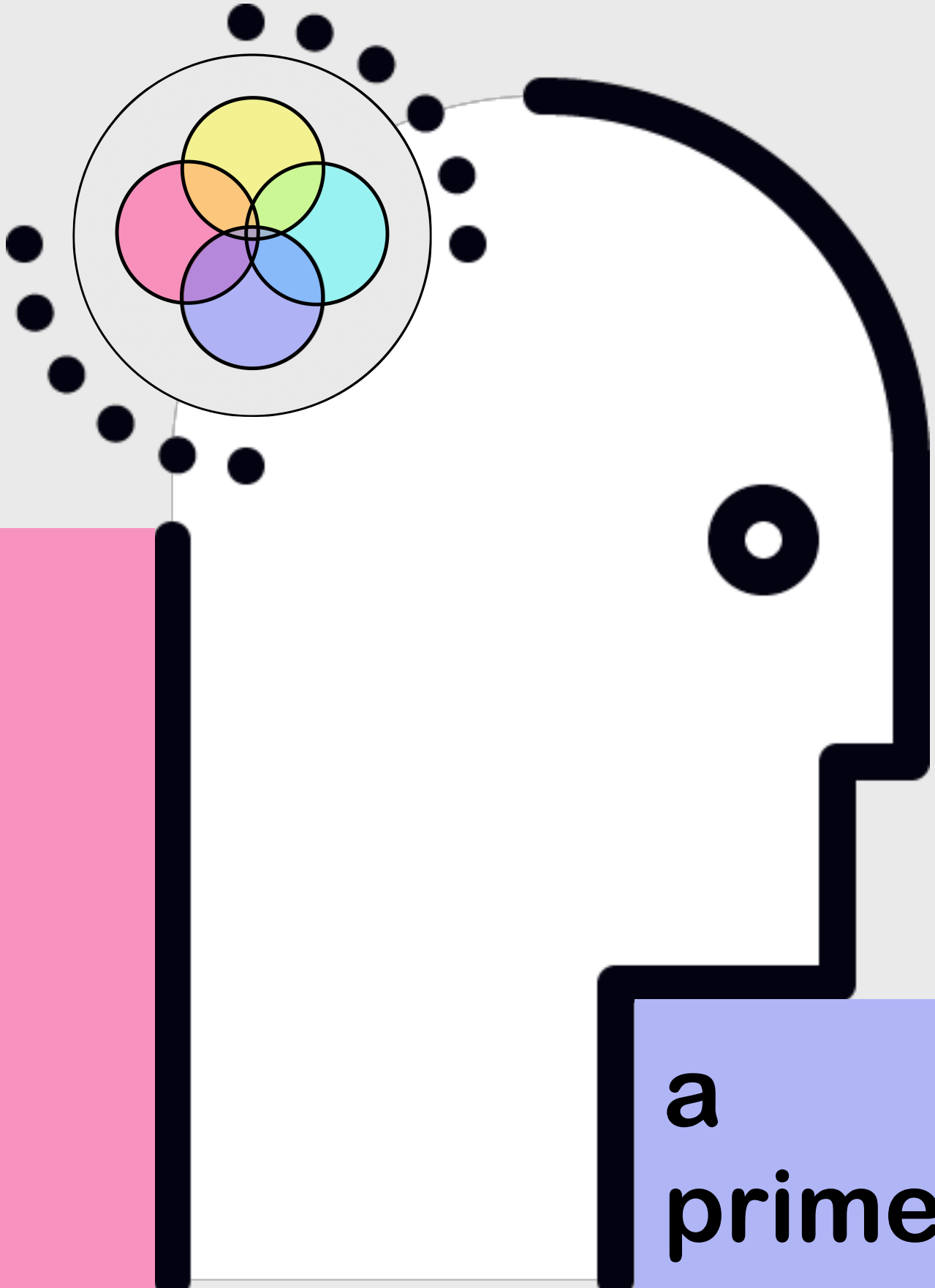
# HUMAN TECHNOLOGIES



a primer

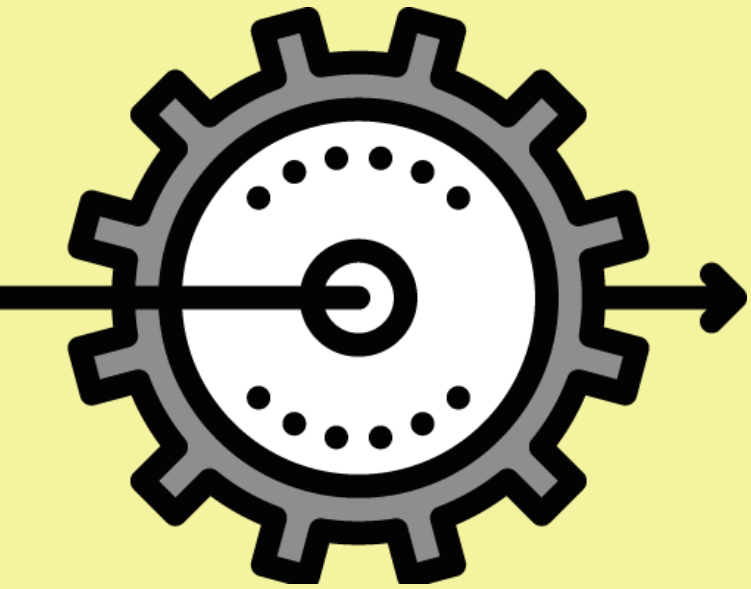
# THE PROBLEM WITH THE CURRICULUM

The secondary school curriculum was conceived and designed at a period very different from the one in which we now find ourselves educating our children[1].

The curriculum bears all the hallmarks of the time of its invention. It is too narrow in its focus; it is insufficiently interdisciplinary; it provides inadequate opportunities for students' agency; it encourages too little teamwork and collaboration; it defaults to 'high stakes' assessments that address too few human qualities and strengths.

In a nutshell, it is not fit for purpose and does students a disservice.

This state of affairs is now widely acknowledged and has been for at least the last five to ten years. Suggested solutions tend to tinker with the model rather than rethink it. As such, there has been no significant improvement. There are many good ideas in discussion and a number of overlapping points of agreement for what is sought, but a realistic alternative has not yet been forthcoming.



# STEPS TO A SOLUTION

The curriculum needs to be rethought, radically. This process needs to take place within the framework of what we now know about learning and the state of the world.

We know that successful learning is tied up with motivation, positive emotions, engagement, a sense of purpose, and self-regulation. We know that the state of the world is precarious.

We know, further, that the traditional mainstream education system, which has been in service for the last sixty years, is the system that has guided our efforts as we have moved to our current point of global development. There can be no stronger argument for why the system must change.

The current education system got us here.

We cannot solve our current problems using the same assumptions and approach that got us here.

We need a new curriculum and a new system.

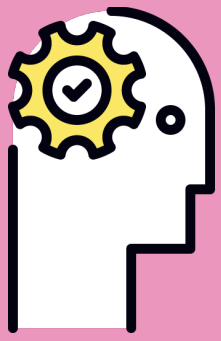
1. This is true both in the sense that we know a lot more now about human beings and also in the sense that the environment in which we operate has changed substantially.

# HUMAN TECHNOLOGIES

The curriculum must be rethought in the light of our current understanding of what it is to be human. We need to focus on how we can best educate young people to be resourceful, resilient, collaborative, open-minded, ethical, accepting of others, sustainable in their habits, and more inclined to take the long view.

In short, we need to educate students to have a profound and positive sense of the art and craft of being human. This is the aim and the promise of Human Technologies.

Human Technologies is not, in itself, a curriculum - it is an approach or a lens that generates and configures materials that become the curriculum. The Human Technologies lens is infinitely customizable and malleable, ever-changing, universally applicable, and expands with its own teaching. It is the 'magic well' of education: the more water you draw from the well, the more there is to draw, in and outside of school. The greater your appreciation of Human Technologies, the more there is to appreciate, in and outside of school.



# UNDERSTANDING THE HUMAN IN HUMAN TECHNOLOGIES

Understanding the human in Human Technologies goes hand in hand with understanding technology more widely. This is an understanding that has been approached many times and in many places, throughout history: an example comes in the Greek myth of Epimetheus and Prometheus.

