CIENT PERIODIQUE

Thrifty Headway: Robotic Cooperative Aids

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Abstract

The cognition procedures distinguishes the human civilisation from the natural backwoods, helping fit ways to social advancements by technology innovation and political deployment. The cognizance has *instruction* modes for its teaching and diffusion, followed by *manufacture* or *relational* modes, to profit from material sources or to benefit from collective arrangements. The tangible transforms entail permanent waste and entropy: the ecology, today, tells that our earth has bounds and depletion and exhaustion cannot continue. The advancement sustainability is new defy, asking the revision of the up-now devised technical and political assets. The review switches *localism*, to *globalism*, with technical worldwide web and robotics and political *global village*. In the thrifty track, robots are men designed cooperative aids: they can enhance the human intelligence efficiency, but not widen its functional operations.

Introduction

The ecology requires revising our ideas on the future progress, with the lessening of worthy supplies and the piling up of polluting wastes. The civilisation requires transforming resources and dropping litters: our planet is finite space; the engineer cannot ignore the linked to all energy equilibria. The thermodynamics entails irreversibility; the cycles never close; the residual entropy and mixed falloffs grow. On the earth, the men's

devised tangible transformations are outcome of intelligence: manually performed mental plans: the humans are reasoning actuators, supplying working hand and designing shills.

The men's agentive and thinking abilities are starting anomaly, making possible aware accomplishments, when, looking at what occurs around them, the changes seem running along fully pre-set trends. These are parts the huge galactic system, progressively distinguished, without identifying parallel similar anomalies. In our observations, what happens in the universe seems following deterministic laws, maybe, under *upper* or *inner* ruling. The men anomaly can be singularity, in the overall laws: we, just, have hypotheses and collect data about different possible explanatory models:

• ‹*mere* monism›: progress/regress is implicit happening, without on looking witnessing;

• ‹*godly* dualism›: tangible transformations have ruling laws, belonging to transcendence;

• ‹*forged* monism›: information qualifies matter and can be implicit construal for events;

• ‹*factual* dualism›: human ‹knowledge› describes the watched tangible transformations.

The presence of galactic information means that the transformations have ruling physical laws, i.e., the tangible stuffs follow pre-set models, supposed holy overseers. The conjectured coherence on the cosmos' behaviours, possibly, has confirmation by ‹*godly* dualism› with the spiritual supervising roles, or by ‹*forged* monism› with the information reduced to quality of matter. These suppositions can enjoy of *godly* wisdom or of *cosmic* rationality, already established, to run the tangible stuffs; then, the divine ‹*Knowledge*› or the natural levelheadedness are transcendent or immanent managing chances of the universe. The attendence of galactic information is plausible speculation, because the human cognizance seems able to be inspired by or to discover its *true* contents: the ‹*factual* dualism› offers simple readings, with the human ‹knowledge› as fancy guess, before *true* finding.

The four models prospect conventional depictions of the reality, typified by the ‹knowledge› roles: these are men's inferences, whether we are the only thinking onlookers. In this context, the first is right absence, the next two are fantasy and the last is the only worth view. The many roles are object of earlier notes [1-14], the last one deserves further remarks. Indeed, the ‹knowledge› packs human ideas, spiritual entities or material qualities, i.e., the *mental* pieces (mere repetition) go parallel to *godly* items or *natural* aspects and, if the latter two are out of sight, we have to identify just the intellectual elements. The *agentive* traits are right evident: nuclear radiations, electromagnetism, gravity, and thermal streams rise force fields; the *thinking* features seem far from perception and intellection processes. Matters and forces show existing orders; these entail ‹big data› and ‹big brother› effects, but need detection, otherwise all remains hidden. The *thinking* skins, compared to the *agentive* ones, need open and closed tracks, for data acquirement by sensing and formatting.

The *thinking* traits, grounded on the ‹*factual* dualism› model exploit fantasy and mental worlds: ideas, as said, replace *godly* objects or *natural* marks; what seen has imaginary replication by symbols with agreed meaning. The men's interpretations of sequences of acts and facts allow imagining causal frames and tried theories, arranged as shared science. The trust in the discovered physical laws is almost absolute: we think owning *true* galactic information. The civilisation, face to wilderness conquests, seems endless issue. The

ecology, only lately, require revising the earlier models, leaving thermodynamics, for informatics, to look at robotic aids. The entropy, in the backstage, moves parallel to progress' myth: this builds on the *human* intelligence, supplying entropy-less growth. Yet, today, the trends need including ecology and sustainability imperatives, registering fit passing steps. The realistic headway shall address thriftiness for our civilisation, looking at focused queries of the following sections:

• how far and correctly the human knowledge replicates the real galactic information;

• how the human civilisation develops, affecting the terrestrial resources and wastes;

• how far the ecology is impending change, forcing decreases along thrifty headways.

The civilisation assembles impressive cultural and scientific achievements, apparently altering the extant whereabouts and transformations, to achieve more suited life conditions. The culture and science accomplishments are human spinoffs or intellectual results, which become ostensible innovation, according to cogent welfare and safety. These intelligence offshoots are men's oddity, based on the aware improvements' design, tasks' planning and results' testing: the opportunities seem in opposition to entropy, creating new orders, with enhanced diversity, afar from the chaotic uniformity. The design, planning and testing are entropy-free believed mental activities; thus, they seem contrasting the jus outlined entropic trends of the reality. Is it believable? And. if true, how can we justify the human intelligence exceptional qualities? The civilisation reliability depends on the answers to these questions, but not only, because the earthly reality is the source, from which deriving resources and dropping the exhausted trashes.

The *human* intelligence, then, is quizzical help, but unsatisfactory for the progress continuance. The analyses shall cover further topics, describing the practicalities of the civilisation modes, with the upcoming limitations and drawbacks. The ‹*factual* dualism› model supplies consistent descriptions for both subjects, focusing narrations on what happens on our planet and ignoring that it is negligible part of the much bigger universe. The end remarks, thus, need taking up again the other models, to summarise how these will modify the timely developed conclusions.

Knowledge-Druven Progress

The earth-bounded narrations have been only reference in ancient ages. The humans are fit peculiarity, with *actuation* capabilities endowing high dexterity hands' manipulation, and *thought* aptitudes, awarding mind's cognition and design. The *hands* and *mind* characterise each individual, implying education and drill prerequisites by the interactive teaching/learning schoolwork of children. The overall expertise is personal and collective issue, entailing subjective proficiency and communal culture; the instruction, moreover, has to overlay the native skill and the ensample fusion, after parental tutoring and ambience tuition. Education and coaching fashion the citizens, with practical and public proficiency, covering:

• the helpful knowhow, allotting technical, business, administrative, healing, etc. expertise;

• the civic backdrop, providing the cooperation drill and political and organisational guideline.

The proficient and social instructions are essential elements, to specify the personal formation and to grant professional qualification. Actually, the teachings move from the native sophistication of the human beings: these are observers, designers and actors; they watch and judge the surroundings; they forecast and plan suited improvements; they build and employ the manufactured goods. The *agentive* effectiveness needs previous guidance and coaching, buoyed by intellectual and ensemble insights, which denote the *cognitive* efficacy of the performers, from drilling, to accomplishments. The thinking efficiency, then, supplies expertise and specialisation, to reach proficient competence [15-24].

Thereafter, the men, being active bystanders and operation performers, implement cognition, creating abstract knowledge and, undertake alterations, improving wellness and life quality. The understanding and reasoning are communal basics to communicate, exchanging symbols, with agreed allocated meaning. The effecting of enhancements and objects allows satisfying primary needs; this promotes personal exchanges; the interactive competence establishes the orderly social setups, to combine collaborative advances, under political structures. The interpersonal changeovers are rather tricking, conceiving associations with linked abstract aids, idiomatic encoding or validity concepts, which manage people and setting authorities and govern the rallies. These interpersonal organisations have political relevance:

• *to communicate*, inventing dialects/languages and setting civic/social local organisations;

• *to transact*, negotiating exchanges by barters/dealings, aimed at business and revenue;

• *to consolidate*, coordinating and systematising people's assemblies, under governments.

The organisation of civil societies is peculiarity based on alterations of the surrounds (building artefacts and businesses) and on creations of communities (families, clans, villages). The recalled goals are, actually, due to actions, defined by *manufacture* modes, or due to considerations, identified by *relational* modes:

• *manufacture* modes, with inventive making of clothes, houses, etc. for people comfort;

• *relational* modes, with behaviours allowing communication, trade and authority setups.

From archaic ages, the *manufacture* modes distinguish the men adeptness to create clothes and homes, modifying the *natural* conditions; in like time, the *relational* modes are starting hints to civic organisations. The variations are, perhaps, adjustments of original trends or innovations, widening the extant backdrops. The *manufacture* and *relational* skills differentiate men from other animals by combining the *agentive* and *reasoning* aptitudes. The individual and interpersonal talents are inborn gifts or learned abilities: they are, anyway, archaic features, typifying garbed cultures. The dresses and narrations are manmade facts, before unknown on our planet, requiring dexterity and social knacks. The explanation models of the men anomaly are, once again, useful mention, to classify the proposed hypotheses:

• *mere* monism: the matter aspects, if existing, are not apparent information, given by thinking deeds;

• *godly* dualism: the mental thinking inspires to the transcendent spiritual reality and shares the issues;

• *forged* monism: the matter qualities are information, truly sensed and encoded, as implied knowledge

• *factual* dualism: the mental perception and intellection imagines data feasibly approaching knowledge.

