

Towards a hydroinformatics praxis in the service of social justice

M. B. Abbott and Z. Vojinovic

ABSTRACT

This paper introduces a new role for hydroinformatics in its sociotechnical environment. It introduces a novel and modern approach for dealing with flooding and other such destructive phenomena which have been increasing ever more rapidly throughout the world. By far the greatest toll from floods and flood-related disasters, however, is in the so-called 'developing' world where the resources for dealing with such problems are either inadequate or non-existent, even as these are often subject to the interventions of corrupt behaviour and practices and their related dubious legal systems. The necessity of promoting the nature of the force that is required to overcome these negativities are identified as those provided by active stakeholder participation and this paper indicates how this force can be informed and motivated largely through projecting ultra-realistic dynamic and coloured illustrations within a collective social environment.

Key words | active stakeholder participation, colour, creative imaginations, social justice

M. B. Abbott (corresponding author)
European Institute for Industrial Leadership,
Château Latour de Freins,
Brussels, 1140,
Belgium
E-mail: knowledge.engineering@skynet.be

Z. Vojinovic
UNESCO-IHE Institute for Water Education,
Westvest 7 2611 AX Delft,
The Netherlands

INTRODUCTION

To date, our experiences of applications of what has become a new kind of *praxis*, as this involves public participation, have been largely positive when there was substantial backing from central and local governments and other such bodies, whereby public participation could proceed satisfactorily. Moreover, in other social environments, where corruption and social injustices have not yet taken such a hold as to have become endemic, essentially the same approaches and praxes have been employed, ultimately also to good effect. To date, however, we have not encountered situations where these social deficiencies have become so effectively institutionalised in size and scope over so many years that they remain unpunished and even become socially acceptable within the miasma of unknowing that these deficiencies themselves produce. This situation must be confronted as and when it arises, and other means again will certainly be needed to overcome it.

It is observed, however, that these kinds of negative forces continue to have ever-increasing destructive consequences, with ever more serious deprivations for the

poorest in their society, and these events have their own influence on the future nature of our praxes. The most intransigent component of this kind of force as it currently proceeds was presented in an article published in the *Financial Times* of 27 September 2012, p. 13, as authored by George Soros and Fazia Hasan Abed, observing that:

'An estimated four billion people [amounting to half the world's population] live outside the protection of the law, mostly because they are poor ...'

'Without basic legal empowerment, the poor live an uncertain existence, in fear of deprivation, displacement and dispossession. A juvenile is wrongfully detained and loses time at school, village land is damaged by a mining company without compensation, an illiterate widow is denied the inheritance she is entitled to and is forced on to the streets with her children. By what means can individuals and communities protect their rights in daily life?'

This then appears as the principal challenge with which we are currently confronted when venturing into this territory.

It is especially in view of the increasing menace of these negative influences that we must now pose the questions of how our own field of hydroinformatics can intervene to expose and counteract these negative forces, which we identified in the first part of *Flood Risk and Social Justice* (Vojinovic & Abbott 2012) and to which we shall return in the second part of this paper. This paper, as a whole, is correspondingly partly devoted to a praxis that is being increasingly applied to defeat these destructive forces in the areas of flooding, water pollution and other water-related damage and devastation, while accepting that this approach is still in its infancy, even though its feasibility was first demonstrated some 15 years ago in describing the road and rail connection across the Øresund that separates Denmark and Sweden. Even then, attempts were made by certain political forces and parts of the media to subvert and derail this gigantic project (see Thorkilsen & Dynesen 2001) and Abbott (2007)). Although that project was not itself concerned with flooding but with countering environmental damage, it has continued to provide a paradigm case for the introduction of *active stakeholder participation*. When seen in retrospect, however, a corresponding contribution to this approach was its demonstration of the power of *coloured dynamic graphics* in reinforcing the formations of stakeholder movements and their consequent empowerment, as means for stimulating the *creative imaginations* and consequent actions of these stakeholders. Many illustrations of these graphics in a variety of applications appear in the book of Vojinovic & Abbott (2012) and four major projects are described in the conclusion there.

The first awakening

It has become increasingly clear that the only kind of activity that can combat and defeat the increasingly powerful forces that we shall call *transgressors*, in the sense that they do not tell the whole truth and cause harm correspondingly, is that which mobilises a combined effort by the persons being transgressed, many of whom may have already experienced flooding, pollution and other waterborne disasters. There is, in this process, a substantial gender issue in that women almost always play a much

more active role than do men in such movements; see Abbott (2000) who explains this in terms of the Object and Value Theory of Alexius von Meinong (see Findlay 1963 [1995]) and the Category Theory of Freyd & Scedrov (1990). However, we do not have space to follow up on this aspect here, despite its importance.

When confined exclusively within the ambit of secular law, there is the question of the cost of mobilising a sufficient legal force to overcome the disclaimers and denigrations mobilised by the much greater legal resources of so many of these transgressors. There is a popular adage that 'British justice is the best that money can buy', but certainly the rest of Europe, most of the Europeanised Americas, and even some others places, are nowadays not very far behind in this respect (Abbott 2012).

However, even in societies with functioning legal systems, it is only through *collective action* by those persons capable of foreseeing the potential destructive forces of flooding, pollution and other such events, and those who listen to them, that it becomes possible to raise the financial means to support the basic costs of those lawyers who remain honest and decent persons. Experience has shown that some such persons and means are to be found almost everywhere from those who are themselves so shocked by injustices. The Mahatma Gandhi was a shining example of this practice, acquiring an iconic status correspondingly, even as he suffered so much from it, and there are other lawyers (barristers and solicitors) who are even today prepared, *in extremis*, to follow his example. However, we now have other means to release ourselves from the *legalised tyranny of language* that otherwise holds sway in this environment, as we must now explain.