Tasked by Zeus with equipping the creatures of Earth with the attributes needed for survival, Epimetheus quickly, and absent-mindedly, apportioned these gifts to each of the animals gathered before him. In his haste, he overlooked man, who was left small, naked, weak of both muscle and eye, bereft of fang and talon and claw, puny, slow and, being hairless, at the mercy of the rain, wind and snow. It was Prometheus who saved the day, bringing man fire and craft in recompense for his natural vulnerability.

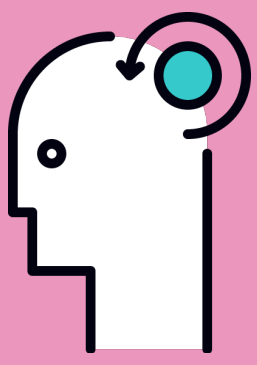
Here, then, is the human in Human Technologies: an otherwise weak and defenseless creature, whose one great evolutionary advantage is its unparalleled intellect and the *technologies* through which that intelligence can be channelled in its workings in and on the world.

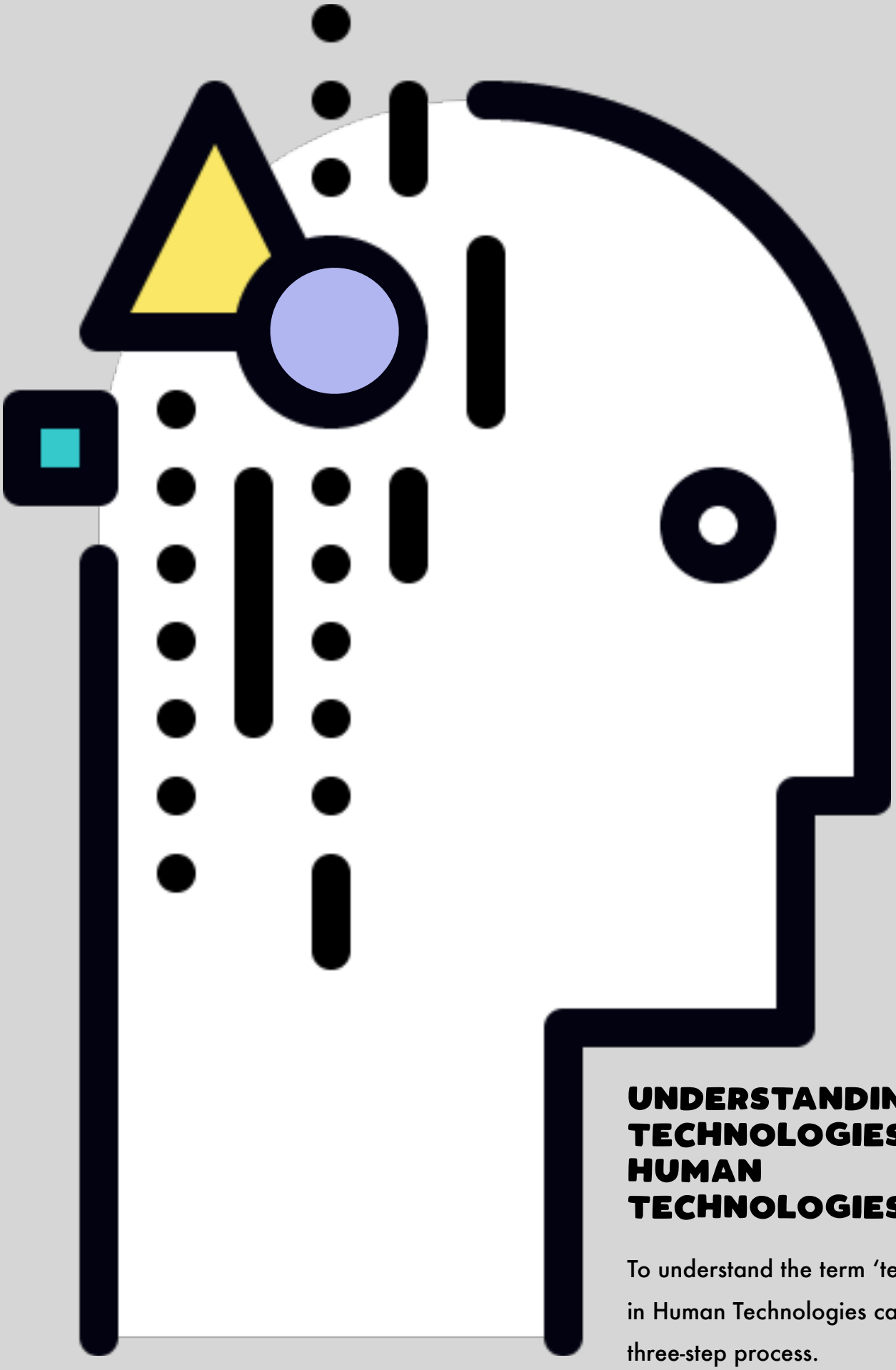
In his recent book The Secret of Our Success, Joseph Henrich discusses 'cumulative cultural evolution', which comes, gradually and then suddenly, to trump and transcend the selection pressures of *biological* evolution:

"As a product of this long-running duet between cumulative cultural evolution and our genes, our brains have genetically adapted to a world in which information crucial to our survival was embedded implicitly in a vast body of knowledge that we inherit culturally from previous generations. This information comes buried in daily cooking routines, taboos, divination rituals, local tastes, mental models, and tool-manufacturing scripts. These practices and beliefs are often (implicitly) MUCH smarter than we are, as neither individuals nor groups could figure them out in one lifetime."

[Henrich, ibid: 112]

In the language of Human Technologies, all the information sources that Henrich lists - the recipes, the taboos, the rituals, tastes, mental models, and scripts - and all the many other ways in which human thriving is embedded in inherited knowledge, are best thought of as *technologies*.





# UNDERSTANDING THE TECHNOLOGIES IN HUMAN TECHNOLOGIES

To understand the term ‘technologies’ in Human Technologies calls for a three-step process.

# STEP ONE:

## reclaiming the term 'technology'

The word "technology" comes from the Greek, "techne": meaning art, craft or skill and "-logy", meaning "knowledge of" or "discipline of". Originally used to denote the art and craft of a domain, by the late nineteenth century, technology had acquired a more limited sense referring to what is done with tools and machines. Today this is the dominant usage in English.

Charting the progress of the term's developing meaning, we witness a change in keeping with the spirit of the times: a conception of human being and human activities in evermore industrial and mechanical terms, best understood through the rational calculus that could be applied to the workings of machines and automated systems.

One is struck by what has been lost in the process of adopting an evermore narrow, instrumental, machine and tool-orientated usage for the term. Consider the domain of medicine. What would comprise a list of the most critical elements of the *art and craft* of health and healing? Scalpels and stethoscopes would feature, certainly, but only after a wealth of other human skills and attributes. A good medical practitioner is marked by her capacity and willingness to listen actively, a comprehensive and accurate knowledge of diseases and their symptomatology, a reassuring bedside manner, the ability to organise and lead a team of colleagues, the confidence to know when to defer to other specialists, and so on. The physical tools of the medical profession are dangerous in the hands of a practitioner without these human qualities.

Ask the same question of another domain: what are the crucial elements of the art and craft of sport? Balls and bats, javelins and judo mats all feature, but the successful sports-person can make little use of this sporting equipment without a knowledge of the rules of the game, of tactics, of teamwork and leadership strategies, of means for self-motivation, of a will to compete, to push beyond boundaries, and of the harnessing of grit and determination.

Is cooking merely about mixing bowls and measuring jugs, or do recipes, a trained palette, patient technique, and a readiness to trial and tinker, not also play an equally significant part in the art and craft of cuisine? Is scientific experiment a matter only of bunsen burners, test tubes and petri dishes, or is it not tied up also with observance of the scientific method, with a commitment to impartiality, an openness to data, a spirit of imagination and wonder, the discipline of reiteration, and a willingness to recognise confounding results?

