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SYSTEMIC VISIONING AND INNOVATION FOR EQUITABLE AND SUSTAINABLE SOCIO-ECONOMIC DEVELOPMENT ¹

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INTRODUCTION

Visions, innovations and inventions are cornerstones of the development of human society. To take root and flourish they need to be embraced by a critical mass of stakeholders, whether those be individuals, communities, businesses, institutions or governments.

To result in equitable, sustainable development the innovations need to be conceived, developed and applied with integrity and functional wisdom. Concurrently, they need to be supported and supplemented by ample, relevant and timely learning, knowledge and information.

Securing extensive acceptance is a major challenge unless constructive innovation becomes part of the predominant culture. In many cases success can be achieved by ethically rewarding the support of new initiatives for the common good. However, the social and bureaucratic context of innovation is often not ready for change. The resistance met in a village, a corporation, or public institution may have cultural, social, economic, political or multiple causes.

The remarkable American vision and accomplishment formulated by President Kennedy in 1961: *"I believe that this nation should commit itself to achieving a goal, before this decade is out, of landing a man on the moon and returning him safely to earth,"* mainly involved the purposeful and innovative mustering of a few sectors of American society. The project primarily involved academia, high-tech industries and the military. An overall national approach was not necessary.

On the other hand, the Malaysian *Vision 2020* launched in 1991 requires the activation and involvement of all parts of the nation. It states that *"the ultimate objective that we should aim for is a Malaysia that is a fully developed country by year 2020... It must be a nation that is fully developed along*

¹ The point of departure of this article is the paper: "Systemic Development and Implementation of Innovation: Towards Vision 2020" presented by Zachariassen in 1999 when invited to offer input to the official Malaysian plan 2001-2005 within the framework of Malaysia's Vision 2020.

*all the dimensions: economically, politically, socially, spiritually, psychologically and culturally. We must be fully developed in terms of national unity and social cohesion, in terms of our economy, in terms of social justice, political stability, system of government, quality of life, social and spiritual values, national pride and confidence.”*² Such a vision is truly among the grandest and most encompassing of visions for any country, including all of those that identify as developed countries today.

For any nation to be well on its way towards objectives comparable to those stated in the Malaysian Vision 2020, it would need to adopt a systemic approach to development and implementation of innovation. This should include all of its major components: population, systems, resources, the environment and a host of other stakeholders and key factors. For such an ambitious nation it is not enough to involve only a few operative sectors. It needs to embrace a culture of innovation for the common good.

In the following I shall outline some key areas of human society which need to be in the forefront promoting and practicing visions and innovations. Direct accounts from real life often make it easier to emphasize points than theoretical statements. So I shall mention a few classical case stories. And I will also include some of my personal observations and hands-on experiences, as I have lived most of my life with visions, innovations, inventions and issues of socio-economic development around the world.

For many people innovation is most frequently associated with technological inventions. Yet innovation and invention in other fields are certainly of no less importance to the development of society. But the issues arising with technological innovation are often strongly reflected in other fields, including governance, conflict resolution, economics, environment, education, culture, organization, legislation, transportation, etc.

TECHNOLOGY INNOVATION

Many believe that important technological inventions can be conceived only in corporations with very substantial research & development (R&D) capacity and budgets. On the contrary, many major inventions have actually come into existence in very modest environments such as kitchens, basements, or shacks, on shoestring budgets. This fact contains a very important message, not the least for developing communities, regions and countries.

It is said that major R&D organizations are likely to be minor sources of major inventions and major sources of ‘improvement’ inventions.³ This statement well illustrates the prevailing situation in many major industries during the past century and more.

At the same time it should be realized that many inventions require very high development and other costs to become successful. That is a major reason why, especially in high-tech sectors, numerous innovative upstart enterprises are taken over by large corporations with the capital necessary for development, production and marketing.

Important inventions can offer exceptional new possibilities. They can also cause disruption far beyond their original field. In many fields even very recent inventions risk being quickly overtaken by

² Extract of the working paper ‘*Vision 2020 - The Way Forward*’ presented by the prime minister of Malaysia, Dr. Mahathir Mohamad at the inaugural meeting of the Malaysian Business Council held in Kuala Lumpur on February 28, 1991.