The matter qualification by the galactic information is puzzling query: open quiz with *mere* monism; holy entity with *godly* dualism; intrinsic aspect with *forged* monism; fancy guess with *factual* dualism. The query becomes manifest, when onlookers and judges are present and can give narrations and interpretations, as far their conscious understanding rises. The observations and findings, mainly, distinguish from the material backdrop; without discrimination (*mere* monism), the watching and detection of events cannot occur; with intrinsic discernment (*forged* monism), the location of spot qualities or changes is function, viably carrying implicit evidence. The explicit discrimination of information from matter entails dualism: the *godly* dualism, separating the spiritual reality; the *factual* dualism, separating the intellectual worlds. In usual definitions, the separation gives rise to *explicit* ‹knowledge›; the intrinsic discernment yields *implicit* ‹knowledge›, just detected quality of the current tangible carrier (the separation of information from matter does not occur). The up to now given details aim at better define the properties of four models: actually, the ‹knowledge› is outcome of not yet specified cognition processes.

The observations and findings, through perception and intellection, generate contingent ‹knowledge› and the resulting reasoning leads to design and to implement profitable improvements of the life quality. The actuation and thinking courses affect the wilderness: the civilisation ensues from mixing the upshots of *manufacture* and *relational* modes, to boost pleasantness and comfort. Today, men have robots replacing activity and thinking sequences, via *synthetic* cognition and *artificial* energy aids and equal or higher results of the computerised word processors and manufacturing lines. Innate/taught abilities are not exclusive, but shared with devices. The *synthetic* cognition and *artificial* energy widen the human reasoning and actuation skills: their origin exclusively is intelligence, with the *factual* dualism model; different origins exist, via the other models, as discussed in the purposely-quoted papers.

Moreover, the ‹knowledge› elaboration via the *factual* dualism model shows peculiarities that the linked human *instruction* modes are qualifying as much as the *manufacture* or *relational* ones. The *learning* modes are actually prerequisite of the other two: the *manufacture* and *relational* modes show action and thought instances, involving hands and minds for *specifically* designed results: objects, actualities and interactions need having detailed descriptions; then, the designs and rules define tasks and behaviours to accomplish. The *instruction* modes are instead latent preconditions, promoting the teaching/learning issues. Thereafter, facts and acts appear having histories; the intellections of them offers explanations by causa narrations: in addition to material stuffs, the abstract details are essential traits. The event progression has driving roots, effecting courses and results, but their finding needs onlookers; the alteration asks designers and actors. In the investigation, we acknowledge the series of mental features: discernment, design, planning, execution, evaluation, etc., which belong to immaterial spheres, ruling and describing the tangible reality and events.

The comments merge *instruction* modes with *manufacture* and *relational* ones: matter and information are parallel stipulations. The qualification and shaping of the reality ask identification and description. The ‹*godly* dualism› is reliable model, but transcendence and *godly* wisdom need proofs. The ‹*forged* monism› is possible alternative, trusting in immanence and cosmic rationality. Last, the ‹*factual* dualism› is right pick, if we can describe credible human *instruction* modes, showing suitable cognition processes, which, notably, support the *manufacture* and *relational* modes. The cognition accomplishes thinking, reasoning and judging tasks, after perception, classing and encrypting the signals from outside. The *instruction* modes are native

abilities, developing as individual and collective feature, possibly, with the necessity of the two components, even if it is hard graduating the communal compulsion; the ensemble learning.

Perception and Intellection

The primary stage of the *instruction* modes has to institute correct individual contacts with the around people. The primary stage is, basically, parental, principally affected by family or ethnic habits. The ensuing stages, conventionally, distinguish two lines: interactive communication by the *relational* modes; practical training by *manufacture* modes. The former line include the cognition processes, usually, performed at the ensemble range, teaching local idioms or dialects. The men's *instruction* modes differ from the ones of the other animals, because of the tuition complexity of *minds* (up to exhaustive languages) and of *hands* (up to dexterous actuation). The statement is, notably, misleading: *hands* and *minds* are evolution outcome; the *instruction* modes should pre-exist to start the adaptive shaping of the involved matter. The query is open and the narration goes on leaving open this and many other cognition steps and details.

The discernment is first step in the construction of mental worlds: it leads to distinguish feelings with allotted imports; the completion requires the choice of symbols, having agreed meaningfulness. The pick allows abstract classing; the encrypting assigns the significance range (out of which the symbols do not have the agreed meanings). The ensuing design, planning, execution, evaluation, etc. steps operate within the ensembles, in which the encrypting meaningfulness exists. The cognition process aims at establishing I interpersonal communication and comprehension within limited contacts: families, clans, ensembles, etc., to make possible the cohesion and cooperation of the involved group. The cognition entails:

• personal discernment classifies the feelings and allots vocal/graphic symbols, with meaning;

• ensemble learning needs shared agreement on the selected symbols and allocated meaning.

The discernment encoding follows parental transmission, fixing native languages, in which expressing the shared ‹knowledge›. The discernment/cognition parting is formal: the universal approach is presently significantly important research area for classification in machine language, supplying universal learning. The approach merges operation systems and interpreters; it achieves enhanced performance by combining individual classifiers, with specialised applications. The combined strength utilise the machine binary codes, with unifying chances, when parallel dictionaries are available, supplying translation automatism. This way, the mixed approaches, combining the outputs of several classifiers and models via averaging, may reduce the risk of selecting biased classing or modelling, granting, instead, robust the overall accuracy. The mixed approach effectiveness is disputable; it has mention because of the ensemble learning mitigation. Indeed, the combined cognition specialises via group of languages, towards selective syntheses, without reaching universal learning. The narrow syntheses positively apply to special decision-making, biomedical, financial, remote sensing, genomic, oceanographic, chemical or other data analysis and classification evils. Their strength builds on the independence of traditional native languages, but these are deceitful universal approaches, based on parallel multilingual dictionaries, mostly, used via bottom up handling.

Today, the construction of universal learning by the mixed approaches remains highly questionable. It shall resort to the collective ‹global village› culture and the linked top down assembly processing directly involves

unifying computer languages. In default of fused ‹global village› culture, the network data handling is feasible; the universal ‹knowledge› is communal worth, even if uttered by many native idioms, unless the universal cognition becomes standard routine of the ‹global village›, by added interpreters, built by the said combined approaches. The discernment/cognition parting remains formal; to look at universal learning, we shall refer, now, to *total* ‹knowledge› or, better, to *true* galactic information, i.e., something not locally invented by men. The galactic information, characterising the all universe, is important outcome, telling that the cosmos shall undergo coherent changes, governed by *total* physical laws, already settled by natural constraints or holy rules. The *cosmic* rationality or *godly* wisdom can be truth, also, if unknown to men. The left open queries shall investigate if the primary stage of the *instruction* modes can start without the biased family or ethnic habits of the acknowledged ensemble learning.

The different ensemble cognition results are descriptions of the same outcomes, by different languages: the universal learning, coherently, recognises the galactic information unity, even if the formats are passing marks. The discernment/cognition parting, while formal, shows communication-dependence: if bounded, only spot dialects are enough; if universal, total formats are necessary. Indeed, the combined syntheses success of the listed spot applications tell that the ‹global village› way is feasible, if special total formats are available. In recent years, the successes multiply with the increasing popularity of electro-optical sensors, such as visual and infrared cameras. The equivalent universal learning typifies many computer/device's central and graphics processing units (CPU/GPU), strong their computing capability; the deep learning and convolutional neural network have grown rapidly along ideas exploiting combined or mixed cognition ways. Among many applications, computer vision and intelligent video-based systems are relevant owing to their effectiveness in providing interpretable visual information as follows: intelligent surveillance, intelligent transportation system, face recognition, person re-identification, anomaly detection, image segmentation, video tracking, and intelligent transportation systems.

The groundwork insight of the ‹knowledge› formation builds on allotting signs and meanings to items, facts and feelings, making their identification possible by narrations, shared by the individuals of the clan. The symbols shall have uttered and written forms, to have easy exchange and storing. The creation of the language duplicates the reality by its description, with linked interpretations and judgments. The all brings to the ‹knowledge›, when the clan can verifies the time meaning stability of the encoded stability, resorting also to intergroup checks. The ‹knowledge› happens denoting the same items, facts and feelings, whatever is the used languages; the linked interpretations and judgments, moreover, appear steady outcomes, giving coherent (or *scientific*) readings of what acknowledged. The personal discernments and ensemble learnings arbitrary mays travel with the selection of signs and meanings: the *scientific* ‹knowledge› is not subjective; the end accounts appear trustful depictions of the reality. The abstraction and encrypting steps yield to the spiritual or mental realities (dualism) or the intrinsic qualities of the reality (monism). In the former events, the cognition is holy or intellectual process; in the latter one, the cognizance shall track inner instructions, so that the ‹knowledge› is implicit attributes of the reality. The holy or intrinsic trails entail transcendence or immanence traits, leading to the already recalled *godly* dualism or *forged* monism models. The present enquiry, just, limits to the *factual* dualism model (without *upper* or *inner* instructions): the cognition course follows the pace wise, bottom up *instruction* modes, towards *contingent* ‹knowledge›; the *total* forms are, possibly, later conquests, along with the outlines hints.

The Social Organisation

The relevance of *instruction* modes, characterising the humankind compared to other animals, is clear since the primary stage, implying contacts with around people and enabling coaching chances. The babies cannot survive without breast-feeding and nursing; the initial tutoring requires months or years for using communication languages; then, decennial tuition and training are necessary, to obtain proficient citizens and workers. The groundwork and teaching are pertinent way to improve the human knowhow, creating qualified employers and managers. The requirements entail practical and collective acquisitions, tracking bottom up courses, by pace wise widening and deepening the *contingent* understanding. The imaginary *contingent* descriptions can undergo tests and improvements by repeated examinations and collectives analyses, to workout coherent theories and scientific truths. The total ‹knowledge›, possibly, is obtainable this way, without resorting to the absolute *spiritual* or to the implicit *natural* hypotheses. At least, here, the *instruction* modes are the possible simple model, describing current cognition procedures.