Human Technologies suggests that the physical tools of our trades are undoubtedly an important part of the picture, but that fully to appreciate the art and craft of human activity and enterprise requires looking beyond the hardware, the kit and the equipment. It requires taking full account of all those other aspects of technology which contribute to our effectiveness and success in any domain and without which the tools are all but useless - the scripts, recipes, rulebooks, routines, conventions, strategies, methods, checklists, protocols, rituals, orthodoxies, procedures, and so on. To map this territory clearly, we must first reclaim a better definition of the term "technology".

# STEP TWO:

# defining the term 'technology'

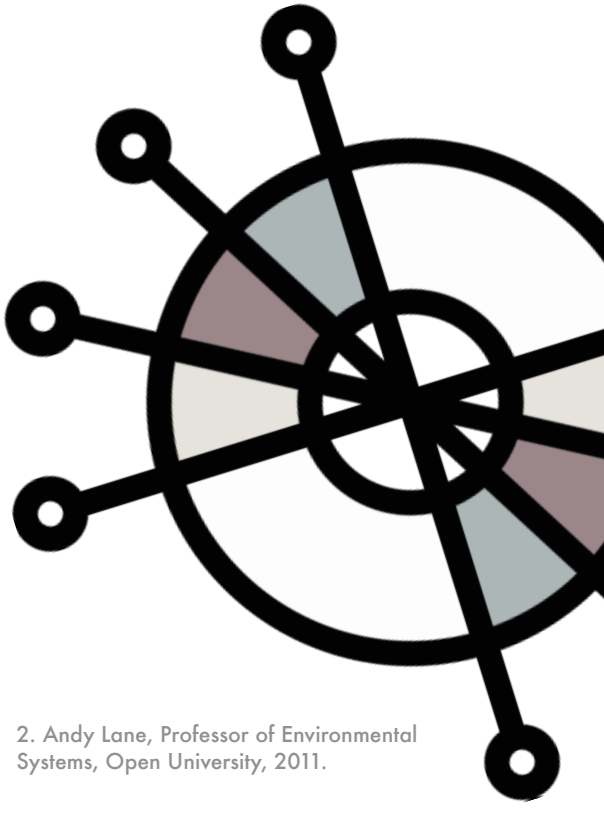
Human Technologies assumes a tripartite definition of the term 'technology'[2]:

1. **Technology is about taking action to meet a human need**
2. **It uses much more than scientific knowledge and includes values as much as facts**
3. **It involves organised ways of doing things.**

1. Technology is about taking action to meet a human need - we draw upon and use technologies to mediate our aspirations, in order to bring about stability or change in the world in ways that, we hope and believe, match our preferences, intentions and desires. In whatever way it is that we are perceiving the world, we find ourselves willing either a continuation of the status quo or its transformation to a different state, in keeping with the human orientation towards some combination of satisfaction, security, psychological reassurance, and repute (all of which, in any event, overlap).

Technologies are the devices, in the widest sense of the term, available to us to realise - or attempt to realise - this willing. As discussed, they can take the form of physical tools and implements: an axe to chop down a tree, a cushion to soften a seat, chopsticks to eat noodles, shoes for walking, shoes for making an impression. But they can equally well take *immaterial* form: as scripts or recipes to negotiate a process, checklists or roll calls to ensure compliance with a procedure, rites or rituals to signal conformity to an expectation or requirement, blueprints or game plans to map out a strategy, protocols or regulations to guide institutional action, and so on. In each case, the technology is something that has been conceived, fashioned and developed elsewhere, by other, and often many other, people, very often over a substantial period of time, but which is available to us, now, by virtue of our cultural knowledge and/or experience. We adopt, adapt, interpret, riff on, modify, extemporize, and otherwise customise the technology in our use of it, but we are *not* called upon to invent it - it is already extant and tested. Its effects are known. That is its virtue and its promise.

We use technologies quite as much to move on our - and others' - *thoughts and beliefs* in the subjective world as we do to move *matter* in the objective world.



2. Andy Lane, Professor of Environmental Systems, Open University, 2011.

2. Technology uses much more than scientific knowledge and includes values as much as facts - given its implication in action, technology necessarily has an ethical dimension. It is deployed in an effort either to protect or transform the status quo. Willing such a continuation or alteration in the state of things is an ethical act, in that it presumes that the state aimed at, whether continuation or change, is preferential. Preferential for whom and to what ends are, of course, issues at stake - and are where values play their inevitable part.

That 'scientific knowledge' rather than plain human values is the critical motivator of technological action is part of our species' contemporary confusion, part of the reason why the current definition of 'technology' is so machine-orientated and unsatisfactory, and a vital hurdle to overcome if we are to come to use technologies generally more reflectively, responsibly, realistically and sustainably.

3. Technology involves organised ways of doing things - technology is not invention. Invention is that moment when something new is created and is not yet available for wider or general consumption. Technology is what comes after, when the invention is taken on by others in their own usage - when they come to routinise, constrain, discipline or otherwise collectively influence its use in performance. Many are the occasions when an invention, in its technological career at the hands of its users, becomes something quite other than intended by its inventor.

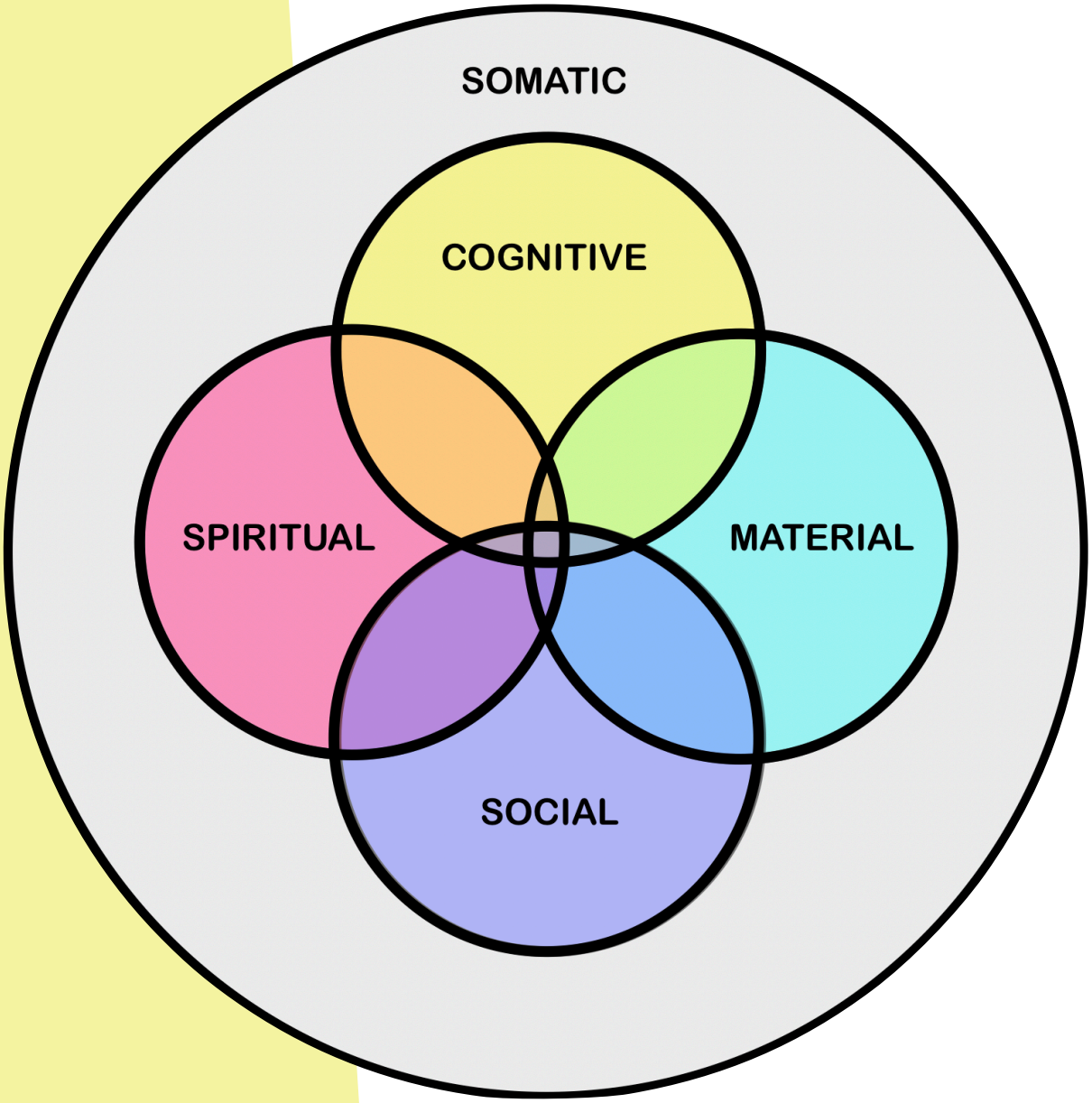
Technology, then, is by definition communal. Its use is pooled and distributed; its significance is shared, common (or with common elements) and mutual; its potential and future reside in the hands of the community who draw upon it.