³ D.Hamberg: *Invention in the Industrial Research Laboratory – The Journal of Political Economy*, Vol. 71, No. 2 (Apr., 1963), pp. 95-115.

still newer and better ones, or sometimes even by old inventions applied in new ways. Today information technology and other industries are filled with scary examples of almost instantaneous obsolescence. *The need for reliable and up-to-date knowledge, curiosity, foresight and wisdom is boundless. Adaptability becomes imperative.*

The following three examples relating to kitchen sinks, dairy machinery, and office copiers are good illustrations of how difficult it can be for even the most respected specialist or organization to make sound forecasts, let alone realistic plans, reaching years into the future of any business or industry.

Example # 1: Production of kitchen sinks

A countryman of mine with only rudimentary schooling made an invention that until then had been declared scientifically and technically impossible by leading technical universities. It was a process for deep-drawing stainless steel sheets to produce among others: kitchen sinks. Since that technological breakthrough there have been produced tens of millions of kitchen sinks based on his invention. When asked how he did it, invariably he answered with a wry smile: ‘Well, I just did it. I did not know that it was impossible...’

Example # 2: Industrial butter production

For decades manufacturers had competed intensely about who could invent the most ingenious device for getting butter out of churns and move it further on in the process. A great many contraptions – including various versions of screw conveyors – were invented, duly patented, and in use. But none of them properly solved the problem of how to easily and regularly clean the rather complicated equipment from the sticky butter.

Then suddenly occurred an elegant solution, which leading manufacturers adopted without hesitation: to attach external vibrators to the churns and other equipment. A few seconds of vibration and all of the butter was out of a churn and further on in the process without any visible trace.

The amusing part of the story is that the new solution could not be patented – because it was based on public knowledge. Had a construction worker, used to vibrating concrete, passed by years earlier and learned of the problem, he would very likely just have turned around and said casually: why don’t you just fix vibrators to the outside of the equipment to get your butter out?

One of the lessons from this story is that *incessant curiosity, association of ideas, and ample occasion to learn about methods and technologies used in fields far apart are most important ingredients during the processes of invention and innovation.*

Example # 3: Office copying machinery

A famous example of how such a mechanism was not in place at the right time in leading organizations of an industry is the story of Xerography, the dry-copying process that fundamentally changed office procedures the world over. It gave The Xerox Company a virtual monopoly on office copying for many years until the key patent expired and the world was inundated by the products of competing corporations using that same technology.

Who invented it? Employees of Xerox? No! Employees of a major player in the photocopying business taken over by Xerox? No again. The inventor was a certain Mr. Chester

Carlson, who developed his invention largely in his kitchen... For years he tried in vain to sell the invention to more than twenty of the largest corporations in the office machinery business including IBM, Kodak, General Electric and RCA. None were interested. They did not have the right procedure (and open-minded spirit) to grasp the unique occasion right in front of them.

There can be enormous opportunity cost to being wrong. A key decision in any direction causes a cascading effect through a company, or industry, or even country that affects future values and future risk. The ideal is a rational balance between two extreme goals: optimize for “low risk” or optimize for “high reward.” But rationality is in the context of the specific information and knowledge available for a decision.

This principle of rationality being specific to context of course also applies to every decision involved with innovation in general. Products, processes and systems are obviously not just the results of innovative minds free of constraints. Usually one way or another they also have built into them the current laws, technical norms and standards, available services, price and tax structure, incentives and disincentives/levies, and of course also: agreements on the labor market, typical ergonomic measures, social and cultural factors, climatic conditions and other specific traits of a particular country, and place and time of origin.

The results of an innovation process, related to any kind of development, are usually optimized for a particular context. That means, they may not be as wonderful, or even be relevant, in a different context. Because of such largely invisible features, in many cases it is quite likely that the function of a product, process or system in the least will be less satisfactory than expected by many, when used outside of the original frame of reference.

Generally speaking, we live in a world where the effects of what we are doing go way beyond the place of origin of anything. Whether it is a thought, a process, a product, a rule, a model, or whatever, we have to have knowledge and understanding of – and openness towards – many other contexts and environments than our immediate one, in order to be able to contribute positively to development outside our home base. We also must realize that there is an optimal frame of reference for everything. To avoid mistakes we should all learn about this throughout our life-long learning and education. It has to do with safety, with environment, cost, opportunity, and so on. And not the least it has to do with due respect and concern for other human beings.

