Solutions derived from natural processes
harmonising nature and material culture

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Abstract

Our ability to define, control and process has been developed to a maximum extent in the natural sciences in general, and to physics in particular. This ability is the nearest we have to physical planning but should inspire further the organisation of the field towards maximum problem avoidance, resisting, mitigating and solving ability. It is also here, within natural sciences, that the importance of universal and general applied systems become clear. Take them away and nature collapses into impotence devoid of evolution ability. A similar lack of such systems in our artificial world, or culture in general, might explain the many urgent current and future problems they cause. In addition, those fields would show an extreme lack of operational or solution making function. These fields and disciplines are relevant and interdependent. They are part of the often mentioned 3 layered global concept which consists of mankind on the top, the cultural or our artificial world interface in between, and nature or the environment studied by physics and natural sciences at the bottom. Our artificial or manmade interface, consists of immaterial political, social and economic sub layers and an important but overlooked artificial material substratum of material culture, or the artificial physical supporting system of mankind. Its importance can be derived indirectly from the call for global economic systems, which do aim at sustainable development in respect of nature or the environment. Indeed, economic systems only impact directly on nature via material goods. Hence, if a global economic system is required, development of a global materialising system might be a precondition for its effectiveness. Those general systems derived from natural sciences can offer help decisively in avoiding, resisting, mitigating or solving urgent, current and future global problems. This is in effect a search for integration and compatibility between mankind and nature.
1 Introduction

Nature is acknowledged to be governed by universal systems. Discovery of those scientific systems and their implementation by applied science boosted development considerably. This development contains major material components, which constitute global material culture in general. Increasingly, their production, use, maintenance, repair and recycling generates negative side effects. These side effects merge in present and future global problems. The problem-avoiding, problem-mitigating and problem-solving capacities of present specific systems have proven to be insufficient to cope with the global scale of these problems. Inevitably those specific systems are to be completed with a global and general applicable materializing system and the resulting ditto material system.

For about 300 years now, there has been an accelerating pace of discovery of systems, which generate variety in nature, or unify and generalise them towards their wider application. This has increased and improved their impact on nature for the benefit of mankind.

Unfortunately, overlooking minor negative side effects of our artificial world, leads to their combining into major present and future global problems which threaten nature directly, and mankind indirectly.

Avoidance and mitigation of those problems inevitably already went through more science or discovery and more elaboration and application of even more scientific systems. This leads to better global applicability of scientific or universal systems and to full operational coverage of the 3-layered concept of reality. This concept, already referred to, consists of mankind on top, nature at the bottom and an ever-expanding cultural interface in between. Harmonisation of those 3 layers depends heavily on relevant powerful scientific systems ranging from sociology, over political science, economics and natural sciences, up to chemistry and physics. Their productivity and general applicability increases commensurate with the measurability of the variety within their fields.

However, most of the suggested problems originate in material culture, or the artificial material substratum of the cultural layer within the mentioned three-layered concept. Indeed, material culture threatens above all the material components of nature. Unfortunately, it’s exactly this artificial material substratum, which is the least comprehensively studied as an entity, although being extremely measurable. Perhaps problem-solving change of material culture is considered to be too difficult. This, because of its normal, natural matter linked inertia on top of social resistance to whatever kind of change. Hence, our calls towards the highest possible authorities and physical planners for focusing on global material culture in general. This is nothing but a call, which is similar and parallel to the UN call for international cooperation. A call for co-operation in the elaboration of a global economic system for development in consideration of the environment. A general materializing system might even more be important since an economic system only has impact on the natural and artificial material entities of nature. Strictly speaking, such material systems can be considered to be scientific thanks to their global and general applicability. Science is indeed
about universal systems within related fields and disciplines. Most of them are real, natural fields. As such, related scientific fields follow retrospective action. By consequence, future general systems can be considered as a result of prospective action towards a virtual material world. In both directions however, commonalities are to be found. They will allow adaptations towards combination of, and compatibility for various purposes. To be able to benefit from those characteristics on all levels, only mobility is to be added. Together they represent maximal potentials for material change if they are combined in a general materializing system, which is able to generate a dynamic and comprehensive solution bank. Together they will constitute maximal problem-avoiding, problem-mitigating and problem-solving capacities. At present, rather indirect socio-economic and high tech strategies lack impact on these capacities. When it comes to CO₂ for instance, they only manage in lowering concentrations by 10% of what’s scientifically needed.