In short, a technology is a communal, shared device that provides for action, whether of thought or deed, in order to achieve a willed end to match human intention or desire. There is nothing more elemental in our experience than technology, and life, in all its dimensions, is (literally) unthinkable without it.

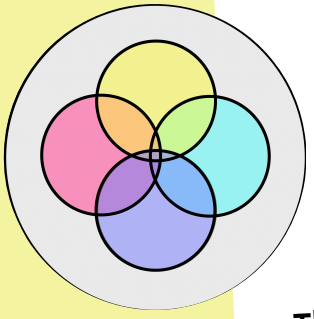
Our final task is to organise the infinite world of human technologies in a way that encourages us to engage with them, reflect on them and mediate our relationship with them more critically and thoughtfully.

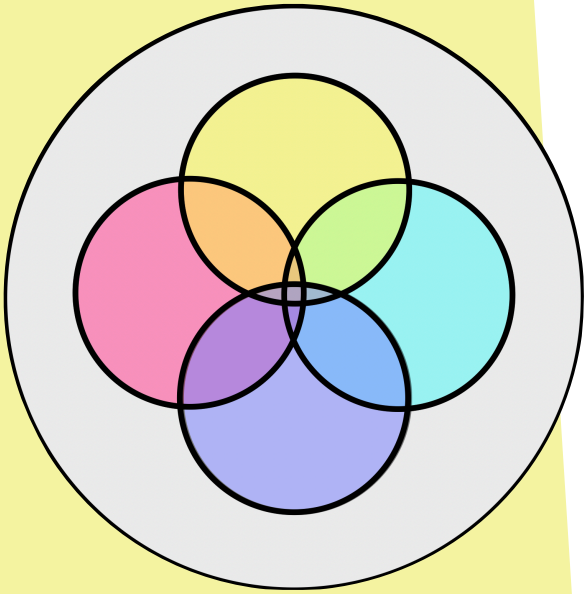
# STEP THREE:

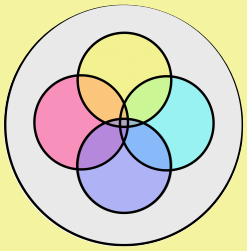
## a model for organising technologies

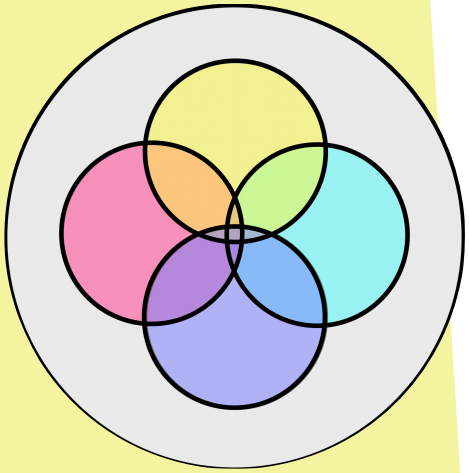


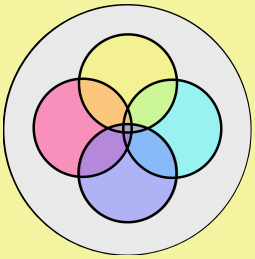

The Human Technologies Venn Diagram identifies five broad types of technologies, placing the remaining four – cognitive, material, social and spiritual – within the enveloping circle of the fifth, the Somatic (technologies promoting the use and maintenance of the physical body).

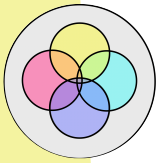








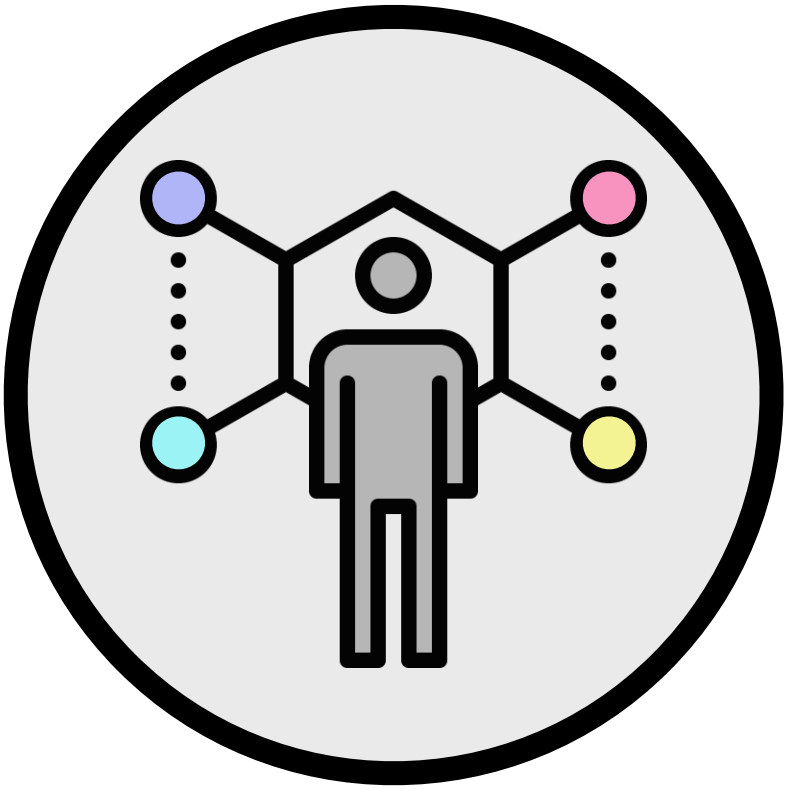




The scope of Human Technologies is far-reaching. We are encouraged to consider everything that humankind has created for its ongoing benefit, but also to its detriment. We consider how we acquire better thinking skills, how we learn to influence others, and the forces that shape who we become, how best to collaborate, and how to cooperate toward shared common purposes. We consider what makes us happy and what makes us tick. And we consider why it should matter to us that we know why we tick.

As a means of engagement with learning, Human Technologies invites us to explore the cumulative technological progress of humankind and, with the growing awareness of that story, the potential in ourselves to employ appropriate technologies, whilst avoiding those which will not serve us well. 'Homo technologicus' is a more apt title than 'Homo sapiens' for our species – we are meddlers and tinkerers not seers and sages. School should be about changing that for the better.

# SOMATIC



**technologies of the body**

**technologies that allow you to maintain and use your body more healthily and effectively.**

**Examples would include -**
**any practice that helps you get enough sleep; any custom that leads to a good diet; any routine that helps you to sustain good fitness.**

# COGNITIVE

**technologies of the mind**

**technologies that allow you to think more effectively and to realise your thoughts more satisfactorily.**

**Examples would include -**
**language; mathematics and working with numbers; the scientific method; Thinking Routines; understanding how to tell a good story; Edward de Bono's thinking tools.**

