

# Smart Asia: A New Platform for Collective Intelligence

Christopher Grant Kirwan

Reignwood Innovation Technology Center, Beijing 100022, China  
mustafa.kirwan@gmail.com

**Abstract.** Asia today is experiencing unprecedented urban growth and development, fast becoming the world's leading consumer of the planet's natural resources, and is now at the tipping point of becoming unsustainable. North America and Europe have finally begun to slow this negative trend through the use of sustainable practices and social innovation models supported by advanced technologies. It is critical for Asia to follow suit by developing environmentally safe solutions for growth, following the best practices from countries around the world. To be successful, this will require willing collaboration by public and private organizations, sharing information on demographics, health, food, water, weather, transportation, and other key urban indices. By developing a virtual framework combining an open-source operating system and collaborative interface we term Collective Intelligence, the goal is to build a Smart Asia platform capable of providing a holistic solution to meet both human quality of life needs and the sustainability of the natural environment.

**Keywords:** Collective Intelligence, Leapfrog, Operating Systems, Urban Interface, Smart Asia.

## 1 Introduction

### 1.1 Context

The threat of imminent disaster to our planet manifest in recent environmental disasters or another global economic meltdown may be the catalyst for world leaders to reach across geo-political and cultural boundaries to create new innovative partnerships and networks and a shared set of values. To achieve Smart Asia as a platform to solve challenges to both human quality of life and the sustainability of the natural environment, an integrated solution utilizing a combination of strategic planning, creative financing, innovative marketing, and appropriate technologies will need to be adopted. In our effort to create a Smart Asia, government, business, academia and the public at large must willingly work together to find equitable ways to share economic opportunities, create new partnerships, and exploit new technologies rather than allowing the interests of powerful corporations or individuals to limit their potential to provide collective benefits to society. In addition, all nations must move away from the present fossil-fuel based economy toward a new era of bio-organic and artificial intelligence as the basis of a developing a sustainable planet. This new Smart Asia

platform must also address how we are working and communicating across boundaries of culture, language and professional/technical disciplines. A Collective Intelligence no longer constrained by the divisions and boundaries of nations, governmental policies and technology IP or imposed security restrictions, must be a bridge between diverse industries, fields of knowledge, and cultural backgrounds to facilitate this critically needed information sharing and decision-making process. The goal will be to serve not only our leading urban centers but also rural communities that must remain viable to maintain social, economic and environmental balance and growth at local, regional and global scales.

Asia now has the potential to develop a network of information-sharing and processing, Collective Intelligence, drawing on the vast economic strength, human capital, natural resources and technological capability of the region. If harnessed correctly, this pan-Asia network, including both developing and developed markets, would provide the supply and demand for innovative solutions to the massive growth, industrialization and urbanization occurring in real-time throughout Asia. This network would include China, India, Japan, South Korea and the ASEAN block (Association of South Asian States) amounting to a total population of 4.3 billion or 60% of the world population and more than 200 cities with populations of one million or greater. ASEAN alone accounts for 600 million people in its 10 member states, with more people than the EU. As a model of Collective Intelligence and potentially the foundation of the Smart Asia platform, ASEAN has proposed the creation of the 'ASEAN Community' and 'ASEAN Connectivity Master Plan' to be implemented by 2015.

However, to achieve this level of connectivity there are major challenges ahead with individual government systems and economic standards within ASEAN countries differing greatly, making it difficult for the union to act as a single unit. Another key factor in the ability for Collective Intelligence to succeed is the future cooperation between Asian governments and the critical role the world's second and third leading economies, China and Japan, will play in building a mutually sustainable master plan for regional growth, peace and collective prosperity. Seeing an opportunity to move forward proactively, China unveiled a new foreign policy in 2013 designed to strengthen ties with neighboring countries. While Japan, a long-standing ASEAN strategic partner and South Korea have both pledged to support the ASEAN Connectivity plan, providing financing and advanced technology. These positive diplomatic, economic and technological indicators are critically needed steps toward building the foundation of Collective Intelligence and a Smart Asia platform.