Fortunately, the direction in which to look for better performing approaches is already pointed out by some artificial material exercises. These rely mainly on data put at our disposal by natural sciences. Morphology and surface finishing of animals inspire engineering, and thermodynamic data improves engine building for instance. This, however, are isolated efforts which as such lack scope and impact. Hence the need for global and general applicable systems that can have an impact on the whole of global material culture in general, trough nearly automatic replication.

Suggested global problems basically ensure lack of compatibility between (material) culture and nature. Only harmonisation can lead to the application of the same systems on both nature and (material) culture. Indeed, also problem-solving communication between two parties is only possible if both parties speak the same language on all levels. Up to now, unlike nature, (material) culture is not generated by, or provided with, any global general applicable, thus pseudo or prospective scientific system. Does this mean that we have to look for inspiration in nature and in natural sciences?

We do indeed have to involve the empirical, positivistic methods of natural science and the resulting knowledge about nature, in order to arrive, via further generalizations, at global and general applicable material systems, which can be applied both on nature and (material) culture towards (or for the purpose of) their harmonisation.

Methods applied in natural science might be the only feasible and acceptable ones and they have proven to be productive. As such, physical planners should apply first of all the same definition of science. Essentially this definition is about discovery of common characteristics in the variety of the studied fields that can be combined into a universal and general applicable thus scientific system, able to describe, explain, define, generate and change that variety. As such, science offers maximal functionality, whenever and wherever, in all phases of problem solving. The same degree of functionality might be highly needed towards "long term" solutions of higher-mentioned "global" problems. Physical planners generate the main cause of those problems. By consequence, physical planners should indeed consider global material culture in general. They should
Consider it at first as a field that consists of more or less existing sub fields. If this is not possible, the material(ising) system they have to develop will have to transform global material culture into a coherent homogeneous field. This is possible through the introduction of general applicable materialising systems, which are based on common characteristics or a coherent set of material elements and a set of rules for the combination, adaptation and transformation of those elements. This is a precondition for productive efficient problem solving in general, irrespective of the kind of local specific solution. Whatever is the local, specific solution, which is included in the general solution.

In general, present scientific data results from global scientific, mainly bottom-up research on behalf of millions of people and scientists, dating back to prehistoric times. Considering urgency and magnitude of the suggested global problems, a top down call, on behalf of appropriate UN levels, should start or accelerate international co-operation in development of global and general applicable materialising systems.

The empirical, positivistic methods of natural science are to be applied on material culture too, starting with an inventory of all past and present artefacts and their description. This artificial material field is to be considered as just another natural field. Indeed, its development took a few million years too. Unlike those natural fields however, the artificial material field started its development on an ad hoc base, without the knowledge of any universal natural system and without having at its disposal any global and general applicable material system. Because this is one of the major reasons of many present global problems, and because this is preventing us from reaching sufficiently fast, direct, feasible and affordable problem solving functionality, such an artificial system is to be developed and introduced in global material culture as soon as possible. For that purpose, the higher mentioned inventory of all artefacts can result in a kind of historic solution bank, similar to genome- and biodiversity banks.

Above all, survey and analyses of collected data is to be guided by the main characteristics and generating principles, which govern and generate nature, as discovered by natural sciences and its methods. An appropriate analysis of material culture has to discover operational common characteristics too, which might be comparable with the result of the genome- and biodiversity projects for instance. Functionality and productivity of this approach however might be much higher since mankind plans, produces, uses, maintains, repairs and eventually recycles global material culture and its artefacts. In addition, for the same reasons, it might be much more efficient to work towards problem solving on the level of the problem causing layer of material culture, rather than trying to fully understand and handle the much more complex inaccessible and difficult to handle natural context. Anyhow, this natural context will always manage in recovering and proceeding, even without mankind. Especially if mankind acted in precautionary ways under inspiration of nature and its reversibility and adaptability.

