How to Visualize the Contribution to the SDGs and How to Use It as a Business Opportunity

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The SDGs were adopted by the U.N. in 2015, and are mainly being tackled by private companies, which have competed to make promises. Now that the “pledge race” has settled down, companies feel a pressing need to produce tangible actions and results. Similar to Environmental, Social and Governance (ESG) investment, how much a company contributes to the achievement of the SDGs is increasingly recognized as a measure of its social value. To assess and improve the degree of such contribution, it is useful to visualize the relation between business activities and the SDGs.

Yokogawa’s IA Systems and Service Business Headquarters has been developing a framework that stratifies and analyzes customer value and its components. This framework helps visualize how much each component contributes to customer value and the SDGs. In addition, it can identify inadequate factors for business strategies as well as promising ones for the SDGs. This paper outlines this initiative and explains how Yokogawa’s system business has been strengthening its business strategies from the perspective of achieving the SDGs.

INTRODUCTION

Private companies including Yokogawa bring prosperity to human beings through pursuing economic growth. However, their economic activities inevitably impose burdens on society and the environment, both of which are the basis of human existence. Therefore, maintaining an appropriate balance among the triple bottom line of economy, the environment, and society is crucial for sustainability.

To implement this recognition as an effective framework across the globe, the Sustainable Development Goals (SDGs) were drawn up. The SDGs clearly define social and environmental values as a new value standard that is as equally worthwhile as economic growth. Now, the value of a company is measured as the sum of these two values. Each goal set in the SDGs and their key performance indicators (KPIs) are very useful for evaluating a company with this new standard. Therefore, the SDGs are expected to be increasingly

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used for this purpose. Companies are required to show how much they contribute to the achievement of the SDGs in easy-to-understand metrics and expressions.

The increase in environmental, social, and governance (ESG) investment is symbolic of changes in standards for corporate value. When companies fail to satisfy the requirements of the environment and society, they will no longer attract capital and their existence will be under threat. Although many companies express support for the SDGs, those that cannot produce tangible results are increasingly being accused of “SDG washing.”

In this special issue, this paper proposes the concept of Value Architecture as a means of presenting our contribution to the achievement of the SDGs. This concept allows us to visualize the contribution of our current solutions and the direction in which we should proceed. In other papers, we will introduce how Yokogawa’s IA system businesses and services contribute to the achievement of the SDGs.

Yokogawa’s concept and efforts for the SDGs have already been presented in Yokogawa Technical Report English Edition Vol. 62, No. 1, in “‘The Sustainable Development Agenda’ and Yokogawa”(1), “Yokogawa’s Transformation to Achieve Its ‘Three Goals’”(2), and other papers. We encourage readers to refer to them.

**VALUE ARCHITECTURE**

**Basic Idea**

Value Architecture (VA) is a framework for separating business activities, determining their relationship with value proposition, and arranging them in a hierarchical manner. The left part of Figure 1 shows the image of VA.

The right part of Figure 1 shows the hierarchical visualization method(3) used in Innovation Architecture, which was proposed by Hugo Tschirky and Tim Sauber. VA was created based on this method. In accordance with the hierarchical structure in Innovation Architecture, layers are added in VA to match the characteristics of Yokogawa’s business. The hierarchical structure of Innovation Architecture needs to be revised to link Yokogawa’s IA system businesses and services to the SDGs. The first step is to replace Innovation Trend, which is the top layer in Innovation Architecture, with each goal of the SDGs and their KPIs, which are then linked to customer economic value (CEV).

Since Yokogawa system products are industrial goods, the CEV is classified into three categories: Sales (boosting customers’ sales), Cost (reducing customers’ cost), and Opportunity (preventing customers’ opportunity loss due to accidents and troubles). Each stage of the long plant lifecycle from construction to demolishing is arranged in VA and the timing when CEV occurs is indicated.

In the part below the plant lifecycle, value proposition is broken down into elements, which are arranged in a hierarchical manner. This step is the same as the one used in Innovation Architecture. Note that some layers are multilayered or expressed recursively since the value offered by Yokogawa’s IA system businesses and services consists of a large number of elements.

