A machine that can make instant copies seems like a no-brainer now, yet it took inventor Chester Carlson 20 years to convince anybody that his xerographic device had any value at all.

We can think of this as the obvious turning into a breakthrough or the unusual as common sense. Plain as the nose on the face you never noticed before. It all points to the fact that a kind of dim brilliance has to go into our Ingénierium. An ability, that is, to see the apparent in a new light, to think of the commonplace as a special place.

Like a switch we have to turn on that makes what is right there in front of us important enough to be an insight.

When the Challenger disaster happened, top scientists began to study the explosion of the rocket to see what might have caused it. Leaks due to some of the gaskets known as O-rings were one possibility and at a conference on the issue, one expert after another presented theories, measurements, studies, guesses. Richard Feynman, Nobel winning physicist and a famous gadfly of common thought, made a dimly brilliant move when he bluntly took one of the O-rings on the table and plopped it into the glass of ice water on the table in front of him. The O-ring cracked when ye took it out. Ta-dah! The gasket was fragile in the cold.

Ordinary brilliance is not stupidity, just simplicity.

On the other hand, the obvious is not always so obvious, which is why it is sometimes brilliant just to notice to it. Take Copernicus, for example, and the notion that the earth revolved around the sun.

It was revolutionary in part because it involved a breakthrough in visualization. Look up and it simply does not appear as though it is the earth that revolves as

you watch the sun going across the sky, due to the earth's rotation. His insight came from a more potent source than common sense or direct observation...the brute force of intuition based on the measurements of others.

But the philosopher Ludwig Wittgenstein asked a very interesting question: "why do people always say it was natural for men to assume that the sun went round the earth rather than that the earth was rotating. The answer is usually, "because it looks as if the sun is going round the earth. To which he replied, "Well, what it would have looked like if it looked like the earth was rotating?" The answer of course is that it would look exactly the same, because it looks the way it does and the earth does rotate.

If seeing the obvious were so obvious, anyone could do it.

Which leads us to the Tale of the Bear in which a genius and a jerk were hiking in the mountains and encountered a bear preparing to attack. The jerk tore through his knapsack, searching for his sneakers to make a run for it while the genius quickly analyzed the terrain, the distance, the velocity of bears and humans.

As the genius explained that they could never outrun the bear, the jerk simply put his sneakers on. The bear started to advance and the genius calculated vectors and climate and physiologies and detailed that there was positively no hope in outrunning it.

The jerk laced up.

The bear tensed and the genius went into how chaos theory and fractals and probabilities made it impossible for them to get away, but the jerk simply got down in a trackstart position.

"It's useless!" the genius shouted. "Don't you understand what I've been saying? We can't outrun the bear!"

The jerk looked up at him sadly.

"If you say so," he said. "But of course, I don't have to outrun the bear. I only have to outrun you!"

And off he went.

Sometimes it takes looking at the obvious in a new way to make it stand out.

Stealmill

“Good artists imitate, great artists steal.”

T.S. Eliot



The best creativity is generally a kind of theft. Because it is a social enterprise as well as a private habit, new ideas tend to emerge from other ones, innovations from previous breakthroughs.

Stealing work outright is a no-no of course, but concepts and ideas are open season. In fact, it is a job description for a creative person to be able to look around, be open to influence, and see what other people are up to. And rip them off...er, that is, be influenced by them.

Most folks who are not used to it, think that they have to generate all ideas from their own knowledge base but they soon find out how limited personal experience is. And also how limiting, since it is easy to get stuck in one's own restricted set of notions. It takes humility to realize that there are a lot of great ideas out there and a lot of them are a heck of a lot better than yours. So why not work with them? Why not use them? Why not rely on them?

In other words, if you want to build a decent Ingenarium, you have to also run a stealmill.

The trick, of course, is knowing the difference between an inspiration and a lawsuit, between being influenced and being sued. It is an amazing and chilling fact of creativity that the line between the two is not all that clear even for professionals. Courtrooms are filled with people trying to work out this difference in the visual arts, music, literature, and invention.

Johan Gutenberg pulled together disparate elements to create the printing revolution but did he borrow from existing technologies or simply grab them? Certainly the parts and pieces of his invention already existed; movable type was used in China for 300 years and the screw press was already used in winemaking. But without any inventor around to sue him for either one, his use of existing innova-

tions was pure creativity not infringement.

In the 1920s a woman by the name of Lizzie Magie invented a game called The Landlord's Game in which players moved little pieces around a board, landed on squares, and bought and sold properties. It was set in New York and the squares were labeled Broadway, Wall Street, and so on. A decade later during the Depression, a man named Charles Darrow took (or borrowed or stole or was influenced by) this idea to come up with his own game. He simplified the design, changed the location to Atlantic City and invented Monopoly, the best-selling board game of all time.

Magie fans say he was a scoundrel who ripped off her idea. Darrow's backers say he transformed it and made it his own. Take your pick, the distinction can be quite vague.

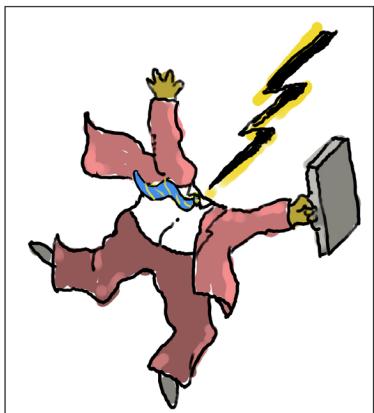
The movie *Flash of Genius* showed a similar battle being waged in the effort to invent an intermittent windshield wiper via a years-long court case that eventually found in favor of Robert Kearns, the inventor. The title of the film was based on the so-called Flash of Genius Doctrine in patent law that said an invention had to come about by a truly innovative insight rather than simple tinkering or altering. Sounds simple enough but the confusions arising from it led to the rejection of the doctrine by 1952. A more recent movie called *The Social Network* raised the same issues of creative ideas and breakthroughs, and just what can be stolen and what cannot, and was equally inconclusive.

So the moral about the stealmill? We have to run it carefully and thoughtfully. Ideas are fair game, actual things are not. But the line is permeable and open to interpretation by juries. The goal here is not to abuse the creativity of others but, nonetheless, to rely on useful ideas when we find them. In other words, we need to be open to influence but shut to theft. And know a good lawyer just in case.

Crackpotting

“Genius, in truth, means little more than the faculty of perceiving in an unhabitual way.”

William James



The imagination is a place where things happen that don't.

This is because creativity does not follow the rules of the hard world, only the laws of the mind and heart. Whereas logical thinking is always this or that, yes or no, one or the other...creativity relies on ifs and maybes and this-is-crazy-but-s. Innovation involves newness more than knowness. In this realm, useful fictions are often more helpful than facts, and futzing and fudging take precedence over focusing and finalizing.

Not everyone is comfortable with this kind of lunacy; most people want clarity and consistency. But creative folks crave jingle-jangle. They are both/anders rather than either/orers. Anyone willing to follow their muse is willing to leave reality behind, at least for brief flights of fancy.

That is why artists and scientists and other creative types are often seen as nut cases because, in fact, they are. Not crazy, just loony. Comfortable with crackpot ideas, haywiring, and the half-baked. They carry hunchpails not lunch pails. They have an ability to doubt the obvious and a talent for accepting the inane, at least as a mental exercise. The scholar Erasmus said that the highest form of bliss was a certain degree of folly and this certainly applies to creative efforts. Non-sense over common sense, the quirk over the quark, the weird rather than the wired; it all amounts to a kind of intentional conjury that can lead to new insights.