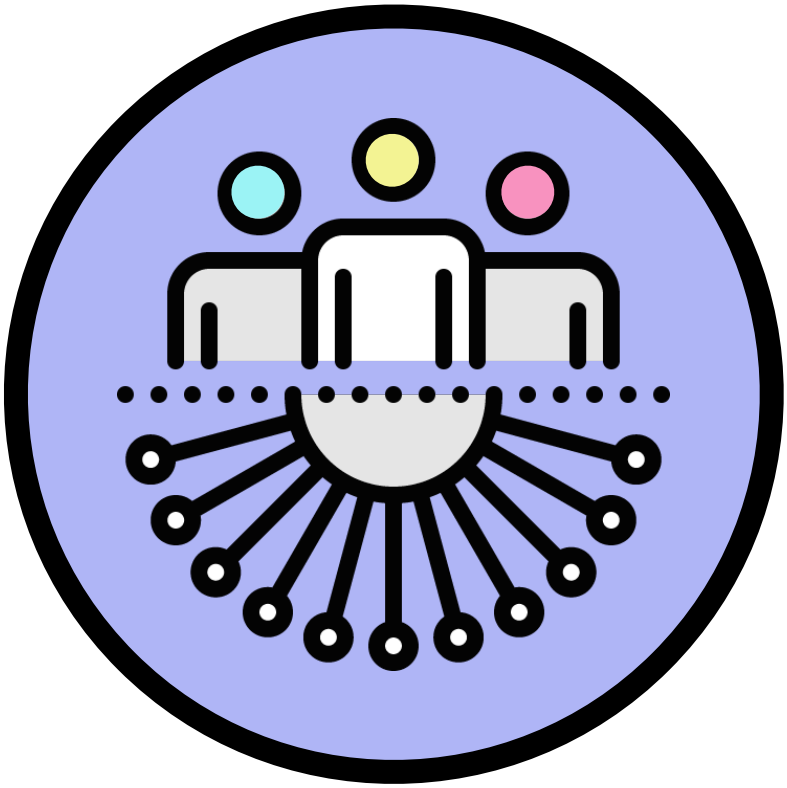
# MATERIAL

**physical tools and devices**

**technologies that allow you to act in and get to grips with the world of things more effectively.**

**Examples would include -**
**fire; clothes; computers; hammers; cooking utensils; pens; books.**

# SOCIAL

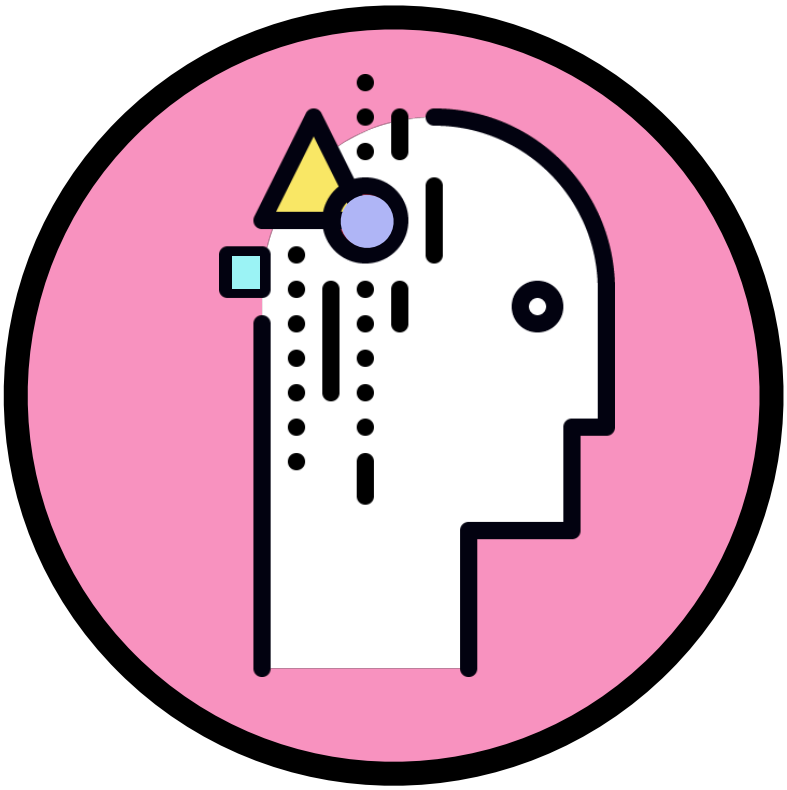


**interpersonal technologies**

**technologies that allow you to understand and get on with other people more effectively.**

**Examples would include -**
**a handshake; consciously nodding to show agreement; being seen to put the team's interests before your own; using your sense of humour to energise and inspire; active listening; attending a communal meal.**

# SPIRITUAL

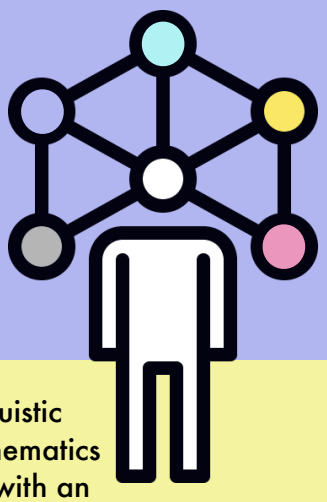


**intrapersonal technologies**

**technologies that allow you to understand yourself better and to make you feel good about yourself.**

**Examples would include -**
**yoga; singing in the shower; mindful breathing; a walk in the woods; noting reasons to be cheerful in a journal; providing loving service to others.**

# THE PRACTICALITIES - THE CRITICAL USER OF HUMAN TECHNOLOGIES IN SCHOOL



Presently, at ICHK, Human Technologies occupies a place of its own, as a 'subject', in the timetable. It is delivered to students in Years 7 to 11. Human Technologies sessions are organised to address different sets of 'technologies for ...'. For example, there are units on technologies for truth, for persuasion, for teamwork, for communication, for advocacy.

Developed more fully, Human Technologies would come to shape the learning of students on a more thoroughgoing basis. It would subsume and reframe much of what is taught at school, and add to it in ways that provided a more holistic experience for learners. In particular, a more comprehensive Human Technologies approach would provide additional space and time, and lend additional value, to the three "S"s - somatic, social and spiritual technologies in a school system where the cognitive and the material are already overserved .

Current curriculum design and nomenclature get in the way of students' understanding of the world they live in. By separating off skills, techniques, methods, approaches, and so on within discrete disciplinary boundaries, the interconnectedness of knowing and knowledge are lost. Reconceived via the Human Technologies lens, this barrier to learning and understanding is removed. Physical Education becomes Human Technologies, with an emphasis on technologies for fitness, leadership, collaboration, self-regulation and fair play; English Language and Literature become Human Technologies, with an emphasis on technologies for expression, communication, linguistic creativity, and persuasion; Mathematics becomes Human Technologies, with an emphasis on technologies for working with numbers, engineering, statistics, coding, spreadsheets and algorithms; Drama becomes Human Technologies, with an emphasis on technologies for performance, confidence, teamwork, self-expression and resilience; Science becomes Human Technologies, with an emphasis on technologies for hypothesizing, observation, experimentation, tabulation and critical reason. And so on.

In other words, the curriculum is recast as an apprenticeship in the use of the many technologies that humans have evolved better to order, organise and work upon their worlds.

Most crucially, the Human Technologies approach encourages learners not only to be aware of the technologies on which they rely, but to employ them as *critical users*. This means to understand that these technologies are of human invention, that they have a history, and that there are usually alternatives with their own, different, histories and users. It also means to understand that technologies sometimes come at a cost as well as a benefit, and that their use in any given situation is an ethical act with consequences.

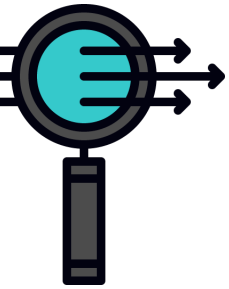
# TECHNOLOGIZING LIFE

A common reaction when people are first introduced to Human Technologies is to say, "Hold on, that means *everything* is technology!"

Well no, that's not quite the case, but it is true to say that, as humans, we *technologise* just about everything.

That's the insight behind the Human Technologies perspective: technologising is what humans do and, being human, we just can't function without recourse to technologies. Forming a useful understanding of humans and of their behaviour, both as individuals and collectively, means getting to grips with the technologies on which we rely across the whole range of our activities and interactivities. And as the option to live without technologies is not available to us (a world without language, a world without tools, a world without etiquette, without clothes, without cooking, without convention, without rules ... ?), so the vital question becomes not "will you use technologies" but "which technologies will you use?"

Let's focus for a moment on an instinctual behaviour native to humankind and which absolutely cannot be thought of as a technology: breathing.