KNOWLEDGE POLLUTION

Proven, timely, appropriate, adequate, and easily understood and applicable information and knowledge is of paramount importance to every individual, community, enterprise or nation wishing to progress. Even in our days of supposed enlightenment giant man-made catastrophes happen because of lack thereof.

New knowledge is created continuously everywhere. Some of it may only or mainly have *ad hoc* or very localized relevance but most knowledge has importance far beyond time and place of origin. At the same time our environment of information and knowledge is immensely polluted, just as our natural environment is in its own way. This phenomenon is so much the more critical for developing countries, communities and people vitally dependent upon the quality and adequacy of the knowledge directly available to them.

An enormous amount of knowledge and information, including countless very valuable innovations in the form of ideas, designs, models, programs and processes, etc, is today available via the Internet or otherwise. Just as an example, millions of expired patents are in this way openly accessible and available for free use. However, much or most knowledge and information of any consequence require reliable verification, and is not

yet available in a form and language compatible with the needs of most potential end-users wherever they may be, not the least in developing countries.

When people have needed information at hand in a suitable form, it becomes much easier to adapt to a situation, or conversely adapt a situation to their needs, and those of their families and communities and so on. The complexity in the modern world is most often solved by indirection, usually known as “middlemen,” but that breeds what generally proves to be a most costly dependence to the delight of middleman industries. However quite often the complexity is unnecessary or it can be significantly reduced through rules of thumb or other focusing mechanisms, and through increased easy availability of appropriate information, knowledge and training.

As an example, when involved in a project in India relating among others to both Mumbai (Bombay) and the foothills of Himalaya, I discovered that the cost of 20 ft Bamboo poles for construction was about 25 Rs in Bombay, while the cost in the forest areas up north from where many of the poles originated, was only 0,05 Rs, that is a ratio of 500 to 1!

Expanded use of innovative tools can make a significant difference in broadening the base of empowered individuals and communities.

To illustrate more precisely what I mean, I like to tell you an eye-opening experience I had many years back in a country in the Middle East. I was negotiating the purchase of a second hand power station for use in connection with a hospital. In came a man from an oasis in the desert. He wanted to buy a cable. ‘What kind of cable?’ asked the salesperson. ‘An electric cable,’ was the reply. ‘What for?’ ‘We want electricity,’ was the reply. ‘And how do you get electricity when you have such a cable?’ asked the salesperson. Well, it transpired that a high-tension electrical transmission line passed by some kilometers from the oasis. So, with a cable they could get electricity into the community...!

‘What should be the size of that cable?’ asked the salesperson. After some palaver, the visitor indicated the cross section of the cable with his fingers, stretching his hand towards the salesman. And thus the conversation went on for a while.

‘How many households are there in your community,’ I asked? ‘What about school and marketplace, and workshops?’ And after some further questions, using rules of thumb and basic formulas I was able to make a very rough first estimate of the needed generating capacity of an initial power supply for the community. Probably within the range of +/- 35%.

The man from the oasis was an intelligent and trusted representative of his community. He and his fellow villagers just had not been given the tools that could have guided them to do their own preliminary feasibility study, including approximate costs of alternative solutions, and how to proceed with the process. The know-how could also include how to set up and run a small electric supply company in the community, how to fix pricing, etc. What I happened to be able to do in that instant, he himself could have done and much more, had the right predigested information and knowledge been available to him in or near to his community from the very beginning. At the same time, the nearest municipal authority, credit union representation or other trusted points of contact with the outer world, should likewise be in touch with the knowledge base and beyond, in order to be able to be constructive partners in the process.

Insufficient knowledge and knowledge pollution together with indirection and lack of cooperation and coordination of development efforts are today decisive impediments to rapid socio-economic development.

EDUCATION FOR THE FUTURE

Since my days as an engineering student, when I was head of the student council at my university, I have been intensely interested in the organization, form and content of education. In countries and institutions around the world I have had countless occasions to skim through local textbooks at all levels – and widely different areas – of schooling, from pre-school to post-graduate, in order to understand what kind of societies these children and young people were being prepared to function in, and how.