The ensemble learning is basic starting stage in the preparation transmission, with duplication of the clan currently developed background. It, typically, employs in the national languages: the ‹knowledge› is collective interpretation of what watched, felt and judged, interacting with the surrounds and local people; the understanding is open to limited purposes, expressed in national language and reserved to spot events. Indeed, the only aims are creating local interpersonal communication: the same aims repeat elsewhere on the earth, but always limited to the locally born interacting people. We, now, notice that the *instruction* modes are ubiquitously present and everywhere communication develops: but the local choices differs and many spot talks and idioms establish. The creation slangs, colloquial speeches or vernaculars is lasting fact, showing that the languages are contingent result, not to confuse with the expressed ‹knowledge›; though, the ensemble learning remains *natural* standard transmission, possibly, to integrate or modify the coding and formatting selections. The described cognition mechanisms, already, show example options:

• combined learning, mixing human and machine languages, with meaningful outcomes:

• universal learning, using translation dictionary and ‹knowledge› permanent constancy.

The former endings positively repeat for the above listed applications. In the results, we find out not just the fundamental aspects of ensemble learning for visual applications, but also the linked time-series noise reduction and natural language processing. In the latter mechanisms, the resulting ‹knowledge› consistency shows its independence from the timely selected encrypting ways, with, in progress, restitution of the true galactic information. The universal learning issue appears authorising the ‹global village› conjectures: after that, notably, we have reliably identified the *true* physical laws. Such conclusion is not at all obvious: these laws shall exist, characterising the cosmos; the parallel ensemble learning s, working on the same data, do not add biasing errors and the averaging just improves the final estimates' accuracy. Together, the above described cognition processes advise trusting in the experimentally detected ‹knowledge›: mixing human and machine encrypting, the combined learning prospects that suited automatic information restitution is possible event. In addition, for example, we review conditions under which mixed learning, used in visual systems and deep learning may be more beneficial than a single model or classifier. Today, indeed, digital processing, generally, replaces the analogue one and proper homogeneity deserves priority.

The last remark opens further potentials. In the review, we have also addressed the machine learning connected to artificial intelligence communities. The benefits are evident in automated decision-making applications, data/sensors fusion, imbalanced data sets, etc.; beside, computer intelligence communities have discovered few-shot cognitions, automatically, operative by ‹big data› and ‹*big brother*› algorithms. The combined learning looks at current and future research lines, which do not need explicit ‹knowledge› formats, for novel applications with implicit intermediate results. The ensemble learning, along the recalled research directions, assembles peculiar procedures, assigning comprehensible formats to real aspects, in order to adapt our operation plans. Our understanding requires such formats, but the reality is different fact and many formats may equivalently describe the single aspect. At the point, it is useful fixing the ideas on the ‹knowledge›, notably, in connection with the cosmic information, if this has identifying autonomy.

The social organisation of the humankind assigns meaningfulness to the distinguished ‹knowledge›; the cognition, in its original formation, has collective shaping and bounded communication goals. The cultural functions and the scientific interpretations are subsequent discoveries. The ensemble learning limits its on process purposes at socialising, but such aims need coaching and training, to achieve adequate expertise. The language inventions remain in such bounded objects. The culture and science discoveries increasingly build, assembling, recording and comparing progressively bigger databases. The construal of theories and models is pace wise conquest, involving personal intuitions and collective agreements: the attainment are feasible, since the galactic information exists and the ensemble learning produces unbiased estimates. The conceived theories and models are coherent completion of the instruction modes, accomplishing trials and inferences to find out dependences and recurrences. The abstraction and encrypting steps of cognition get final points with theoretic mock-ups and behavioural laws, allowing computer simulations and forecasts.

Today, we recognise a hierarchy of cognitive processes, started by the innate *instruction* modes, which appear characterising every new baby. The ensemble learning is immediately possible, for parental tuition and the ensuing school teaching. The social backing is permanent necessity: the established communication has foundations in worded7graphic symbols, with clan's agreed meanings. The communication requires the understanding of the interacting people: actually, the aspects of the watched reality need having tags that singles out each feature by a shared identified; the given labels have only to be shared choices. The parallel combined learning applies, where communication connects processes and data handling devices: here, the machine instructions are intrinsic options, not requiring further specification, but immediately usable in the overall data transmission and restitution apparatus. Lately, the machine languages are jolly aids, for coding interfaces and instrumental services, to become standard references in many applications.

Finally, the validation of the timely assessed ‹knowledge› and formulation of theories and science truths are research developments, with the discovery that the universe has causal celestial mechanics ruling the galactic bodies. The progressive detection of fundamental physical laws, governing by deterministic pre-set orders the interstellar space, continues up to leading the microscopic details by probabilistic rules. The in progress ‹knowledge› unearthing postulates that the galactic information already qualifies the universe by inner rationality (or by upper wisdom). If we cannot prove that a *priori* qualification, the pace wise finding of galaxy coherent depictions make such qualification plausible. To conclude the outlined cues. If we only trust in the ‹*factual* dualism› model, the cognition is the peculiar procedure that allows to explain and to justify

what happens in the universe, to forecast possible sceneries and to plans useful corrective actions for better life quality. Tacit propositions are that explanations exist and improvements are conceivable:

• the cosmos follows coherent courses, described by rational trends or showing wise styles;

• the cognition gives worth to men, assessing dependable depictions and planning options.

The second result, in association with the ‹*factual* dualism› model, allocates significance to the human cognition capabilities, also, proving the first conjecture. The human ‹knowledge› is, surely, *contingent* issue, but it is the beginning of factually important outcomes: the civilisation headway; the awareness of falloffs and special effects. The two lines are object of the following paragraphs; the second one is, also, relevant to evaluate the other models, when the *transcendence* or *immanence* hypotheses play central roles.

Technical/Political Progress

The instruction modes are major humankind virtue, founding the civilisation deployments by means of technology innovations and political dispositions, say, changes operated on the material surrounds, to work out more friendly, ambiences and organisation of the personal and collective clusters, to build civil setups. The two transformations alter the original wilderness in responsive and sociable arrangements, where the individual comfort and the communal societies categorise along suitably enacted ethics. The improvements are composite outcomes, with technical and social modifications, performed by adroit hands and proficient minds. The all changes typify being enhancements, being designed and tested on their upgrading fallouts. The men assemble compound design and actuation operators for the technical attainments and integrated concept and execution players for the political enactments. These workers or actors typify by:

• the *manufacture* modes epitomise design inventiveness and productive effectiveness;

• the *relational* modes characterise communication, trade and governance capabilities.

The modes define innate approaches or styles of human operators and players. We start the enquiry by the *instruction* one, to tell that men are animals entailing very long and sophisticated training and teaching; with the *manufacture* and *relational* ones, we now recognise the extension of the thinking and reasoning spheres, to profit with manmade artefacts and procedures and to benefit from structured public settings. The technical workers supply front-end hands for material transformations, with plus-value fallouts; the political players secure on-process attentions for organisational duties and management responsibilities. The necessity of practical qualification explains the complexity of the teaching/learning procedures based on the *instruction* modes; the parallel requirement of proficiency skills describes the intrinsic intricacy of the human societies, with the invention of *communication, transaction* and *government* layers. The finds of technologies show the departure of men from the other animals, carrying outfits and inhabiting houses; in like measure, the creation of acquaintance links, legal organisations and public architectures wholly isolate the garbed societies, from the pre-existing natural surrounds, into new manmade environs. The progress is joint technical and political innovation, directly promotes by men [25-39].

The human work, founded on experiential knowhow, allows fashioning series of personal artefacts and collective constructions, which modify the previous scenarios: the civilisation marks discontinuity from *wild* trends, deprived of the *artificial* alterations devised by the humankind. The manmade changes aim at more health and wealth conditions and friendly wellness, at the individual/private and collective/public levels; the variations, based on the acquired ‹knowledge›, denotes high sophistication, due to the implemented theories and science and to the instituted businesses and organisations. Both levels widen the gap from the animals, making evident that the abstraction/encrypting abilities modify the agentive upshots; the designed practices have the effect of revolutions and breakthroughs, timely, starting new social orders.

Technology Innovations

The technical innovations undergo a series of revolutions, each time starting new production concepts, to obtain food and basic stuffs of the current needs of the inhabitants. The humankind differs from all other earth occupants, because they create wants, exceeding the natural produces and have to invent substitute supplies, to survive. The devising is deceptive: the existence of the up now listed modes makes the change; the linked shills allow perforating imaginative and productive processes, parallel to the *natural* ones. The fit practical design and accomplishment courses have archaic starts and continuously evolve to wider results. Still, we, notably, acknowledge impressive technology upturns:

• ‹clothing revolution›: archaic layout of garbed societies, living in aptly built houses;

• ‹agrarian revolution›: old structure of settled societies, fed by breeding and farming;

• ‹industrial revolution›: coming setup of open societies, aimed at robot-aided being.

At first, the *manufacture* modes provided personal and spot advantages, for producing wears, dwellings or memorials to leave religious or sovereignty marks. Monuments, shrines and statues last the builders and are testimonial of the oldest civilisations. Then, the manmade breeding and farming start replacing hunting for nourishments; the rural choices advise the tenure of lands and husbandry rights. The agrarian upturn is extraordinary advance, bringing on-process brainy labourers and watchers. Finally, the work effecting looks at autonomous design and labour scheduling: the industrial upturn opens to robotic improvements, when the *synthetic* hands and minds progressively replace the front-end human ones:

• the *manufacture* modes typify by personal speciation, aimed at multiple arts and crats;

• the *agrarian* advance widens to new biology areas the manmade productive effecting;

• the *industrial* improvement brands by controlled efficiency of the activity organisation.

