System Safety Using Ten Hundred Words

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Abstract

Albert Einstein is alleged to have said, "If you can't explain it simply, you don't understand it well enough." A challenge currently floating around the world-wide web is to explain complex ideas using only the most frequently used "ten hundred" (1,000) English words. This was first done describing NASA's Saturn 5 (Up Goer Five) and has even been used for a small book on cosmology called "The Edge of the Sky – All You Need to Know about the All-There-Is." MIL-STD-882E defines the terms of system safety using 441 words of which only 104 are part the ten hundred. With a little thought, system safety terms can be meaningfully redefined using only the ten hundred words. What truths about system safety can we learn in the process?

Introduction

Access AL&T is the online news source for the United States Army Acquisition, Logistics and Technology (AL&T) Workforce. Its blog format enables active engagement to share articles via social media. Information and articles are available on Access AL&T daily and via email. On January 20, 2015, the author received an email from Access AL&T with an article from its blog titled "Technically Speaking: Simple is Hard" by Dr. Roberto Trotta (ref. 1). The article had been published in Army AT&L Magazine (ref. 2). "Technically Speaking" is a new column in the magazine to "challenge subject-matter experts to explain a highly technical job, a system or a concept in the plainest language possible." In this article Dr. Trotta, a theoretical cosmologist in the Astrophysics Group of Imperial College London, recounted that he had been searching for "a language to translate in a more pictorial, immediate way the often complex and abstruse cosmological concepts my research is about: dark matter, dark energy, the Big Bang and the fundamental nature of the universe." He "stumbled on the Ten Hundred Words of Science challenge— a website collecting people's descriptions of their jobs written using only the most common 1,000 words in English." He continued,

> The format was inspired by a cartoon by Randall Munroe, the creator of the XKCD website. This is a humorous site with geeky sticklike cartoons, often revolving around physics, maths, computer science and other technical subjects. Randall had drawn a picture of the Saturn V moon rocket (or "Up-Goer Five"), and labeled its parts using only the 1,000-words list. (ref. 1)

Dr. Trotta used this idea of "ten hundred" words to write a short book, *The Edge of the Sky: All You Need to Know About the All-There-Is* (ref. 3) a story that "recounts the tale of how we got to understand the universe ("All-There-Is") and of its many outstanding mysteries. All of it using only 707 words out of the allowed 1,000." Dr Trotta's article got the author of this paper to thinking that this concept could be applied to system safety. The author had already spend time exploring 2300 system safety terms from 32 sources to determine which definitions best communicate the concepts of system safety.

The Ten Hundred words.

So how does one go about using the ten hundred words? First, get the list. The list used by Dr. Trotta is on his web site (ref. 4) as well as the same list on the Up-Goer Five text editor (ref. 5). The ten hundred words fit on one page. They are: a, able, about, above, accept, across, act, actually, add, admit, afraid, after, afternoon, again, against, age, ago, agree, ah, ahead, air, all, allow, almost, alone, along, already, alright, also, although, always, am, amaze, an, and, anger, angry, animal, annoy, another, answer, any, anymore, anyone, anything, anyway, apartment, apparently, appear, approach, are, area, aren't, arm, around, arrive, as, ask, asleep, ass, at, attack, attempt, attention, aunt, avoid, away, baby, back, bad, bag, ball, band, bar, barely, bathroom, be, beat, beautiful, became, because, become, bed, bedroom, been, before, began, begin, behind, believe, bell, beside, besides, best, better, between, big, bit, bite, black, blink, block, blonde, blood, blue, blush, body, book, bore, both, bother, bottle, bottom, box, boy, boyfriend, brain, break, breakfast, breath, breathe, bright, bring, broke, broken, brother, brought, brown, brush, build, burn, burst, bus, business, busy, but, buy, by, call, calm, came, can, can't, car, card, care, carefully, carry, case, cat, catch, caught, cause,