At the turn of the last century, Henri Poincare was the great master of physics, the man who knew the most and saw the limits in Newtonian mechanics. Poincare even came close to developing a theory of relativity...but he didn't. It took a young 26 year-old upstart like Einstein, not vested in old patterns, to come up with a revolutionary view of things.

It was Einstein who posed questions that other people thought were nuts.

Thought experiments like imagining what a beam of light look like if you were traveling alongside it at the speed of light. Or how people traveling at different

speeds would experience time. No one, including Einstein himself, had an answer for that. It was new kind of question, not meant to be resolved with an answer but used as a starting point for an inquiry.

In the same way, Tesla's loopy experiments with X-rays and Dali's offbeat surrealist fantasies seemed off the wall batso...until they didn't.

In other words, we need a little madness in the Ingenarium.

This is not to put down sanity, always admirable. Intelligence is the grasp of useable knowledge and a key to understanding. But craziness is another kind of key. Not just reading but reading outside the lines. Not just memorizing facts but locating good drivel. Not the right answers but the best questions with no answers. Not simply which is true and which is false but how it may be both. The physicist Heinz R. Pagels said: "The capacity to tolerate complexity and welcome contradiction, not the need for simplicity and certainty, is the attribute of an explorer."

Like the engineering student who was asked to come up with a levitation device and, thinking loony, came up with a belt that strapped a cat to a piece of buttered toast. Since cats always land on their feet and toast always lands buttered side down, he had a hovering device with no moving parts. Completely crackpot of course, but then you start wondering about combining materials that might have counterforces acting against each other, like magnetic fields, and even cat/toast levitation might prove fruitful.

One of the biggest stumbling blocks to creativity is normalcy itself, being stuck in a mental rut. This is the safe space where innovation dies. As the old saying goes: the only difference between a rut and a grave is the depth. Same habits, same influences, same old same old. A runaround of sane approaches and solutions. Creativity, though, is more about shots in the dark, the leapfrogging of facts, and off-the-wall solutions.

For this reason, crackpotting as a kind of talent for the oddball goes into our Ingenarium. Craziness, haywiring, sheer blunderment. After all, the ridiculous is only ridiculous just before it makes perfect sense.

Butting

“Creativity is just connecting things.”

Steve Jobs



Maybe the most basic and obvious of creative gambits is the practice of putting two things together that don't belong.

In his book *The Act of Creation*, Arthur Koestler referred to this as bisociation. Two wrong things slammed together can create inanity of course, but they can also charm. What does a kite-flying frog do for you? Nothing much probably...unless you are a children's book author. Over and over again in science and art, bisociation has been at the core of breakthroughs.

As an example, take Johannes Gutenberg who is always credited with the invention of the printing press. A major breakthrough but it is much more revealing to see his innovation as an example of this kind of butting together of disparate ideas. One plus one makes new. The press that Gutenberg invented was really based on the butting of three existing items.

First was relief printing, a method already used for playing cards in which ink on a raised surface could be transferred to paper repeatedly. That was a well-known technology in Gutenberg's time. Second was the idea of casting the letters of the alphabet in metal so they could be reused and moved. That too was already in place from the existing manufacture of coins and seals. Butt those two together and you have moveable type, which had already been in practice in China. Gutenberg was not so much butting as rebutting, except that, according to his letters, he was not at all familiar with that fact.

But it was the third piece of the puzzle, the next butting insight, that led to the print revolution. This relied on another technology, an existing mechanism used in the wine harvest. Printing in Gutenberg's time involved paper hand pressed against metal or wooden plates. But as he wrote at the time: "I took part in the wine harvest. I watched the wine flowing, and going back from the effect to the cause, I studied the power of his press which nothing can resist." He was referring to a screw press that applied enormous pressure as it squeezed the grapes.

So putting together raised molds for letters and the screw press is what finally led to the mass production of books by the mid 1400s.

Butting, or bisociation, is one of the purest sources for innovation. It is not usually arbitrary but more often comes to a prepared mind already thinking about a problem and looking for solutions.

Another example involves the invention of George de Mestral who, taking a hike in his native Switzerland, came home covered with cockleburs. He was an inventor and naturally interested in the structure of things, so instead of just being annoyed, he put the burs under his microscope. (Curiosity is already in the Ingenarium). On closer examination, he saw the little hooks on the ends of the cocklebur that make them stick to fabric and fur and that allow them to be distributed by animals for propagation. Butting that fact together with the idea of a method for securing fabric, he came up with Velcro.

Even accidents can be useful when the right things butt.

When Marshall McLuhan came up with a name for an article he was writing, he wrote down the temporary title “The Medium in the Mass Age.” But when he left out the space between the last two words, the unexpected word “Massage” suddenly popped up. (Misteaking is also already in the Ingenarium). The two words don’t fit but the idea of the medium as a kind of massage, soothing us into submission, led to an entirely new line of thought for McLuhan that became a catch phrase for his approach.

So the next ingredient we need is this habit of taking two or more unrelated things and slamming them together to make something new and useful. Or at least a willingness to see the connections between odd bedfellows. It doesn’t always lead to innovation, but when it does, we change the world. We can call this creative maneuver butting and place it into our Ingenarium and see what happens.

Exploding

“The only difference between a rut and a grave is the depth.”
Folk Wisdom



One of the biggest stumbling blocks to creativity is routine, being stuck in a mental rut. Same habits, same influences, same old blah blah. It leads to what the computer programmers used to call GIGO...garbage in, garbage out. Pointless routines that lead to useless programs.

The same is true in the world of creative efforts but for most of us in this age of all-encompassing data, the garbage in question is rigid patterns of information. The risk in our time is being overwhelmed by repetitive

input, which becomes numbing. Like watching endless reruns of the same TV show, the information available to us can be entertaining but not inspiring. We can be stuffed without being sated. Redundant information is comforting but it is rarely a boost to innovation.

Creative thinking, on the other hand, tends to thrive on the new, the different, the unexpected. The tid that does not quite fit the bit. In this sense, all information is not equal but assessing the value of our input is not easy. In a world swamped by canned data, it is hard to break out of patterns and see new possibilities. To counteract this tendency, most innovators become data brats – informographers – who are always poking their noses where they shouldn't. They have to do this to get out of mental ruts. They know, or intuitively sense, that injections of the unusual can wreck those cozy neural pathways and force our brains to make new connections.

This is one of the reasons to study new things – another language or a new instrument, for example – because going out of our information comfort zones forces our complacent synapses to start reforming.

When I first wrote this, I accidentally typed the phrase “explose yourself to new data.” Not a bad mistake. Exposing does in fact explode the norm and open the way to new discoveries. One nice thing about “exploding” yourself is that it is easy

to do. You don't have to scour the world for it, unless you enjoy world scouring. Plenty of creative work has been done within a narrow, routine lifestyle. Immanuel Kant, the philosopher, never left his small town of Konigsberg; neighbors said they could set their watches by his routines. But Kant's creative work was not to be found in his daily habits or his travels; it was in his thinking and writing informed by reading everything, especially the philosophers he most disliked.

A good way to approach this habit is by exploring what you don't get, can't fathom, or vehemently disagree with. This relies on an appetite for discomfort well known by explorers and stand-up comics but if you don't have that innately, you can force yourself to do it. Make an effort to expose yourself to the unusual, the unfamiliar, even the uncomfortable. New news. Stuff that shakes you up and challenges your assumptions.