The starts consider men, as front-end devices or machines: today, we can find plans and gears that are more effective, to perform the useful design and labour scheduling. We shall not blur *manufacture* modes and men; we have recognised that, better than men, the robots do the designing and effecting activities. In the survey, the evolution of technical conception and production accomplishments characterise the quality and quantity of artefacts and edifices made available to individuals and collectives in each societies. At first, the technical expertise is clan prerogative; this remains steady for long whiles, planned as home economy, with specialised

teams, qualified in guilds. Recently, only, the country economy settles, with local finance and toll protection, quickly aiming at maximising the productivity by scale economy, readily turned in sale driven programming. The industrial revolution rules these changes, with, new entry, the ecology:

• home manufacture, by means of spread out domestic and local textile and building jobs;

• country produces, using husbandry and upbringing jobs, as diversified fonts of foodstuffs;

• mass production, with economy of scale maxi sing productivity with minimal item cost;

• customers' satisfaction enabling economy of scope, optimising the return on investments;

• ecology sustainability, with circular planning, aimed at sources' recovery and depollution.

The industrial revolution involves the production and productivity control: the innovation turns in heavy competition factors, favouring the industrialised countries, with high productivity factories. The huge plants or shop-floors assemble the production activity out of the homes, into purposely-conceived edifices, which allow singling out the performed work cycles. The industrial parting of processing yards, successfully applies in the textile and clothing domains, followed by all, from automotive, to chemical production shops. The innovation, compared to the earlier agrarian works, is possible, if staff and energy gather locally, with the suited specialism and power. The *artificial* energy is prerequisite of the industrial revolution: the matter can avail of extra power, to widen production and productivity; the scale economy is practical challenge, if also men reduce steered mechanisms. The progress and the productivity myths start and stop. The latter turns in *economic* failure, with unsold products; the former becomes ecology disaster, when the exhaustion and pollution grow critical amounts. The short notes summarise in a series of steps:

• ‹industry 0›, with *productivity* maximally obtained by extra power and artificial energy;

• ‹industry 1›, with *making* given by on-line workforce and *scientific* work organisation;

• ‹industry 2›, with *throughput* settled by fixed automation and special purpose trapping;

• ‹industry 3›, with *production* done by robotic, aimed at adaptive planning and delivery;

• ‹industry 4›, with *provision* of products, functions, services or any other robotic deeds;

• ‹industry 5›, with running of all *tangible supplies*, under eco-sustainability constraints.

The ‹industry steps› show that the manufacture modes are agentive/thinking skills, transferred and shared with robots; moreover, the last two steps, when the agentive/thinking services apply out of the manufacturing areas, covering more general administrative, business, etc. tasks and perform the new ecology duties. The analyses of the ‹industry steps›, in conclusion, denote that:

• the agentive/thinking functions (building the progress) are shared with the robotic devices;

• the ‹industry steps› include the shift, from the manufacture, the generic engineering fields.

The remarks tell that the human-like improvements of the civilisation can have robotic origin; moreover, the industrial processing effectiveness, with computers and autonomous data processors, is general line of

work and help. These are weird acknowledgments: the civilisation is men intentional alteration of the wild natural settings by *manufacture* modes; the enhancing *industrial* effectiveness, shared with robots, applies in all technical, giving similar improvements, if satisfied the ecology constraints. The enquiry, covering the *technology* revolutions, has to deal with human abilities (*manufacture* modes), discoveries (agriculture) and activity organisation improvements (having fallouts shared with robots), but, at the end, the results have to face the ecology constrictions, requiring deepening in appropriate section.

The *technology* revolutions, however, cannot have easy justifications using the hints, earlier suggested by the *instruction* modes, because of permanent connections of the extant reality and describing physical laws. We, actually, need to distinguish the effecting and management of the processes, from the ideation and forecasting of the innovations leading benefits. The former are clever options, conceivably transformed in series of instructions, to become object of teaching and training, with linked results:

• remote dexterous undertakings of garbed societies inhabiting dwellings and settlements;

• systematic execution of manmade biology replicated courses, for foodstuff multiplication;

• effective control of the activity programming, aimed at the efficient supply organisations.

The latter are problematic options: the discovery of the textile procedures, biology courses or workflow dealing are example attainments that become unblemished, when already experimented. The *technology* revolutions, therefore, appear having mysterious roots and puzzling reasons, if the elucidations only look at clear-cut driving causes. Once we prefer resorting to looser backgrounds, the origins refer to manufacture meds, *agrarian* advances and *industrial* innovations; the choice, here done, does not limit the roots' search. Some a *priori* reasons may exist, addressing the human performances towards the said meds, advances and innovations. Our explanations, then, can avail of wider backdrops, inborn aids, unaware profits and hidden eases, or similar other events, parallel to human actions and decisions. In the short survey, the queries are open: the biology has formal settings after agriculture and the earlier revolution does not change for that. Nevertheless, the points deserve mention, for later deepening.

Political Deployments

The political *orders* experiment a series of *collective* breakthroughs, between extremely different social organisations of the communities. In the previous section, we have the physical laws on the background: in opposition, the entropy aims at dissolving the original ordered architecture; in the present section, we have the human meetings, which, from random gatherings, progressively transform in ordered assemblies. The invention of political *orders* seems to be effect of the *relational* modes, inborn ability of the humankind. The manmade *orders* undergo *collective* breakthroughs, when the earthy inhabitants face wholly altered conditions, modifying supply means, grouping routes and demography:

• ‹scattered populations›: nomadic tribes, changing homelands, aiming at foodstuffs;

• ‹settled countries›: split-sovereign ‹nation states›, fighting for conquest/supremacy;

• ‹earth fullness›: uniform contacts and trades ‹global village›, under ecology checks.

The nomadic tribes are archaic options, gathering families and clans, to reach cooperating mass effects, if the suited *relational* modes apply. The agriculture opposes to wandering, looking after land fit tenure and ownership. The stable and itinerant peoples for long whiles, asking enforced shelters and enacted laws. The stabilised societies are successful settings and the earth populations grow: intermediate settings define:

• ‹nation states› with mainly agriculture economy, to protect against rival ones and migrants;

• ‹nation states› with mixed agrarian/industry economy and worker-centred ‹industry steps›:

• ‹nation states› with worldwide contacts/trades and chiefly robot-centred ‹industry steps›.

The *collective* breakthroughs, basically, appear distinguishing the up now detailed *localism* structures, with authority splitting, from the forecasted *globalism* architecture, under cohesive control. The central ‹nation states› advances have explanation, when we presume that men enjoy personal and collective traits for exchanging ideas, carrying businesses and being subject to rules; we, namely consider:

• the sociable intercourse: colloquial links of parental/friendly approachability interfaces;

• the fit market format: public endorsement of negotiation determinants and statements;

• the apt authority setup: official enacting of governmental regulation, with cogent appeal.

These *relational* capabilities involve peculiar fallouts: invention of articulated sounds and drafted signs, to communicate; choice of value scale for barters and sale of goods; hierarchy allocation and agreement on headships; and so on. The relevance of symbols and codes, with allotted meanings, soon appears, to label the group or clan and to distinguish friends or foreigners or to mark sites or objects for special purposes. These *relational* modes have bottom up generation, with locally encrypted values and scales:

• the personal communication sphere allows civilian understanding and interacting;

• the indorsed legality sphere sustains transactions, keeping right business dealings;

• the pubic headship sphere brings in the operation autonomy of nation assemblies.

The *relational* layers have confined meaningfulness, but accomplish general functions that repeat in all clans and nations with equivalent effectiveness, thus, they look innate virtues of the entire humankind. The broad roles show the attention on mental worlds, copying and interpreting the material reality by abstract concepts and narrations and showing the coherence between acts and facts, according to causal links. This discovery is bot obvious at all, but acknowledged in parallel mental worlds an object of shared agreements. The consistency of the abstraction reasoning, however, appears replicating outer pre-existing orders, thus, assessing constitutive foundations to what involved with the *relational* modes: to *communicate*, inventing idioms; to *transact*, negotiating trades, and to *consolidate*, coordinating nations. The *relational* construal of the reality uses mind worlds to explain what sensed. The investigations build abstract accounts, apparently, according to agreed codes and inferences, but following constant schemes on three layers, yielding spoken and written idioms, legal markets and structured headships:

• the interpersonal obligations, collected as private rules, for the impartiality regulation;

• the economic foundation, inventing market and trade options, to simplify goods' supply;

• the authority establishment, prospecting government effectiveness by sanctioned rules.

The receptive, lawful and approved interactions show the intricacy of human links, through abstraction, encrypting, managerial or dominance, conceptual approaches, promoted by *instruction* modes, if applied to men, but with hopeless issues, when resorting to animals. The *relational* modes, not less than *manufacture* ones, typify men, but now dealing with the dimensions of mental worlds, immaterial brainchild, collecting ideas and feelings, fruit of the discerning and conjecturing of interacting people. The teamwork and social blend crate the cultural and widespread contents that bring together groups and nations.

With these bottoms up *relational* approaches, the political structures have *localism* arrangements, built by people speaking native dialects and idioms, with home and country markets protected by tolls and social architectures limited at the district and nation ranges. The ‹nation› concept turns out to be gathering cue to single out citizens, from aliens, fashioning spot ‹nation states›, each ones in conflicts. The shaping of closed societies resorts to cultural means (language), economic rewards (biasing tolls) and political shelters (split-sovereignty), assuming completely decisional independence of each assemblies. The autonomy is manmade verdict, indorsed using the national closure as geographic parting stipulation, completing:

• the civilian constraints, specifying lawful behaviours and forbidden activities;

• the business tasks, detailing market regulation and defining money courses;

• the official onuses, stipulating lands' exploitation and crafty empowerment.