cell, chair, chance, change, chase, check, cheek, chest, child, children, chuckle, city, class, clean, clear, climb, close, clothes, coffee, cold, college, color, come, comment, complete, completely, computer, concern, confuse, consider, continue, control, conversation, cool, corner, couch, could, couldn't, counter, couple, course, cover, crack, crazy, cross, crowd, cry, cup, cut, cute, dad, damn, dance, dark, date, daughter, day, dead, deal, dear, death, decide, deep, definitely, desk, did, didn't, die, different, dinner, direction, disappear, do, doctor, does, doesn't, dog, don't, done, door, doubt, down, drag, draw, dream, dress, drink, drive, drop, drove, dry, during, each, ear, early, easily, easy, eat, edge, either, else, empty, end, enjoy, enough, enter, entire, escape, especially, even, evening, eventually, ever, every, everyone, everything, exactly, except, excite, exclaim, excuse, expect, explain, expression, eye, eyebrow, face, fact, fall, family, far, fast, father, fault, favorite, fear, feel, feet, fell, felt, few, field, fight, figure, fill, finally, find, fine, finger, finish, fire, first, fit, five, fix, flash, flip, floor, fly, focus, follow, food, foot, for, force, forget, form, forward, found, four, free, friend, from, front, frown, fudge, full, fun, funny, further, game, gasp, gave, gaze, gently, get, giggle, girl, girlfriend, give, given, glad, glance, glare, glass, go, God, gone, gonna, good, got, gotten, grab, great, green, greet, grey, grin, grip, groan, ground, group, grow, guard, guess, gun, guy, had, hadn't, hair, half, hall, hallway, hand, handle, hang, happen, happy, hard, has, hate, have, haven't, he, he'd, he's, head, hear, heard, heart, heavy, held, hell, hello, help, her, here, herself, hey, hi, hide, high, him, himself, his, hit, hold, home, hope, horse, hospital, hot, hour, house, how, however, hug, huge, huh, human, hundred, hung, hurry, hurt, I, I'd, I'll, I'm, I've, ice, idea, if, ignore, imagine, immediately, important, in, inside, instead, interest, interrupt, into, is, isn't, it, it's, its, jacket, jeans, jerk, job, join, joke, jump, just, keep, kept, key, kick, kid, kill, kind, kiss, kitchen, knee, knew, knock, know, known, lady, land, large, last, late, laugh, lay, lead, lean, learn, least, leave, led, left, leg, less, let, letter, lie, life, lift, light, like, line, lip, listen, little, live, lock, locker, long, look, lose, lost, lot, loud, love, low, lunch, mad, made, make, man, manage, many, mark, marry, match, matter, may, maybe, me, mean, meant, meet, memory, men, mention, met, middle, might, mind, mine, minute, mirror, miss, mom, moment, money, month, mood, more, morning, most, mother, mouth, move, movie, Mr., Mrs., much, mum, mumble, music, must, mutter, my, myself, name, near, nearly, neck, need, nervous, never, new, next, nice, night, no, nod, noise, none, normal, nose, not, note, nothing, notice, now, number, obviously, of, off, offer, office, often, oh, okay, old, on, once, one, only, onto, open, or, order, other, our, out, outside, over, own, pack, pain, paint, pair, pants, paper, parents, park, part, party, pass, past, pause, pay, people, perfect, perhaps, person, phone, pick, picture, piece, pink, piss, place, plan, play, please, pocket, point, police, pop, position, possible, power, practically, present, press, pretend, pretty, probably, problem, promise, pull, punch, push, put, question, quick, quickly, quiet, quietly, quite, race, rain, raise, ran, rang, rather, reach, read, ready, real, realize, really, reason, recognize, red, relationship, relax, remain, remember, remind, repeat, reply, respond, rest, return, ride, right, ring, road, rock, roll, room, rose, round, rub, run, rush, sad, safe, said, same, sat, save, saw, say, scare, school, scream, search, seat, second, see, seem, seen, self, send, sense, sent, serious, seriously, set, settle, seven, several, shadow, shake, share, she, she'd, she's, shift, shirt, shoot, shock, shoe, shook, shop, short, shot, should, shoulder, shouldn't, shout, shove, show, shower, shrug, shut, sick, side, sigh, sight, sign, silence, silent, simply, since, single, sir, sister, sit, situation, six, skin, sky, slam, sleep, slightly, slip, slow, slowly, small, smell, smile, smirk, smoke, snap, so, soft, softly, some, somehow, someone, something, sometimes, somewhere, son, song, soon, sorry, sort, sound, space, speak, spend, spent, spoke, spot, stair, stand, star, stare, start, state, stay, step, stick, still, stomach, stood, stop, store, story, straight, strange, street, strong, struggle, stuck, student, study, stuff, stupid, such, suck, sudden, suddenly, suggest, summer, sun, suppose, sure, surprise, surround, sweet, table, take, taken, talk, tall, teacher, team, tear, teeth, tell, ten, than, thank, that, that's, the, their, them, themselves, then, there, there's, these, they, they'd, they're, thick, thing, think, third, this, those, though, thought, three, threw, throat, through, throw, tie, tight, time, tiny, tire, to, today, together, told, tomorrow, tone, tongue, tonight, too, took, top, totally, touch, toward, town, track, trail, train, tree, trip, trouble, true, trust, truth, try, turn, TV, twenty, two, type, uncle, under, understand, until, up, upon, us, use, usual, usually, very, visit, voice, wait, wake, walk, wall, want, warm, warn, was, wasn't, watch, water, wave, way, we, we'll, we're, we've, wear, week, weird, well, went, were, weren't, wet, what, what's, whatever, when, where, whether, which, while, whisper, white, who, whole, why, wide, wife, will, wind, window, wipe, wish, with, within, without, woke, woman, women, won't, wonder, wood, word, wore, work, world, worry, worse, would, wouldn't, wow, wrap, write, wrong, yeah, year, yell, yes, yet, you, you'd, you'll, you're, you've, young, your, yourself.