The formation of the stakeholder group

The task of the hydroinformatician is to form a force from out of those who truly care about flooding and other water-associated damage in such a way that, whether allied with engaged and honest lawyers or not, they are capable of exposing and repulsing such transgressions that may be so destructive to their lives. Such a movement is usually motivated by earlier flood and other water-related events that have provided warning signals of future water-driven damage. This is the task of our *new kind of praxis*,

one that is only now coming into its own as a *sociotechnol*ogy. This praxis is concerned in the first place with providing realistic simulations of flood, pollution and other such water-related events, as provided by the hydroinformatician over the web, whereby these phenomena can be projected onto the minds of the present and potential stakeholders using their web facilities, such as are demonstrated by the websites of www.knowledge-engineering.org and www.urbanhydroinformatics.com, both of which include simulated dynamic coloured illustrations, primarily of flooding. This process corresponds to one of catalysing the movements of the minds of both the existing and the potential stakeholders in such a way that they experience the real-life appearances, and even the physical experiences, of the outer-world, water-driven events. This first stage initiates what we can describe as *social infrastructure*.

In taking this route we can largely avoid what Cheetham (2005, pp. 2–3) described as ‘this shift in relations between the subject and the object [which] involves a ‘withdrawal of participation’... Another disjunction, another loss of participation, accompanies the transition from oral to literate society.’ To continue with Cheetham (2005, pp. 2–3):

‘For European history the crucial transition occurs in Greece roughly between Homer and Plato. The techniques of alphabetical writing and reading forever changed the relations of humans to language and to the nonhuman world. Socrates was very concerned about this new technology, and was afraid that it signified the death of real thinking, and that education would suffer irreparably. In fact the great sweep of Western history as a whole has been read as a story of withdrawal and the progressive ‘death of nature,’ and the birth of a mechanistic cosmology based on abstract materialism.’

There are of course many other authors who have emphasised this descent. Correspondingly, the first lesson in our praxes is that we must avoid so far as possible all our speaking, writing and reading as means of transmitting meaning, and in our case necessarily falling back upon our envisioning of events.

In the conflict between the consequently better-informed stakeholders and the potential *transgressors*, it is

in this way that the stakeholders come into possession of that most powerful of all weapons: *a more complete truth*.

This estimation is based upon the twin-definitions introduced from a sociotechnical standpoint by the first-named author:

‘Reality is the name that we give to the interface between our inner and our outer worlds and a truth is an intimation of the oneness of these two worlds.’

Following the admonitions of Hugh of St Victor, as adumbrated by Illich (1993), such a definition should be sounded just as if it were being physically consumed, very much as we taste and consume our food, so that it is another experience than that of reading a naked text (see Cheetham (2002)).

The first task of the hydroinformatician within this environment is to create *a truthful oneness* from these two worlds, thereby taking the first steps in catalysing the processes leading to deeper understandings, and thereby to more profound truths concerning the actual and potential threats – and therewith identifying the means for repulsing them.

These are the first steps in creating an environment populated by active stakeholders, as it proceeds through deeper individual understandings, and from there *transmutes* into more collective understandings, and from there again *transmutes* into the worlds of the *creative imagination*, leading to *creative understandings*, that the process of active stakeholder participation comes, through processes of repetition, to fruition – and thus to *a transcendence in the understanding of the innermost reality of the water-related threat*. But this necessitates that we ask how this process is to proceed in terms of communication.

Cheetham (2005), among increasingly many others, ascribes the origins of the now clearly disintegrating world of discourse in European modernism as follows (p. 3, with further italics added):

‘Henri Corbin was a French philosopher, theologian and scholar of Islamic thought, particularly Sufism and Iranian Shi’ism. It was Corbin’s contention that European civilisation experienced a ‘metaphysical catastrophe’ as a result of what we might call *The Great Disjunction*.

This was signalled by the final triumph of the Aristotelianism of Averroes over the Platonic and neo-Platonic cosmology championed by Avicenna. To the defeat of that cosmology is coupled the disappearance of the *anima mundi*, the Soul of the World. The catastrophic event that gave rise to modernity is the loss of the soul of the world.'

'The details of this history hinge on the fate of the Aristotelian *nous etikos*, which became the Agent or Active Intellect in medieval Western philosophy. This Active Intellect operating through us was something equated in Islamic thought with the Holy Spirit or Angel of Revelation, the Angel Gabriel. *The realm of being to which this intellection gives access is this place of vision*, which depth psychology calls the world of the psyche and the imagination. Corbin called it the *mundus imaginalis*, the *imaginal world*, to underscore the fact that it is not imaginary or unreal. Through the agency of the active imagination we have access to an intermediate realm of subtle bodies, of real presences, situated between the sensible world and the intelligible. This is the realm of the *anima mundi*.'

We may now proceed to introduce one of the most powerful – and nowadays least expected – of the post-modern (and thereby pre-modern) instruments for entering the realm of the *anima mundi*, so as to provide the means for the catalysing of our transmutations, *namely those of colour*.

The role of colour in catalysing the processes of understanding

Active stakeholder participation, if properly conducted, is in the last analysis a means of promoting states of social justice, defined as states that provide the possibilities for the individual participants to transcend the selves with which they entered into the participation, even as they collectively seek to establish wider states of social justice in society and its physical and emotional environments more generally. As already introduced, the way in which this has been realised and promoted is to provide web-based hydroinformatic environments which use dynamic, highly detailed and relevant illustrations, *almost always in colour*,

of the objects that are of the greatest concern to the individual participants and to society as a whole, who are then represented by their active stakeholders. These illustrations are increasingly dynamic, so that the effects of proposed changes in the environment, for example, can be followed in detail and in their own experiential time by the active participants.

THE CORRESPONDING HISTORICAL BACKGROUND

We have already introduced the notion that, although the physical inputs to such hydroinformatic environments are for a large part definable within the ambit of modern science, the functioning of the *sociotechnical* hydroinformatic environment cannot be so described. Thus, quoting from Wikipedia, the free encyclopedia, under the heading of the *Condemnations of 1210–1277*, referring to the *Système du Monde* of Pierre Duhem (Duhem & Brenner 1997, p. 24):

'According to Duhem, 'if we must assign a date for the birth of modern science, we would, without doubt, choose the year 1277 when the bishop of Paris solemnly proclaimed that several worlds could exist, and that the whole of heavens could, without contradiction, be moved with a rectilinear motion...'