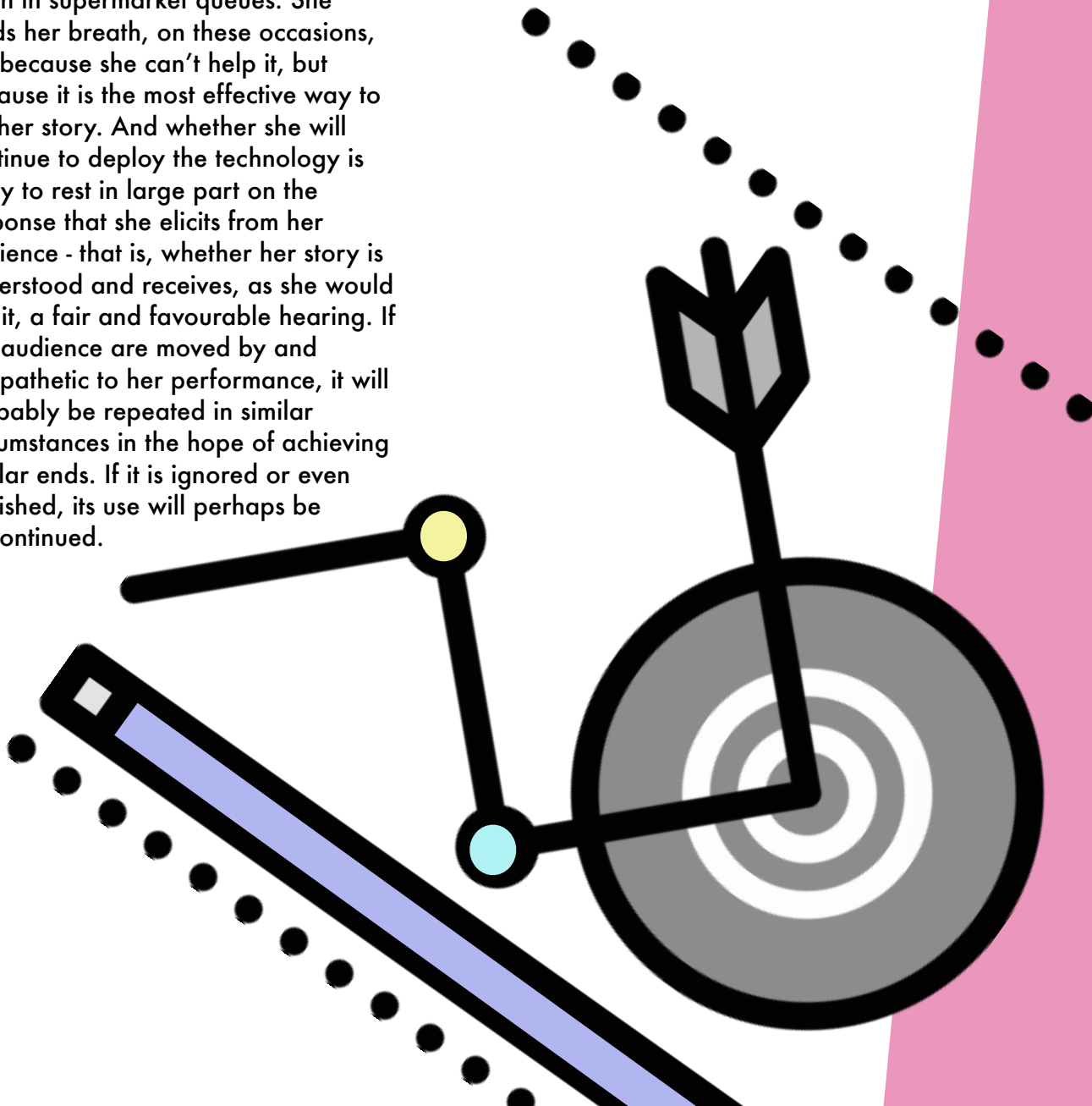
When a newborn infant is delivered into the world, breathing is something she'll do instinctively, without any form of prompting or instruction. Well, *naturally*, you might think, because *not* to breathe would result in her immediate or imminent destruction. And that's absolutely right - the entire evolutionary process has served to equip the newborn to respond in critical ways to her new environment outside of the womb. As an organism that subsists on oxygen, she breathes to oxygenate.

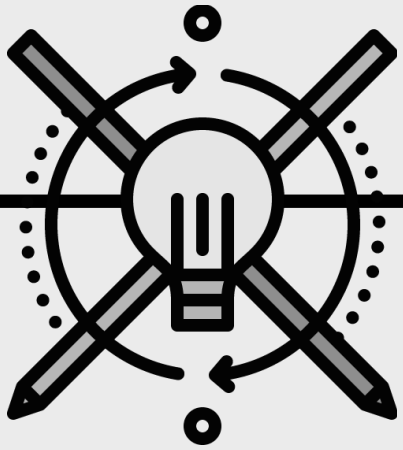
However what follows for the newborn, as she gradually grows and develops and is tutored in life, is not natural even with respect to this most essential feature. Breathing will come to form the basis of a repertoire of intentional strategies deployed for deliberate ends.

One primitive example of the technologizing of this innate somatic feature can be found in the phenomenon of breath holding. An authentic breath holding spell is a reflexive response that occurs in some healthy young children. These spells usually affect children between the ages of about eight months and two years and last between two and 20 seconds. During this time, the child cries or gasps, forcibly exhales, stops breathing, and turns either blue or pale. While in the grip of the spell, the child may faint or briefly lose consciousness. Indeed, some physicians do not consider it to be a true breath holding spell unless the child faints. Once fainting occurs, the body's involuntary breathing mechanisms take over and normal inhalation picks up once more. The entire episode usually lasts less than a minute, at the end of which the child regains consciousness and resumes normal breathing, with skin and lip colour restored. Understandably, these episodes are terrifying for parents, especially when first encountered and poorly understood.

It is precisely because of the terror that attends these involuntary spells, that breath holding will come to be, for some children, one of the first weapons drawn upon in the battle of wills that comes to characterize life, no less so with caregivers than other social players. A great many parents will be familiar with the child who holds her breath deliberately and strategically as a means of eliciting a response when words and other channels have failed: the deliberate act of breath holding is no less frightening for parents than the involuntary, authentic variety, and the child, growing in self-awareness and the effects she can elicit through her behaviour, comes to realise this. The threat, "I'll hold my breath until I die" from a toddler thwarted in her desires is familiar to many mums and dads, often in supermarket queues. She holds her breath, on these occasions, not because she can't help it, but because it is the most effective way to tell her story. And whether she will continue to deploy the technology is likely to rest in large part on the response that she elicits from her audience - that is, whether her story is understood and receives, as she would see it, a fair and favourable hearing. If her audience are moved by and sympathetic to her performance, it will probably be repeated in similar circumstances in the hope of achieving similar ends. If it is ignored or even punished, its use will perhaps be discontinued.

If breath holding is the traumatic archetype of technologized breathing, later variants will be more productive and less alarming. We learn to technologize our breathing as actors or singers, drawing breath from the diaphragm not the lungs so as to project our voices; as sports men and women, we are taught breathing techniques that help to achieve focus before or during performances so as to optimise achievement; in the practice of yoga and mindfulness, controlling breath is one of the first skills to be mastered as we handle ourselves with greater care. The simple act of breathing becomes subject to human technologies.