Note that the author substituted "fudge" and "shoot" for words not used in polite company. Also note that 35 words are contractions (e.g., aren't). These contractions are all of words already on the list and could have been eliminated so the next 35 most used words could have been included in the 1,000.

Dr. Trotta used the following rules in "The Edge of the Sky" and the author of this paper did the same. All the words on the 1,000 words list are allowed, and so are words obtained from the list by adding the following suffixes: -(e)s, -er, -ed, -ing and these suffixes in combination so -ers is also allowed). For adjectives, comparatives (-er) and

superlatives (-est) can be formed from the adjective given. Adverbs can only be used if present in the list, e.g. "completely" is allowed because it appears as such in the list, but "deeply" is not allowed because only "deep" appears on the list. Possessive forms are allowed, as well. So are names of people but not names of places. (ref. 6)

<u>The Terms of MIL-STD-882E</u>

Military Standard 882 (MIL-STD-882) (ref. 7) has been a principal source for systems safety practice since it was first published on July 15, 1969. The latest version, MIL-STD-882E, was published on May 11, 2012. It currently has 49 terms defined in the standard which the author of this paper grouped these into three categories. The first, called the fundamental system safety terms (Table 1) are those terms that are basic to system safety. The second, derived system safety terms (Table 2) are those that spring from applying system safety principles to specific aspects of systems. Finally, the third category are system engineering and acquisition terms (Table 3) which are useful in applying system safety concepts.

In order to rewrite the terms and definitions of MIL-STD-882E using the ten hundred words one needs to become reasonably familiar with the ten hundred words. One way is to determine which words are nouns, which are verbs and which are other parts of speech (adjective, adverb, pronoun, preposition, conjunction, or interjection). Another exercise which was helpful was to take the existing terms and definitions of MIL-STD-882E and extract a full list of the words used. This turns out to be 441 words. Of those, 104 words are on the list of ten hundred words and 337 words are not. Of the 104 words, the following might prove useful for defining system safety using the ten hundred words: accept, approach, cause, change, computer, control, death, expression, fault, field, fix, high, human, known, life, low, plan, serious, state, team, track, train.

But finally one must simply just attempt to rewrite the terms and definitions. Finding the simpler terms involves looking up some of the words of the existing 882 definition to see what simpler words define that term . For example, the 882E term "Software control category" is defined using the term "autonomy." That term is defined on Merriam Webster.com as "the state of existing or acting separately from others." "Acting separately from others" with just a little thought became "being able to act alone" in the ten-hundred-words definition. Obviously, many of the MIL-STD-882E terms are defined using other terms so once these have been simplified, the terms defined by them can then easily be redefined into the ten-hundred-words convention.

