

## **Systems engineering approach to smart computing: From farmer empowerment to achieving sustainable development goals**

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### **Abstract**

Smart Computing aims to combine advances in Information and Communication Technologies to create smart systems to make human life better thus, providing a new approach to address many complex and challenging problems faced today by humanity. The study developed a solution to one such problem, uncoordinated agriculture production using Smart Computing which otherwise will lead to wide fluctuation of market prices, waste and farmers getting trapped into a poverty cycle. This was done using a bottom up approach. Using systems thinking in Systems Engineering and the insights gained from the bottom up approach the study derived a top-down approach as a way of guiding the process to solve other similar humanitarian challenges. The evolved top-down process consist of 3 broad steps; a) Root Cause analysis and development of a conceptual solution drawing on learnings from multiple disciplines, b) Development of an artefact based on Smart Computing technologies to implement the conceptual solution, and c) Development of a Closed Loop Control system to continuously monitor and manage the inputs identified in the conceptual solution using the artefact developed to achieve the desired outputs.

**Keywords:** Agriculture, Digital knowledge ecosystem, Smart computing, Systems engineering, Sustainable Development Goals (SDGs)

### **Introduction**

Smart Computing is an effective method to integrate the capabilities of computer hardware, software, social media and communication networks together with digital sensors, smart devices, internet technologies, big data analytics, computational intelligence and intelligent systems to realize various innovative applications. Smart Computing can be broadly classified into two major areas: how to design and build smart computing systems and how to use computing technology to design smart things and make human life better. Thus, Smart Computing can be used to provide new solutions to many challenges faced by humanity. The United Nations have formulated 17 global goals and classified them as Sustainable Development Goals (SDGs), which are aimed to transform the world we live in by 2030. “No Poverty” and “Zero Hunger” are two of these goals. To achieve these goals, a multi-disciplinary approach is needed, while for it to be effective it should be easily scalable to reach the billions of people across different continents irrespective of the countries development status. This is a very complex challenge.

The lack of a suitable framework to handle the complex multi-disciplinary nature of these applications is hindering finding effective long term solutions to these issues. What we see today is a very large number of “apps” providing point solutions to various human needs rather than an integrated system to solve a complex human problem. This paper presents an approach to utilise Smart Computing to develop a multi-disciplinary solution to a complex problem using Systems Engineering approach to make human life better.