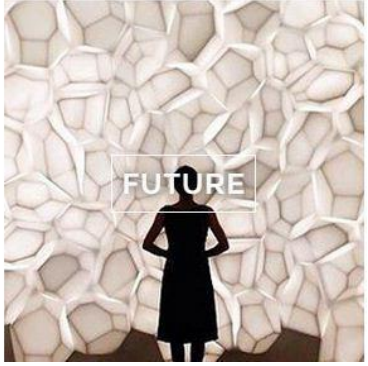


'Our struggle for global sustainability will be won or lost in cities' UN Secretary General Ban Ki Moon

Arie Voorburg

Presentations urban resilience

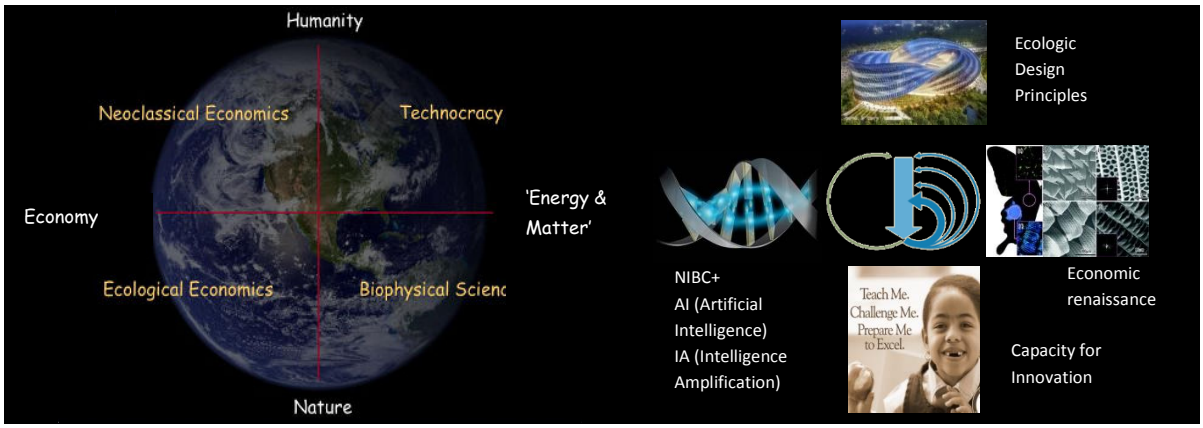
1.OUR URBAN WORLD: research, development, trends: biophysical boundaries /thermodynamic limits, urbanization, geopolitics-resources, disruptive technologies, social values.

CONTEXT. We live in an urban world. Half of the world's population already lives in cities, generating more than 80 percent of global GDP today. But the urban economic story is even more concentrated than this suggests. Only 600 urban centers, with a fifth of the world's population, generate 60 percent of global GDP. In 2025, we still expect 600 cities to account for about 60 percent of worldwide GDP—but the cities won't be the same. During the last century, industrial and technological development in combination with global trade has resulted in an enormous economic growth, which has propelled human welfare. This development path is rooted in exponentially increasing resource usage. During the twentieth century, worldwide material consumption increased eight-fold. More and more signs show that this practice cannot be sustained. The dominant business model behind economic growth is a linear process, "disconnected" from the physical world, because the impacts on human, social and natural capital and the long-term availability of critical resources are not taken into account. The linear economic model has prevailed until now, because resources were cheap and abundant. In the last decade, however, prices for natural resources increased or became more volatile. Prices of many commodities have peaked. Supply chains themselves are becoming more volatile too. The continuous search for efficiency (maximalisation of throughput) has resulted in extreme fragility

By 2050, global resource use is expected to have tripled. More and more signs show that this practice cannot be sustained. The dominant business model behind economic growth is a linear process. This model is "disconnected" from the physical world, because the impacts on human, social and natural capital and the long-term availability of critical resources are not taken into account. 2038- 2050 between 8.6 - 10.3 billion people, 70-80% lives in cities, growth to 150 megacities (5-10 million inhabitants), 60% of economics, 55% in urban deltas. Already challenged by eco and biophysical boundaries: climate change, biodiversity, global fresh water use, ocean acidification, nitrogen. an phosphorous cycle, etc. Poverty and exclusion, exacerbating water and food scarcity, globalization, resources etc. Humanitarian disasters, including desertification and floods of increasing magnitude.

How to manage global resource politics that will likely dominate the global agenda, connected with sustainability and governance: within biophysical boundaries and thermodynamic limits, and manage perceptions, expectations and fears of resource scarcity, politicization and securitization to avoid the worst-case scenarios.

2. TRANSITION PATHWAYS



The four urban transition pathways: Ecologic Urban Design Principles, Economic Renaissance, Talent for Innovation, Technology

ECOLOGIC URBAN DESIGN PRINCIPLES

Biomimicry, biobased materials, life like systems, metabolic materials

CONTEXT. The concept of bionic cities is an urban design and planning model that proposes cities be reconceptualised as interconnected ecosystems. By embracing an envirocentric agenda it opens the door to new paradigms for restorative urban programs through applying equal weight to socio-cultural, ecological and technical processes. The principle of bionics relates to structures and processes imitating nature's mode of organisation, optimization and adaptation. This does not only mean to imitate singular solutions but rather the application of holistic systems. Bionics implies using the most efficient solution while employing a minimum of resources. Cities that efficiently cycle matter require less energy input.By doing this the bionic city concept respects the earth's abundance enabling a recognition that humans are not divorced from natural systems. Sensitive to their surroundings, fused to form a complex adaptive system in sync with the Earth's natural processes. The build environment within the software of the city -its culture, society and economy- convergence technologies and connect with natural systems. In contrast to the sprawling mass of disconnected, static and inert structures, a bionic style means synthesis of natural forms and high tech developments. Operating as a seasonally adaptive collective of interconnected and interdependent shape-shifting, color changing, dynamic architectures.