Additional help is available online to check whether a block of text complies with the ten hundred words. One tool is the Up-Goer Five text editor (ref. 8). It only tells you if the full collection of words, as a whole, is or is not compliant. The Up-Goer Six text editor (ref. 9) is better because it shows by a color code of varying shades, which specific words are non-compliant and when you click on a specific word it shows that word is "number x in the list of most common words."

The output of the author's effort is shown in Tables 1, 2 and 3. The MIL-STD-882E term and definition is listed first in gray immediately followed by the ten-hundred-word term and definition that means the same thing.

Table 1 -- Category 1, Fundamental System Safety Terms

Source	Term	Definition
882	Hazard	A real or potential condition that could lead to an unplanned event or series of events (i.e. mishap) resulting in death, injury, occupational illness, damage to or loss of equipment or property, or damage to the environment.
1,000 Words	Possible Hurt	A real or possible state that can lead to one thing that happens or things that happen one after another that cause death or hurt to a person or thing or the world around us, or lost stuff.
882	Mishap	An event or series of events resulting in unintentional death, injury, occupational illness, damage to or loss of equipment or property, or damage to the environment. For the purposes of this Standard, the term "mishap" includes negative environmental impacts from planned events.
1,000 Words	Bad Surprise	One thing that happens or things that happen one after another that cause death, or hurt to a person or thing or the world around us, or lost stuff.

Source	Term	Definition
882	Mitigation measure	Action required to eliminate the hazard or when a hazard cannot be eliminated, reduce the associated risk by lessening the severity of the resulting mishap or lowering the likelihood that a mishap will occur.
1,000 Words	Hurt Less Act	Act that causes the possible hurt to go away or if it can't go away, to make it hurt less or less often.
882	Probability	An expression of the likelihood of occurrence of a mishap.
1,000 Words	How Possible	An expression of how often a hurt can happen
882	Risk	A combination of the severity of the mishap and the probability that the mishap will occur.
1,000 Words	Expected Losing	How much we can expect to lose from bad surprises when we use our part-group. The hurt together with how possible the hurt is.
882	Risk level	The characterization of risk as either High, Serious, Medium, or Low.
1,000 Words	How Much Expected Losing	Stating expected losing as either High, Serious, Middle or Low.
882	Safety	Freedom from conditions that can cause death, injury, occupational illness, damage to or loss of equipment or property, or damage to the environment.
1,000 Words	Safe	Free from being hurt or killed or hurting or losing stuff, or hurting the world around us.
882	Severity	The magnitude of potential consequences of a mishap to include: death, injury, occupational illness, damage to or loss of equipment or property, damage to the environment, or monetary loss.
1,000 Words	Hurt	How much possible hurt comes from a bad surprise.
882	Software	A combination of associated computer instructions and computer data that enable a computer to perform computational or control functions. Software includes computer programs, procedures, rules, and any associated documentation pertaining to the operation of a computer system. Software includes new development, complex programmable logic devices (firmware), NDI, COTS, GOTS, re-used, GFE, and Government-developed software used in the system.
1,000 Words	Soft words	That which a computer reads to do its job
882	System	The organization of hardware, software, material, facilities, personnel, data, and services needed to perform a designated function within a stated environment with specified results.
1,000 Words	Part-group	The group of parts, people, jobs, soft words, places, stuff, and helps needed to do a picked job within a said part of the world with picked out comes.
882	System safety	The application of engineering and management principles, criteria, and techniques to achieve acceptable risk within the constraints of operational effectiveness and suitability, time, and cost throughout all phases of the system life-cycle.
1,000 Words	Safe part-groups	Using the knowing of how to use the facts about the world around us to build part-groups and how to manage the building of part-groups to get expected hurt that managers can accept within the stops of how well it does its job, time, and money throughout the part-groups entire life.
882	System safety engineering	An engineering discipline that employs specialized knowledge and skills in applying scientific and engineering principles, criteria, and techniques to identify hazards and then to eliminate the hazards or reduce the associated risks when the hazards cannot be eliminated.

Source	Term	Definition
1,000 Words	Safe part-groups building	Using the special knowing of how to use the facts about the world around us to build part-groups to get expected losing that managers can accept within the stops of how well it does its job, time, and money throughout the part-groups entire life.
882	System safety management	All plans and actions taken to identify hazards; assess and mitigate associated risks; and track, control, accept, and document risks encountered in the design, development, test, acquisition, use, and disposal of systems, subsystems, equipment, and infrastructure.
1,000 Words	Safe part-groups managing	Managing the building of part-groups to get expected losing that managers can accept within the stops of how well it does its job, time, and money throughout the part-groups entire life.

