"The Pi-Shaped Person"
excerpt (pp. 426-430) from *Artful Design*,
Chapter 8 "Manifesto"

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ALL THE WHILE, NO MATTER HOW PURE THINGS SEEM, IT IS MUSIC AND THE ARTFUL THAT PULL US BACK FROM THE BRINK AND CALM THE SAVAGE INSIDE, OFFERING SANCTUARY AND ALLOWING US TO TRANSCEDE BRIEFLY OUR PETTY STRUGGLES. HUMANS WILL ALWAYS MAKE ARTFUL THINGS, EVEN STRIVING TO UNDERSTAND OURSELVES AND TO REACH FOR SOMETHING BETTER THAN OURSELVES. IT IS THROUGH THE ARTFUL THAT WE ARE AUTHENTICATED, NOT SO MUCH BY ITS GREATNESS, BUT BY THE FACT THAT WE MAKE IT AT ALL.

THIS AESTHETIC DIMENSION IS NOT SEPARATE FROM LIFE -- IT IS LIFE. PERHAPS IT’S WHY WE BOTH DESIGN BEAUTY INTO USEFUL THINGS AND WHY WE STRIVE FOR TRUTH IN THE SHAPING OF TECHNOLOGIES THAT CONTINUE TO TRANSFORM OUR LIVES. TECHNOLOGY WITHOUT POETRY IS BUT A BLUNT INSTRUMENT, WHEREAS AESTHETICS WITHOUT UNDERSTANDING OF TECHNOLOGY IS LIKE SOUL WITHOUT A BODY. EVEN PURE ART NEED A MEDIUM.

IN THIS UNION OF AESTHETICS AND TECHNOLOGY, WE FIND A THIRD THING THAT IS NEITHER PURE ART NOR PURE ENGINEERING, BUT A SYNTHESIS OF TWO SEEMINGLY DISPARATE HUMAN ENDEAVORS...

THIS IS A CALL -- NOT FOR A NEW WORLD OR NEW SYSTEMS OR NEW COMPANIES, BUT FOR A NEW KIND OF INDIVIDUAL: A DEEP HYBRID BETWEEN ENGINEER, ARTIST, AND HUMANIST; A BUILDER WHO CAN IMBUE HUMAN VALUES INTO OUR CREATIONS. I WANT TO CALL SUCH AN INDIVIDUAL...

YOU... THE HUMANIST ENGINEER!

"IF IT IS REASON THAT MAKES MAN, IT IS SENTIMENT THAT GUIDES HIM." -- ROUSSEAU

...AND YES, THE ARTFUL DESIGNER!

A DEFINITION 8.13

MORE THAN PRACTICAL TOOLS AND TECHNIQUES, THE ENGINEER NEEDS CRITICAL TOOLS (TO QUESTION, INQUIRE, REFLECT, INTERPRET, ANALYZE, AND ARGUE) AND EMOTIONAL TOOLS (TO FEEL, WONDER, AND EXPRESS). THE PATH FORWARD HAD TO COME FROM WITHIN OURSELVES, BY FOSTERING A NEW KIND OF HYBRID HUMAN THAT CAN GROK TECHNOLOGY, ART, HUMANISM -- AS PARTS OF A SINGLE PURSUIT.

SUCH MULTI-FACETED HYBRIDS ARE NOT NEW. THEY HAVE PLAYED PIVOTAL ROLES THROUGHOUT HUMAN HISTORY BECAUSE THEY ARE SYNTHESIZERS -- DESIGNERS CAPABLE OF FUSING THE PRACTICAL WITH THE AESTHETIC, THE PRAGMATIC WITH THE IDEALISTIC, THE LOGICAL WITH THE PHILOSOPHICAL.

SUCH HYBRIDS DO NOT NEED TO BE THE FUTURE LEADERS OF THE WORLD, NOR ITS SO-CALLED GENIUSES OR SAVANTS. THEY ARE SIMPLY ITS PENNZENS AND CITIZENS.

YEARS AGO, AS A COMPUTER SCIENCE UNDERGRAD, I FIRST ENCOUNTERED THE IDEA THAT CERTAIN WELL-DEFINED PROBLEMS (SUCH AS "WRITE A COMPUTER PROGRAM THAT, GIVEN A SECOND COMPUTER PROGRAM, DETERMINES WHETHER THE LATTER WILL HALT OR LOOP FOREVER"), PROBABLY CAN NEVER BE SOLVED BY OUR NOTION OF COMPUTERS. IT WAS A PHILOSOPHICAL AND AESTHETIC MOMENT THAT MADE ME APPRECIATE THE COMPUTER ALL THE MORE... BECAUSE ON THAT DAY I UNDERSTOOD SOMETHING ABOUT WHAT IT IS AND WHAT IT'S NOT, AND THAT MORE CLEARLY DEFINED ITS TRUE NATURE. MOST OF ALL IT MADE ME A WITNESS AND PARTICIPANT TO A CERTAIN POETRY INHERENT IN THE DISCIPLINE OF COMPUTER SCIENCE, THAT IT IS A HUMAN INQUIRY MEDIATED BY TECHNOLOGY -- NOT THE OTHER WAY AROUND...

SAY IT WITH ME... ENTSCHEIDUNGSPROBLEM -- THE DECISION PROBLEM!