We use the concept of Innovation Architecture for VA, expecting its Function layer to work effectively. We do not directly connect the elements of market needs in the top layer and those of technology seeds in the bottom layer but link them through a translation layer, which is equivalent to the Function layer in Innovation Architecture and closely examines the functions of each element. This is the same idea as the MFT framework proposed by Arthur D. Little, a management strategy consulting firm. This way of thinking is very useful in describing Yokogawa’s IA system businesses and services, in which many components are intricately intertwined to create value.
How to Use VA

How to use VA is explained below by referring to Figure 2.

Needs-seeds matching

To match needs and seeds, VA is examined from the top and the bottom.

As shown in the left column of Figure 2, the possibility of rolling out seeds is examined from the bottom level of resources to the upper levels of development items and individual functions, products, and services. To make it easy to match these contents to the needs, they are described using abstract expressions, which will bring them closer to customers’ point of view. Meanwhile, needs are broken down from the upper level to lower levels. By combining the abstract expressions from the bottom and the broken-down elements from the top, seeds and needs can be matched.

Use as input to resource procurement strategies

VA can also be used to identify which resources are to be procured (the right column of Figure 2). Breaking down needs into elements often reveals that some resources are missing. This serves as the input to the technology procurement strategy, and also as the input to M&A, partnership, industry-academia-government collaboration, licensing, and recruiting strategies.

How to Create VA and Its Tricks

The creation of a VA requires some “tricks.” Figure 3 shows how to create a VA and some tips.

In the VA hierarchy, some layers are familiar to you and others unfamiliar. You should start at the most familiar one, work upward and downward from it, draw a link from the bottom to the top, and use it as the trunk to expand the branches and leaves (Figure 3 (1)). Candidate starting points are core technologies and individual functions for engineers, and customer economic value (CEV) and system value for those in charge of product planning.

After laying out all necessary elements as branches and leaves, each layer must have the same granularity (resolution, details, or depth of branching). It is important to arrange all items in the layer in a mutually exclusive and collectively exhaustive (MECE) manner (Figure 3 (2)). If you cannot identify elements for the upper layer, group elements at hand to find the common denominator for the upper layer (Figure 3 (3)). If the granularity is uneven, elements should be integrated or separated (Figure 3 (4)). This is also effective in adjusting the VA to the user’s perspective. For example, abstractions may be used for managers and a breakdown for engineers.

One important trick is not to try to make a perfect VA on the first attempt. A seemingly perfect one makes it difficult to get feedback from others, and difficult for them to point out new elements and connections that you are not aware of. To create a VA more effectively, you should leave some weak points that would attract suggestions and advice from others.
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RELATIONSHIP BETWEEN YOKOGAWA'S SYSTEM BUSINESS AND THE SDGs

Relationship between the Papers in This Special Issue and the SDGs

Figure 4 outlines the relationship between the papers in this special issue and the SDGs, according to the VA concept.

Yokogawa’s system products and services are all related to the construction and maintenance of industrial infrastructure. The paper “A Platform based on the Semantic Data Model That Makes Full Use of Design Data throughout the Plant Lifecycle” introduces efforts to remove the difficulties associated with the complexity of plant design information managed by various parties in different formats. This is related to SDG 9 “Industry, Innovation and Infrastructure.” The paper “Effectiveness of ‘Remote Engineering and FAT’ on Project Execution and Contribution to Society” introduces a highly efficient way of using cloud technology to eliminate the need for on-site engineering and FAT with actual equipment. These efforts will help engineers focus on tasks that truly need human intervention and contribute to achieving SDG 8 “Decent work and economic growth.”

Meanwhile, infrastructure provides essential social resources such as energy (SDG 7), water (SDG 6), and food (SDG 2). Its resilience is indispensable for the stable supply of these resources. The paper “How Yokogawa’s DCS Hardware Satisfies the SDGs” introduces our efforts to support the high performance and reliability of the CENTUM VP production control system. The paper “Contribution of Asset Excellence to Sustainable Plant Operations” introduces our efforts to stabilize plant operation and reduce burdens on maintenance workers by centrally managing a large number of field devices in a plant and predicting their malfunctions. The paper “How the OmegaLand Integrated Environment for Dynamic Simulation Helps Achieve the SDGs” introduces training for proper operation of infrastructure. Cybersecurity has been receiving increasing attention in view of resilience, and the paper “Yokogawa’s Commitment to Developing Secure Products that Contribute to Achieving the SDGs” introduces how to avoid creating vulnerabilities in the system and how to deal with any that are found.