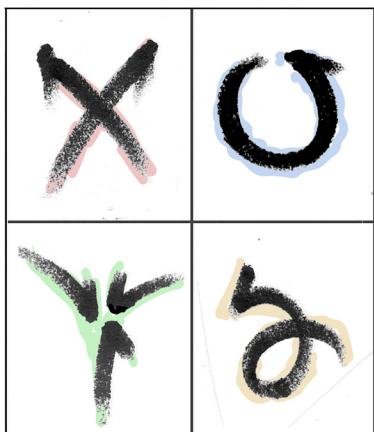
This is more difficult than it sounds in a world in which we are inundated with packaged information. Through TV, movies, and the web, we are mostly passive recipients of pre-planned edutainment. Fascinating stuff and some of it inspiring, but overall it can easily become a rut of slick commercial forms and formats. For creative work to work, we need to get out of these ruts by delving into new, even unusual and offbeat, input. New news, crackpot websites, kooky zines, unfamiliar images and texts, alien cultures, unfamiliar pasts. Stuff that shakes us up and out of the standard patterns of information processing and allows the brain to go hog-wild now and again.

That is why parents who want to foster creativity in their kids make sure to have rich and varied stimuli around not just TV and video games, plus materials for actually making as opposed to simply using things. With this in mind we can be fostering parents for ourselves as adults.

It is not always pleasant to indulge in the uncomfortable but it can be enlightening and push us in new directions. It is that habit of exploding, of actively seeking out the unfamiliar, that goes into our Ingenarium.

Revisioning

“The world of reality has its limits;
the world of imagination is boundless.”
Jean-Jacques Rousseau



Central to creativity is the ability to see things in a new way, to be able to visualize the common uncommonly. Whether you are lucky enough to have this as a talent or need to practice it as a habit, it is certainly a key element in innovation.

A new pattern, a new geometry in the mind, a different way of diagramming what there is. Revisioning, in other words, which means reshaping the way we visualize things. Take ringing, for instance. Not the sound but the maneuver...taking a set of linear points and bending them into a circle or ring. It is amazing how many creative breakthroughs have depended on this simple revisioning.

In 1865 a Belgian professor of chemistry by the name of Frederich August von Kekule was struggling with the problem of how to visualize the benzene molecule. No matter how he played with its arrangement of carbon and hydrogen atoms in his mind, he could never seem to fit them together in a coherent way.

In his diary Kekule wrote about dozing by a fire and seeing the atoms in his mind's eye in long rows twining and twisting in a snakelike motion. When one of the snakes seized hold of its own tail and formed a ring, he realized that the structure of benzene might be circular. “Let us learn to dream, gentlemen,” he wrote.

Since snakes do not really form themselves into rings, Kekule was more likely imagining a well-known graphic image called an oroborous, an alchemical symbol of a snake biting its own tail. But however it came into his consciousness, this trick of the mind allowed him to revision the way he saw the molecule...not as a linear arrangement but as a circular one. It was a simple thing to do yet no one else studying the problem in 50 years thought to do it. That insight became the basis for the entire field of organic chemistry, which uses a ring structure for all organic molecules.

Isaac Newton had a similar breakthrough in 1664, the year in which he came up with the theory of gravity, explored the new science of light and optics, and invented the calculus. Using a prism, Newton was observing the neat, orderly sequence of the colors of the spectrum when it occurred to him that, since the colors at the ends of the spectrum looked similar, it might be fruitful to arrange them into a circle. At that moment, he invented the color wheel.

This revisioning allowed him to see the structure of color in a new way and led to the notions of color families, differences between hue and chroma and intensity, relationships around and across, supplementary and complementary colors, neutral grays in the middle.

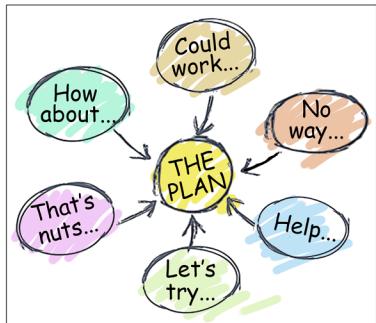
All modern theories of color and practical guides for color mixing are based on it.

Early clocks were linear shadow markers indicating the passage of time using the height of the sun. It took until the 11th century to hit on the idea of putting that linear sequence into a circle to get the clockface...and a new way to think about time. The circle of fifths in music, the thermodynamic circle in physics that clarifies molecular motion, even the circling of the wagons for self-protection....all rely on this move in the mind, turning a linear structure into a ringing one.

The ring is not the only way to revision...the hub is another one that has led to breakthroughs in business structure, economics, and city planning. The twirl has been at the center of the invention of rope and the structure of DNA. This ability to revision, to look at a familiar structure and reform it in our minds, to use shapes as a tool for creative thinking...this is the ability we need to include in the Ingenarium. Although, given its role in the history of innovation, it would not hurt to toss a ring in.

Doodledo

“The way to get good ideas is to get lots of ideas and throw the bad ones away.”
Linus Pauling



A philosophy professor of mine had an interesting and annoying assignment: List ten things you know about an apple. Now list ten more things. Now list twenty more things... and so on.

He was trying to get us to practice thinkering, imagining, conceiving. It was tedious at first but instructive later on. After you exhaust the obvious – you can eat it, it is red, it grows on trees, etc. – you turn to the unexpected.

It falls at the rate of 32 feet per second per second, cut it crosswise and it reveals a star, each one is $\frac{1}{4}$ water which is why they float, and so on. Then comes the opaque from Adam to William Tell to Isaac Newton to Steve Jobs. And then the deep...it is what is, when it is, and nothing less. It is the very measure of love by a bushel and a peck. And finally something like this: an apple hides its yearning like the sun, now coy, now brazen.

From a simple description to a line of poetry in only forty or so steps. A silly exercise maybe but that kind of working at an idea and pushing out notions is pure practice in creative thinking and crucial to breakthroughs of all kinds.

We have already put play and thinkering into the Ingenarium, but let us now add a small idea generating engine by way of any habit or practice that will allow us to produce concepts. A lot of them, more than we need, way more than we can ever use. We can do it through daydreaming, nightdreaming, brainstorming, drinking (water, that is, to hydrate), sputtering, babbling...it doesn't matter. The idea is to get lots of ideas to work with, or ignore, or improve.

Painters use sketches to accomplish this; designers draw thumbnails for the same reason. These kinds of practices help us to exercise our playfulness with the material but also help to produce concepts. Novelists write snippets or snatches or even background stories that may not ever appear in the final book for the same reason. Entrepreneurs draw bubble charts of business strategies. The purpose is not to define the final product but to produce ideas for it, loads of them. Parents who keep art supplies, artists who collect junk, or inventors with bins of things,

all know how this works. The more ideas you produce, the more productive your idea generation becomes. The road to creativity is littered with unused ideas but that is a good thing because they make the road itself possible.