## **1.2 Considerations for Developing a Smart Asia Platform**

One of the greatest challenges facing Asia, and most of the world, is the disparity between urban and rural areas caused by this century's unprecedented urban migration and the explosion of the megalopolis. According to China National Bureau of Statistics (NBS), in 2012 the urban population outnumbered the rural population in China. A key aspect of the Smart Asia platform is to provide solutions for development in both urban and rural communities, overcoming differences in regional social,

economic, and geographic conditions by deploying cost effective solutions that allow all populations to connect to the energy grid and telecommunication infrastructure, and to create and operate businesses regardless of physical location and socio-economic status. In a functioning Smart Asia platform, users will be enabled to freely exchange information, move and operate independently, creating new, shared resources and develop more sustainable communities in both urban and rural contexts – with a combination of China, Japan, India and South Korea, all with advanced technology and trained workforce, working together to lead the new Smart Asia development.

### **1.3 Smart Asia Operating System – Hybrid Top-Down / Bottom-Up**

The key to creating Collective Intelligence is the utilization of new models for deploying a broad spectrum of information collection, processing and management. This operating system must be simultaneously top-down and bottom-up. For such a hybrid operating system to properly function and evolve, a Master Operating System must be developed to accommodate both existing proprietary technologies and open-source hardware and software. The resulting OS must be a holistic solution, incorporating a collaborative approach, cross-disciplinary teams, open source technologies, and a global telecommunications network with the goal of creating a functioning Smart Asia platform linking both urban and rural populations throughout participating countries in Asia.

### **1.4 Smart Asia Interface – Big Data / Filters / Visualization / Interaction**

Creating a Smart Asia interface will involve: 1) Collecting large amounts of information (Big Data) from both human and environmental sources, 2) using new software capable of uncovering, filtering and visualizing key patterns and data, and, 3) creating user-friendly interface to interact effectively with end-users in real time. The participation of millions of people interacting within virtual systems will provide critically-important information on patterns of consumption as well as a wide range of other data representing environmental, financial, technological and societal trends.

## **2 Principles of Collective Intelligence and Smart Asia**

The following set of guiding principles seek to define the characteristics of a Collective Intelligence system and the varying ways it could be applied to creating a Smart Asia platform:

- **Virtual Framework – Cross-Border Cooperation**

The greatest challenge to achieving Collective Intelligence and a Smart Asia is the current geo-political disputes between countries throughout Asia. Disagreements over borders and governmental policies are to be expected since national boundaries and socio-economic preferences usually stem from long-standing historical conditions. However our proposed virtual framework could help to

overcome these limitations by creating a new level of information sharing and networking that is not constrained by the current realities and historical factors. The 'ASEAN Connectivity Master Plan' is a good example of the potential of such cross-border cooperation.

- **Broad-Scale Interface – Distribution within Urban and Rural Contexts**

A key challenge is the need to create a semblance of balance and equity in the physical, social and economic development of urban and rural environments. The recent urban migrations and projected concentrations of growth are indicators of the massive changes taking place in real time, revealing the imbalances that most of the world's developing countries are facing, particularly in Asia. China, a prime example with a projected 350 million new people migrating to urban centers by 2025, must protect and support its agricultural communities in order to ensure that food sources and raw materials will adequately provide for the entire population.

- **Real-time Data – Environmental Balance and Sustainability**

The many natural disasters being experienced around the globe make it mandatory that a collaborative effort be made to monitor the causes of global warming and its effect on human, plant and animal populations. Developing the capability to track changes in real-time through deploying a network of sensors linked to data filtering and visualization applications will permit us to understand and respond to both long-term environmental change and short-term effects due to natural and man-made factors.