The upper *relational* layer, not less than the other two, is human decree, perhaps, justified by God's will or Darwin's theories, which settle the *total* sovereignty conjecture with a *priori* origin. The ‹nation states› arrangements, thus, are typical *localism* constructions, with ethnic, fiscal and public narrowness, which has, perhaps, *spiritual* or *natural* foundations, allotting *total* worth. The settled countries development brings to variety of civic engagements, from city-states, the empires. Usually, the political organisation of the settled countries confers advantages compared to nomadic populations; this starts assembling empires by better performing countries, which conquest and dominate the nearby ones. The Roman and Chinese empires are classic examples, increasingly subject to raids, swops and invasions and creation different political layouts. For long whiles, the effectiveness is made by agriculture and the dominance change entails land ownership switch and differ life style of the new landholders. Many new names appear for old countries and, in any case, the settled inhabitants give slowly the rise of altered ethnic contexts.

The *industrial* revolution appears as discontinuity, affecting a subset of European countries and giving to them huge, for over a century, rewards, with profits offsetting the other political setups. This starts, for half a century, hegemony wars, involving worldwide peoples leading to the end of the European leadership and to the beginning of half-century bipolar headships outside Europe, followed by fit industrialisation of many other countries. The second millennium of the extant human history sees the world over spread of industry effectiveness, with over-depletion and over-pollution outcomes on our bounded earth. We expect that the

localism breakthroughs of the ‹settled countries› become critical political arratangement, probably, leaving way at administrations that keep account of the coming ‹earth fullness› situation.

At first, we list three *collective* breakthroughs, including, after the bottom up civic trends, the *globalism* prospects, which suddenly appear, modifying the previous leanings. These changes have technology causes and develop with the availability of computational and devices and information methods, but they directly affect the political societies, possibly, leading to the third *collective* breakthrough, due to:

• *global* communication: the worldwide web allows universal contacts and connections;

• *global* transaction: collective links promote widespread business and managing tasks;

• *global* lawfulness: over-exhaustion/contamination requires the earthy eco-regulation.

The *globalism* breakthrough founds, certainly, basis in comparer networks and worldwide web. Yet, the civic step forwards oppose to split-sovereignty setups, instead, it offers widespread connections and it asks global fairness and legality. The *globalism* outcome is, in like time, *technology* and *collective* innovation, if it imposes the stop to the ‹nation state› setups, after centuries of gradually fitting completions. The analyses of the *relational* modes seem figuring out the third upper layer, with management and government roles, if consolidation, authority or officialdom have just autonomous *local* coherence. In the lack of autonomy, the split-sovereignty is groundless claim: what happens somewhere on the earth affects the all globe; the other assemblies upset each local planning. The independence and sovereignty are mystifying conjectures; cross-coupled actions trouble the conditioning backgrounds, modifying the individual decisional freedom. These biasing constraints play explicit (but tiny) coupling, during the ‹scattered populations› ages, they, along the ‹settled countries› periods, move out of sight as inner/upper events, or disguise as conflicts and takeovers or downfalls; they, in the future ‹earth fullness› conditions, finally, shall become obvious driving inputs.

Ecologic Sustainability

The globalism is *collective* breakthrough to come, enabled by the worldwide web and computer devices, and, simultaneously, forced by the ecology constraints. The proposition seems figuring out critical swops, modifying the summarised bottom up political interpersonal arrangements, due to top down restrictions, already pre-set in the surrounding material backgrounds. Actually, entropy is well-known universal law, but now the ecology trends directly link to the human activity and to the transformations, kneeing the progress go. The changeover is impressive: it concerns the manmade inventiveness, design and planning; the linked fallouts have unwanted damaging outcomes that need controls and recovers. The independent sovereign nation-states appear questionable establishments, as they enact laws to favour their citizens, face to aliens and the unevenness is not only legal, but also institutional. If not independent, the indorsed legality shall have shared agreement, abolishing the sovereignty. The parallel nation-states, compelled to harmonise the mutually enacted lawfulness. the local sovereign independence is way to critical successes [3,40-51].

The legitimacy coordination leads to state-confederations or to federal-states; but the ‹global village› is widespread setup, to cover the complete globe and the federated lands compulsory need uniform legal rules, granting correct steadiness. Indeed, the globalism starts as technology and economic improvement,

providing contacts via the worldwide web and scale benefits via the world over market; the shared ecology restraints are further chance, specialising the ‹global village› environmental fitness. Today, we distinguish:

• localism: shaping of *regular* societies, namely, autonomous and sovereign nation-states:

• globalism: setting of the *uniform* society, say, worldwide village under ecology constraints.

The former *regularity* typified by three *relational* layers; the progress trends lead to pace wise upgrading the world over, reaching the ‹earth fullness›. The rivalry and competition, in such situations, become hardly profitable; they advise moving to *cold* wars or global liability measures, with extant frozen settings:

• the marginal autonomy: with establishment of peoples, performing leadership targets;

• the split-autonomy: with formation of competing closed societies, aiming at headship;

• the global liability: with self-rule similar countries wholly exploiting earth's resources.

The situations keep the three-layer *regularity*, but without the operation benefits of free challenging, moreover, without compulsory controls on the resource depletion and the surrounding pollution. There situations need revision, with hints from the past trends. The archaic tribes promoted nomadic settlements, limiting the consumption to spontaneous produces and for new locations, when further foods are crucial. The agriculture activity obliges land's allocation with country's' detaching and nation's formation, aimed at steady protection. The industrial activity requires *artificial* energy, produced via fossil fuels, with poisoning outcomes. The autonomy leads to sovereignties, owing leaders, which looking at the distinct profits: this is spot progress, with spot regress of neighbouring nation states; the negative effects do not have checkers. The ecology imposes controlling the allowed consumption and contamination figures: the enforced rules needs be *uniform*, as the enacting authorities cannot allot local favours; the former nation state rivalry shall become illegal; the replacing ‹global village› shall be political setup to invent.

The analyses performed using the *relational* modes have provided the *regular* political architecture with three layers. The same is, again, helpful reference, even if, now, we cannot resort to localism outfits, stating civic values. The ‹global village› has atypical political autonomous authority design, maybe, leading to total coerces, out of the democratic jurisdiction. The comprehensive contacts, businesses and eco-safeguard jobs appear having computer automatic management, without human involvement, resorting to:

• the global communication, based on computer networking and worldwide web facilities;

• the global dealing, enjoying worldwide transactions and active multinational enterprises;

• the global ecology, with equally compulsory consumption and contamination constrains.

The complexity of the political backdrops, leasing to nation-state phases, is, possibly, *natural* occurrence as if the invention of language, trade and governance are obvious facts. The alternative to the bottom up localism is the top down globalism: the global village is trustworthy social arrangement, when steadiness replaces not better-identified particularities:

• the homeland's *regularity* yields to the split-sovereign setups of parallel closed societies;

• the homeland's *uniformity* establishes the dependable open society of the global village.

The ecology requests revising how long civilisation can continue and how far progress is sustainable: the queries prospect two situations: the humankind spot progress; the galactic headway. The latter question is, still, without general answers, but with little interest, if the humankind is passing happening. Hints, limited at devising solutions of the former query, are possible, according, again, two line: *contingent* prospects just linked to the in progress human ‹knowledge›; *total* projections, if we believe in the galactic information and the *cosmic* rationality or *heavenly* wisdom are common choice hypotheses. If the devised physical laws are nothing more than human conjectures and we cannot trust in *inner* rationality or *upper* wisdom, we turn to stage of passing suppositions. These, nevertheless, allow some safeguarding policies and these are object of remarks in the following, to figure out if or not the globalism follows the present *localism*.

The investigation on the *relational* modes needs further consider the interpersonal layers: we shall not look at passing aspects, but at steady features, finally present the overall assembly need harmonising, once the earth saturation reaches worldwide spread, according to permanent layouts:

• the single sociability: family and clan cooperation aimed at friendliness and coordination;

• the private liability: self-ruled groups, exploiting stuffs, goods and doings by shared contracts;

• the public accountability: organised assemblies, under hardships and agreed hierarchies.

The final layout consolidates as ‹global village›, with boundless *uniformity* and without confined residual privileges. The civil rights are man inventions and the linked complex hierarchies denotes the goal of setting peculiar distinctions, actual merits or mere separations. The *regular* societies and linked civil rights multiply activities, fostering administrative, business, clerical, directional, governmental, managerial, supervisory, etc. duties, with the tied planning and execution processes. The civilisation requests multiplicity of human-centred jobs, needing expertise and proficiency, acquired via teaching and training. In the present inquiry, the all, mostly, avails of the *relational* modes; it creates intangible worth, through tiny decay. However, the progress develops, if the parallel *manufacture* modes evolve along the mentioned technology revolutions. The course of events changes with the *industrial* revolution, when the effectives builds by *artificial* energy and the robotics replaces human actuation and reasoning. The *globalism* connects with such change in the course of events; it equally links to technical aids, allowing social switches, and to material kerbs, requiring earthy salvage measures. The *globalism* breakthrough, thus, is necessity, having tangible foundations, but, as well, is practical opportunity, possessing suited instrumental aids; two lines open:

• robot assistances: global contact, trade, business and management, done by computer aides

• ecology restraints: global exhaustion/contamination tests, experiencing automatic effecting.

The ecology restraints are necessity. The *relational* modes are impressive way, to implement *localism* frames, but the *globalism* swop is plausible compulsory obligation, to face the dearth of new resources and the growth of daring wastes. The consciousness is today, probably, faulty: we look at our narrow interests and we do not

perceive the piling up of snags. The *globalism* brings forth assembled accounts; moreover, it offers the way to the explicit monitoring the supply chains with all connected fallouts, by means of usual data processors. The ‹global warming› is well-known accumulated effect, with side-upshots on weather and meteorological hitches. The monitoring practices have, already today, many applications:

• the even manufacture areas, developing many instances, unmanned factory included;

• the lifelong maintenance and management of delivered artefacts, by on-process acts;

• the continuous care and repair, with service coverage and repair executive handling;

• the logistic supervision, performing monitored overhaul, with sure peripheral bargain;

• the facility provision and regulation, with real-time supervision and practical controls;

• the utility distribution makeup, granting steady supply and enduring manoeuvre aids;

• the reverse logistic, to fulfil circular processing cycles, to zero litter and spoil planning.