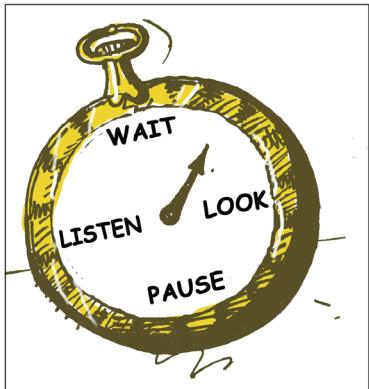
Doodledo is an amusing word that means to fool around and generate ideas and make silly pictures and then see what sticks and works. Doodledo is really a way of working through the whole mind-into-matter transformation. When you draw a bunch of sketches or thumbnails or make mock-ups, you are in effect testing the material waters. Trying out ideas on the world bit by bit, even in a very rudimentary form. And these useless ideas lead to new ones and that is the whole point. The writer Emile Chartier wrote: “Nothing is more dangerous than an idea when it is the only one you have.”

Most serious people think of this kind of toying around and throwing out thoughts as unserious. But that is only the view from a culture that focuses on moments of triumph, not all the work that went into them. Frank Lloyd Wright testing his ideas on form and structure by playing with toy blocks and Linus Pauling folding and twisting paper models of his double helix concept for DNA in order to better visualize the possibilities are both examples of the usefulness of sheer idea generation.

A familiar joke says that there is no great trick to being smart, you just have just come up with something idiotic and not do it. But that kind of restraint is better for humor than for creative effort. For our creative practice, we need the opposite...a habit and method for coming up with lots of ideas, even idiotic ones, and then sifting through them and sticking with the stuff that works best. And so we toss some doodledo into our Ingenarium.

Stopwatch

“Genius is nothing but a great appetite for patience.”
Georges Louis Leclerc De Buffon



We really should put a stopwatch into the Ingénarium.

Not the timepiece that first comes to mind, but a different kind of mechanism....something that forces us to stop and watch.

We think of creativity, correctly, as all about making, producing, generating. Creative people are always working on something because there is always something new to work on. But to be innovative, we also have to be aware of what there is out there so that we can change it and make it better. And to be aware involves watching and looking and listening.

In other words, we need time away from the studio, the lab, or the computer. We need time to observe and absorb.

Yogi Berra said that you can observe a lot by just watching and we might add that you can also hear a lot just by listening and see a lot by just looking. The focus here is a kind of receptive mode in which we can sponge up the world. This is crucial because what we notice there can become the raw material for our projectivity. But this does not mean being idle or lazy. Instead, it is an active effort to induce rather than produce, to take in rather than put out. And of course, like most aspects of creativity, it takes work.

Darwin began the explorations that led to his theory of evolution by noticing the slight differences in the wings of sparrows. He was a student of variations in form. Da Vinci noted the patterns of shape and color in urine stains on alley walls, observing the visual impact of accidental imagery. He was a keen observer of visual effects. The poet Langston Hughes listened carefully to patter, cadence, and slang and this influenced his poems. Merce Cunningham studied the way ordinary people move to enliven his choreography.

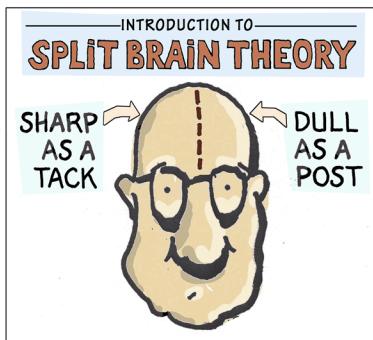
What we need in the Ingénarium, therefore, is a willingness to stand back and be receptive. To note and notice. Open eyes and ears are a good place to start but a few pieces of technology would help too. A pencil and a notebook or sketch-

book, invaluable to writers and artists, help to record observations. A camera or an audio recorder can work too, or any kind of tool that can enhance our looking and listening and force us to pay attention to what there is. As an example, a standard assignment in photography classes is to walk around your city and capture as many faces as you can find – either designed or imagined - in the architecture and environment. You can do the same with numbers or shadows or circles. An audio recorder can achieve the same thing in terms of the music of motion, the rhythms of the industrial world, the melodies of speech. These exercises may not lead directly to new work and the goal is not to think in terms of a final product. Instead, they are disciplines that allow us to pay better attention, to take a break in the making and immerse ourselves in the world. The goal is to look more, hear better, notice and note.

And practice patience. Patience is already a natural part of the Ingenarium since everything takes time. But here it allows us to experience times in between bursts of energy when we simple wait and watch. And perhaps even shut up for a change, fight the urge to purge (verbally, that is). There is a saying in Yiddish that suggests: “Better to be quiet and thought a fool than to speak and remove all doubt.” That’s good advice but quiet and observation serve another purpose too. They get us out of ourselves and our incessant tinkering and thinkering. They allow us to let the world in and that is critical to creative work because it tells us what needs to change. The stopwatch being included here would force us into that mode of thinking.

Dumbbell

“How stupid not to have thought of it before.”
T.H. Huxley on reading Darwin’s *Origin of the Species*



Here is a famous dumb question:
Sally is five feet tall, always tells lies, and weighs what Sam would weigh if he were 2 inches taller than her. Sally says she weighs 10 pounds more than Sam. Sam is the exact same height as Sally and always tells the truth and in fact weighs 10 pounds less than her. What is the simplest way to find out Sam’s weight?

Smartycats relish the details of that question and see it as a fine challenge. But that will not help because the answer is not in the calculus but in the obvious. We will get to that in a moment.

What is striking about many creative breakthroughs is not how majestic they are but how dull. Not explosive but plodding. In a word...dumb. After all, great ideas do not have to be brilliant; they just have to be illuminating in the same way that even a tiny match in a dark room is a bright light.

This is another take on Occam’s Razor, the idea that the simplest solution to a problem can be the most effective one. Sometimes the answer is the most obvious one no one else saw. But to see it, you have to lower your sights, take the low road, plod with the best of them. Like the question posed by a French newspaper: “If a fire broke out in the Louvre and you could save only one painting, which one would it be?” Of the many opinions about that, the French dramatist Tristan Bernard had the simplest answer: “The one nearest the exit.” Sometimes you just have to dare to be dumb.

Which naturally brings us to the Black Death.

The plague that ravaged Poland in the 14th century led to a host of victims who were not actually dead but instead in a deathlike coma. It was discovered after a while that they could sometimes spontaneously revive. The problem was that you could not tell by observing them who would live or succumb and the upshot was that many people were accidentally being buried alive.
Horrible thought.

So they came up with all sorts of elaborate designs to solve the problem of being buried while you were still alive. Food and water systems inside the casket, bells and pulleys so someone inside could signal from the grave, and complicated methods of bringing air into the coffin. But these were all way too expensive, too complex.

There was actually a much simpler solution but it took a while to find it. What was it? The coffin makers began to install a foot-long stake in the coffin lid directly over the victim's heart. Brainstorm! When the coffin lid was nailed down, the stake in the lid killed you.

That solved the problem because now they knew for certain that the person they were burying was dead. It was a simple solution but it involved changing their thinking, dumbing it down in a way. The question about what to do if they buried someone alive was complicated. A much simpler question was...how do we make sure that everyone we bury is dead?

The fact that this tale may have been the basis for the best way to kill a vampire, another twist on the undead, is just icing on the cake.

Dare to be dumb means that you may have to ask a simpler question to get a better dumb answer. But perhaps a more upbeat example will make a better case. It involves NASA, the space agency, which spent millions of dollars trying to create a pen that would write in zero gravity. They did experiments on fluidics, tests of various pump mechanisms, new kinds of pigments and binders, hired design firms to compete for solutions that would work. Meanwhile, the Russians did not have that kind of money. So what did they do?

Their astronauts used pencils.