Somehow one particular school left a very special impression on me even though what I observed was only all too typical. It was in a small town far from the capital of a country south of Sahara. The town had no electricity and no other public amenities visible to me. But the school was new, and already an out of town contractor and his crew were building additional school buildings.

I visited some of the classes during hours, and the very clean and keen children demonstrated their skills. The faces of the teachers were beaming. The children read for me, they recited, and they made calculus. I asked the teachers whether they profited from the occasion that construction was going on around them to teach the children about tools, materials, planning and design. ‘Of course not,’ was the reply. That was certainly not their line and assignment.

I became very depressed. During my lengthy drive back to the capital I thought of the future of these children and that of their community. Next day I bought a small box full of tools, some of each, and sent it to the children. In the covering letter I thanked them for the wonderful occasion I had had the previous day witnessing how well they were doing in school. In return I was sending those tools asking the children to request the teachers to somehow help them to learn how to use them, so that in the future the children could participate in building other buildings and houses in their town.

Of course I have found happy exceptions, but generally most education systems anywhere are still in many ways extrapolations of the old religious and tribal ways of teaching dogmas, and a world picture and history as it has been agreed to being interpreted and told. No doubt, most conflicts between peoples have their roots in such traditional educational schemes.

Moreover, current education is largely functioning as an incubator of manpower for static industry, services and government. ‘Innovation’ is still in many ways mainly a smart catchword.

Nevertheless, quite some progress has happened in a number of institutions and countries since a special panel of experts set up in the nineteen-sixties to advise the Secretary of Commerce of the United States of America about the situation of invention and innovation in the USA. They concluded by then that there is an *‘abundance of ignorance about the processes of invention, innovation and entrepreneurship.’*

As occasionally I have taught invention and innovation to professionals, many years back I had the opportunity as a volunteer through two semesters to teach fourth graders in a Danish municipal school ‘how to make inventions.’ It was a most interesting experience. Within that school year the constructive-creative abilities of the children as well as their self-confidence developed greatly, and I too developed in the process.

Subsequently organizations of school principals and schoolteachers, as well as the Danish Ministry of Education, became interested, and the ministry financed me in developing and running courses in innovation and invention for school principals and teachers. The principals wanted tools to apply in their administration and further development of the schools. The teachers wanted to learn how to teach the subject.

However, I dare state, that till this day, practically anywhere in the world, there is still an abundance of ignorance about the processes of developing the constructive creativity of people. *To my knowledge no major school system anywhere in the world has yet been designed specifically to broadly develop pupils' innate capacity for invention and constructive innovation!* This may cause amazement since the mental and practical processes are by now quite well understood. The world is full of problems and challenges that require truly innovative and inventive thinking and action. This should be a great challenge to visionary governments, not the least in developing countries.

In fact, many developing countries may have a substantially better background for adopting this new line within their educational system than more settled countries, once they see how such innovative educational initiatives can help underpin and accelerate the processes of development.

On another note I see a need to upgrade the teaching and training of the pupils in how to function better in their local environment. As an example, easily learned knowledge about locally occurring soils and water, topography, conditions of the ground, and the weather can likely help reduce the occurrences and magnitude of localized weather and ground related disasters, including flooding and earthquakes. Simultaneously, most of that same knowledge can be useful in connection with construction, public works, sanitation and agriculture. Obviously, such knowledge should be part of the local 'public goods,' not just delivered piecemeal from the outside.

Finally a note on the curricula at large. As indicated above, there may be a need to take an 'innovative look' at many of the subjects already taught as well as to the way they are taught. As an example, when my son was learning calculus in high school, I told his teacher that I assumed that he was giving the students good illustrative examples of what integrals could be used for in real life. Regrettably, the answer was just a resigned expression on the teachers face. He did not know ...! Just think of how much more interesting and useful it would have been if he had been able to give a few exciting examples ...

GOVERNANCE CULTURE

An integrated national program of innovation would necessitate that government and many public and private sector institutions and organizations earnestly commit to and identify with the program. I am fully aware that this will not be easy to accomplish. But it is possible to build powerful innovation-promoting mechanisms into almost any organization.