'Duhem believed that Tempier, with his insistence of God's absolute power, had liberated Christian thought from the dogmatic acceptance of Aristotelianism, and in this way marked the birth of modern science. The condemnations certainly had a positive effect on science, but scholars disagree over their relative influence. Historians in the field no longer fully endorse his view that modern science started in 1277.'

Being postmodern – that is, functioning in societies of *Consumers of Knowledge* rather than in the modern sense, the sense of *The Condemnations*, as *Knowers* – its science reverts back to the Premodern, and then in the first place to Alchemy, as described in Bruno Latour's 1991 book among many others. It is only within this context and its manners of expression that it can be described at all. Thus, as the imaginations of the individual stakeholders are

mobilised, providing *active imaginations*, and as these stakeholders coalesce into larger groups and even come to cover the group in its entirety, we enter into the realm of the *creative imagination* which is at the centre of the succeeding decision-making processes. We observe that these processes are of an *essentially qualitative nature*, so that, once again, they can only be described alchemically, as *transmutations*, rather than modern-scientifically, as mere *transformations*. For the nature of these transmutations themselves we reach back in the first place to the twelfth to thirteenth century works of Ibn' Arabi on the creative imagination, as recalled into the twentieth century by Henri Corbin and into our twenty-first century by many other authors. In the spiritual sense of this movement, we may speak of a *theophonic imagination* (Corbin 1958/2006, trans. 1969, p. 99).

For our purposes, the knowledge-transmitting components of the hydroinformatics environment, such as those delineating houses, gardens, schools, shops, roads, children, etc., have to be directly, subjectively and even immediately *identifiable*. This necessitates the *emotional identifications of and attachments to objects that are of the deepest concern*. The role of colour in hydroinformatics environments is to facilitate the evocations of these emotional identifications as clearly and precisely as possible.

The Bortoft intervention

It is now 16 years since Henri Bortoft's book, following French- and German-language editions, entered the English language as *The Wholeness of Nature: Goethe's Way Toward a Science of Conscious Participation in Nature* (Bortoft 2010). This was introduced by John Barnes, starting as follows:

'Few recognise the depth of the existential crisis into which our modern scientific world view has led us. Through its analytical approach to material processes, it has come to focus on a molecular realm far removed from the world of our human experience. This narrow focus has evoked a countermovement calling for the recognition of personal experience and yearning for meaning and wholeness. The result is an unhealthy polarisation of our culture in which there is a yawning gap between objective, materialistic science on the one hand and the subjective culture of human experience on the other.'

'What is urgently needed today is a further step in the evolution of science, leading beyond material analysis to a deeper, holistic understanding of nature. In *The Wholeness of Nature*, Henri Bortoft describes how, already 200 years ago, Goethe, the great German poet and scientist, began to lay the groundwork for this new development in science. I know of no other book written in the English language that articulates the principles of Goethe's scientific approach as clearly as this work.'

For his own part, Bortoft provided a summary of his lecture on *Goethe's Phenomenology of Colour* when this was presented on the 17 October 2011 in London through the good offices of the *Temenos Academy* and attended by the present first-named author, as follows:

'Goethe's 'theory' of colours is wrongly named. It is not a theory in the conventional sense because it does not set out to explain colour, but to 'make a phenomenon visible'. It is the development of a new way of seeing through the practice of working with the senses and exact sensorial imagination, which keeps the phenomenon in the centre of attention instead of replacing it with a theory. Goethe's way of working is illuminated by phenomenology, so that we can understand better what he was doing on his own terms without having to rely on comparisons with more theory-centred approaches. This opens the door to the possibility of a phenomenological approach to nature which 'allows the phenomenon to be.'

The background to this subject is very extensive and very varied, see [Goethe \(1810 and 1820\)](#). In the present case we start out from Josef Albers' *Interactions of Colour* that first appeared in 1963 from the Yale University Press as its most magnificent production ever. By following examples and their different modes of expression, Albers observed that:

'This discrepancy between physical fact and psychic effect, called in this case a *haptic illusion* – haptic as related to the sense of touch – is so 'in the haptic sense'. To begin the study of how colour deceives and how to make use of this, the first exercise is to make one and the same colour look different.'

The value of the psychic means of personalised perception as opposed to the modern scientific means of impersonal perception lies in this direction, whereby a colour enhances the impact of an emotionally charged ‘surreal’ object and is no longer associated with an emotionally neutral ‘real’ object – and it is only in this sense that it ‘deceives’. Colour can ‘deceive’ in this way, *but it cannot lie*. Thus, when the user interface projects the streets along which the various families’ children are walking to school with mobile telephones and/or other such communication devices, the blobs that represent the children may be simply ‘children-coloured’ when there is no danger from flooding, with the families correspondingly indifferent to any flood-related danger, but may appear flashing with an intensified ‘children-colour’ when these children are in danger and the parents may need to intervene. We may call this ‘thinking in terms of situations’, whether predated, actual or anticipated, and, in this example, it is realised by bringing the danger into coincidence with the potential victims in the minds of their parents, thereby contextualising their deepest concerns, whether to assuage them or to support them. We have to do here with an emotional impact which is entirely qualitative, even as it depends upon the quantitative resources of web technology.

To this, however, Albers (1963) observes that ‘when it comes to colour intensity (brightness) occasionally one may find agreement among a few people but hardly within a large group (such as a class)’. So this ‘solution’ is not so simple as it may at first seem. Of course, we are now in the world of multi-media, so that sound transmission over mobile telephones may be used to back-up the visual impressions. Albers identified this possibility even before the advent of mobile telephony:

‘Though we were taught, only a few years ago, that there is no connection whatsoever between visual and auditory perception, we know now that a colour changes visually when a changing tone is heard simultaneously. This, of course, makes the relativity of colour still more obvious, just as tongue and eye perceptions interdepend when colours of food and of its containers increase or diminish our appetite.’