ECONOMIC RENAISSANCE

Circular inclusive biobased economy

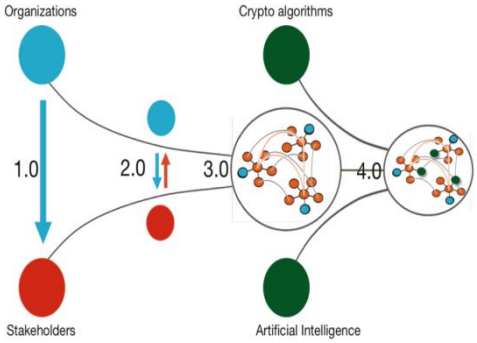
CONTEXT. The transition to a bio-economy will be far-reaching. It will involve much more than replacing fossil-based raw materials and introducing new technologies; society will need to change in a way that clashes with the status quo in some cases.
Our economic model is currently hitting a brick wall. Industrial development has brought enormous economic growth, but the linear economic model is unsustainable. Resource-scarcity risks are increasing, leading to more volatile prices and supply chains. Our society is headed for global overshoot and collapse. Steering away from this course requires breaking the current bond between prosperity and material consumption, or 'decoupling'. In a circular economy, the industrial system is restorative or regenerative by
design. Within the circular economy new business models are developed that reduce the need for virgin raw materials. This is accomplished by rethinking how production chains can become closed loops. The circular economy aims to become a new paradigm that essentially changes the functions of resources in the economy: waste material of one (industrial) process will be input for another, and products will be repaired, reused and recycled.

'power of the inner circle'

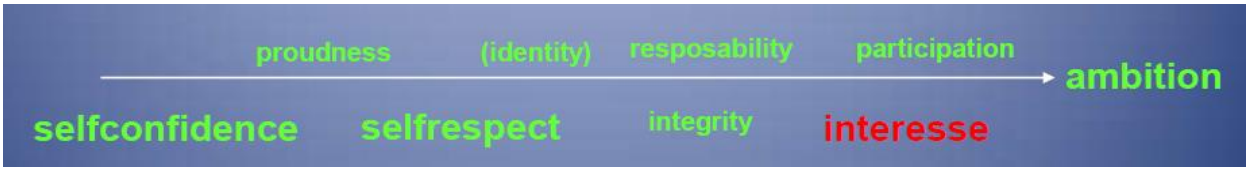
'power of circling longer'

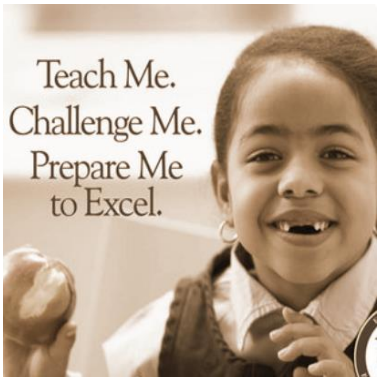
'power of cascaded use'

'power of pure circles'
'



TALENT FOR INNOVATION

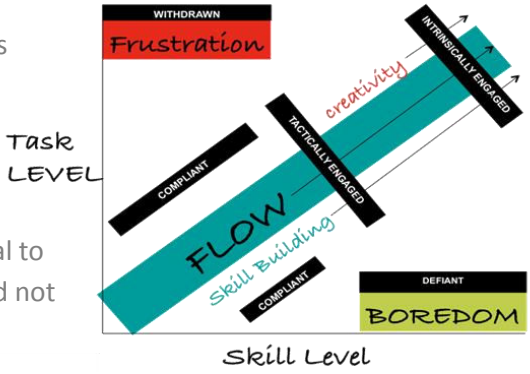




The root of our existing educational system mirrors that of our economic system. Both emerged from the traditions and world view that originated in the Enlightenment: the world is 'machine-like'.

Education, at least in the formal sector and before the age of 19 is often seen as delivering specified content (knowledge). Learning is usually understood to result from teaching and that certification guarantees at least a portion of that knowledge.

It tells us little about what has been learnt, how learning has been facilitated, what skills have been developed and what perspectives have been explored. It is a great distance from an ambition to "rethink and redesign". The education system must evolve to enable learners to grasp 'whole systems' design.



The ability to think in a more connective and integrated way is vital to live in a highly interdependent world. So, for example, skills should not be addressed separately in different subjects but should seek to link disciplines together in order to re-design the whole system.

Important social developments that have implications for education, the transition to a knowledge-intensive society, the flexibility of the labor market and the importance of life-long learning, and the impact of new technology on how we communicate, learn and work.
The future of education clearly indicate a move away from the traditional path of education for children, educators, students, teachers, faculty and institutions.

As the economy change, this view of the traditional experience is more the exception than the rule. The traditional boundaries defined by preschool, primary, secondary, and higher education are no longer adequate to define a student's path through his or her preparation for the workforce. The educational experience is often much less linear, more complex and varied, with many different paths of educational attainment.
Learning services and resources will become more interconnected and seamless. Information about student needs and skill gaps will become more instrumented and non-intrusive to the teaching process.

DISRUPTIVE TECHNOLOGIES

Technology is found to be one of the cross-cutting drivers with impacts across strategic domains (urban resillience empowerment, work, education, etc.)

Nano, info, bio, cogno convergenties

Mobile internet
Automation of Knowledge work
Internet of things
Cloud
Advanced robotics
Autonomous and near autonomous vehicles
Next generation genomics
Energy storage
3-D printing
Advanced materials
Advanced oil & gas exploration and recovery
Renewable energy