Legislation, and technical standards and norms are of course areas of special importance. It is not particularly difficult to develop legislation that supports innovation in the private sector, at universities and other institutions. Also, it is quite straightforward to establish by law institutions specially dedicated to the promotion of innovation. It is much more challenging to adjust existing laws, regulations and government procedures to make room for yet unknown innovations.

Possibly the biggest challenge though is to subject legislation as such to innovation, both with regard to form: to make laws easy to understand for those it concerns, including lay-people of course, and with regard to the way people are informed of their rights and duties. And also to insure that legislators and officials truly understand the full implications of the laws and regulations they create, and that there are never internal or external inconsistencies. To secure through each and every law that if literal application of a law or regulation in certain specific circumstances would lead to absurd and clearly unintended consequences, then it is the intent behind the law, not the letter, that overrides the other.

It is so necessary to build up rule systems that people can easily understand and navigate and will know how to apply in relation to all aspects of individual and community life. This is an area where complexity can be most effectively treated at its source.

One example from my own experience may illustrate how one kind of tools can greatly facilitate understanding of and communication relating to development and use of rules of law.

When creating a manual on design, construction, maintenance, etc., of sewage systems, at a time when my country had just established its first comprehensive law for environmental protection, I found it useful in the manual to list all the laws and regulations with a summary of contents governing sewage projects. I had an assistant working several weeks to read the laws with matching regulations, and extract the essentials. When I got those summaries, I myself had great problems in absorbing the knowledge. To aid my own overview I started sketching and using graphic symbols to illustrate the procedures – for instance to call for a public meeting, to publish a proposal, to make a final decision on a project, to study the project and forward recommendations but not take the final decision, to just give comments to a proposal, etc., that is: symbols depicting all the typical functions of public institutions and others in relation to the handling of a project. I came up with a list of in all 23 various basic procedures plus the respective procedures of appeal, directly relating to sewage alone, and decided to use the symbolic descriptions in the manual. I asked the people at the ministry of environment to help proof the draft.

A few weeks later when I came back to hear the result, the reaction was “Wow! If only our people had had these symbols since long ago to help grasp very quickly the content of the laws, they could have saved great amounts of time.” I am certain that with such symbols not only lay people can understand the procedures they need to follow in a particular case. Also the legislators and government officials can work with the symbol in their creation and negotiation of the laws and making sure that there are no inconsistencies. To my knowledge, along the way the symbols introduced in the manual actually contributed to some simplification and weeding out of contradictions among the rules and procedures.

The graphic symbols are culturally neutral, and can be learned instantaneously as well by people in China, as in Peru, or wherever. Moreover, they can be used in contracts. It is a beginning of a universal language that can be expanded to be used in many other areas. As a consequence of the symbol language being part of the reference material I was creating, several hundred municipal engineers and many other professionals became familiar with that innovation within a few weeks at brief training courses, and the system was then used by every single municipality in Denmark as well as by consulting engineers, contractors, community organizations, etc.

Providing common legislative transparency, simplicity, consistency, and clarity, and giving primacy to functional objectives, are major elements of risk reduction and innovation promotion, as it can be directly influenced by one of the major products of government.

At this point relating to governance in a broader perspective, I shall emphasize the importance of eliminating adverse rivalries between government institutions, including ministries, and to promote constructive collaboration among such ministries regarding new innovative initiatives.

Such collaboration between ministries was only partly in place in the late 1980s in Denmark when I initiated the involvement and support of several government ministries as well as the European Union in a pilot eco-community. Most of the ministries showed exceptional flexibility, and the new community was started up in harmony and cooperation with the original community of the area.

Unfortunately one of the ministries, though seemingly not negative towards the project as such, was not ready to practice a lawful but liberal interpretation of one of its regulations in order to secure full

synchronization of the various constituents of the scheme. That delayed important parts of the project for several years. Later, in 1995 the eco-village went on to obtain the highest recognition, including a European first prize for participatory community planning.

Also, intergovernmental organizations, such as those of the United Nations system, as well as governmental and non-governmental international and national development aid organizations need urgently improve their mutual cooperation and synchronization of efforts, among others through constructive delegation and sharing of responsibilities. The formal structure of governance can contribute significantly through constructive coordination and synchronization of such development related efforts. Also within this field there is scope for a lot of courageous and constructive innovation.