Albers first made a fundamental distinction between *The Factual* and *The Actual*, observing correspondingly that

‘in dealing with colour relativity or colour illusion, it is practical to distinguish ‘factual facts’ from ‘actual facts’. He continued:

‘The data on wave length – the result of optical analysis of light spectra – we acknowledge as fact. This is a factual fact. It means something remaining what it is, something probably not undergoing change.’

‘But when we see opaque colour as transparent or perceive opacity as translucent then the optical reception in our eye has changed in our mind to something different. The same is true when we see three colours as four or two, or four colours as three ...’

‘Gestalt psychology has proved that 3-dimensionality is perceived earlier and more easily than 2-dimensionality. This explains why children do not begin – as most art-teachers still wish – with painting and drawing, which are lateral abstractions on a two-dimensional plane, but begin all by themselves with building, constructing in space, on a ground and upwards, in three dimensions.’

‘We believe that art education is an essential part of general education, including so-called higher learning. We promote therefore, after a natural and easy *laissez-faire* as an initial challenge, an early shift from aimless play to directed study and work, which offers with basic training, a continuous excitement to growth.’

‘To say this in psychological terms, it means a shift from a recognition of the primitive drive for being occupied, entertained – *Beschäftigungstrieb* – to a more advanced drive, or better need, for being productive, creative – *Gestaltungstrieb*.’

It is within this framework of Heidegger’s *Ge-stell* of 1927 that we identify an antinomy between the so-called Laws of Modern Science and the Laws of Nature, which subsume the laws of our own beings as nature has formed us. The one speaks about Albers’ *factual fact* and the other about his *actual fact*. Albers provides many examples of the differences between these two ways of looking at and more generally as experiencing the world, as examples of a

fundamental difference in our ways of experiencing the world, our *Weltanschauung*, but now in a situation where we have come to live, to continue with Heidegger (1963), in ‘a world deprived of its worldhood’. The movement that Albers describes is completely at one with the natural drive to transcendence that was re-established in the seventeenth century by Blaise Pascal, was raised again by Kierkegaard with even more effect in the nineteenth century, and has now been adopted as doctrine by the Catholic and some other Churches. This is at one with the ambition to restore a social justice that is now being expressed ever more clearly in so many parts of our present-day world, even as it necessitates a totally other way of experiencing this world if this ambition is ever to be realised.

As Albers explains, this difference between what enters the eye and what is observed in the mind was already identified by M.F. Chevreul in his work on *The Laws of Contrast of Colour* of 1839. He showed how an exponentially increasing ($1 \times$, $2 \times$, $4 \times$, $8 \times$, $16 \times$, ...) intensity of colour, when presented to the eye, transmutes into a linearly increasing ($1 \times$, $2 \times$, $4 \times$, ...) intensity of colour as it appears in the mind. Several other examples of this nature are given in Albers’ text.

Taking our cue from Edmund Husserl’s masterpiece (originally of 1900, 1901 and as partly reworked in 1913), that introduced the world to *phenomenology*, as *the means for identifying the things themselves*, rather than accepting whatever happened to be the current ‘modern-scientific representations’ of them, we can most conveniently return to Bortoft.

‘Zu den Sachen Selbst!’ // ‘To the things themselves!’

It is with the language of modern science as with any other language, that *although we can more or less understand how we come to use that language, we cannot really understand how that language comes to use us*. We have already introduced the notion that knowledge is not achieved by the senses alone. Thus, with italics added (Bortoft 2010, p. 68):

‘There is always a nonsensory element in knowledge, and this must be so whether this element is verbal-intellectual or intuitive. The difference is that, whereas the verbal-intellectual mind withdraws from the sensory aspect of

the phenomenon into abstraction and generality, the intuitive mind goes into and through the sensory surface of the phenomenon to perceive it in its own depth. It is by first going into the full richness and diversity of sensory detail that the intellectual mind is rendered ineffective, so that we can escape from its prison into the freedom of intuition.’

‘Etymologically, ‘intuition’ means ‘seeing into’, which clearly expresses the fact that it is the experience of seeing the phenomenon in depth. But this depth is peculiar inasmuch as it is entirely within the phenomenon and not behind it – so it should be seen as an intensive dimension, and not in the manner of an extensive dimension of physical space. It is in fact the depth of the phenomenon itself. It is as if something which appears to be two-dimensional suddenly turns out to be three-dimensional, so that what had seemed flat is now seen in relief. This is the experience mentioned earlier, of seeing the phenomenon ‘standing in its own depth’. It was said then that there is no intellectual equivalent to this experience, and the reason for this is now clearly because it is *an intuitive experience which depends on a change of consciousness*.’

It is this change of consciousness that initiates and activates the mobilisation of the imagination of the individual stakeholders, whereby they become *activated stakeholders*, and then as activated stakeholders within the hydroinformatics environment that the hydroinformatician provides with his or her dynamic and coloured, interactive-user interfaces. It is this *active imagination*, as it is distributed over the different stakeholders, each one commonly with an own environmental interest, that leads them to explore the *actual facts* of their own ‘real worlds’ in relation to the *actual facts* of the ‘real worlds’ of their fellows, as the preparation for their mutating into participants in the *creative imagination of an increasingly unified stakeholder group*. This is in turn the *conditio sine qua non* for the transmutation from a higher level of collective consciousness (*Bewußtsein*) into a higher level of collective conscientiousness (*Gewissenhaftigkeit*) that, through its recursions, has the capacity to establish states of social justice, including

ecological justice, in our otherwise so dreadfully misused world (Vojinovic & Abbott 2012).