I rest my case and hereby place a nice solid dumbbell in the Ingenarium, a symbol of looking for the obvious.

And the answer to that opening poser? The simplest way to find out Sam's weight is to just ask him. After all, he always tells the truth!

Playability

“Seriousness is the only refuge of the shallow.”
Oscar Wilde



The artist Jasper Johns summed up his creative process like this: “It’s simple. You just take something and do something to it. Then you do something else to it. Pretty soon, you’ve got something.” Simple advice...if you just muck around with your materials, you will end up somewhere you weren’t before.

While it is true that creativity takes discipline, hard work, and focus, it is equally true that a spirit of mucking around – known more commonly as play – is at the heart of innovation.

I once heard a first-grade teacher say to one of her students who was in the art area: “don’t just smear the colors around. Paint!” I never quite understood the difference myself and I noticed that the kid kept doing exactly what she was doing before but with a more serious expression on her face. In any case, kids know about this better than adults because play is part of the work to prepare for life while most adults think play is frivolous. A leisure time diversion.

Yet pure curiosity and idle exploration with no particular outcome in mind are an important part of the discovery process. This also may be one of the most pleasing aspects of it because without judgment, with nothing at stake and no sense of significance or importance, you can discover all sorts of new things.

Therefore, an ability to play and a sense of playfulness – or playability – go right into our Ingénierium.

Fiddling around with gizmos, futzing with materials, fooling with words or sounds...these are all part of the playful process of making new stuff. Doodling, dabbling, dribbling (material not saliva) and just gadding about in the work can all lead to creative breakthroughs. In fact they are essential to it.

Robert Motherwell, the painter, talked about thinking of his paintings as doodles. Linus Pauling, who won a Nobel Prize for chemistry, played with paper models to explore his ideas. Frank Gehry, the architect of new forms, played with folded and crumpled paper and waxed-dipped fabric to record his playful experiments.

Henrik Ibsen, playwright of serious themes, played with dolls as an adult to work out ideas for his plays.

You have to be proud of aimless play, not embarrassed by it, and see it as a road to exploration. Rigid logic, right answers, and dogmatic methods, although useful in their own ways, rarely lead to leaps of the imagination so crucial to creativity because they rarely lead outside the limits of the system. Play, on the other hand, can and does.

Even the way we mull something over can become an important example of this in a kind of thinking you might call...thinkering. This refers to thinking without a goal, daydreaming, noodling around. Wondering what if.

We tend to think of Einstein, for example, working out his ideas through the cold logic of formulas and equations. But the work that led to his Special Theory of Relativity, for example, began with thinkering...a series of playful thought experiments with no immediate answers. What would a beam of light look like if you were traveling alongside it at the speed of light? Would a flash of light on a train appear differently to someone on the train as opposed to someone on the ground? If you were in a windowless elevator on the surface of the Earth or in one accelerating through space...how could you tell the difference?

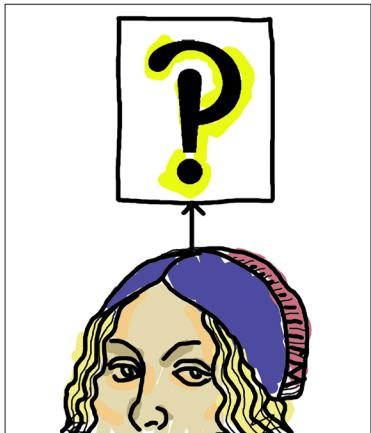
These were mental games, playful puzzles that could lead to insights. Einstein always claimed that the gift of fantasy meant more to him than any talent for absorbing positive knowledge. And as Carl Jung said: "Without the playing with fantasy no creative work has ever yet come to birth. The debt we owe to the play of imagination is incalculable."

So go ahead and doodle and noodle, scribble and babble, and thinker your time away. It is not wasted at all; what you are doing is slipping the chains of reality and playing with the components of the system you are exploring, testing new approaches, going beyond the norm.

And that, of course, is what creative breakthroughs are all about.

Questclamation

“Searching for answers in life presumes
that we even know the questions.”
Wayne Visser



Don't look for answers in our Ingénium. Creatively speaking, answers are the end of the line, the period concluding the thought. Once you have an answer to something, you can move on to something else, which is just fine for multiple choice exams and bad dates. Not so good for the imaginative enterprise.

Creativity, after all, is about the choices, the endlessly recurring possibilities. Options and opportunities. And in that sense it makes more sense to question answers than to answer questions. In fact, most creative people tend to be the ones who will not take yes or

no for an answer because they refuse to take an answer for an answer. They are stubborn about their flexibility.

Knowers, true believers, experts, and egotists revel in truths, essences, and answers. That is all very important when decisions have to be made, when deals are sealed, and things must be wrapped up. But the creative process is different and here it is more useful to approach all answers as relative, temporary, and limited.

A famous bumper sticker said...an answer is a tombstone for an inquiry. In other words, a conclusion was the place where you got tired of thinking. The physicist Niels Bohr put this more profoundly but, of course, he was inventing Quantum Theory not writing bumper stickers. He said that while the opposite of a true statement was a false statement, the opposite of a profound truth was another profound truth. This is a necessary attitude in the quantum world with all of its contradictions, strangeness, and paradoxes. Particles can be in two places at the same instant, can travel backwards in time, and certain measurements are unmeasurable because the act of measuring changes them. Weird stuff that requires a weird quirk within the answering mind.

Bohr's own creative work in quantum physics relied in part on his ability to be flexible in his thinking, to accept paradoxes, to question categories and answers.

After all, the truth of pat answers is almost always a momentary truth, shallow in scope. The bigger truths are ones of contradiction in the roiling universe in which we live. Einstein's famous "imagination is more important than knowledge," hints at the same thing.

Questioning answers often relies on not accepting the premise you are given in the first place. This is the Gordian Knot approach to problem solving. If you are not up on your knot lore, The Gordian Knot was a complex knot made of rope that tied the chariot of the king in ancient Greece. It was said that whoever could undo this knot would become ruler of all Asia. Everyone who tried failed because the knot was intricate and cleverly designed; when you pulled on it, it just tightened up. Then this kid from Macedonia came up, studied it for a few moments, took out his sword and sliced the whole damn thing in half. Problem solved...no more knot.

Everyone else was trying to answer the question of how to unravel the knot. But this guy refused to find that answer because he refused to accept the question in the first place. Instead he challenged the whole premise and went on to become Alexander the Great.

Challenging the whole "question and answer" mentality is so critical and important that there ought to be a punctuation mark to express it. I propose combining the question mark and the exclamation point and calling it the Questclamation Point. It is a combination of an exclamation (That's it! Aha! The end!) and a question (Oh yeah? Huh? You sure?). It suggests that all answers can be questioned and all questions too. It should be on every keyboard, at the end of every answer, and concluding every statement of absolute certainty.

Therefore a big Questclamation Point goes into the Ingenarium.

Win Fail

“There is no hope of achieving what I want, of expressing my vision of reality. I go on painting and sculpting because I am curious to know why I fail.”
Alberto Giacometti



Our culture is obsessed with winning, with success, with triumph. Sometimes it seems that almost every endeavor comes down to an auction or a competition with numbers, judges, votes...and winners and losers. Yet as anyone involved in creative work knows, the role of either success or failure is ambiguous at best. Commercial failures can be artistic successes, public achievements can be private disappointments, and critical triumphs can be personal disasters.