- **Citizen Interaction – Social Engagement**

The capacity today to connect all segments of our populations through mobile phones and other internet devices, and to collect and apply a multitude of behavioral data will allow both public and private sectors (governments, NGO's, companies) to access critical data to better serve the needs of the end user. At the same time, end users will be able to contribute and participate directly as part of the *Collective Intelligence* interface by self-publishing real-time information and providing valuable performance feedback.

- **Adaptive Technologies – Appropriate Solutions to Specific Contexts**

A major goal for Smart Asia will be the identification and adaptation of appropriate technological solutions that will aid in meeting the needs of specific populations rather than allowing domination of large enterprises, which often do not act in the best interest of the public. To provide solutions in this critical matter, organizations with recognized expertise and credibility such as universities, research institutes and NGO's would be engaged to evaluate the most appropriate technologies to meet the requirements of specific local contexts as well as to train people for management and operation of selected technological systems, hardware and software.

- **Open Source Framework – Information Sharing and Collaboration**

The Internet has provided us with an amazingly accessible medium for the open exchange of information and open source code and we must capitalize on it to the fullest extent. Governments and corporations must aggressively adopt and support new models for information sharing, otherwise the ability for co-development will be limited and typically end up under the control of specialized groups and companies. For sensitive cross-border collaboration to become a reality, all public and private participants must also strive to meet clear standards of transparency and reliability.

- **Artificial Intelligence – Big Data / Data Visualization / Data Analysis**

Advanced computational capability now makes possible the collection and analysis of huge data sets and dramatic new visualizations (mapping) of such key data. This new art/science will provide both organizations and the general public with a more intuitive understanding of broad trends and patterns and the ability to analyze and make decisions using real-time information on a myriad of social, economic and environmental factors. Additionally, artificial intelligence will allow the filtering and processing of the massive streams of data more efficient.

### 3 Case Studies

Smart Asia requires technology solutions that embody the principles of Collective Intelligence suggested in this paper and to adopt social innovation models that better engage and serve the relevant stakeholders. Additionally, Smart Asia requires sustainable approaches addressing the greater socio-economic and environmental opportunities and challenges. The following three case studies attempt to illustrate a more holistic view of how technology can serve as both Operating System and Interface, responding to the immediate context specifics, targeted user requirements and providing a broader platform for connectivity.

#### 3.1 Case Study: Telecommunications – RUBI Smart Phone

**Empowering Agricultural Communities in Southeast Asia.** Without adequate communication technology solutions, farming communities throughout Southeast Asia do not have access to the Internet and are not able to stay informed on critical market data to better manage their businesses. The RUBI smart phone is designed to allow farmers who typically do not use computers or have access to more sophisticated technology to conduct business in an easy and targeted way. By developing a communication device that has limited but very useful functions, RUBI enables local farmers the ability to conduct transactions including trading and making payments to distributors that link their products to urban centers. Conversely, RUBI allows migrant workers in cities to pay remittance to their family members in rural communities.

Currently being developed by a group of committed technology providers and designers in Asia as a consortium working across geo-political boundaries, RUBI is an example of a solution that seeks to connect both urban and rural communities and resources by providing a leapfrog solution especially where more advanced technology hardware and software is not required and is not readily understood or absorbed by rural populations. Additionally, RUBI is an example of a bottom up rather than top down approach since it addresses the real needs of the end user by providing an appropriate technology solution giving rural inhabitants a necessary tool to make their lives more sustainable. For Asian governments and particularly the Chinese government this is a key issue. The necessity to keep local agricultural communities viable will require new technologies that allow farmers and other small rural businesses to connect to the larger market network without the need to travel or to invest in expensive equipment. At the same time, solutions are required that do not involve extensive training and are intuitive for the end users. RUBI has an additional function that can allow small groups to share an individual unit as did rural communities when the telephone was first introduced, and a single TV set functioned as a community centerpiece when they first became available. This shared resource also strengthens community bonds and reinforces local collective activity.