The *global* ecology precincts lag behindhand, due to the need of parallel compulsory acts, enacted by autonomous regulators. Even the Confederations of States and Federal Countries, most of the times, leave open guidelines about many domains, such as welfare and environmentalism, to be privately managed by insurances. The common *public* watchdog of the ‹global village› is fantasy; even when world-over contacts exist and have official tenders: the ecology *restrictions* imply technical automatisms, not biased by *political* interpretations, instead, strictly balanced for the earth's recovery and salvage. The ecology constrictions, in conclusion, have origin in the extant physical laws and the environmentalism rules the connected *globalism* breakthrough according to already set causal rubrics. The upper relational layer of the actual ‹global village› cannot be *public* question; the free decisions are illusory; the outcomes affects the residua evolution of the human civilisation, even if we yet are unable to assess the consolidated upshots. It is better preserving the ‹global village› wording tom perhaps, to only setting, which includes the ecology constraints.

The Robot Assistances

The influences of the *technology* revolutions on the *collective* breakthroughs are manifest. The *agrarian* one gives significance to countries and the economy developments benefit from the safe ownership and exploitation of lands. The *industrial* one focuses on the activity organisation effectiveness and the growth gradually changes, from optimising the actuation, to integrating the reasoning, moreover, it moves, from front-end workers, to robots. The ‹industry steps› a couple of noteworthy switches:

• the ‹industry 3›, with the entry of robots, basically, to accomplish manufacturing operations;

• the ‹industry 4›, with robots to perform every, from business, t medical and service, duties.

The robot assistances means on-line computers, i.e., inclusion of *hardware/software* information gears. These, presently, are men programmed and behave following to the choices the designers. The *relational* layers can remain unmodified and can incorporate the administrative or clerical jobs with human-like logic. The robot aids do not appear *relational* switches, when considering the linked layers:

• the direct effecting, involving friendship agreements and voluntary covenants;

• the contractual links, presuming private law obligations and promised leaflets;

• the imperative bonds, rooted in supreme edicts, engaging the all communities.

The situation modifies, when the programmed duties have to include several decision levels, notably, some linked to human choices and some connected to environmental facts. Conventionally, we distinguish different options: when the updating is explicit; when it is automatic; when it is implicit; say:

• *one-way* update: changes directly link to altered downgrading with stabilising rescue;

• *automatic* retrieval: recoups develop via planned instruction and training of citizens;

• *synthetic* settings: variations add and programming has inner/upper continuity tasks.

The three options allow dealing with the ecology constraints. At first, we consider the upgrading openly done by men; then, the actions clearly linked to the om-going process; finally, we look at possible hidden rescues, perhaps, having *upper/inner* origins. Actually, we are aware of the life/cognition singularities that happened on the earth; similar other anomaly might occur, caused by miracles or stochastic events. This last line needs due mention (it is, actually object of previous studies, as already said), but left aside here, where we limit the peculiarities to the *instruction* modes or to the allied *manufacture* and *relational modes*. The present enquiry limits at detailing the transition imposed by the ‹industry steps›, when the execution of purposeful improvements, in lieu of men, has robots accomplishments. The restrictions, however, allow stating some characterising requirements in the programming management:

• the interpersonal improvements, applied as instant rules, for technical and cultural alms;

• the economic foundation, inventing market and trade options, to enhance goods’ supply;

• the ecology establishment, prospecting recovery and salvage jobs, by standard schedules.

The robot assistance adds benefits, starting at the human interfaces, specialising the transactions and monitoring the purposeful plans. The example developments show that the integration in the active space of machinelike gears does not alter the current headway: the civilisation remains intelligence driven and the around collective setups may continue according to the planned relational modes:

• the *colloquial* society, when communication is fundamental interpersonal link;

• the *business* society, when economics is dealt with, by *legal* trade regulations;

• the *political* society, when government requires enacting fit *official* protocols.

The presence of robots, nonetheless, supplements functions and opportunities: this is obvious with the worldwide contacts and the universal trading and it becomes quizzical for the ‹global village› governance. This higher layer, we already noticed, can have coherent interpretation, with the more or less direct resort to the ecology imperative bonds, but the all happens at the expense of the local autonomy and sovereignty.

The long travel of the human ‹knowledge›, from the ‹clothing revolution›, to widen the science (by biology processes) and effectiveness (by industry procedures), becomes useless and misleading since deterministic planning is enough and inventions may turn dangerous. The machinelike actuation and reasoning abilities are perplexing ways, to replicate the equivalent human skills: the former needs *arterial* energy supply; the latter entails decisive *softer* aids. These ask designers, at human or at *upper/inner* ranges (omitted option, here); the robotic competences have instrumental aims, leaving out the effecting causes. Nonetheless, the energy and intelligence are supplementary helps, supplied by the enabled processes and procedures. The robots, thus, turn up the main civilisation peculiarities, applying the designed jobs and modifying the reality to sociable assets. The deviations from the natural wilderness require clever actors, but the robots can do equivalent duties and the performed results appear tracking inner rationality or upper wisdom, depending on the used interpretation models. At the point, the robots, or equivalent clever actors, epitomise the wide set of duties that express the civilisation accomplishments, whatever done by men or not.

The progress is *crafty* invention, originally implemented by men, based on technology innovations and political deployments. At first, the clever novelties, done by scattered performers, do not affect the benign earthy courses. In early ages, the recourse to biology by-products is safe multiplication of food sources. In recent ages, the productivity makes use of effectiveness enhancement via *artificial* energy and *robotic* aids, replacing the human actuation and reasoning, by expedients and computations. We shall recognise that the agentive thinking processes are human peculiarities, possibly replicated by *artificial* energy and *robotic* aids, i.e., the civilisation can have *synthetic* development. Moreover, both, the human and *synthetic* ways, involve the increase of drawbacks, depletions and pollutions: the circular economy transformations do not exist; the entropy piling up is *natural* upshot. However, the last remark is not conclusive:

• the natural transformations have undecided trends and their steady conservativeness is faith;

• the civilisation worsening is pilot assessment, due to faulty appraisal of synthetic way.

The natural trends of the material reality are, conceivably, non-conservative, with entropic decay, but the safe lifespan is hidden expectancy; we, further can *hope* upper or *inner* event starting new cycles. How the human civilisation affects the entire galactic system is, as well, unknown, but the disproportion among the two tells that the possible fallouts shall remain *local*, with negligible *universal* impacts. The *spot* effects are, moreover, dubious, combining the singularities, starting agentive and thinking processes, with gradual decays, entailing contained exhaustion and contamination. Our analyses join progress, anthropic wellness and technical/political settings: the changes aim at men gratification, even by robot effecting. The growth sustainability shall avoid the industry effectiveness without circular conversions shall add reverse logistic steps, with parallel monitoring, granting the full visibility of the performed transformations.

The Robotic Obligations

The automatically included compulsions are opportunity the ecology constraints, according to uniform rules, all over the ‹global village›. At the state of facts, we might devise a dual arrangement, with political localism ruling the parallel ‹nation states› and the compulsory uniform ecology regulation of the earth. The enhancing transformations of the industrialism bring to resource spoiling and environ contamination. The

automatic monitoring allows verdicts and miserable issues, establishing the recovery, recycle and residual damage figures. The ‹industry 3› provides such backdrop for the manufacturing activity; the ‹industry 4› extends similar appraisal possibilities to any other activities under computer overseeing. The next industry step is, then, possible, according to alternative viewpoints:

• ‹industry 5›, ecology limits automatically applied to all activities, with globally agreed rules;

• ‹industry 5›, inner accomplishment, performed by the ‹global village›, as enacted ecology limit.

The enhancing industrial transformations cannot stop: they need have controls and undergo the ecology transition, to avoid spoils and wastes. The today headway tracks the firmer viewpoint, formally following the traditional three-layer relational closed-societies arrangements:

• the sociality constraints, prospecting right behaviours and wicked activities;

• the business tasks, detailing market regulation and defining money courses;

• the official onuses, stipulating lands' exploitation and crafty empowerment.

The separation of the political from the economic frames entails inconsistent aggregation diversity. The regular societies appear enjoying, if originally set or started orders, right shaped by the *relational* modes, possibly, after stochastic happenings. The economic and political orders, indeed, have ‹knowledge› based intangible structure, but they provide suited legality and governance setups, with material worth; then, the entropy progression growth leads to the uniform chaos, destroying the local *relational* orders. If true, the ‹global village› is steady architecture. Instead, the former ‹industry 5›, possibly, is passing step: actually, ‹nation states› without sovereign jurisdiction on the ecology needs look to be gobbledygook. Without spot independence, the local citizens have to share the common sort of the other earthy inhabitants and shall cooperate for the joint wellbeing, according to uniform rules. The *altruism* is law of the ‹global village›.

The *altruism* of the ‹global village› replaces the *solidarity* of the ‹nation states'› residents, which live with interstate rivalry. The *gene* selfishness, possibly, explains the human competition and the national contention: the conflicts allows emerging the stronger players; fights and wars seams being standard way to establish the *relational* modes, adding sociable contacts, legal businesses and effective leaderships. The contests are *natural* selfishness issue, possibly suspended if sociability is more profitable, the legality gives advantages and authority grants recompenses. The races and rivalries avoidance and adjournment require reasoning and judgment. The *solidarity* and *altruism*, thereafter, are induced effects, built on cognitive and decision tests, detected through the causal narrations exchanged within the human communities. The *gene* selfishness is firs upshot; the *meme* solidarity is second result, started by *instruction* modes, when the clans promote and propagate the collective cognition figures, along with the localism outlines. The ‹nation state› ages bring the rivalry at country's rank, with nationalists fighting aliens, following patriotic faiths. The ethnic parting avail of suitably formalised and presented native idioms and cultural traditions. The three *relational* layers develop self-sufficient regularity, providing trustworthiness to the split-sovereignty interpretations. The *globalism* breakthrough is the alteration of such well-defined political setups.