HOMAGE TO GOETHE

In the German language there is a word for what we otherwise call ‘concrete vision’ in the present context, and this is *Anschauung*. Bortoft (2010, p. 90) expressed the essence of this word as follows:

‘Agnes Arber, who spent her long life studying plants, said that in this context it ‘may be held to signify the intuitive knowledge gained through contemplation of the visible aspect’. This indicated very clearly that Goethe’s approach to animal form follows the same pathway as we have discovered in his work on colour. The method, as described above, is active looking followed by exact sensorial imagination, plunging into the visible aspect to provide dishabituation from the verbal-intellectual mind and the analytical mode of consciousness. This exercise of redirecting attention to seeing, inwardly as well as outwardly, removes an obstacle to the holistic mode of consciousness. At the same time, the exercise of trying to see the visible aspect as a whole promotes the restructuring of consciousness into the holistic mode. This procedure therefore has the result of taking the *Naturschauer* into the phenomenon intuitively and not just sensorially, while escaping from the prison of abstraction that is the intellectual mind.’

In the conjunctive knowledge that joins together the social and the technological, so as to provide a *sociotechnology* as an entirely other species of knowledge than the knowledges that it binds together, we have to face issues that have not been much considered previously, either in the modern sciences or in technologies. As we move into the arena of active stakeholder participation in projects of all manner of kinds, so we enter into new territories of thought and intuition that were not previously addressed in our own field. In the present authors’ 2012 book we come face to face with the challenges that confront us, even as they hold us together in our mission, the source of which is expressed within the body of the work as ‘a fascination with

technology is a fascination with truth’, but then in such a way that this fascination should never degenerate into a one-sided ‘idolatry of truth without feelings’, such as would threaten the most basic spiritual values of benevolence (*Wohltätigkeit*), benignity (*Freundlichkeit*) and compassion (*Mitleid*), those timeless values which are the only certainties in our lives. As expressed already in the words of Kierkegaard (1844/1855/1960, p. 186, 1980, p. 139): ‘He who has observed the present generation can hardly deny the discrepancy in it, and the reason for its anxiety and unrest is this, that in one direction truth increases in scope and in quantity, and partly also in abstract clarity, while in the opposite direction certainty constantly declines’.

...still familiar?

Active stakeholder participation, as introduced by the first-named author in 2007 and by the present authors together in their paper of 2010, and as developed further in their 2012 book, is increasingly seen as the only way in which an otherwise world-catastrophic process might be avoided, and this possibility has been taken up by several authors in more recent times. Thus, His Royal Highness The Prince of Wales has expressed his support for this kind of intervention (2010, p. 19) as follows:

‘Now there are many examples where communities have replaced the short-term impulse with the long-term plan. But part of that strategy – to my mind at least at the heart of it – is the need for a new public- and private-sector partnership which includes NGO and community participation. To work effectively this will require governments to provide policies which support community participation.’

From the *UNESCO Water and Ethics Series* of 2004 we select a piece from the introduction by our late-lamented friend, James (Jim) Dooge, as follows:

‘There is no life without water, and those to whom it is denied are denied life. Water for all and meeting minimum basic needs are vitally tied to the principle of human dignity. The ethical principle of association means that the person is social as well as sacred. The principle of participation means that individuals,

especially the poor, must not be shut out from participating in those institutions which are necessary for human fulfillment. Both these ethical principles mirror a major theme: namely, that those who are impacted and who would benefit from water (which is vital to their fulfillment as humans) must have the opportunity to participate in its planning and management.'

Turning to the other side of the world, to China, we have the situation where extensive public participation has become an accepted means of preparation for decision-making. Thus, already in an editorial to the *Beijing Review of 5 March 2008* and entitled 'Transparency: it's the law', its editor, Yao Bin, after castigating the many examples of social injustice that so much concern the peoples and the governments at all levels of that nation, observed that: 'Clearly, a complete change in the above-mentioned situation lies in the establishment of a strict and transparent legislative system that features the broadest public participation'. This has been strengthened by new legislation on property and water rights and responsibilities that had become increasingly urgent and which involved the active participation of many tens of thousands of persons, even though this participation itself necessarily led to considerable legislative delays in many cases. It depends of course on the omnipresence of the web, where China currently has much more than 500 million users, and the mobile internet, with more than a billion mobile telephones in circulation as of October 2012.

As explained in the second part of this paper, this kind of action depends upon the hydroinformatician's ability to create a virtual environment that conveys the menaces and possibilities of projected interventions in the *outer worlds* of the activated stakeholders through conveying the consequences of these works into the *inner worlds* of the minds of the individual stakeholders. This process, in turn, motivates the collectivity of stakeholders to exercise their combined creative imaginations. All such processes must then employ the colours that are most suited to motivating the active and the creative imaginations and the choice of these most appropriate colours is an essential part of the hydroinformatics-created environments that are at the heart of success in this enterprise.

THE HYDROINFORMATICS OF THE THREE ECONOMIES – WITH COLOUR REVISITED

The definitions of the three economies

It is generally understood that the human economy, which most persons in the West like to think of as a 'first economy', is 'supported by' or, figuratively speaking, 'floats upon' the natural economy, which then becomes a 'second economy', where this 'floating' metaphor introduces water, which is that which most binds these two economies together. For the greater part of humanity, however, this all-embracing natural economy is founded upon *another economy again*, which created and has continued to support the natural economy and with this the human economy in all its manifestations, but then in such a way that it makes its presence known to those humans within their first economy who understand that they are charged by this 'other economy' with sustaining and supporting the 'second economy'. This 'other economy', this *Third Economy*, this third support that has served to preserve the stability of the other two economies for as long as human existence can be traced, and continues to sustain some semblance of stability even in the West today, is commonly subsumed within the general category of *the spiritual* to the extent that it is concerned, under the heading of 'Economy', with *the divine governance of the world*, to use the *Shorter Oxford Dictionary* definition. In the *Greater Webster's Dictionary* it is defined, again under 'economy', as 'God's plan or system for the governance of the world'. The term 'economy' itself refers back to the Greek word for the governance of the household, as *husbandry*, implying as it does an attribution of values and therewith responsibilities. Another term that is widely employed is that of *stewardship*.