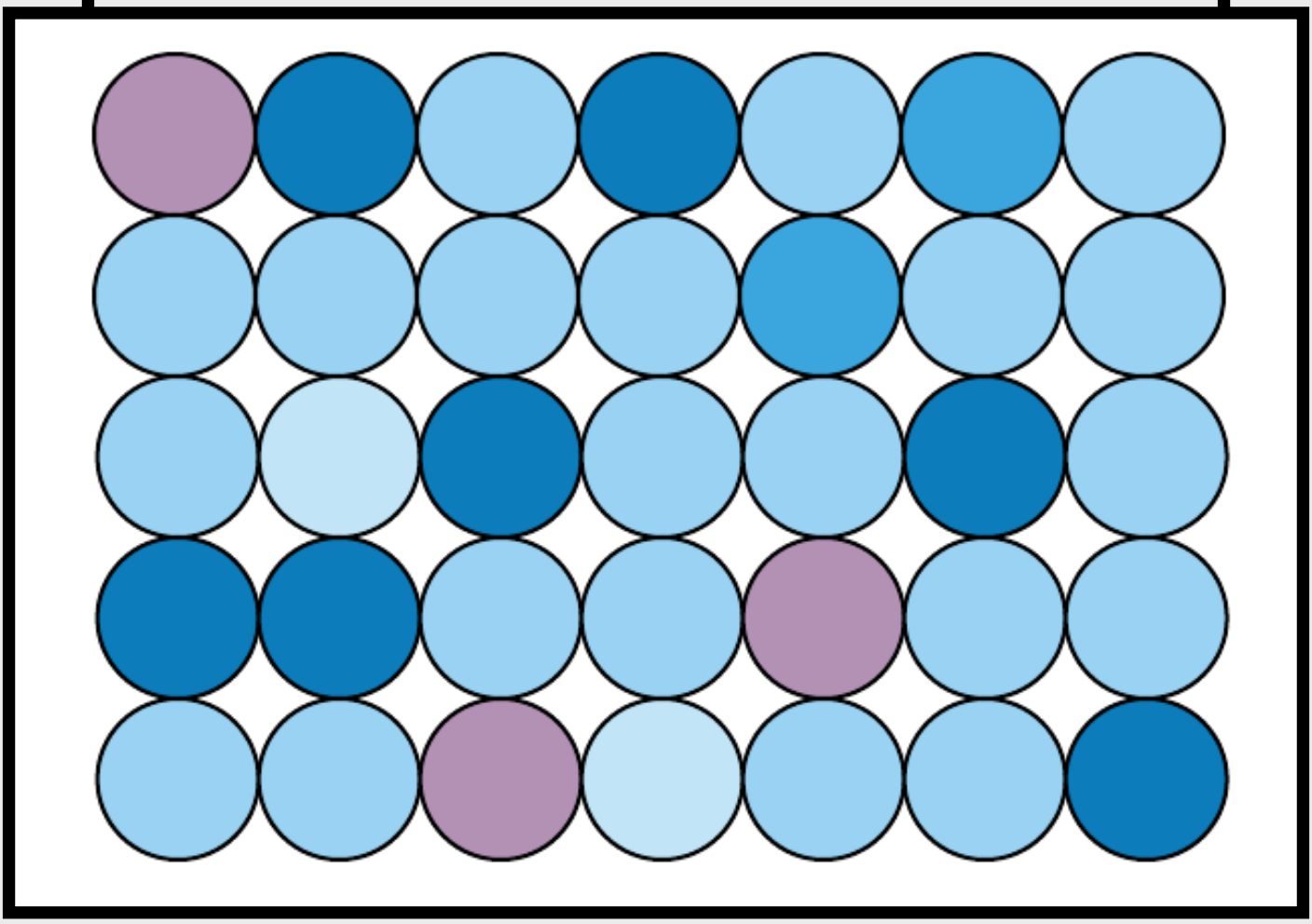




# TECHNOLOGIZING HOW YOU KNOW

The following exercise gives an insight to the Human Technologies approach.

Take a look at the diagram below. How many circles are there altogether?

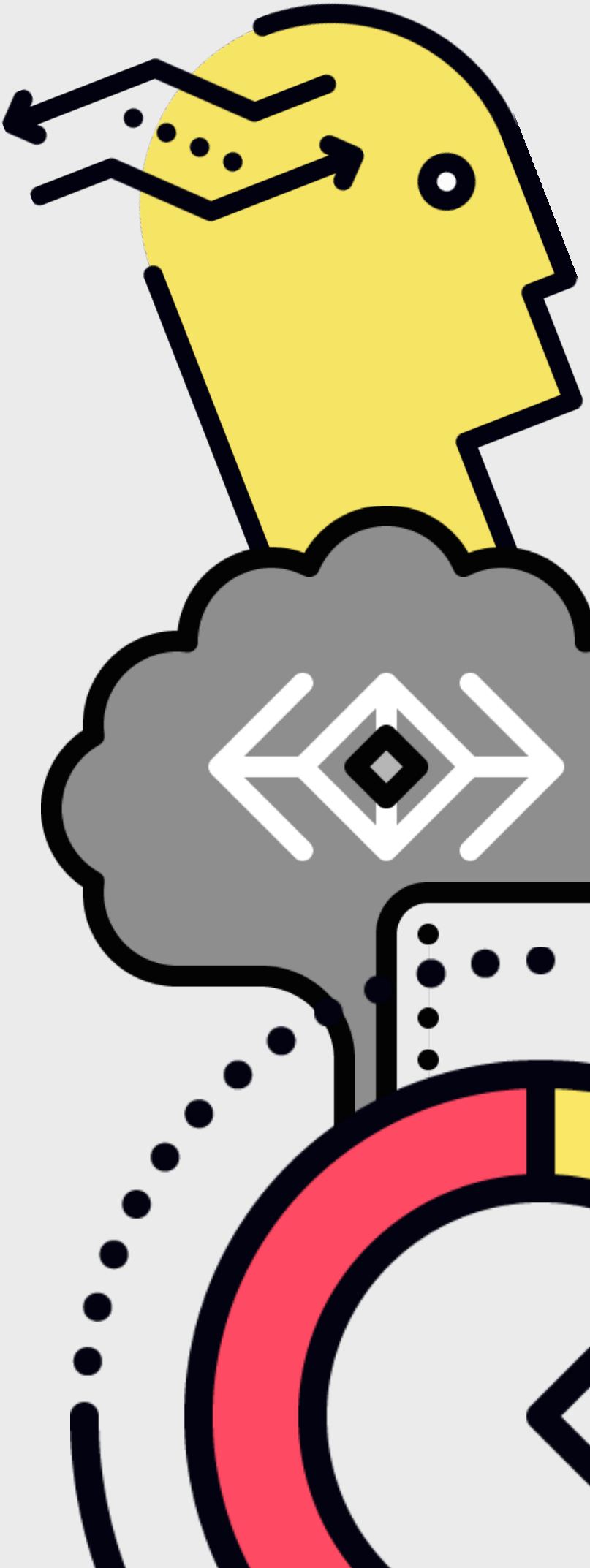


35, of course. 7x5. You were able quickly and accurately to arrive at the answer, not by counting the circles one by one, but by counting the rows and the columns and multiplying the one number by the other. You employed multiplication as a technology. The different colours were not a distraction, because your appreciation of the strength of multiplication as a mathematical tool trumped other cognitive considerations. Understanding how multiplication works as an operation allowed you to ignore distractions, cut the time the task took to complete and to be confident of your answer.

For the average seven year old, yet to master her multiplication tables, the task would have been much more demanding. She would probably have gone through the laborious process of counting the circles, one by one; haunted by the attendant danger of losing her place and having to start again or of getting muddled. The different coloured circles might have interfered with her processing, as they invite an alternative focus and risk dividing her attention. If she wanted to have faith in her answer, she would probably have repeated the whole process a second time, just to be sure.

For the average five year old, whose mastery of numbers itself is still developing, the task would likely have been beyond her. The dual cognitive challenge of counting plus keeping track of which circles have and have not been accounted for would have defeated her.

Numeric digits are a technology, multiplication is a technology. Colour coding is a technology. Technologies can be deployed in ways that are helpful or unhelpful. Understanding and mastering technologies is critical to effective performance. The more technologies you know and the better you are at choosing between them, the more likely you are to meet the challenges you face in ways that please and reward you.