The *meme* altruism induced result appear lop-sided condition, without rivals to contest and foreigners, from which getting profits. The *gene* selfishness, with the ‹global village›, aims at steadiness, i.e., resource continuity and leftover nonexistence; this is utopia and the return planning has just intellectual construal. The globalism, nevertheless, has coherent scenery with the ‹industry 5›, widely exploiting robotic devices, instead of front-end workers, for the design and effecting of the civilisation headway. The ‹industry 5› has enforced programming and manacles are unavoidable, thus, fully transferable as reflex accomplishments, already fixed with the asked ecology limitations. We acknowledge two facts:

• the planning and execution automatism in the management of the men-replacing robots;

• the compulsory sort of the ecology constrictions on the civilisation headway transformations.

The free decision means infringing the set ecology boundaries. The previously settled robotic obligations are obvious way to keep sustainable ecology targets, according to the prospected intents. Now, the ‹nation state› localism seems aiming at unsafe environments; the ‹global village› globalism, possibly, offers proper alternatives. With the globalism breakthrough, the emerging political setup enable new behavioural types and practices, providing more powerful and effective results. The new ways shall distinguish:

• the robotic design and effecting merely duplicate standard manmade activities and controls;

• the robotic activities and controls can accomplish operations, exceeding the human capabilities.

The former way, typically, presumes that the robots are manmade design: they can be more talented or efficient, but the performed operations remain in conventional domains, imagined and implemented by the *human* intelligence. We shall recall, however, that the apparent *human* intelligence is possible side effects of *inner* or *upper* properties of the reality, say, natural rationality or godly wisdom. The robots, thereafter, identify the wide sets of actions and controls with *natural* or *holy* origins, already present in in the tangible surrounds and timely enabled at appropriate instants or stochastic events. Such latter way helps assuring recycle and recovery operations, automatically keeping conservative earth stability. If the global rationality or wisdom is *total* truth, the universe trends reflect the same coherent conservative; our planet shall follow safe steadiness, with *inner* or *upper* corrective interferences, applying natural or holy remedies, even when the human intelligence appears unable to find solutions.

The latter way, as already recalled, has mentions prospected in studies, when *faith* in *cosmic* rationality or *godly* wisdom is helpful guess. The present enquiry prefers omitting the *inner/upper* intrusions. Yet, the latter robotic way limits to rigs and schedules designed by men. This, anyway, widen the chances: recourse to deep-sea or space robots allows working in hostile environs and reaching new sources or extra deliveries out of usual anthropic regions; the option, certainly, modifies the ecology limitations, but, presently, the robotic aids assure tiny profits. However, sustainability implies full ecology transition: this is defy that asks looking at apt renewable resources and performing complete recycling processes. At the point, the ecology transition turns the robot assistance into robotic compulsory tasks, with enforced accomplishments for the ecology safety; the duty entails the ‹global village›, transforming in robotic obligations.

The sustainability implies ‹ecology transition›, i.e., the systematic resort to rescue and recycle processes, to minimise rubbishes, instead, to supply alternative supply sources. The standard industrial practices shall have parallel reverse logistic courses, removing the potentially toxic falloffs. The ‹ecology transition› could approach economy circularity, when the recovery stimuli offset the reverse logistic duties; on the earth, it cannot be neutral: the entropy is general physical law. We need resort at interplanetary balances, moving off disorders and using stellar sources: the robotics is critical aid, exploiting the extant distort that makes negligible for the universe, what happens on our planet. The ‹global village› becomes complex collective organisation, combining the socio-political responsibilities and the current ‹ecology transition› errands, automatically assigned to properly programmed robots. The localism made imaginable narrow autonomy, establishing marginal sovereignty, aimed at home-centred supremacy, with national limited traits. Now, the globalism makes conceivable stable self-rule, founding uniform ecology control, targeted at sustainability. The ‹global village› does not allow restricted self-government, banishing selfish solidarity, which damages the other earth's dwellers. The *relational* modes, without marginal regulation, cannot deal with bordering team spirit and the lawfulness, face to ecology, directly builds the inhabitants' altruisms.

Conclusion

The human civilisation appears intriguing happening in the universe, with aware actors and designers on the negligible planer earth, endowed of the thinking and judging skills. The reality is galactic backdrop, with still undecided size and scope: we even do not know if backdrop, size and or are meaningful notions. We, only, perceive that we cannot affect the galactic setting: the reality evolves whatever are our thoughts and designs, because the humankind is wholly negligible aspect, compared to the overall reality. The absence of symmetry between human and galactic courses is *scientific* statement or *total* truth and this enthralling not less than the initially mentioned men civilisation. The different remarks and conclusions, specified along the study, shall never ignore such lack of proportion, relegating the human facts at the level of trifling racket.

This initial statement or truth explains the men's expectancy of founding our civilisation on *absolute* acts and facts, somehow, linked to the galactic reality. The simplest cue connects the *human* intelligence (giving thoughts and judgment to men), with the *cosmic* rationality or the *godly* wisdom, say, *inner* or *upper* traits of the surrounding reality, granting *total* worth to our ides and projects. Such guesses are possible; they link to amazing capabilities of the human species, started by the *instruction* modes. In the carried enquiry, the *inner* or *upper* foundations do not exist: instead, cognition develops by pace wise *meme* fruition; further, *manufacture* and *relational* modes suffice creating technology and political advances. The civilisation is just *contingent* issue of the *human* intelligence. In like time, we have the aware development of science, leading to true physical laws (and entropy) and the mindful integration of worldwide understanding and managing options (with full account of profits and losses) [52-58].

The limitation to *contingent* acts and facts implies bounds on the growth leeway, since the earth can just deal with marginal and temporary provisions and disorders. Our partial operation freedom specifies by:

• ecology restraints, with exhaustion/contamination limits, assigned by rescue/recycle abilities;

• robot assistances with worldover and interplanetary handling/management of the resources.

The ecology asserts the supremacy of the tangible surrounds on the improvements, wittingly, conceived for enhancing the life quality: the unwanted effects are unavoidable; perhaps, we may mitigate the snags, if aim at thrifty headways. The frugal prospects entail awareness of worries and extenuations of drawbacks, since the entropy is universal effect of all tangible happenings. The cooperative robots' inclusion looks after conscious planning of changes and automatic alleviation of fallouts. The exoneration from hitches involves the universe/earth unbalance, resorting to extra galactic sources and dispersing litter in the sidereal space, so that our planer keeps safe steadiness and the universe disturbances remain insignificant. In the present study, the robot roles do not look at extra helps from *cosmic* rationality or *godly* wisdom; the simple human intelligence is enough to design and implement the robotic equipment that automatically grant the devised safe earth's steadiness. The universe's incognisance implies thrifty headway, to limit every excesses at vital and frugality ranks. The ‹global village› is compound social organisation, performing the ecology protection acts with the required planning uniformity. The *altruism* is top down issue, automatically accomplished at the collective range, being residual ‹knowledge›, already shared at relational governance layer and agreed as standard lawfulness tenets [59,60].

Bibliography

1. Michelini, R. C. & Razzoli, R. P. (2014). Anthropoid odds: robotics & cognitive revolution. *Intl. J. Engineering Research & Management., 1*(5), 177-185.

2. Michelini, R. C. (2015). Economy plans and growth features. *Int. J. Higher Education of Social Science, HESS., 8*(3), 37-48.

3. Michelini, R. C. & Razzoli R. P. (2015). Progress continuance sustainability. *American Journal of Industrial and Business Management AJIBM., 5*(12), 829-838.

4. Michelini di San Martino R. C. (2016). The intellect depoyment: creation of civic modes. *Int. J. Advanced Information Science and Tecnology, 16,* 57-69.

5. Belotti, V., Michelini, R. C. & Razzoli, R. P. (2017). Relational modes and thrifty progress. Int. J. Application Innovation in Engineering & Management, 7(1), 131-146.

6. Michelini di San Martino, R. C. (2017). The relational trends to sustainability. *Intl. J. Sustainable Entrepreneurship and Corporate Social Responsibility (IJSECSR), 2*(1), 13-26.

7. Michelini di San Martino, R. C. (2019). Humankind engineering and management: robotic track. *Journal of Robotics and Automation, 3*(1), 83-98.

8. Michelini di San Martino, R. C. (2018). Civilisation modes and ecology constraints. *Intl. J. Historical Archaeology & Anthropological Sciences., 3*(6), 803-811.

9. Michelini di San Martino, R. C. (2018). Progress bases: biology and cognition. *Intl. Robotics & Automation J., 4*(6), 358-366.

10. Michelini di San Martino, R. C. (2018). Business sustainability and frugal chances. *Int. J. of Robotic Engineeing, 3*(1), 1-11.

11. Michelini di San Martino, R. C. (2020). Anthropic advances: global robot driven rescue. *Int. J. of Robotic Engineeing., 5*(1), 1-15.

12. Michelini di San Martino, R. C. (2020). Progress queries and sustainability: basic views. *Intl. J. Clinical Studies & Medical Study Reports., 6*(4), 1-8.

13. Michelini di San Martino, R. C. (2021). Manufacture paths: robotics & sustainabilty, in M.A. Mellal, Ed., Advanced Manufacturing: Progress, Trends and Challenges. *Nova Sci., 7,* 126-188.

14. Michelini di San Martino, R. C. (2021). Manufacture/relational modes: robotic sustainability. *Intl. J. Research Studies in Science, Engineering & Technology, 6*(1), 9-22.

15. Michelini, R. C. (1983). Revisione di aspetti sulle misurazioni, Ingegneria. *Rivista di Scienza e Tecnica, 4,* 76-82.