We may return very briefly here to the most basic modes of recognition of the various societies and individuals of the 'second' and the 'first' economies by referring again to the value, and indeed the very purpose, of colour, in that, in both economies, the most distinguishing features of these worlds are their uses of colour, the 'first' through such agencies as clothing, homes, flags and banners, and the second by such devices of nature as grasses, leaves, skin, fur and feathers, whereby colour is in the first place an attribute

of the second economy, as that for which we, in our self-styled 'first' economy, are charged with sustaining.

It is from such examples as these that the worlds of the imagination and especially of the creative imagination now arise, whereby colour becomes the first creative agent in our imagination.

The subversion of technology

The reason for introducing this, in Western eyes, obscure branch of human knowledge, and then, following a Western-theological tradition, as an economy, is that it presents as great a challenge to the West, in particular, as does anything else occurring in the human and natural economies. Since almost all technology proceeds nowadays through our being challenged, we see at once that, to the extent that we experience that there is something highly irregular in our technology, we must conclude that *we are being challenged in 'the wrong way'*. But what is it that causes *us* to be challenged 'in the wrong way', this being a way that we otherwise experience, albeit subjectively, as not being a way of truth at all, but a way of deception, of untruth? Since modern technology must still remain, in Heidegger's words, as 'the place where *alētheia*, truth, happens', what we experience as happening now is that our present-day applications of technology *are telling us the truth about an untruth* that is not itself attributable to technology as such at all, but must be attributable to something *within our own selves*, something that comes to presence through the frame that *we* set around our worlds, in *our* action of Enframing that serves to negate our spiritual virtues.

But what is this 'something'? This is a question that has in fact persisted throughout history, but which became increasingly urgent in the Europe of the nineteenth century as the negative influences attributed to modern technology and the changing ways of life that it engendered became increasingly more evident. It became posed with increasing force again during the first half of the twentieth century, where this question demanded increasingly clear answers in response to the rise of the forces of fascism and Nazism, for much the greater part in Europe, with their glorification and prosecution of modern technology in its most terribly efficient, brutal and barbarous forms. Since that time, this negative force has taken on less obviously ugly forms in that part of the world that likes to call itself the First World, having transferred its

nefarious attentions much more to the so-called Third World, but it still remains most active, and ever more dangerously so in Europe, and indeed just as much and perhaps even more so than elsewhere just because it is so much less evident. Thus in the words of Jacques Derrida (1993), responding, in his *Spectres of Marx*, to the empty-headed 'optimism' of Fukuyama's (1992) book entitled *The End of History*:

'For it must be cried out, at a time when some have the audacity to neo-evangelize in the name of the ideal of a liberal democracy that has finally realized itself as the ideal of human history: never have violence, inequality, exclusion, famine, and thus economic oppression affected as many human beings in the history of the earth and of humanity. Instead of singing the advent of the ideal of liberal democracy and of the capitalist market in the euphoria of the end of history, instead of celebrating the 'end of ideologies' and the end of the great emancipatory discourses, let us never neglect this obvious macroscopic fact, made up of innumerable singular sites of suffering: no degree of progress allows one to ignore that never before, in absolute figures, have so many men, women and children been subjugated, starved or exterminated on the earth.'

If only for these reasons alone, we have no alternative but to outline this response here already if we are to understand the essential features of modern technology in its *false enframing*, in its divorce from spiritual values, but we must do this for other reasons besides. The hydroinformatician cannot ignore, and indeed must take into proper account, the existence of this negative force in all that passes around that person. Our object is thus also to arm the hydroinformatician properly with an understanding of this force so that he or she can more quickly identify and subsequently defeat this adversary whenever it is encountered.

But what, we may ask, is the name of this adversary? It – for we have here to do with an 'it' – was introduced in Søren Aabye Kierkegaard's *Begrebet Angest* (1844/1855/1960, p. 179)//*The Concept of Anxiety* (1960) as *Intet*, which translates literally as 'nothing', and *Intethed*, which we can only translate as 'nothingness'. It correspondingly entered German as *das Nichtige*, and into French as *le néant* and into English, and more awkwardly so than ever, as *nothingness*. In an essentially atheistic philosophy, it was described

as a *nihil* and its manifestations were described as *nihilism*. We now have, most unfortunately because it is an unpleasant matter, to introduce this ‘it-which-can-be-no-thing’. As we shall see, it is this ‘nothing’, this *nothingness*, which touches everything as it strives to destroy all that has been created, whether by ‘The Absolute’ or, by extrapolation, by humankind and the whole world of nature. Correspondingly, *almost all the much-vaunted gains of one relatively small part of the first economy are bought at the cost of the devastation of both the greater part of the first and the second economies*, whereby the third economy abandons its first economy on the grounds of its treachery, which has allowed nothingness to instil itself in it, leading to the *Deus absconditus* of our Western world, thereby setting it on the path of certain destruction.

From nihilism to nothingness

It was primarily the experiences of nineteenth-century European industrialisation, with all its negative manifestations, that gave rise to a new, more highly educated, so-called ‘middle’ class that made the conventional sophistries of the Western churches untenable. In the incisive words of the foremost among such critics, in the words of Nietzsche (1882 [1969]) written with his usual biting irony:

‘The decline of belief in the Christian God, the victory of scientific atheism – this is a combined European achievement (*ein gesamt-europäisches Ereignis*) for which all races will claim their own share of merit and honour.’

And to this he elsewhere added, in deadly seriousness:

‘The greatest recent event – that God is dead, that the belief in the Christian God has become unbelievable – is already beginning to cast its first shadows over Europe.’

To Nietzsche’s rhetorical question that arose immediately from this situation: ‘Are we not then straying through an infinite nothing?’ Heidegger, in his own time, of the third quarter of the twentieth century, responded (1967, pp. 60–61):

‘The pronouncement that ‘God is dead’ contains the confirmation that this Nothing is spreading out. ‘Nothing’ means

here: absence of a suprasensory, obligatory world. Nihilism, ‘the most uncanny of all guests’, is standing at the door ...’