# AN EXAMPLE OF HUMAN TECHNOLOGIES AS DELIVERED IN SCHOOL

On YouTube, search for: Weaving the Bridge at Q'eswachaka

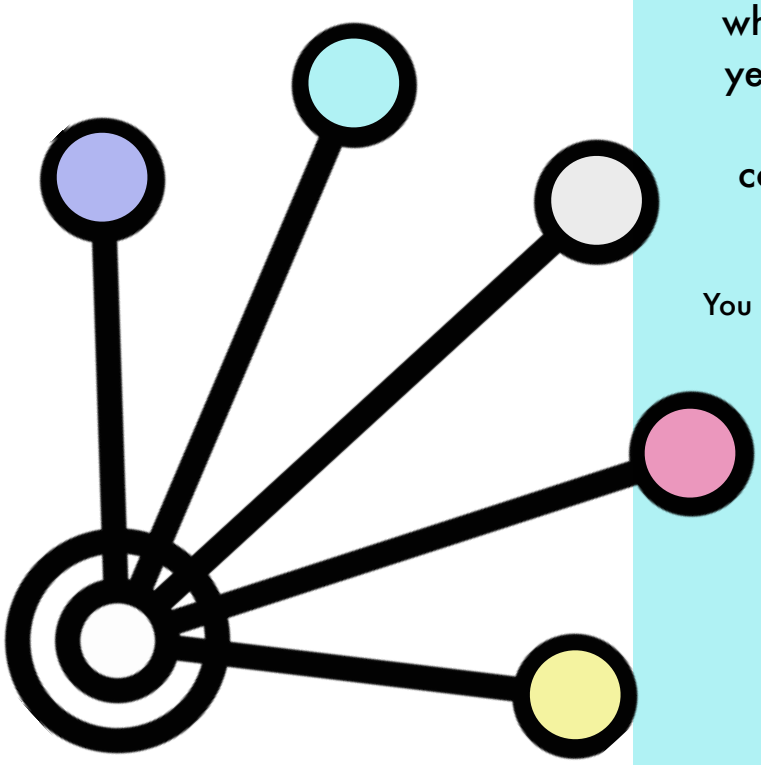
You will find a short documentary film about the centuries old practice of two Peruvian communities, who come together each year to weave a new rope bridge that spans a narrow but deep ravine that separates them from each other.

The old bridge, despite being wholly intact, is cut away and a new bridge strung across in its place. All the members of the community play a part and the successful completion of the task is celebrated by a festival of food, song and dance.

Show the film. Pose the following question to the students:

"You are a government health and safety inspector, who has been burdened with deciding whether or not the existing bridge should be replaced by a new permanent, custom-designed aluminium version, which has passed stringent international standards, and which has a projected life-span of 120 years. What is your recommendation? Following a discussion with your colleagues, file a report and explain your decision."

You will find that the activity will run and run...



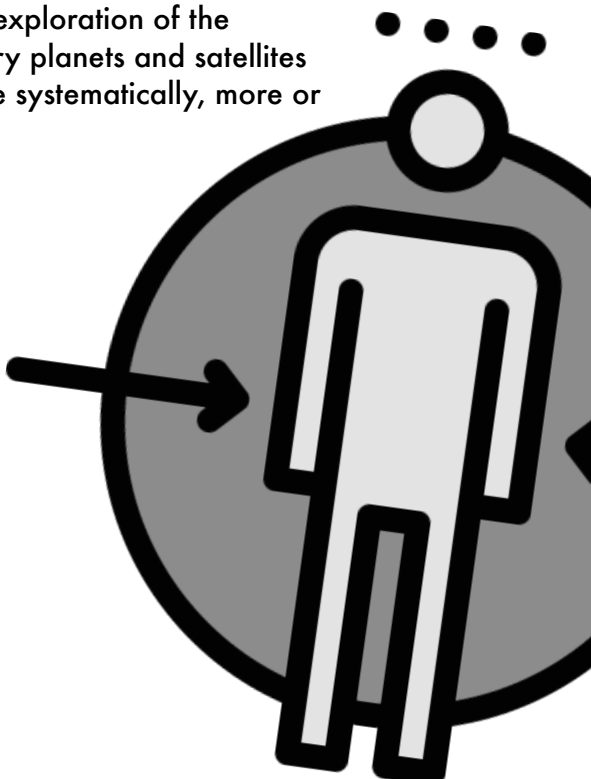
# THE HUMAN TECHNOLOGIES TEACHER

The Human Technologies teacher understands that teaching is itself a technology that has been built on the tendency found in all primates to observe, selectively mimic, and experiment with behaviours modelled to them by others in their social group. Using this orientation towards emulation as a foundation, teaching has developed over time to become perhaps the most significant way in which humans are able first to cope with and then to have an increasing effect on the world. Unlike other animals, the human social group within which learning happens can now extend almost infinitely to include individuals who are proximate neither in time nor space: unlike other primates, we learn from the absent, we learn from the dead.

In the history of our species, the quality of teaching and the quality of what is taught have thus become central and vital. Teaching is achieved by reliance on a vast set of available technologies, which have evolved to serve the task of growing awareness, understanding, appreciation, and mastery in others. There is no set way of ordering these technologies as necessarily better than others. Their effectiveness can only be evaluated once they are folded in to the complex interactions and involvements of an actual learning situation: a crucial part of any such occasion is the preferences of the learner herself and these are liable to differ from person to person and, moreover, can change, even quite rapidly, within the person herself.

So it is that the responsibility of the Human Technologies teacher is to appreciate the role of attention, interest, volition and motivation in successful learning and, as far as possible, to create learning experiences that engage, incite, involve and mobilise the learner, inviting them to want to know and understand more, and to apply that new found knowledge in authentic ways.

Wherever possible, Human Technologies units of study will give rise to choice for the learner, so that the exercise of agency in response to a flexible field of learning is a part of the overall experience. The 'cosmological' design of the curriculum is intended to support this intention: once identified and approached as 'gravitationally' significant, the stars at the center of each unit give rise to opportunities for self-directed exploration of the supplementary planets and satellites that associate systematically, more or less directly.



# POSTSCRIPT: FOUR COMPLICATING FACTORS

There are a number of reasons why change in secondary school education is difficult to bring about:

## ONE

Everyone has been to school and knows what school looks and feels like. For school to be otherwise is hard to imagine and even harder to evaluate 'theoretically' - especially when what is being suggested deviates significantly from the remembered template. Until there are well established alternatives, school change remains a difficult 'thought experiment' in an area that causes parents unique anxiety. While there is widespread agreement that transformation of school is overdue, many parents take a NIMBY approach, supporting the idea of innovation anywhere but at their own child's school. We are caught in a vicious circle.

## TWO

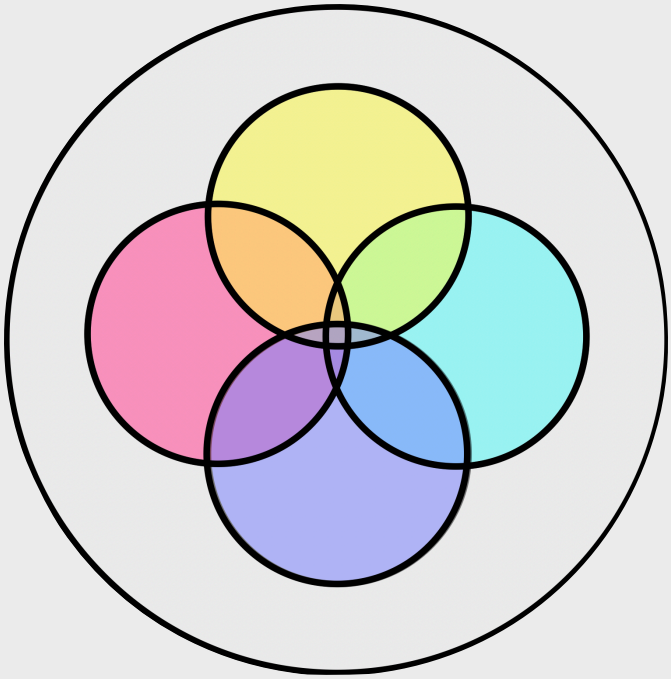
The 'product' of school, i.e. the school leaver, has a long and complex production cycle. Changes in the quality of its 'output' remain mysterious for many years after the cycle is completed and, even then, are hard to associate with one or another specific adjustment or innovation. Judging what does and does not work in improving the product is a contested business and evidence is open to multiple interpretations.

## THREE

School does not stand alone. It is entangled in a massive para-educational system with many vested interests and entrenched opinions. It is a billion dollar industry and a matter of national pride. It is a media football, endlessly kicked around. It has wide financial and political implications that have very little to do with the actual learning experienced by students.

## FOUR

School is subject to an end-point called University that generates very specific requirements for the school leaver that are, if anything, more retrograde, bureaucratic and unyielding than school itself. Unless and until universities change, it is hard for schools to.



# A PRIMER IN HUMAN TECHNOLOGIES

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