Yokogawa Group Engineering Standards Embodying the Spirit of the SDGs

The previous section explained how Yokogawa’s products and services are related to the SDGs. These goals are achieved by customers that use our products and services, and also by Yokogawa. The company has long been trying to reduce the environmental impact of its own products.

All of Yokogawa’s products including the CENTUM VP integrated production control system, which is the core product of Yokogawa’s IA system businesses and services, have been developed in accordance with Yokogawa Group Engineering Standards, which is one of the most important intellectual properties of Yokogawa. It systematically defines the points to be followed and know-how throughout the entire process.
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Follow rules

Easy to acquire all of these abilities at once in an “all-inclusive” manner. It is realistic to gain experience by getting multiple people to create a single VA; list and study the elements, assess and discuss them from different perspectives, and arrange and connect the elements in a VA.

Tool for Drawing Up Business Strategies

VA can reveal missing elements in a business strategy and thus can identify what resources need to be procured. This VA perspective will help you prepare for and take an appropriate response to unexpected opportunities for M&A and collaboration.

Application to Enhancing Employee Engagement

VA can also reveal the relationship between internal activities and external values such as customer value, the SDGs, and other social values. Applying this feature to the activities of individual engineers is expected to strengthen employee engagement.

Yokogawa’s IA system businesses and services are based on the combination of diverse values, but individual technologies, functions, and services offered by each employee are relatively distant from the product value perceived by customers, and thus it is difficult for engineers to recognize their own contribution to customer value. VA can solve this problem. First, you list your activities and lay out them in the form of a VA. Then you discuss the VA with others to transform it into an organizational VA. This process will help engineers recognize how they contribute to customer value. The completed VA will also clearly show how they contribute to the company, and thus enhance employee engagement.

CONCLUSION

This paper described VA as a method to visualize the value structure connected to the SDGs. VA expresses the lifecycle of the products from the very early planning stage to the design, production, sale, use, repair/replacement, removal, and disposal stages.

The whole system of the Standard was established in the 1980s and repeatedly revised to reflect changes of the times and technical innovations. Currently, measures against information security threats are being incorporated.

Meanwhile, as a vendor of industrial goods, we have long been aware of our responsibility for saving energy and reducing environmental loads, which is compatible with SDG 7 “Affordable and Clean Energy” and SDG 12 “Responsible Consumption and Production.” Both goals were already defined in the Standard by the late 1990s.

Figure 5 illustrates how the content of Yokogawa Group Engineering Standards is compatible with SDGs 7 and 12. The effectiveness of the Standard is supported by the two phrases that have been handed down through Yokogawa’s history. “Follow rules” is a culture passed down by generations of Yokogawa employees, and “Quality first” is an aphorism of Yokogawa’s founder, Dr. Tamisuke Yokogawa. This word suggests not only the importance of the functionality and performance of products but also their friendliness to the environment.

**CHALLENGES AND THE FUTURE OF VA**

**Need for Raising the Abilities of Employees**

Creating a VA needs an ability to understand each piece of information and arrange them at the same level of granularity and abstraction. Specifically, it is necessary to take a comprehensive view of the entire value chain, prevent any omissions, and achieve a balance. It also needs an ability to reconcile different perspectives, for example, the perspective of engineers and that of product planning. However, it is not easy to acquire all of these abilities at once in an “all-inclusive” manner. It is realistic to gain experience by getting multiple people to create a single VA; list and study the elements, assess and discuss them from different perspectives, and arrange and connect the elements in a VA.

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**CONCLUSION**

This paper described VA as a method to visualize the value structure connected to the SDGs. VA expresses the
relationship between the SDGs and individual activities, and how the company contributes to the SDGs through its economic activities.

VA clarifies how much Yokogawa and its employees contribute to achieving the SDGs with its products and services. This also leads to achieving SDG 8 “Decent Work and Economic Growth.”

REFERENCES


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