### 3.2 Case Study: Renewable Energy – Biomass Gasification

**A Cooperative Model for Sustainable Economic Development.** Empire Asia Energy Group, a private investment company based in Bangkok, Thailand, in partnership with the Earth Group & Green Planet Association has developed a comprehensive scheme to provide electricity to rural areas throughout regions in Asia that are located off the grid, as well as serving as a platform to stimulate rapid rural economic development. The proposed model combines the establishment of Biomass Gasification power plants to produce clean electricity on a 7-24 basis to be distributed via local medium voltage lines and using local biomass for a constant supply of fuel. The local biomass is generated by easily grown specialized tree varieties adapted to each region including the *Leucaena* tree, that can be processed into wood chips, which also provide value added benefits to the environment, improving soil, protecting from erosion, producing animal feed as well as employing thousands of direct and indirect workers. Each 1-MW power plant requires a total of 800 acres of *Leucaena* cultivation that earns revenue from both supplying the fuel and from producing and selling animal feed. The easily replicable 1-MW packaged “very small power plants” (VSPPs) can be quickly set up at any location in the countryside where power is needed. The power can be delivered to the national grid and or sold to local industries and companies under a highly desirable “distributive energy approach,” and while capitalizing on new attractive government incentives for using clean energy especially in remote locations.

The biomass generated by the *Leucaena* has no real competition in the renewable energy field (solar, wind, ethanol, etc.) in terms of both its low capital and operating costs (lowest cost per continuous kWh of any competitive system) and by virtue of its 7-24 overall reliability (greater than 90% availability) and its ability to attract

maximum benefits from government and international agency programs, including receiving carbon credit from the power generation operation and from the associated *Leucaena* plantation. This Cooperative Empowerment plan, based on the Biomass Gasification business model, allows local cooperatives to partner for resources and financial management, providing sustainable options for farmers to generate new sources of revenue, increase the generation of clean energy and to become more self-sufficient, accelerating economic development and quality of life for the entire community.

### 3.3 Case Study: Infrastructure – Aerotropolis

**Clustering Synergy Functions and Linking Global Networks.** Today, a new regional economic catalyst and globally linked model has been developing around airports and along transportation corridors radiating from them, forming a new urban typology termed the *Aerotropolis*. Analogous in shape to the traditional metropolis made up of a central city and its rings of commuter-heavy suburbs, the *Aerotropolis* consists of an airport city and outlying corridors and clusters of aviation related real estate development. A number of these clusters in Asia including Kuala Lumpur International Airport and South Korea's Songdo International Business District have become globally significant airport edge-cities, examples of planned urban megadevelopment; a combination giant airports, planned cities, logistics and business hubs.

As a prime example, the Kuala Lumpur International Airport (KUA) in Malaysia's capital is currently expanding as an *Aerotropolis* and has been a key driver of KL's economic development. The project is currently being developed as a destination for international business and conferences and a global supply chain hub comprising cargo warehousing and logistic facilities. At the same time, the real estate development plan has been designed to balance this self-sustaining multifunctional airport with creating an environmental friendly district including office campus, hotels and entertainment, integrated with parks and gardens and a large green buffer zone. KUA remains the only airport in the world with the Green Globe GG certification. Originally the airport was developed to serve the Malaysia Multimedia Super Corridor (MSC) providing the basis for industrial, commercial, educational and residential development. Companies located within the MSC are globally connected with direct access to supply chain processes, R&D, just-in-time manufacturing, storage and distribution.

By clustering operations and developing synergistic functions supported through a combination of telecommunications, transportation and new technologies infrastructure, *Aerotropolis* models promote efficiency and integration of resources, stimulate regional economies and link international networks. The biggest challenge facing the *Aerotropolis* model is the current reliance on fossil fuel and the massive environmental impact question. The planning and design of such large-scale frameworks require much more attention to the integration and balance of man-made and natural systems. However, well-planned *Aerotropolis* models incorporate multiple synergistic functions and thus create better-optimized systems for logistics reducing the overall carbon footprint. At the same time, the opportunity to imbed new sensor technologies to monitor the natural environment will allow a better integration and management of

these resources. Smart Asia is absolutely needed to insure these resources are managed properly.

