
The Mission of NILIM: Research that Pursues the Essential by Focusing on Reality

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1. Introduction

The Mission of the National Institute for Land and Infrastructure Management (NILIM) is “to use technology as a driving force to create an attractive society that is safer, more secure, and more vigorous, both now and in the future.” On April 1 of this year, NILIM celebrated the 20th anniversary of its establishment. During these two decades, both Japanese society and the international environment surrounding this country have changed significantly, and even faster and larger changes are expected in the future. Under these circumstances, I would like to offer several perspectives on matters that we should consider in our present research in light of the Mission of NILIM.

2. The essential is immutable and transcends the times

There is an expression in Japanese, *fueki ryuko*, which is derived from haiku and combines the concepts of “transitoriness” and “immutability.” At a glance, these two concepts may appear to be complete opposites, but in fact there is no contradiction between the two, since it is possible to approach the essential, which transcends the times, by responding flexibly to changes in surrounding conditions (transitoriness) when we pursue the unchanging essence (immutability). Our research at NILIM is truly an embodiment of this principle, since we pursue our essential Mission by responding flexibly to an ever-changing environment by incorporating new viewpoints that answer the needs expressed by society.

The immutable Mission of NILIM includes the words “attractive, safe, secure, and vigorous,” which are analogous to “strength,” “utility,” and “beauty,” the three principal elements of architecture according to the classical Roman architect Vitruvius. It would be fair to say that this transcends the times and touches on the essential, since those ideas were advanced in the first century before Christ, and were still picked up in one of my courses at a university. Although national land and society are different from

individual architectural structures, the land of a nation is constructed by human efforts to shape nature, and society (social capital) is created by humans through close contact with that national land. Considering this, it is possible to regard national land and society as forming a complex structure. From the viewpoint of our mission at NILIM, “Strength” is the structure that provides “safety,” “Utility” is the functions that produce “vigor,” and “Beauty” is the “attractiveness” that supports a pleasant, secure life. It can be said that our goal at NILIM is to explore and develop the technologies to sustain the national land, housing and social capital that provide these three elements, both in the present and in the future, and to realize social implementation of those results.

3. “Strength”: A structure supporting safety

The greatest challenge for NILIM is research to ensure the resilience of Japan’s national land, and the most important issue at present is responding to large-scale earthquakes and climate damage, which we fear will become both more severe and more frequent as a result of ongoing climate change. Research for disaster prevention and mitigation of these natural disasters includes the conventional research fields of resilience measures such as structures (e.g., seawalls, earthquake-resistant buildings, etc.) and other “hard” countermeasures, and “soft” measures such as damage prediction and estimation technologies. Although the importance of these fields will remain unchanged in the years to come, if that is so, what points should we consider in the future?

When studying resilience of Japan’s national land, the most important technical issue is how to set the external forces that require a response. Since the scale of natural disasters is essentially unlimited, the most recent knowledge of the fields of meteorology, geology and seismology is necessary when assessing the scale and frequency of natural disasters caused by torrential rain and earthquakes that may occur in the future as the

boundary conditions surrounding national land, housing and social capital. However, research cannot be limited to the laboratory. Results that will be useful in creating a resilient society are demanded, and for this, an insatiable appetite for exchanges with many academic fields, and a greater knowledge than in the past of natural external forces and techniques for evaluating the topographies that express the action histories of actions of those forces will be required.

It is also necessary to establish a response strategy based on an evaluation of external forces obtained from that knowledge, and in doing this, it is essential to exclude the “unexpected.” Of course, technical development to expand the range that avoids damage in a natural disaster (i.e., strengthening disaster prevention capabilities) is necessary. But when a disaster exceeds that range, it is essential to minimize the damage, including economic damage, with protection of human life as the highest priority. When responding to complex disasters, not only strength, but also social implementation of what might be called “smart failure” designs and plans is necessary. Achieving this will require simultaneous research aiming at resilience based on a total understanding of the national land and society, and not simply individual projects and facilities.

4. “Utility”: Functions that produce vigor

Japan’s 5th Science and Technology Basic Plan proposed Society 5.0 as “a human-centered society that balances economic advancement with the resolution of social problems by a system that highly integrates cyberspace and physical space.” From this viewpoint, it will be necessary to utilize cyberspace to enhance the future functions of the national land and society.

At present, the keyword in this field is DX (“digital transformation”). As a metaphor for DX in the infrastructure field, DX can be likened to innovating functions by incorporating a nervous system (corresponding to the human brain and sensory organs), into the national land, housing and social capital (which corresponds to the skeleton and muscles of the body). Integrating this “nervous system” into infrastructure will not only realize higher efficiency in work in the construction field, but can also be expected to enhance the effectiveness and efficiency of infrastructure by enabling easy feedback of the state and use condition of infrastructure under management. In turn, this will increase the vigor of society. This will require great strides in research and development, referring to the nervous system functions of living beings, aiming at DX that coordinates the totality of infrastructure, from individual structures to the national

land, so as to demonstrate the functions of infrastructure in harmony, without waste, and in a robust manner.

5. “Beauty”: Attractiveness for a comfortable and secure life

Daily life is not realized without a safe and vigorous national land and society, but at the same time, life is not worthwhile without comfort and security. However, the requirements that must be satisfied by the element of “beauty,” as exemplified by comfort and security, is difficult to evaluate by an objective index. Although it is frequently hard to determine the proper form of measures and projects from this viewpoint, measures and projects in the field of national land, housing and social capital should be developed in line with a shared sense of values in society, based on the common culture of the region or country. Thus, this is a field where it is necessary to systematize research so as to contribute to enhancing the quality of life through appropriate evaluations.

It is essential to include preservation and improvement of the living environment and natural environment as purposes of measures to provide safety and vigor in society. In particular, as we accumulate individual measures and projects, we must construct sustainable national land, housing and social capital from diverse viewpoints, including decarbonization, looking at those efforts as a whole. Here, the question is how to construct research in a way that will increase the attractiveness of the national land and society.

6. Conclusion

The target research fields of NILIM are broad and cannot be completed independently. Thus, we will continue to update the organization of our research fields, but in areas where our own capabilities are insufficient, we must also carry out research in cooperation with other organizations with different specializations.

Our research results are materialized as technology policies, and they fulfill the Mission of NILIM by contributing to society. Therefore, our research results must be capable of social implementation. However, we must go far beyond that. As I have described in this paper, it is my hope that NILIM will continue to adopt a stance toward research that systemizes the chaos of “reality,” and exhaustively pursues “the essential” in order to manage that reality more appropriately.