Nature is inescapable and of paramount importance. Indeed, mankind evolved from nature, arrived on top of her, understands her better and better, and uses
parts of nature in order to make better use of nature or protect herself against nature. Within this context, it might even be too far fetched to distinguish nature and culture. The artificial is indeed nothing but a variant of nature. Maybe, the most natural human behaviour is artificial? Also for this reason, but above all, towards maximum compatibility and internal efficiency, physical planners should apply the most general applicable characteristics of nature on material culture towards maximal compatibility and internal functioning. Nature for instance creates her variety by means of a minimum set of standardised compatible components and combining forces. Developed countries however produce about 500,000 different building components and combine them mainly in irreversible ways. This inevitably leads to a lack of cheap, direct and fast artificial functioning. Which leads in turn to the incapability of coping with the combinatorial problem causing speed in nature in general and in the particular situations of artificial ignition.

Natural and artificial problem causing and solving speeds are to be harmonised. This is to be achieved by means of a minimum of artificial components and rules of combination. Every artefact can be compared with an atom or a molecule. The latter however (de)combine automatically, thanks to natural constants. These constants can be replaced on the artificial material level by standardisation. This standardisation would result in a decrease of the need for special planning of artefacts and would be in favour of fast, cheap and direct problem related intervention. Formal nature is not considered, but the most general generating principles are taken into account, principles about a minimum number of elements, characterising constants and rules towards their combinations, adaptions, transformations, movements and general purposeness, and last but not least, the principle about presence on all. Differences in the vibrations of strings seem to generate the set of fundamental elements. Some of them combine into subatomic elements. Together with the 4 fundamental forces, they constitute a series of atoms that already yield an endless number of natural and artificial molecules. On the next higher level, those molecules constitute minerals, single cells, and multiple cells, organic beings, animals, people, families, tribes, nations and united nations. Within each of those levels, the same limited number of basic units and rules generate endless variety. Somewhere in between, a variant of global material culture is to be provided, based on the same principles. Cloths can become part of furniture, furniture becomes means of transportation, parts of used means of transportation become infrastructure or constitute less mobile shelter etc. All of them are provided with maximal mobility, compatibility, adaptability, multi- and general uses.

These characteristics are essential since they can be found and provided in both nature and culture. Indeed, results of analyses and natural systems are to be generalised in order to reach general applicability on nature and culture. This will inevitably lead to the above-mentioned capacities.

Because of the measurability and quantifiability of artefacts, physics and by extension, chemistry can provide in a maximum of ideas and inspiration, since their progress benefited decisively from that set of characteristics, in combination with mathematics and its operational capacities. The same
capacities are needed for global problem solving and can be realised through formal and dimensional regulation or standardisation of all building and construction elements. The best possible set of measures can only be found via international research. On lower levels of generality, the halving or doubling principle and the one about fractals offer particular advantages in the field of global material culture in general.

Nature can only function as a model on the level of its most general generating principles. Theoretically, they can lead to a much higher amount of formal solutions than those existing and registered. Indeed, nature made choices out of trillions of potential possibilities. Moreover, scientific knowledge about nature results from retrospection. Planning of material culture however is a prospective exercise. As such, artificial material systems can't be considered to be scientific ones, strictly speaking, except if they are viewed as virtual or prospective ones. After all, they are also about global and general applicability. Functionality in nature is increasingly about interventions in nature towards restoring nature in its originality. As such, original nature functions as a model and a guideline for whatever intervention in nature is projected. This explains high productivity, relative success and preference for green action. Physical planning on the contrary is a prospective activity towards the unknown future, which is not provided with models. Provision of such models and the generating systems will allow the artificial or cultural context to reach at least the same functionality towards solution of the suggested global problems.

Theoretically, everything is or should be possible in the future. Although this is considered to be impossible, this should be taken into account in the design of the methods and strategy. That’s why international agencies like UNCHS habitat restrict the validity of their Agendas to 25 years, in spite of the fact that longevity of buildings and infrastructures stretches way beyond.

Fortunately, science already discovered the ways and means to consider the unknown, nevertheless. Quantum mechanics and logic indeed vary characteristics between opposing extremes. The same should be done with the characteristics, which have been registered in global material culture. This results in a complete set of relevant multivalued dualised series around every single characteristic. This theoretical comprehensiveness allows for consideration of whatever kind of describable future and avoids expiring of agendas.

Agendas frame explicitly in sets of such series and assure global and general applicability.

This approach constitutes finalisation of whatever fundamental scientific exercise, which is essentially about generalisation towards universal applicability beyond the fields of culture and nature. This means that the most general essence is about more or less (im)mobility (in)compatibility, (in)adaptability, and single multi- and general purposeness.