CAPABLE COMMUNITIES

Communities are the basic building blocks of human society, whether they be neighborhoods in cities and towns, villages in the countryside, or groups of nomadic people. Homeless people like the pavement dwellers in Mumbai, India or elsewhere, also constitute communities that have their own structure and life, however agonizing that may be.

Just as government initiatives constitute a top-down approach to introducing and encouraging systemic visioning and innovation within society, a community-based approach would be the complementary bottom-up effort that clearly has the potential for near and immediate impact for individuals in the community.

Visions and innovations specific to individual communities and micro-regions can help turn marginalized communities around, from utter despair to well founded optimism and progress within a few years. Each community needs a few capable, committed and inspired people to lead the charge in close cooperation with outside stakeholders who can help in the process. But that alone is not enough to create scalable and sustainable development. A replicable, integrated, and flexible approach is obviously necessary to achieve scalability, and a good value for the effort. The challenge is how to do this.

Even though I have been involved for decades in socio-economic development in many countries and cultures, I have never been able to find, even with extensive research, a fully integrated and replicable model which I believe is necessary in order to substantially accelerate the development process. Too many development efforts are point programs without any integration, for example sector-specific (building roads, schools, hospitals, factories, introducing IT, etc.), or has a limited development objective (fight illiteracy, hunger, AIDS, etc.). However commendable such efforts are, this is not replicable and self-sustainable, does not cover all aspects of development touching the entire life of a community and its people, and perhaps most importantly does not develop people's self-confidence and trust in, and ability to create, their own future. In many instances even such point programs have been seriously counterproductive, among other ways through accelerating migration by many of those people best fit to spearhead local development.

In the apparent absence of approaches satisfying these concerns, I have spent my time the last few years developing and executing a systemic approach that is applicable to communities in almost any context.

A primary focus of the approach is on the local community and 'micro-regional' level, operating through specific localized community development programs:

- to enable the broad and active participation of community members,

- to encourage the constructive, focused and coordinated involvement of civil society, the private sector, and all levels of the public sector, and
- to promote the coherence and cost-effectiveness of all outside aid.

The participatory processes include starting in motivated and representative communities, and spreading from each of these through combined demonstration and proliferation programs to neighboring and other communities with comparable cultural, social and/or other determining characteristics.

All significant actual and latent human, natural and other resources and barriers within or otherwise of consequence to these communities and clusters of communities are determined, and creative, focused and coordinated efforts are then applied to build on and further develop the resources while removing or alleviating the barriers.

The approach is flexible and has substantial capacity for serving local uniqueness, variations in context over time, and spontaneous innovation. It can also be used as a framework in combination with other models and methods focusing primarily on more specialized aspects of development, such as natural disaster prevention and mitigation, or combating infectious diseases.

A core feature of the approach is a model program that serves as the paradigm for the creation and realization of each local community development program. The model program has multiple overlapping phases that go from bootstrap activities including creation of support structures, to maturity and proliferation.

Organizational, technological, social and financial components of the model program are adapted as appropriate to the particular local conditions of each community or cluster of communities.

In order to further well-informed choice and action, all members of the communities and all others concerned will have easy access to relevant and timely information, knowledge and training in a locally understood form and language. This is provided through a combination of social and technological facilities and services to be openly available and useable for everyone, including for people of limited or no formal learning and of widely diverse cultures and languages. Each community will have their own local Internet development portal with both practical and catalytic functions.

The new local support structures and services include: a multi-purpose center for community development (including facilities for the development of new products, processes and services based on the special resources available), an information and communication infrastructure, support structures for economic and non-economic development, and a support structure for coordinated development financing.

The support structures and services then enable the startup and realization of a multitude of practical projects and other activities that become the drivers of socio-economic development and quality of life improvements in each community.

The proliferation of the approach is prepared in the first phase of each specific local program. Thus, representatives from neighboring communities take part as trainees and otherwise in the demonstration operation of the first community in order to be able to participate with special knowledge and experience in the staggered start of the approach in their respective home communities. New communities joining the program will equally host trainees from subsequently joining communities.

In the larger context, the communities will benefit from sharing resources, delegating responsibilities among themselves, and from being part of a shared dynamic community development movement.

CONCLUSION

It is possible to advance a community, an organization or a country towards very impressive levels of accomplishments through common purpose, vision and innovations applied with integrity and functional wisdom.