Table 2 -- Category 2 Derived System Safety Terms

Source	Term	Definition
882	Acceptable Risk	Risk that the appropriate acceptance authority (as defined in DoDI 5000.02) is willing to accept without additional mitigation.
1,000 Words	Take-it expected losing	Expected losing the Big Job Manager can live with.
882	Causal factor	One or several mechanisms that trigger the hazard that may result in a mishap.
1,000 Words	Cause	Thing that makes a bad surprise happen
882	Event risk	The risk associated with a hazard as it applies to a specified hardware/software configuration during an event. Typical events include Developmental Testing/Operational Testing (DT/OT), demonstrations, fielding, post-fielding tests.
1,000 Words	Test possible losing	Expected losing from a test or another thing that happens.
882	Initial risk	The first assessment of the potential risk of an identified hazard. Initial risk establishes a fixed baseline for the hazard.
1,000 Words	First idea expected losing	The first idea of the expected losing of a known possible hurt.
882	Level of rigor	A specification of the depth and breadth of software analysis and verification activities necessary to provide a sufficient level of confidence that a safety-critical or safety-related software function will perform as required.
1,000 Words	How much trying	Stating how much soft words study and checking must be done to give managers and builders a good feeling that the soft words will do the job that's needed.
882	Safety-critical	A term applied to a condition, event, operation, process, or item whose mishap severity consequence is either Catastrophic or Critical (e.g., safety-critical function, safety-critical path, and safety-critical component).
1,000 Words	Safe-very-serious	A word for a state, thing that happens, job steps, or thing whose hurting causes death or serious hurt or serious stuff lost.
882	Safety-critical function	A function whose failure to operate or incorrect operation will directly result in a mishap of either Catastrophic or Critical severity.
1,000 Words	Safe-very-serious job	A job that a part does that study shows can cause a bad surprise with hurt to the point of death or serious hurt or serious stuff lost.
882	Safety-critical item	A hardware or software item that has been determined through analysis to potentially contribute to a hazard with Catastrophic or Critical mishap potential, or that may be implemented to mitigate a hazard with Catastrophic or Critical mishap potential. The definition of the term "safety-critical item" in this Standard is independent of the definition of the term "critical safety item" in Public Laws 108-136 and 109-364.

Source	Term	Definition
1,000 Words	Safe-very-serious thing	A hard thing or soft words thing that study shows can cause a bad surprise with hurt to the point of death or serious hurt or serious stuff lost.
882	Safety-related	A term applied to a condition, event, operation, process, or item whose mishap severity consequence is either Marginal or Negligible.
1,000 Words	Safe-serious	A word for a state, thing that happens, job steps, or thing whose hurting causes less serious hurt or less serious stuff lost.
882	Safety-significant	A term applied to a condition, event, operation, process, or item that is identified as either safety-critical or safety-related.
1,000 Words	Safe-important	A word for a state, thing that happens, job steps, or thing who is Safe Very Serious or Safe Serious.
882	Software control category	An assignment of the degree of autonomy, command and control authority, and redundant fault tolerance of a software function in context with its system behavior.
1,000 Words	Soft words control name	Setting how much being able to act alone, the power to decide what to do, and having more than one way to deal with faults for a soft word job keeping in mind the way the part-group acts.
882	Software system safety	The application of system safety principles to software.
1,000 Words	Safe Soft Words	Safe part-group known facts for soft words
882	Target risk	The projected risk level the PM plans to achieve by implementing mitigation measures consistent with the design order of precedence described in 4.3.4.
1,000 Words	Wanted expected losing	Expected losing the part-group manager wants to have