16. Michelini, R. C. & Rossi, G. B. (1985). *The PSD Measurement of Atma-Process Correlation by Exponential Modelling.* IASTED Int. Conf. Applied Signal Processing & Digital Filtering, (Pp. 302-305).

17. Michelini, R. C. & Rossi, G. B. (1986). *IMIMS an Interactive Cad-Code for the Modelling and Identification of a Multi-Mass Vibrating System.* IASTED/ADCET Int. Conf. Identificati on & Pattern Recognition, Toulouse, (Pp. 587-522).

18. Michelini, R. C. & Rossi, G. B. (1987). Computerised test-scheme for the motion recognition and evaluation of dynamics systems. *Intl. J. Measurement., 5*(2), 61-68.

19. Michelini, R. C. & Rossi, G. B. (1992). Assessing quality measurement and technical certification. *Intl. Conf. Automation '92, Budapest, 2,* 321-333.

20. Michelini, R. C. & Rossi, G. B. (1995). Evaluation of uncertainty: probabilistic theory for intensive entities. *IMEKO Int. J. Measurement., 15,* 143-157.

21. Michelini, R. C. & Rossi, G. B. (1996). Assessing measurement uncertainty in quality engineering. 13th Intl. IMTC IMEKO Conf. TC7, Brussels, 1, 1217-1222.

22. Michelini, R. C. & Kovàcs, G. L. (1999). *Knowledge organisation and Govern-for-Flexibility Manufacturing.* Baskin, A., Jacucci, G., Kovàcs, G. L., Eds., Cooperative Knowledge Processing Drsgn, Academic Press, New Mexico, (Pp. 61-82).

23. Belotti, V., Crenna, F., Michelini, R. C. & Rossi, G. B. (2002). Wavelet analysis for railway wheel-flat detection. *Intl. Conf. Sound and Vibration., 351-357.*

24. Michelini, R. C. & Kovàcs, G. L. (2005). *Information Infrastructures and Sustainability*. Camarinha Matos B., Ed., Emerging Solutions for Future Manufacturing Systems, Springer, Berlin, (Pp. 347-356).

25. Michelini, R. C., Acaccia, G. & Molfino, R. (1987). *Design of Intelligent Logistics for Factory Automation*. IFIP Workshop on Factory Automation, Invited Lecture, Tokyo 19-21, (Pp. 184-208); and Sata T., Olling G., Eds., Software for Factory Automation, North Holland, Amsterdam, (Pp. 297-312).

26. Michelin, R. C., Crenna, F. & Rossi, G. B. (2001). *Diagnostics for Monitoring Maintenance and Quality Manufacturing*. Leondes C.T., Ed.: Computer aided design and manufacturing: techniques and applications, CRC Press, Boca Raton, II, 10.01-62.

27. Michelini, R. C., Acaccia, G. M., Callegari, M., Molfino, R. M. & Razzoli, R. P. (2001). *Computer Integrated Assembly for Cost Effective Developments*. Leondes C.T., Ed.: Computer integrated manufacturing, CRC Press, Boca Raton, V, (Pp. 2.01-66).

28. Michelini, R. C., Acaccia, G. M., Callegari, M., Molfino, R. M. & Razzoli, R. P. (2001). *Instrumental Robot Design with Application to Manufacture*. Leondes C.T., Ed.: Computer integrated manufacturing, CRC Press, Boca Raton, VII, 3.01-68.

29. Acaccia, G., Michelini, R. C. & Qualich, N. (2005). *End-of-life Vehicles Gathering and Disassembly: Modelling and Assessments*. Intl. ESM-MESM Conf. Eurosis'05, Porto, 24-26, (Pp. 34-40).

30. Acaccia, G., Kovàcs, G. L., Kopàceski, S., Michelini, R. C. & Razzoli, R. P. (2006). *Service Engineering and Extended Artefact Delivery*. Putnik, G. D., Cunha, M. M., Eds., Knowledge and technology management in virtual organisations, IGI, Hershey, (Pp. 45-77).

31. Acaccia, G., Michelini, R. C., Penzo, L. & Qualich, N. (2007). Reverse logistic and resource recovery. *J. Sustainable Eng. Management: Review of Science, Technology and Sustainable Development, 4*(3), n. 4/5, pp. 284-332.

32. Michelini, R. C. & Razzoli, R. P. (2008). *Innovation for Sustainability in Product Lifecycle Design*. Cascini G., Ed., Computer-aided innovation, Springer, Berlin, (Pp. 217-228).

33. Michelin, R. C. & Razzoli, R. P. (2010). *Environment–Enterprise Integration: Networked Entrepreneurial Opportuinities*, in F.Teuteberg, J. M. Gomez, Eds., Corporate environmental management information systems, IGI-BSR Pub., Hershey, (pp. 347-364.)

34. Michelini, R. C. & Kovàcs, G. L. (2013). Lifecycle eco-services for sustainability. *Int. J. Service Science & Management Research, SSMR, 2*(4), 48-56.

35. Michelini, R. C. & Razzoli, R. P. (2012). Cognitive revolution: prosperity and sustainability. *Intl. J. Productivity Management and Assessment Technologies IJPMAT., 1*(3), 87-103.

36. Michelini, R. C. & Razzoli, R. P. (2012). Formation and information of value-aided attainment. *Intl. J. E-Business Development IJED., 2*(4), 145-154.

37. Michelini, R. C. & Razzoli, R. P. (2013). Relational deployments towards cognitive global frames. *Intl. J. Systems, Cybernetics & Informatics, 11*(1), 1-5.

38. Michelini, R. C. & Razzoli, R. P. (2013). Social breakthrough to global collective order. *Intl. J. Systems, Cybernetics and Informatics, 11*(5), 13-19.

39. Michelini, R. C. & Razzoli, R. P. (2004). Product-service eco-design: knowledge-based infrastructures. *Intl. J. Cleaner Production., 12*(4), 415-428.

40. Crenna, F., Michelini, R. C. & Razzoli, R. P. (2014). Robot driven cognitive revolution: sustainable growth images. *Intl. J. of Research on Computer Engineering and Electronics, IJRCEE., 3*(3), 300-305.

41. Belotti, V., Crenna, F., Michelini, R. C. & Rossi, G. B. (2005). Remote sensing and control via client-server layout by robotic landfill total recover. *Intl. IMEKO Conf. TC1/TC7., 725-834.*

42. Michelini R. C. & Acaccia, G. (2006). Distributed intelligence shops: quality clothes manufacture from fabric warehouse to sewn garments. Lin J.X., Ed., New Developments in Robotic Research, Nova Sci., New York, 4, (Pp. 121-172).

43. Acaccia, G., Michelini, R. C., Penzo, L. & Qualich, N. (2006). Car dismantling facilities: programming and operation results. *Intl. Conf. ECEC & FUBUTEC., 75-81.*

44. Kovàcs, G. L., Kopàski, S., Haidegger, G. & Michelini, R. C. (2006). Ambient intelligence in product life-cycle management. *Int. J. Engineering Applications of Artificial Intelligence, 19*(8), 953-965.

45. Anufriev, A., Kovàcs, G. L., Kopàceski, S. & Michelini, R. C. (2007). Ambient intelligence: enabling technology in modern business paradigms. *Int. J. Robotics & Computer Integrated Manufacturing, 23*(2), 242-256.

46. Michelini, R. C. & Razzoli, R. P. (2009). Complexity patterns of closed industrialism. Cruz-Cunha M.M., Ed., *Mamagent & Organisation of Enterprise Information Systems, 17,* 329-351.

47. Michelin, R. C. & Razzoli, R. P. (2010). Decision support for the lifecycle eco-design. EMC Press, Intl. *J. Environment Conscious Design & Management, 14*(3), 67-85.

48. Michelin, R. C. & Razzoli, R. P. (2010). Reverse logistic: the end-of-life vehicles pledge. Goti A., Ed., *Discrete Event Simulation, 7,* 115-140.

49. Michelini, R. C. & Razzoli, R. P. (2011). Integrated design: lifecycle eco-consistency. *WSEAS Transactions on Environment and Development, 7*(9), 275-284.

50. Michelini, R. C. & Razzoli, R. P. (2013). Extended enterprise lifecycle reliability: the KILT model and TYPUS metrics. *Intl. J. E-Business Development IJED., 3*(3), 108-115.

51. Michelini, R. C. & Razzoli, R. P. (2014). Growth vs. spoil: knowledge sceneries. *Int. J. Environmental Science & Engineering, 2*(5), 1-14.

52. Michelini, R. C. (2008). Knowledge entrepreneurship and sustainable growth. *Nova Sci.*, xviii-32.

53. Michelini di San Martino, R. C. (2009). Robot-age knowledge changeover. *Nova Sci.*, xvi-344.

54. Michelin, R. C. & Coiffet Ph (2010). Essai sur les quatre capitaux assurant la fortune de l'humanité. *Libraire de l'Académie de Frances des Technologies.*

55. Frumento, S., Michelin, R. C. & Razzoli, R. P. (2010). The duty-split approach in robot surgery. *Nova Sci.e Inc.,* v.78).

56. Michelini, R. C. (2012). Society progress evolution: sustainability and responsiveness, Nova Sci. Pub., New York, p. xxxi-418.

57. Michelini, R. C. & Razzoli, R. P. (2016). Industrialism reduction either complexity patterns, in M.M.Cruz-Cunha, Ed., Social, Managerial & Organizational Dimensions of Enterprise Information Systems, IGI Pub., Hershey, 17, 329-351.

58. Michelini di San Martino, R. C. (2016). Cognitive revolution quest: human civilisation prospects. *Aracne, Roma,* xi-775.

59. Michelini di San Martino, R. C. (2021). Progress management and ecology sustainability. *Int. J. of Medical and Clinical Studies, 4*(3), 1-15.

60. Michelini di San Martino, R. C. (2021). Robot-like construal and civilisation. *CPQ Medicine., 12*(2), 1-17.