## 4 Conclusion

Smart Asia will require sustainable strategies that adapt to local environments, finding solutions that fit the needs of the end user while leveraging the resources of collectives and larger networks. Each of the documented case studies represent solutions at differing scales from personal, to community, to city and has linkages beyond their immediate context and geographic boundaries. Each solution integrates multiple functions, optimizes resources and utilizes communication technologies to support a holistic platform connecting entities within a broader system. Simultaneously, each solution demonstrates building at an appropriate level of engagement and considers both top-down and bottom-up approaches. Each of these examples also reinforce *The Third Industrial Revolution* concept, described by author Jeremy Rifkin, that presents the case that self sufficiency and localized solutions are now more viable due to the ability of technology and networks to link people, communities and larger systems together. This newfound freedom is just at the beginning stage; *Leap Frog* technologies will enable emerging economies to develop cost effective solutions by avoiding unnecessary and inefficient development while allowing end users to shape the required functions through the use of open source applications designed to meet their real needs and adapt to context specific requirements.

Importantly, it is necessary to recognize that self-sufficiency also requires integration and connectivity beyond the immediate situational context. In system theory and in the life of organisms, open systems have a lesser tendency toward entropy than closed systems where new material and resources do not enter into and inform the process. Open systems have the capacity to adapt and transform by interacting with outside conditions; in this case, the capability to share across borders and organizational boundaries that will be critical to the sustainability of the Collective Intelligent operating systems.

Supporting the Smart Asia platform is the formation of a cross-university, cross-discipline, collaborative research program by a core team including Tsinghua University (China), Seoul National University (South Korea) and Chiba University (Japan) and linked to an international network of academic and world organizations. Already in the third year of this joint research initiative under the theme Urban Media, the collaboration explores theory, methodologies and applications for the ways new media shapes and influences the operation of cities. This year's focus has expanded to initiate the dialogue of what constitutes Smart Asia, a broader platform for applying what knowledge has been gained to-date and catalyst for the subject of this paper. A key objective of the Smart Asia collaboration is to link research with real projects in Asia. Research teams will identify specific opportunities for collaboration with industry to jointly conduct test projects, determine the effectiveness of the new technologies, demo applications, secure governmental approvals, attract capital investment and generate public interest. This effort will represent a more comprehensive



approach by developing an in-depth understanding of user needs and requirements for projects and technologies to be successful in a wide variety of specific contexts.

A much broader effort, through increased government support, private sector investment and academic research will be needed to successfully develop a system of Collective Intelligence and to establish the proposed Smart Asia platform. This process is now in the beginning stage and shows great promise; however to continue its momentum, creative approaches, new partnerships and most importantly, trust must be established between participants to meet the pressing social, economic, energy and environmental challenges facing Asia and other rapidly-developing regions. This paper is an effort to stimulate the required collaboration and connectivity by establishing a set of guiding principles and presenting examples of how Smart Asia and Collective Intelligence may be realized through a combination of government policies, real projects, academic research and cross-disciplinary exchange. It is also a medium to share these concepts with individuals and organizations that will be able to further develop Smart Asia.

**Acknowledgements.** I am pleased to recognize contributions to this paper made by the following colleagues:

- Academic Research & Collaboration – Professor Fu Zhiyong, School of Art & Design and co-founder of Design Beijing Lab, Tsinghua University, Beijing, China.
- Business & Technology Applications – Colin Liu, Senior Vice President, Director of International Business Division, The Reignwood Group, Beijing, China.
- Case Studies – Edward S. Grant, VP Development, Empire Asia Group, Bangkok, Thailand.
- Editorial Support – Ernest E. Kirwan, AIA, retired architect / planner and faculty member, Harvard Graduate School of Design, Cambridge, Massachusetts, USA.

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