‘Nihilism is a historical movement, and not just any view or doctrine advocated by someone or other. Nihilism moves history after the manner of a fundamental ongoing event that is scarcely recognised in the destiny of the Western peoples. Hence nihilism is also not simply one historical phenomenon among others – not simply one intellectual current that along with others, with Christendom, with humanism, and with Enlightenment – that comes to the fore within Western history.’

‘Nihilism, thought of in its essence, is rather the fundamental movement of the history of the West. It shows such great profundity that its unfolding can have nothing but world catastrophes as its consequence. Nihilism is the world-historical movement of the peoples of the Earth who have been drawn into the power realm of the modern age.’

This is to say that, for Heidegger, nihilism was not only a product of the nineteenth century, even though it was primarily in that century that its presence became more clearly recognised and its name more firmly established, but its origins proceeded much further back, back through all the histories and pre-histories of the European peoples.

It is in a spiritual reply to Nietzsche’s *Sieg des wissenschaftlichen Atheismus*, that we nowadays speak of this loss in terms of an *absconded God*, this *Deus absconditus* (See Cheetham (2005), pp. 19, 55–57, 74–75, 99, 117).

This view of the mysterious nature but only too manifest influence of ‘nihilism’ was, however, essentially a philosophical one, and it was by no means the view of those with a more theological foundation who persisted in speaking of ‘nothing’ and ‘nothingness’. Thus, even though Heidegger, for example, did have a substantial theological education, he was not himself a theologian: his knowledge of theology provided him with a certain theoretical apparatus for his philosophical work, but this work was itself in no way theological. The same could be said of Sartre, who also entered into this analysis. It is accordingly first necessary to explain this difference between the philosophical and the theological in order to follow why it is that nothingness, in its essence, can only be understood from a theological, and indeed

from a ‘dogmatic-theological’, standpoint. We emphasise that it cannot be at all expected nowadays that everyone interested in such matters is Christian, or indeed has any explicit faith at all, but nonetheless all persons concerned with such matters as the present one can and should learn from theological studies. As concerns the most obvious world-catastrophic consequences of nothingness – the two world wars of the last century – both had their main focus within Europe. As Barth observed (1960, Vol. 3, Part 3, p. 345) in his masterly commentaries on the disparate views of Heidegger and Sartre (1960, Vol. 3, Part 3, p. 345):

‘We experience nothingness, and in so doing we experience ourselves and all other things as well. Heidegger’s astonishment [as expressed in his masterly *Der euro-päische Nihilismus*] is no less eloquent than Sartre’s defiance [as in his equally famous *L’être et le néant*], nor does the latter bear lesser witness. Their thought is determined in and by their real encounter with nothingness. Their thought and expression are determined in and by the considerable though not total upheaval of Western thought and expressions occasioned by the world wars.’

In the words of the present first-named author, as written in *Hydroinformatics* (Abbott 1991):

‘In his *Church Dogmatics*, Barth explained how that motion in the depths of the collective unconscious that is the innermost expression of nothingness has continued to take on ever more concrete names and forms in our outer world. Today we see in the destruction of the natural environment and an ever-increasing poverty of the majority of our populations, and so in the undoing of the creation, the further allegorical representation of nothingness and one which gives expression to ‘the kingdom of nothingness’ in the most concrete and material way possible.’

‘Now of course the manifestations of an ever-encroaching nothingness are by no means a feature that is peculiar to the European peoples. By no means is it this! It is however centred upon Europe; it has a focus, in the same way as does a physical sickness, and this focus is situated in the collective psyche of the European peoples. Then, in so far as hydroinformatics constitutes in its essence one

part of the total field of contest of nothingness, so it follows that *hydroinformatics begins as a European possibility.*’

This is to say that the *Hydroinformatics* of 1991 was conceived as something directed to a specifically European situation, so that it proceeded for the most part through the actions of the orderable, the numerable, the countable and the computable: it was for much the greater part a *mathematical hydroinformatics of the quantities*. Now, however, as the pendulum of socioeconomic development moves increasingly, inexorably and ever more dramatically towards Asia, and so away from the European *Zeitgeist*, this hydroinformatics has to be rethought and reformulated within new and essentially different social, cultural and increasingly religious-cultural contexts, whereby it is described more by a *mathematics of the qualities*. For this purpose we have used or – as probably some at least will say – misused, some fragments of *category theory* in our earlier works and most recently in the 2012 book, so as to provide an appropriate descriptive apparatus.

Reassessing technology

In this latest book (Vojinovic & Abbott 2012), as in some earlier works, we have observed that a *fascination with authentic technology is a fascination with truth*. Technology is grounded in a seeking after truth in the world of human creativity, and in our present case it seeks and finds its truths in acts of industrial creativity. Industrial technology is only one, but still one, of the many, many ways of seeking after truth and experiencing truth that gives us hope, cohesion and guidance as seekers after truth in an otherwise so troubled world. In Christian-theological terms, all such searchings and strivings are borne by that covenant of the spirit that we commonly call ‘love’, and the most profound of these movements of the intellect is the love of wisdom itself.

For well over 2,000 years now, it has been normal within the so-called Western tradition to distinguish between a love of wisdom translated into works without the explicit supposition of any agent external to humankind itself, and so by reason alone, which is called *philosophy*, and a love of truth as the issue of a wisdom that includes but also necessarily transcends the powers of unaided human reason, which is called *theology*. Thus philosophy requires human

understanding, as mediated by reason, while theology requires not only this human understanding but also something more again, which is called *faith*. Thus, within the Christian tradition, as in other religious traditions of the book besides, faith is that which surpasses human understanding, which transcends reason, so that, following Kierkegaard [(*Sydommen til Døden* 1849//*The Sickness unto Death*, 1983, p. 39)],]'faith is a miracle, otherwise it is not faith'.

The theologian Karl Barth correspondingly introduced our present subversive element as follows (Vol. 3, Part 3. p. 289):

'There is amongst the objects of God's providence an alien factor. It cannot escape God's providence, but is comprehended by it. The manner, however, in which this is done is highly peculiar in accordance with the particular nature of this factor. It is distinct from that in which God's providence rules the creature and creaturely occurrence. The result is that the alien factor can never be considered or mentioned together in the same context as other objects of God's providence. Thus the whole doctrine of God's providence must be investigated afresh. This opposition and resistance, this stubborn element and alien factor, may be provisionally defined as nothingness.'