2 Basic method and resulting general framework.

Towards comprehensiveness on the levels of description of problems and solutions, the verbal method of regulated multivalued dualising might be the
most appropriated. This theoretical method explicitly considers fundamental basic facts of reality towards maximal functionality. Regulated multivalued dualising is somehow a synthesis of all those systems and many others, towards maximal applicability and functionality.

That method provides all possible terms about all possible characteristics with their more or less opposing extremes and the variants in between (fig. 2). Graded series result from this theoretical exercise. Those extremes are only involved for technical reasons towards reaching comprehensiveness. In practice, it's difficult to imagine that such extremes will be chosen in solution building, especially on higher social and global levels where only compromises are acceptable. The number of variants in between those extremes is unlimited of course. For reasons of, convenience and functionality, selection might be needed. Such regulation or standardisation is of paramount importance in nature too, especially on atomic and molecular levels where natural constants allow for automatic combinations.

Randomness would oblige nature to engineer every separate atom or molecule separately. Evolution as known and accepted actually would be a far cry. Such standardisation implies rules to be applied on the endless series of variants. Maybe an unlimited number of rules are available too. Choices are to be made again however. The most practical and operational one however should be considered first and might eventually exclude other ones. Since solution building is about handling of potentials, which can be verbally characterised, it might be of paramount importance to enhance that manipulation. Towards that purpose, every one of those characteristics are to be provided with capacity to transform into the variant before or after. The easiest way to do this is combining the smallest or weakest one into the larger or stronger one. This comes down to the capacity to adapt and move characteristics towards their combination, especially if characteristics about the material artificial or the natural world are considered. This inevitably gives way to doubling and halving or process, which occur permanently in nature, during cell productions for instance. These are also the easiest mathematical operations.

Whatever solution contains some of those characteristics. As such, whatever solution corresponds with the intersection of the corresponding series (fig. 3). Towards that purpose, the variants of all series are to be compatible too. This implies even more regulation and standardisation.

Combination of all possible variants of all possible series results in a theoretically comprehensive dynamic solution bank. Every one of its single solutions is provided with maximal multi- or general and can adapt and move towards, combine with, transform into each other, (in)directly and wholly or partly.
As such, described method, strategy or approach works as a UNIVERSAL AND GLOBAL GENERAL APPLICABLE GENERATING SYSTEM, which constitute a THEORETICALLY COMPREHENSIVE DYNAMIC SOLUTION BANK or framework. As such, this can be considered as a scientific exercise too science provides in universal, global and general applicable systems which can describe or define, explain adapt generate all variety which is typical for a considered field.

Depending on the kind of considered terms, natural and artificial systems such as sociology, economics, political science and social-economics. Each of them has, or can produce its own solution banks and can be distinguished. Of course they involve more specific, thus less general applicable systems, which are typical for each field or discipline. As such, all of them are to be based on the commonalities that are present in this variety which constitutes each of those
fields and which do assure a maximum of fast, direct functionality, which is involving a minimum of whatever kind of energy.

Universal systems and resulting solution banks proved their functionality and efficiency in nature. Knowledge about them accelerated development considerably. Reaching sustainable development implies constitution of solution banks as confirmed by the genome and biodiversity projects.

Within the context of this project however, this universally applicable verbal method is only applied on terms which are formally and dimensionally relevant, can be represented graphically or can influence 2 or 3 dimensional entities. All of them are combined in a model (fig. 1) which is the synthesis of models derived from all artefacts, and completed in order to allow them to adapt towards, combine with or transform into each other, (in)directly and wholly or partly thanks to their maximised multi- and general purposeness resulting from projection of that dynamic model on each of those artefacts and their components (fig. 4).

21.A

● bar, wire, rod ...
○ round ...
○ thick ...
○ full ...
○ plain ...
○ round ...
○ thick ...
○ full ...
○ plain ...
○ round ...
○ thick ...
○ full ...
○ plain ...

21.B

<table>
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<th>FORMAL SERIES</th>
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Figure 2: Singular characteristics provided by or extended into their opposites
Figure 3: Every composite characteristic corresponds with the point where all concerned comprehensive series about singular characteristics cross.
Figure 4: The regenerating form system applied to the design of screws