Table 3 -- Category 3, System Engineering and Acquisition Terms

Source	Term	Definition
882	Acquisition program	A directed, funded effort that provides a new, improved, or continuing materiel, weapon, or information system or service capability in response to an approved need.
1,000 Words	Get-it big job	A big job with direction and money that gets new, better, or the same old stuff, attack thing, or computer part-group or help because someone proved they needed it.
882	Commercial-off-the-shelf	Commercial items that require no unique Government modifications or maintenance over the life-cycle of the product to meet the needs of the procuring agency.
1,000 Words	Business-bought-stuff	Things businesses already have that do not need changes made for The Man.
882	Contractor	An entity in private industry that enters into contracts with the Government to provide goods or services. In this Standard, the word also applies to Government-operated activities that develop or perform work on acquisition defense programs.
1,000 Words	The Business	A group of people looking to make money that agrees with the Man to give him stuff or work.
882	Environmental impact	An adverse change to the environment wholly or partially caused by the system or its use.
1,000 Words	World Hurt	Hurt to the world around us from using our part-group.

Source	Term	Definition
882	ESOH	An acronym that refers to the combination of disciplines that encompass the processes and approaches for addressing laws, regulations, Executive Orders (EO), DoD policies, environmental compliance, and hazards associated with environmental impacts, system safety (e.g., platforms, systems, system-of-systems, weapons, explosives, software, ordnance, combat systems), occupational safety and health, hazardous materials management, and pollution prevention.
1,000 Words	ESOH	Four letters that stand for saving the world around us from hurt (E), staying safe (S), and not letting people get sick from work (OH).
882	Fielding	Placing the system into operational use with units in the field or fleet.
1,000 Words	Fielding	Placing the part-group into use by users in the field or on the waves.
882	Firmware	The combination of a hardware device and computer instructions or computer data that reside as read-only software on the hardware device. The software cannot be readily modified under program control.
1,000 Words	Read-Only Words	Soft words and facts that are read-only on a hard thing and cannot be easily changed.
882	Government-furnished equipment	Property in the possession of or acquired directly by the Government, and subsequently delivered to or otherwise made available to the contractor for use.
1,000 Words	Stuff-the-man-gives	Stuff the Man owns or will get he will give the Business to use
882	Government-furnished information	Information in the possession of or acquired directly by the Government, and subsequently delivered to or otherwise made available to the contractor for use. Government furnished information may include items such as lessons learned from similar systems or other data that may not normally be available to non-Government agencies.
1,000 Words	Facts-the-Man-gives	Facts the Man owns or will get that he will give to a Business to use to build a part-group. Facts the Man gives may be facts learned from building part-groups like the one being built or facts a business usually does not have.
882	Government-off-the-shelf	Hardware or software developed, produced, or owned by a government agency that requires no unique modification over the life-cycle of the product to meet the needs of the procuring agency.
1,000 Words	The Man's stuff	Hard things or soft words built, made or owned by The Man that needs no changes over the entire life of that thing to meet the needs of the Man.
882	Hazardous material	Any item or substance that, due to its chemical, physical, toxicological, or biological nature, could cause harm to people, equipment, or the environment.
1,000 Words	Bad stuff	Any thing or stuff that, because of its nature, could cause hurt to people, work things, or the world around us.
882	Human systems integration	The integrated and comprehensive analysis, design, assessment of requirements, concepts, and resources for system manpower, personnel, training, safety and occupational health, habitability, personnel survivability, and human factors engineering.
1,000 Words	Human-part-group together building	The together and complete study, building, needs study, ideas, and stuff for getting the right people, training, staying safe and not getting sick on the job, building things people can live in, keeping people safe from attacks, and building things humans can use easily.
882	Life-cycle	All phases of the system's life, including design, research, development, test and evaluation, production, deployment (inventory), operations and support, and disposal.
1,000 Words	Entire life	All the time of a part-group's life