Just extrapolating from what we have been doing until now will not do. Constructive systemic changes in thought and action will be necessary to realize the latent potential of socio-economic development. This is the kind of effort that leaders in any size community, whether local, national, or international, can champion. *Someone* has to muster the necessary operative visioning and innovation, to get started, and root it in the social consciousness, to succeed.

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John ‘Zac’ Zachariassen has a M.Sc. in civil and structural engineering from the Technical University of Denmark. He has conceived, developed and implemented a number of internationally recognized and applied technological, social, educational and informational innovations and inventions, and has carried out assignments in more than 30 countries for governments, many United Nations Organizations, and non-governmental organizations, including federations of industries and trade unions, as well as businesses and communities. One of Zachariassen’s inventions, the DIS simultaneous interpretation system has been utilized in about 100 countries. Zachariassen is the president of the Solertia Institute.

POINTS FOR THE CLASSROOM (send comments to forum@futuretakes.org):

- *How can the need for a culture of innovation be reconciled with the near-term mindset in some parts of the world – specifically, politicians wanting to maximize re-election prospects and corporations cultivating a “quarterly earnings statement” mindset? Is there a more fundamental issue involved, such as an instant gratification culture?*
- *As Zachariassen points out, an overall national approach was not necessary for the US to put a man on the moon. Others have observed that at least in the case of some nations, going to war does not require a full national effort. What level of consensus is needed for a culture of innovation?*
- *Diverse examples suggest a trend toward mediocrity and risk aversion, trends that generally do not support a climate of innovation. Examples: (1) In government, academia, and corporations alike, “tinker-at-the-margins” managers are more common than true leaders. In fact, it has been speculated that the great generals and admirals of WWII would not survive in today’s ranks. (2) A number of established scientific journals publish “progress report science” papers and are not receptive to those papers that challenge mainstream paradigms, even when such papers are themselves based on good science. For their part, professors on a tenure track are sometimes fearful of publishing papers that challenge the prevailing paradigms, even though the professors are then in their most creative years. (3) Companies are often founded on a “wild idea,” but when they mature, they become more risk-averse and less receptive to new ideas.*

For this, some eventually pay the ultimate price of going out of business, but that does not deter various other companies from risk aversion. All considered – in your part of the world, what is the future of innovation vs. risk aversion? Another question – is risk-aversion cultural, or is it a consequence of the fact that long-term creative is often short-term disruptive?

- *Research and development (R&D) budgets are shrinking in some companies that are more interested in near-term profits as reflected in their quarterly earnings statements. However, the rate of technology growth and proliferation is accelerating rapidly, perhaps approaching "the singularity." Zachariassen refers to instantaneous obsolescence – and indeed today, the shelf life of a commercial or military advantage may be relatively short. What will be the tipping point that will reverse the trend of shrinking R&D budgets in some established corporations? Also, what will be the primary sources for R&D funding in your part of the world in 2020 – venture capital, government, or other?*
- *Considering all of the trends that are impacting education – for example, the knowledge explosion, the advent of new fields of study and knowledge, and the demise of at least some "careers for life" – what will education look like in 2020? For example, will it be more "real life" focused and more supportive of outside-the-box thinking, and in what ways? If so, will the traditional subjects continue to be taught? In 2020, will education help people think beyond hidden assumptions more so than it does now?*
- *In 2025, what percent and types of innovation will be by large corporations? Small companies? Individuals?*
- *In one case discussed by the author, "the right predigested information and knowledge" would have been an enabler had it been available. Although accurate, well-managed information can be useful, in what circumstances can it be counterproductive to innovation and to cultural diversity – specifically by encouraging a "one size fits all" approach to problem solution? Is the resulting "prosperity" or other "success" defined in Western terms that may not be optimal for the developing nation?*
- *Zachariassen discusses the complementary approaches of top-down vs. bottom-up approaches to systemic visioning and innovation and observes that "Communities are the basic building blocks of human society..." Will this be even truer in 2025, and will the level of group identity support visioning and action at the community level? Or will there be more of a tendency toward aggregation of identity and effort? In other words, "fission" or "fusion"?*
- *What factors support or inhibit a climate of innovation in your part of the world?*