All theology involves a struggle to express in words the many experiences, impressions and feelings which our present-day languages were never developed to describe and for the expression of which these languages remain always inadequate. This is nowhere more evident than in the present case. In Christian-theological terms, the relation between God and man becomes broken by this alien element, with the consequence that every attempt to describe nothingness, even theologically, must itself be broken in thought and in utterance. This is to say, however, that *this description cannot form a system*.

FOR WHAT THEN IS THE MODELLER SEARCHING?

That for which the hydroinformatician is constantly searching, as the *initiating modeller* in active stakeholder participation processes, is *cause and causality*. For example:

what is it that is causing the issues that are of concern to the active stakeholders to lead to a failure to agree on a mutually acceptable arrangement, or verdict? From this standpoint it is clear that *he or she is looking for the cause of failure*, so that for the initiating modeller, just as for the psychoanalyst described by Lacan (1973/[1977], pp. 9 and 22): 'In short, there is cause only in something that does not work'. When it can be brought 'to work', through the processes of repetition and transcendence, then we arrive at 'The Great Work', the *magnum opus* of our latter-day alchemists, as both an individual transcendence of the Self and as a group transcendence of the community of Selves of the active stakeholders. Clearly, no such process is realisable in the case of passive stakeholders. In the same vein, only in the case that the initiating modeller can overcome the temptations of exercising only 'deficient modes of solicitude' in the now-classical Heideggerian sense (whereby the stakeholders are maintained in a passive state, such as happens when these stakeholders are only being 'consulted', 'informed' and 'directed', rather than being challenged-out to exercise and develop their own inherent knowledges, imaginations and judgments, and to exercise these both independently and interactively) can 'The Great Work' succeed.

The second immediate consequence is that the function of the modeller changes, indeed drastically, in such situations, as corresponds to this reversion from the chemical back to the alchemical. Whereas in the pre-internet era of hydroinformatics the emphasis was on the model, in its new web-connected and mobile era the emphasis of hydroinformatics is much more on the modeller: *the emphasis changes from the operand to the operator*. In the words of Lacan (1973/[1977] p. 9):

'What is it that makes us say that, despite the dazzling character of the stories... from ages past, alchemy, when all is said and done, is not a science? Something, in my view, is decisive, namely, that the purity of the soul of the operator was, as such, and in a specific way, an essential element in the matter.'

In hydroinformatics similarly, the *purity of the soul* of the operator, which we can better here describe as the *quality of the character* of the modeller, becomes inseparable from

the quality of the model within the quality of the total production. Thus, in modern science, the outcome of an experiment should be independent of the nature of the experimenter, whereas in a pre-modern (and thereby, as in the present case, post-modern) science this is not the case. Correspondingly, the central question now comes to be posed of ‘what is the modeller’s *desire*?’ It is this in turn that establishes the economy of the modeller’s libidinal (in the original sense of emotional or psychic energy) resources. Thus the proper employment of the web-based *Software as a Service (SaaS)* paradigm in hydroinformatics depends vitally upon an authentic answer to this question, and thus, so far as is possible, an authentic understanding. Our question then becomes: with what kind of human activity, and correspondingly with what kind of participating Selves, are we concerned here? To put this question in the terms appropriated by Lacan for his field of psycho-analysis: ‘What grounds it as praxis?’ But then we must pose the question of what we now mean by *praxis*? We follow Lacan, again adding italics, when he says that ‘It is the broadest term to designate a concerted human action, whatever it may be, which *places man in a position to treat the real by the symbolic*’. What we then do is to take our praxis with us, as interconnected applications in our outer world, and we let our observations of the applications ‘direct us at once towards some fairly well-located, specifiable points of practice’.

Clearly the hydroinformatician must be able to identify nothingness, but he or she must also be able to combat it. For the ‘non-believer’, Barth’s observation on present-day man and woman’s chances in this combat must then appear at first sight as decidedly discouraging: ‘God alone can summon, empower and arm the creature to resist and even to conquer this adversary...The creature as such would be no match for nothingness and certainly unable to overcome it.’ From the Christian-theological point of view that is adopted here, however, it is not of much consequence whether the person who is summoned, empowered and armed to combat nothingness is immediately aware at all of the source of that person’s strengths, and this person may well be a match for nothingness without the slightest inkling that she or he is such a match because she or he is *by no means standing alone in this confrontation*. From a theological point of view of course, both would be better prepared again if they were aware and alert to this support,

but it is not the most immediately essential issue. The essential point is that the person so ‘chosen’ is prepared to face her or his responsibilities in such a combat – and after that it is our present responsibility to prepare him or her for this combat with such weapons as theology and other means have prepared.

It follows that the weapons necessary to combat nothingness are those of expressing and communicating and inculcating truth at this most exalted level. Thus (Barth (1950) *loc. cit.* p. 529):

‘That the lie should be exposed is what is most appropriate to the lie itself and most helpful to those who are threatened, oppressed and tormented...And as it is done the lie loses the vital breath which enables it to threaten, oppress and torment. It is vanquished and driven from the field.’

We conclude, again with the words of His Royal Highness The Prince of Wales (2001, p. 14):

‘I believe that if we are to achieve genuinely sustainable development we will have to rediscover, or re-acknowledge, a sense of the sacred in our dealings with the natural world and with each other. If nothing is held sacred any more – because it is considered synonymous with superstition, or in some other way ‘irrational’ – what is there to prevent us treating our entire world as some ‘great laboratory of life’, with potentially disastrous long-term consequences?’

ACKNOWLEDGEMENTS

The authors thank the referees of this paper for their engagement in providing well-founded criticisms and several corrections that have been of great value in finalising its form (see also www.knowledge-engineering.org).

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First received 4 November 2012; accepted in revised form 26 March 2013. Available online 15 May 2013