The real trick in this realm is to keep working – keep making the vision real – in spite of both failures and successes and that is the odd balance we have to put into our Ingenarium. A kind of win/fail situation that accepts both and pays attention to neither. The simple fact of the matter is that, in the end, only the successes are remembered.

The manuscript for the novel Ulysses by James Joyce was rejected 22 times before it found a publisher. To people who do not think they can handle a single rejection of their work, this is heroic. Yet Joyce found the gumption to submit that one manuscript not just three or four more times but for the 22nd time...the one time, as it turned out, that mattered because it rendered all the others irrelevant.

People hearing this story about Ulysses naturally assume that someone like Joyce believed in his own genius and its eventual success and therefore was not bothered by the failures. But this was not the case. Joyce was devastated by rejection and destroyed manuscripts in fits of despair. What he did have was an ability to keep on going in spite of the roadblocks. As Francis Bacon wrote: “There is no comparison between that which we may lose by not trying and that by not succeeding.” Being stubborn helps but seeing failure and success as less important than the creative rush is even better.

Like Babe Ruth who, as everyone knows, set a home run record in 1927 that lasted

for decades. Babe Ruth remains in our mythology for that achievement. But no one ever seems to recall or at least mention the fact that in that exact same year he also set the strikeout record. The reason that you have to be willing to fail in order to succeed is because failure happens far more often than success. In this sense, success even depends on failure.

It also helps to keep in mind that there is an important difference between winning and succeeding: you win relative to someone else but you succeed relative to your own expectations. Most creative people find a way to keep their own expectations afloat in order to keep trying to do what they want to do, despite anyone else's success or failure. This is not easy to do – scientists and artists are notoriously jealous of their peers – but it is a useful creative discipline to ignore the ups and downs of judgments and focus instead on the work and how to pursue it.

Win or lose, succeed or fail, find acceptance or rejection...these are judgments we do not easily ignore and most people, including those working on creative projects in all fields, find this to be a constant struggle. What we can learn is to be players rather than winners or losers, doers rather than achievers or failers. Confidence, even false confidence, can help us keep at it and when that is absent, a kind of reckless disregard is next best.

“Do it anyway” is a good motto for this corner of the creative universe and this is the spirit that needs to be added to our Ingenarium. It does not make creative work any easier; it simply makes it possible in spite of negative outcomes.

Forgetability

“The prerequisite of originality is the art of forgetting, at the proper moment, what we know.”
Arthur Koestler



Much has been made of memory.

Memory may very well be the most studied talent of the brain. And for good reason. A good memory is obviously essential in life and for certain aspects of the creative process. You cannot interpret a cantata if you cannot remember the notes or dance expressively if the steps keep slipping from your mind.

A good memory can, of course, be innate. Arturo Toscanini apparently had a vast

memory of all the notes played by every instrument for every symphony he ever conducted.

Nice ability! There are savants who remember numbers, dates, even every single detail of every day of their lives. But how helpful all that is for anything other than showmanship is another question.

In Funes the Memorious, Jorge Luis Borges wrote of a young man who remembered every detail of everything he ever encountered. It was a grand skill that, in the end, seemed to lead nowhere outside of the intricacies of his own isolated mind.

Thousands of books have been dedicated to helping improve memory based on various theories of how the brain works. Joseph Jacobs, a 19th century psychologist, first explored the notion that memory space consists of roughly seven “things”. A thing, in this sense, is a cohesive unit with meaning... letter, number, word, image. If you can pack a bunch of items into seven memories, you have a better chance of recalling them.

The Russian psychologist A. R Luria, studied a professional mnemonist called “S” who would associate each word on a list with an imaginary walk down a street in Moscow that he knew well. In retracing his imaginary path, he would stop at each house and visualize the word inside. Plato used this technique to keep track of the topics of his lengthy lectures; his school of philosophy was called Peripatetic, from the Greek word for “wandering.”

The familiar trick of turning lists into word sequences has been used by every schoolkid. Every Good Boy Does Fine for the notes of the musical staff. Lazy French Tarts Lie Naked In Anticipation for the nerves that pass through the superior orbital foramen of the skull...lacrimal, frontal, trochlear, lateral, nasociliary, internal, abducens. King Philips Class Ordered a Family of Gentle Spaniels recalls categories of taxonomy...kingdom, phylum, class, order, family, genus, species. HOMES triggers the names of the Great Lakes just as ROYGBIV does for the colors of the spectrum.

On a broader scale, storytelling – connecting ideas into a narrative – is another method for retaining information. It is the way we recall our own experiences and is demonstrated by our amazing ability to retain and retell complex plotlines from movies, books, and TV shows...far more details than we might be able to dredge up if we were studying a list for a test.

Yet when you delve into it, memory is not all it is cracked up to be in the world of creative innovation. In many ways a good memory ties us to what already exists but to come to new conclusions and presumptions, we must forget aspects of what we already know. To innovate you have to forget what you know to be true and imagine a world not yet the case.

This suggests a complex dance between what is retained and what is rejected... sometimes it means forgetting all you know about the details in order to get to the big picture, as Einstein had to do to revolutionize physics. Sometimes it means forgetting the big picture in order to discover new details, as Darwin did when he revolutionized science.

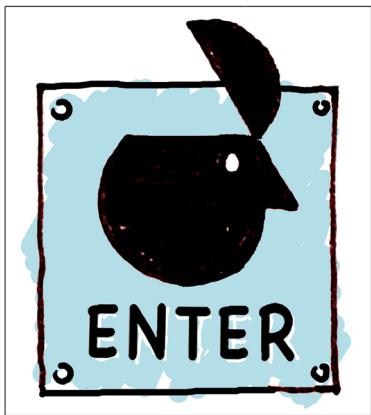
An effective memory, and any tricks and tools we can come up with to enhance it, has to be part of our Ingenarium. But so does practical forgetting. Not dementia but a kind of constructive forgetting. An ability, in other words, to erase anything that clogs our creative arteries and holds us back. Forgetability, a memory eraser, is the other side of the coin and just as crucial to innovation.

Of course if it could also wipe out bad memories, a memory cleaner would not only be a good addition to the Ingenarium...it would make a fortune.

Innerstanding

"I am 80. So now I take chances I never took before...now I let go and enjoy myself and to hell with everything except the music."

Arthur Rubenstein



Innerstanding is a word originally used in alchemy.

It refers to intuitive comprehension as distinguished from knowledge or understanding through analysis or logic. It is what we would probably call intuition today. But innerstanding is a little different and perhaps more essential to creativity. The adept or student of alchemy, by studying ancient texts and principles, learned not only factual data about mixing chemicals, but also something primary about his or her inner life. You could not be an alchemist – not a successful one anyway – without going on a journey of personal

discovery. Learning the craft was both about the outer facts and the inner truth. Alchemy had as much to do with psychology as chemistry.

This is a good word to keep in mind...and a good ingredient to add to the Ingénium mix. Creative work, after all, is not just a process of making new things; it is a process that alters the individual as well. It is about growing and knowing as much as it is about doing and making. To be a creative person is to explore one's own capacities and the world and our place in it.

Innerstanding means having a sense of one's own strengths and weaknesses, talents and challenges, and the way our life experiences have shaped our beliefs. Very often an ability to turn problems into projects relies on just this kind of innerstanding. Inventor and designer Buckminster Fuller, for example, always claimed that his poor eyesight was one of his secret strengths. He wrote: "I was born cross-eyed. I could see only large patterns...Lenses fully corrected my vision. Despite my new ability to apprehend details, my childhood's spontaneous dependence only upon big patterns has persisted."