THE FORMULATION AND PROOF FOR THE HALTING PROBLEM, LIKE ITS SPIRITUAL COUSIN IN LOGIC, GÖDEL'S INCOMPLETENESS THEOREM, ARE TRIUMPHS OF HUMAN THOUGHT. THEY TELL US THAT THERE ARE ASPECTS TO OUR SEARCH FOR TRUTH THAT WE CANNOT FULLY HAND OVER TO THE AUTOMATED STEWARDSHIP OF OUR CREATIONS, THAT THERE MAY ALWAYS NEED TO BE A CORE HUMAN ELEMENT THEREIN. THERE IS A FUNDAMENTAL LIMIT TO PROVABILITY AND TO COMPUTABILITY -- AND THAT IS PROFOUN... TO BE A HUMANIST ENGINEER IS TO BE AWARE OF THE METAPHYSICAL (E.G., PURPOSE, FUNCTIONALITY, AND LIMITS), THE ETHICAL (E.G., WHAT IS GOOD?), WHAT IS JUST?, THE DIFFERENCE BETWEEN TECHNOLOGY AS A MEANS VS. AN END), AND THE AESTHETIC (E.G., THE BEAUTY, TRUTH, AND POETRY INHERENT IN OUR ACTIONS AND PURSUITS).
**Definition 8.14**

**The Ti-Shaped Person**

The humanist engineer is an individual who is able to integrate deep engineering knowledge with a broader humanistic context (aesthetic, moral-ethical, philosophical). More than a specialist, this is someone who is capable of shaping the world from not only practical needs, but also from the underlying values.

Translated into an educational context, the crazy idea here is to teach aesthetics, humanities, and engineering in conjunction, emphasizing the deep interplay between them. In higher education, we speak of the notion of a “Ti-shaped student,” where the letter Ti represents **disciplinary expertise** on one leg (e.g., computer science) and **domain expertise** on the other (e.g., public health or music). The horizontal bar represents an **aesthetic lens** that gives broader context in bridging the two legs.

**Aesthetic Lens**

Philosophical, artistic, moral lens that gives broader meaning and context in bridging the two legs!

**Disciplinary Expertise**

E.g., computer science

**Domain Expertise**

E.g., public health or music

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**Mantra 8.15**

Do, think, feel. Doing without thinking is dangerous. Thinking without feeling is baneful. Feeling without doing is powerless. Must combine!

*Ahem*

That’s crazy talk! To combine the uncompromising idealism of art with the unswerving pragmatism of engineering...

But then again...

It would be madness to expect to achieve results never before accomplished — except through a means never before attempted!

Francis Bacon

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In order for us to truly move forward, the narrative of our educational and technological institutions must evolve — from a primarily need-driven and problem-solving narrative to a value-based, self-defining (and still problem-solving) ethos. As an engineer myself, I obviously champion problem-solving, but a core issue with the solution-centric narrative is that much of the humanities and arts (and life itself) is not about solving problems (e.g., music, philosophy, history aren’t “problems to be solved”). Rather, they are about ever more fully understanding and expressing ourselves as human beings. At the same time, I, for one, believe engineering is capable of more than “simply” solving problems. Through how we shape the world, we can speak authentically to who we are (not unlike art and the humanities). The ethos of the humanist engineer ties this together!

**Patron Saints of Humanist Engineering**

The idea of combining art, the humanities, and engineering is not new. Rather, it is something we have to recover, something we may have lost in our quest for specialization. Buckminster Fuller had the notion of a comprehensive anticipatory design scientist — an emerging synthesis of artist, inventor, mechanic, objective economist, and evolutionary strategist. There are echoes of such hybrids throughout history — Aristotle, da Vinci, Michelangelo, Ada Lovelace, and many others who naturally bridged what we think of today as “separate disciplines”...

And... Wile E. Coyote! (The unrelenting designer!)

Yes! The patron saint of builders, hackers, and those who persevere!

Aristotle The Logical Ethicist
Leonardo The Inventor Artist
Ada Lovelace The Poetical Programmer
"If it is reason that makes man, it is sentiment that guides him."
—Jean-Jacques Rousseau (1761)
Julie, or the New Heloise

AESTHETICS FIRST

It may seem a radical idea to prioritize aesthetics—before science, technology, engineering, even before ethics and morality. And yet aesthetics—the intellectual-emotional recognition of beauty not only artistic but broadly humanistic—provides the human context and impetus to learn subjects requiring advanced logic and reason, in a way that is not anchored solely in the calculus of need, but with an artfulness that can only be human. To value things for their intrinsic worth, beyond pure function, may well be to appreciate a core condition of being human.

In our increasingly technological society, we lack an aesthetic dimension—a baseline awareness of shared humanity and the beauty underlying our capacity for reason, civility, and morality. If there is truth to this line of thinking, then today's engineer may need to become much more than a specialist and evolve into a synthesis of a technological artist, a moral-ethical inventor, and a compassionate system designer.

Although aesthetics is not the direct conduit for knowledge, discovery, innovation, civil society, or governance, it supplies a common humanity that stands to make us capable and worthy of such achievements. Alongside science, technology, engineering, mathematics, we need to educate ourselves in aesthetics. Before we can truly know other things, we must learn to be human beings.

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