Source	Term	Definition
882	Mode	A designated system condition or status (e.g., maintenance, test, operation, storage, transport, and demilitarization).
1,000 Words	Job state	A state of a part-group that goes with a job it does
882	Monetary Loss	The summation of the estimated costs for equipment repair or replacement, facility repair or replacement, environmental cleanup, personal injury or illness, environmental liabilities, and should include any known fines or penalties resulting from the projected mishap.
1,000 Words	Money losing	All the money lost fixing or getting new things, fixing or building new buildings, cleaning up the world around us, healing and losing people hurt or sick, paying for hurt to the world around us, paying known fines because of a known possible bad surprise.
882	Non-developmental item	Items (hardware, software, communications/ networks, etc.) that are used in the system development program, but are not developed as part of the program. NDIs include, but are not limited to, COTS, GOTS, GFE, re-use items, or previously developed items provided to the program "as is".
1,000 Words	Given things	Things used for a part-group that are already ready.
882	Program Manager	The designated Government individual with responsibility for and authority to accomplish program objectives for development, production, and sustainment of the system/product/equipment to meet the user's operational needs. The PM is accountable for credible cost, schedule, and performance reporting to the Milestone Decision Authority.
1,000 Words	Big Job Manager	The person the Man tells to do what is needed to get a part-group together and gives the stuff to do it.
882	Re-use items	Items previously developed under another program or for a separate application that are used in a program.
1,000 Words	Use-again things	Things used before that can be used again.
882	Software re-use	The use of a previously developed software module or software package in a software application for a developmental program.
1,000 Words	Soft words re-use	Using words that are read by one computer to do its job for another computer to do its job.
882	System/subsystem specification	The system-level functional and performance requirements, interfaces, adaptation requirements, security and privacy requirements, computer resource requirements, design constraints (including software architecture, data standards, and programming language), software support, precedence requirements, and developmental test requirements for a given system.
1,000 Words	Part-group needs book	A book that shows all the things a part-group must have and be able to do.
882	System-of-systems	A set or arrangement of interdependent systems that are related or connected to provide a given capability.
1,000 Words	Part-group-of-part-groups	A group of part-groups that work together to do a job
882	Systems engineering	The overarching process that a program team applies to transition from a stated capability to an operationally effective and suitable system. Systems Engineering involves the application of SE processes across the acquisition life-cycle (adapted to every phase) and is intended to be the integrating mechanism for balanced solutions addressing capability needs, design considerations, and constraints. SE also addresses limitations imposed by technology, budget, and schedule. SE processes are applied early in material solution analysis and continuously throughout the total life-cycle.

Source	Term	Definition
1,000 Words	Part-group Building	The steps that a part-group team uses to get from something we want to be able to do to a part-group that can actually do it.
882	User representative	For fielding events, a Command or agency that has been formally designated in the Joint Capabilities Integration and Development System (JCIDS) process to represent single or multiple users in the capabilities and acquisition process. For non-fielding events, the user representative will be the Command or agency responsible for the personnel, equipment, and environment exposed to the risk. For all events, the user representative will be at a peer level equivalent to the risk acceptance authority.
1,000 Words	User Person	When fielding happens, the part of The Man that he says can say whether a part-group is fine for users and is as important at the one who can say the expected losing of the part-group can be lived with.

Lessons Learned

The exercise of rewriting the MIL-STD-882E terms using the ten hundred words has some lessons.

Lesson 1. Complex terms can be defined using the ten hundred words. While the exercise took some effort at first, once immersed in using the ten hundred words, was as much fun as doing a crossword puzzle or a similar word game.

Lesson 2. The exercise did improve the authors understanding of the terms or improved the ability to explain it to others. The ten hundred words enabled the author to deal with system safety concepts at a more visceral level. For example thinking in terms of "hurt" instead of "damage" or "Expected losing" instead of "risk." When these terms were shared in a recent meeting of the Tennessee Valley Chapter of the International System Safety Society, one attendee stated that now he can explain to his children what he does for a living.

Lesson 3. Some MIL-STD-882E terms are overly complex and should be defined more simply. The goal should be elegance, i.e., precision, neatness, and simplicity An example is this is the term "software." Much of the 882 definition is really information that is or should be included in the text of the standard. The definition is more like a short encyclopedia article than defining a term. The ten-hundred-word definition defines the term well without all the extra verbiage.

Conclusion

While this exercise was effective in finding ways to improve the intelligibility of our defined terms, the ten-hundred-word definitions are perhaps overly simple. The vast majority of people have a vocabulary much bigger than 1,000 words including their use of the word "thousand." And while we could use the term "part-group" for "system," "system" is a better word when defined well. Perhaps the ten thousand word most used words would be a better limit to keep technical explanations from being too filled with technical jargon. Even so, the exercise of converting the terms and definitions of system safety to much simpler terms was for the author a rewarding experience because it helped to reconnect to the fundamental concepts of system safety theory that until then were taken for granted.

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<u>Biography</u>

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