This ability to turn weaknesses into assets is an important part of the creative process. But it also suggests that one has to have – or develop – a sense of oneself in relation to the problems that are worth solving. This is true for any creative

pursuit whether in engineering, science, or art. Or even just living a full life. Innerstanding gives us a sense of who we are and what we can do.

Part of this internal awareness includes a willingness to identify ourselves in certain ways. One of the most common attitudes of creative people is that they tend to think of themselves as creative. Whether this is the result of an inherent belief or family support or even an artificial posture is irrelevant. It is the identification with a creative life as a deep innerstanding that helps propel us through the rough terrain of innovation. The painter Larry Rivers wrote: “I produce art, I make art. Is it out of some overall interest in art, or is it just a constant concern with myself as an artist, having been identified as an artist, and continuing that identity?” In other words, being or thinking of oneself as a creative person is crucial to actually functioning as one.

And yet, just as with the alchemists, there is another side to this coin.

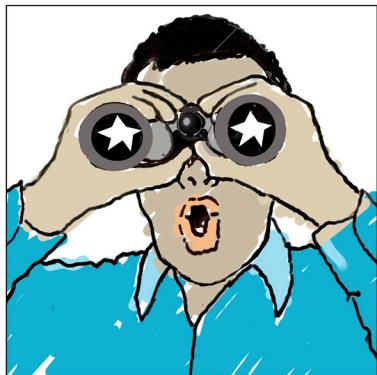
Innerstanding requires a kind of selfish probing of one’s own inner being but it also calls on us to be selfless too. It is easy to think of creativity as ego-centered, focusing on unique skills and talents and goals. But that is never enough because creative people do what they do in a complex world of others. In this sense, innerstanding also includes a selfless sensitivity to the world at large, to other people and their needs. The alchemists were trying to improve themselves but also trying to change the world. Empathy, awareness, sympathy, consideration...these are all part of innerstanding too. Artists who communicate, engineers who improve, scientists who solve, innovators who design...these people are not simply following inner muses; they are also aware of and trying to reduce the suffering in the world.

And that awareness is no small thing to have in our Ingenarium.

Wonderment

“The most beautiful thing we can experience is the mysterious. It is the source of all true art and science.”

Albert Einstein



The word inspiration comes from the Latin *inspirare*, meaning “to breath into.”

Anyone who has felt it knows why that makes sense. Under the influence of inspiration, there seems to be a force at work outside of our calculating minds. Inspired creators often say that they feel they are in the grip of something, carried along on a wave of energy, or perhaps even experiencing what athletes refer to as being “in the zone.” This is a wonderful point at which one loses control and yet still seems to be compelled towards a

resolution. Call it a neurotingle or a carnival in the cortex...or just a sense of awe or awesomeness.

It is the ability to experience this feeling of wonderment that needs to go into the Ingenarium. Being open to the richness of life and letting it flow through you. Lasciarsi ardare is an operatic term meaning let it pour forth and that applies well to this unique moment when we are both breathed into and breathed through. Artists know it well, if they are lucky; a strange awareness of being both an “in” and “out” basket at the same time, giving in to something beyond your power but outwardly empowered by it anyway. In this way, Noel Coward referred to the process by which he wrote his play *Blithe Spirit* as a “psychic gift.” He was referring to the feeling of letting go and allowing the creativity to unfold, almost as a bystander to the event.

Writers often talk about the sensation of transcribing the words rather than creating them. Vladimir Nabokov was more specific about this when he wrote about the way in which inspiration seemed to come in phases and the way that artists had to surrender to them. First, he wrote, there was the “prefatory glow,” the feeling of “tickly well-being” that banishes all awareness of physical discomfort. The feeling does not yield its secret just yet, he said, but a window has been opened and some wind has blown in. Some time later, Nabokov continued, the

writer “forefeels what he is going to tell.” There is an instant vision, the lightning bolt of inspiration, that turns into rapid speech, and a “tumble of merging words” that form the nucleus of a work that will grow from it over the ensuing months or years. In other words, you have been breathed into and now have to turn that currency into a real thing, which is no small task in and of itself.

Inspiration and wonderment are inspiring and wonderful...but creativity still takes patience and work and effort.

The most interesting aspect of this is the sense most people who experience it have that it is occurring outside of themselves, something over which they do not seem to have any control. That is an unusual situation to be in, especially for people working hard to manipulate materials and ideas and output. It is liberating but also a little weird. Unfortunately, you cannot make inspiration happen. But what you can do is put together the time, energy, raw materials, and information that you need to take advantage of it when it does. Anyone can be inspired, but that only becomes useful if you are prepared to turn it into a project.

The Ingenarium is a practical device and so planning and craftwork and practice are all part of it. But let us not forget to also add this sense of awe, this openness to the flow of insight, the acceptance of inspiration when and if it happens to us. The inventor Michael Faraday said, “Nothing is too wonderful to be true.” It is an acceptance of – and a trust in – that kind of oceanic feeling that we need to include in our whizbang.

Luckmaking

“Chance is the fool’s name for fate.”
Guy Holden in The Gay Divorcee



Maybe the single most important ingredient we can put into the Ingénierium is the one thing we have no power over whatsoever. You cannot practice it, exercise it, get better at it, or bottle it. Yet no artist or scientist or entrepreneur would be able to succeed without it. In fact, success on all levels, including life itself, depends on it.

That ingredient is luck.

You need it for any project to work out; you need to be healthy enough, hearty enough, with the right kind of support, at the exact place and proper time, with the best idea and the most effective skills at the ideal moment. That is a lot to ask. Some of this you work at but most of it relies on happenstance beyond your control just working out for you. Or not working at all.

Take the case of Diamond.

Diamond was the name of Isaac Newton’s dog. Newton, of course, is well known as the inventor of calculus and a theory of gravity and color theory, among many other things. Lots of luck there in a number of ways, not the least of which was not succumbing to the plague that was ravaging London at the time of his earliest achievements.

But in his diary, Newton wrote that at one point he was working on a promising new theory of chemistry when his dog, Diamond, knocked a candle over and started a fire that destroyed all the work. That was a massive dose of bad luck that stopped him in his tracks. Newton went on to other breakthroughs but that particular work was completely lost.

We only know that story because Newton was lucky enough to do other work that had better fortune. Who knows how many untold achievements have been sacrificed to rotten luck, to accidents of time and place?

On the other hand, of course, good luck can also seem like fate taking a hand. In 1917, the artist Georgia O’Keeffe was a young, struggling painter living in New York. One day she decided to go for a walk and just so happened to end up

on Fifth Avenue. Of all the people out walking that day, she just so happened to bump into – actually bump into - a man who just so happened to be Alfred Steiglitz, the photographer. Steiglitz at the time, and as luck would have it, just so happened to run a photography gallery and this just so happened to be the day that he had decided to expand the gallery to include paintings as well. Naturally, O'Keefe just so happened to have some photos of her work with her. Steiglitz liked the work enough to show it, liked her enough to begin taking portraits of her, and so on. This chance encounter with all of its tiny particles of good luck began a great artistic partnership that lasted their entire lives.

We all know stories like these in our daily lives and the history of creativity is filled with artful and awful accidents. Whether you see this as fate or chance is a matter of attitude but either way, it would serve us very well to throw some luck into the Ingenarium brew. Or at least the idea of striving for luck. Or befriending fate.

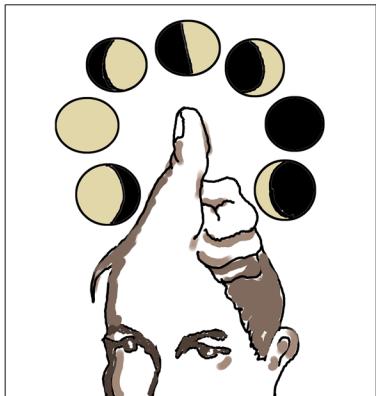
How exactly do you do that? What secret recipe can we include to insure good luck and eschew bad? No clue, and good luck on figuring it out. We can do whatever we can to improve our chances of success by trying and retrying. We can stay focused and not give up and take our best shots and do all the other things self-help and creativity books tell us to do. We can do what we can to stay on the good side of fate; look both ways before we cross the street, stop smoking, cultivate helpful acquaintances, and so on.

But in the end luck is luck and all we can do is strive for it, whatever that means to us, and hope for the best.

So good luck as we toss some into the mix.

Phases

“The creative process is a
process of surrender, not control.”
Julia Cameron



For anyone who continually works at it – in other words, practices it – there seems to be a familiar process to creativity. It is a kind of systematic unfolding starting with the germ of an insight and leading to the final realization of it. We can think of these as phases of the process and an awareness of them should be included in any decent Ingenarium because we want to work through them, not against them. In a sense, we want to surrender to them.

Yet we should not be too strict about them either, since the order and significance of one

or another may vary, overlap, or even be ignored. The length of time spent, the amount of effort required, the need to do certain things in a certain way...all these depend on the difficulty of the creative challenge, the scope of the effort, the type of project, the limits of the materials, and much more.

The genius of genius is in its ability to overcome the challenges of each phase and move through them before anything undermines the effort.

Ignition

The initial spark for the project; that moment when a delicious question or challenge or problem arises that may have a solution. It is the inspiration that something might be possible or at least pose-able, often as a result of irritation, aggravation, or disgust with the way things are. For this phase to work, we need to be open to new possibilities...or even impossibilities.

Absorption

To solve problems and take an idea and run with it, we have to be immersed in the world it inhabits. This is where research and information come into play. Facts, realities, current truths need to be gathered. Especially important during this phase is casting a wide net and understanding that failed solutions and imperfect resolutions – even input from other fields – may lead to breakthroughs.

Compression

Everything known about the challenge has to be organized into some comprehensible framework or we risk getting lost in a sea of information. This is especially tricky in our world where so much can be gathered so quickly. In this phase, charts, files, diagrams, and even piles – on the desk or in the head – can help turn a chaos of data into a potential structure that can be evaluated and understood.

Expansion

In this phase, creative juices flow, materials fly, equations proliferate. Hunches lead to sketches and models and snippets that may become part of the final project...or not. The Ingenarium, not to mention the workspace, fills up with material – some part of the solution, some dead ends – any of which may help the process along.

Percolation

Also called incubation, this phase offers an important escape from the creative grind. Most inventive people are familiar with it as a kind of idle, non-working getaway... a vacation from the intense involvement of the project. It can last a moment or much more and allows unconscious or non-intentional parts of the brain to work on the problem. This is the phase in which daydreams kick in and potential solutions pop up.

Production

A fully realized project begins to take shape that includes the steps to make it real while working with the strengths and weaknesses of the materials. Final goals can be set at this phase, which can also be thwarted as the realities of the hard world come into play. Here, as at any phase, uncharted directions and unexpected challenges can ignite new insights and start the whole process over again.

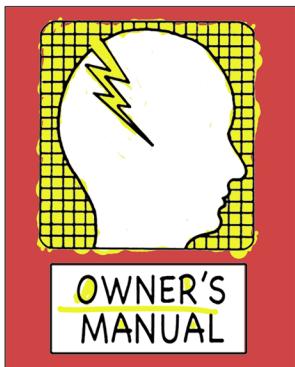
Revision

Design as re-design, creative work as commentary on what came before. Nothing made exists outside of a history, an environment, and a context. At any point along the way, even after the project is done, re-evaluation and revision are possible. This may give the maker a few proud moments or even decades of acceptance before going back and altering or redoing it. Creativity is about outcomes but also about change.

Take Care

“God was satisfied with his own work, and that is fatal.”

Samuel Butler



So there we have it – or at least a start – on our Ingenarium.

A creativity whizbang designed as a self-contained ecosystem – like a desktop terrarium – to foster creativity, invention, innovation, ingenuity.

We have put in some of the basic ingredients like leaps of the imagination, a talent for projectivity, some wishcraft, a stealmill, dogged persistence, a love of questioning, a tolerance for mistakes, a desire to make things, a hunchpail, and so on. Dumb brilliance,

craftiness, playfulness, clever forgetting, hard work, practice and more. We have even remembered to include that most precious of ingredients...pure unadulterated whacked out luck.

But even so, the device is incomplete.

We have yet to put in a number of more complex issues of the mind that affect creative work. For instance, various styles of intelligence have to match the work in the sense that architects tend to be dimensional thinkers and musicians think tonally. Also, modes of consciousness have to match the work so that playwrights ought to be socially aware and poets sensually focused. The structure of feelings should support the insights needed; cartoonists have to think funny. Personality factors matter too...conviction has to overcome doubt, desire has to triumph over anguish. Not to mention levels of intentionality, varieties of disappointment, and belief systems which all have to align with the tasks at hand. And we have yet to consider inescapable influences from the outside world like political restraints and freedoms, social controls or liberties, family support or lack thereof, whichever would work.

Also, what we have added so far are mostly attitudes, practices, habits. Creative processes and effective ways of thinking and doing. But creativity relies on actually making stuff so any complete Ingenarium would also supply the raw materials of the work...words, lines, shapes, colors, sounds, forms. We would have to

include every single kind of technology we can muster.

But what we have so far is enough to get started for a number of reasons.

First, the Ingenarium is not a machine, it is an ecosystem. It is designed to grow. Unlike a machine, which is fixed in its form and function, this is a habitat for innovation and as habits feed on other habits and skills build on skills, the creative potential in it, just as in the human variant, will evolve and change. We have simply put in the basic ingredients to begin the process.

Secondly, the Ingenarium will never be truly finished because creativity itself never is. Creativity is not a thing, it is a process. It is elastic, expansive, adaptive. There will always be new factors to consider based on changes in the material world, the evolution of interacting systems, new technologies, and our own view of our place in the universe, our capabilities and our limits.

Finally, our Ingenarium is also not automatic. It will not run hummily all by itself. Like any dynamic system, it will have to be tended. We have to maintain it. We will have to make sure that there is constant new input of all kinds; we will have to ensure that nothing like dogma clogs it up so that all the ingredients are given a chance to blossom and grow. We will have to be vigilant against any kind of outside force – political, religious, or social – that tries to choke off the air or suck out the nutrients. We will have to watch out for the weeds of despair and self-destruction that plague any creative desire. We will have to make sure that complacency and mindless acceptance do not take hold.

All of that sounds like a lot of work, and it is. But to be caught up in the passion of creativity is to be willing to do what has to be done to make it work.

Incomplete and undone for sure, yet what we have so far has promise and promise is what drives us and drives the Ingenarium.

So let us step back and let the mix work its magic.

In other words, let's see what happens next...