

# An Integrated Decision Support System Framework for Strategic Planning in Higher Education Institutions

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Osama Ibrahim, David Sundgren, Aron Larsson

Department of Computer and Systems Sciences (DSV), Stockholm University

[osama@dsv.su.se](mailto:osama@dsv.su.se) [dsn@dsv.su.se](mailto:dsn@dsv.su.se) [aron@dsv.su.se](mailto:aron@dsv.su.se)

**Abstract.** Strategic planning models and information provision for decision-making in complex strategic situations are frequent subjects for scientific research. This research deals with the problem of supporting strategic planning decision-making in public higher education (HE) institutions by designing a Decision Support System (DSS) to be used by HE decision makers in implementing their strategic planning process, considering that the DSS would be anchored in on all databases of the institution's information systems. This paper adopts a model for the strategic planning process, advocates the incorporation of technologies of participation (ToP) and introduces a collaborative framework for the planning activities at the different institutional levels to develop the institution's strategic plan using a bottom-up approach. Based on the strategic planning process model, a DSS framework is proposed and decision support methods are suggested for the different modules of the DSS. The DSS provides intelligent support (on the individual, group and organizational levels) to strategic planning decisions in all stages of the process. By utilizing this DSS, it is possible to create better conditions for implementing the objectives of the future-oriented activity of the institution.

**Keywords:** Strategic Planning, Higher Education, Technology of Participation, Decision Support Systems, Group Support Systems, Collaborative frameworks.

## 1 Introduction

*“In today's competitive higher education atmosphere it is critical to strategically develop approaches for the improvement and growth of systems, services, and strategy” [1].* Therefore, it is the complexity and uncertainty of higher education's future in a briskly changing world that will position the foundation for the challenges facing HE institutions ahead. The main challenges are: (i) the competition for scarce

resources; (ii) absence of a strategic systems approach to planning in order to understand the changing marketplace and identify opportunities, threats and internal strengths and weaknesses; (iii) the shift in faculty and students' pursuit of a greater participation in decision-making and a more robust culture of transparency [2] [3].

The application of strategic planning, which is rooted in the military theory and has been adapted as a tool for businesses, in HE institutions allows the institution to: (i) devise a realistic framework for determining the process a university should take in achieving its stated and desired future; (ii) embrace continuous innovation and quality improvement; (iii) establish goals and priorities; and (iv) involve key implementers and stakeholders in defining the strategic direction of the institution. The key element of strategic planning is to achieve competitive advantage, in order to obtain qualified students and resources and provide quality programs. The institution's strategic plan should reflect assessment and evaluation of educational activities, learning outcomes, research and postgraduates, admission and grants, student services, human resources, financial stability, governance and administration, institutional effectiveness, cooperation with national and international HE institutions and compliance with accreditation requirements [4].

Technology of Participation planning was recognized internationally in the mid 80s when introduced by the Institute of Cultural Affairs (ICA). The approach used by ICA is a structured planning process, which incorporates group facilitation methods into productive action, and concrete accomplishments that enables a group to come to a common vision and create a "*participant-owned*" plan that deals with the realities blocking the group [5] [6]. Figure (1) illustrates a "spiral strategic thinking" model that provides leaders with a way to engage an entire group in a thought process that produces a participatory practical vision and leads to commitment and action [7]. Adopting a participatory culture requires new attitudes, tools and methods. The design of customized applications building up on the ToP strategic planning approach, brings high levels of participation to the decision-making process, cultivates the collective ideas that generate the spirit of commitment and fosters creativity and innovation.



Fig. 1. Strategic Thinking Model [7]

Literature review reveals gaps in educational strategic planning. Though, much has been written on the importance of strategic planning in HE, it is not clear how these practices are fully realized on public universities campuses. And how computerized decision support can be used for implementing strategic planning decision-making processes. *“Recent analysis on decision support and expert systems has shifted from considering them as solely analytical tools for assessing best decision options to seeing them as a more comprehensive environment for supporting efficient information processing based on a superior understanding of the problem context”* [8]. The use of DSS for strategic planning in HE allows utilization of quantitative models and qualitative knowledge to solve semi and unstructured problems and provide users with various options and scenarios to make future projections of decision variables. It can also provide coordination among a large number of participants from the different institutional levels through group decision support and collaborative frameworks. Nevertheless, evidence of widespread use of DSS’s for strategic planning in HE institutions is hard to come by.

## 2 Adopted Strategic Planning Process

Literature demonstrates similarity and overlap among the proposed steps or phases of the strategic planning process. Based on models from literature [9] [10] [11] [12], we introduce a process model, which: (i) goes through the full process; (ii) uses a systems planning approach to define the steps with each step providing input to the next; (iii) groups steps into stages; (iv) defines a “*review stage*”, the strategic direction; and (v) reflects the continuous nature of the process that requires constant assessment, evaluation and adjustments to any of the stages by linking these stages as shown in figure (2). A short description of each step is provided:

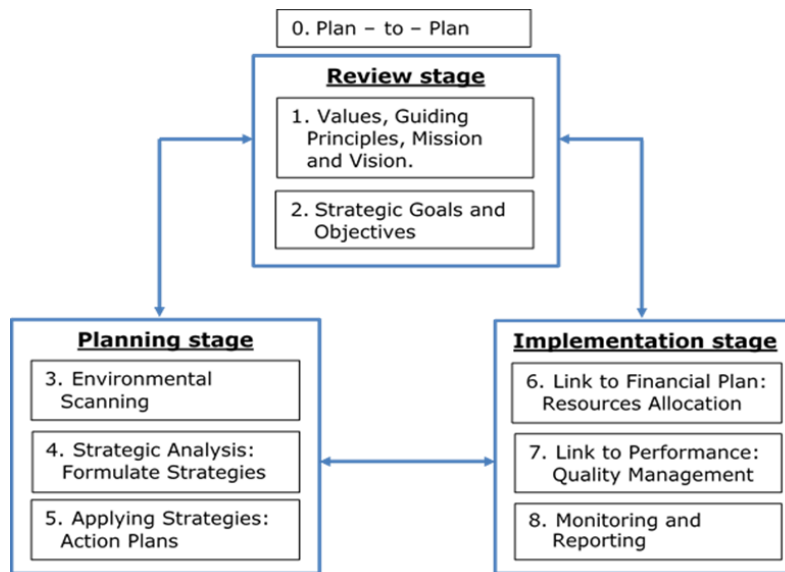
*Step 0: Plan to plan:* Preparations for strategic planning include: (i) description of the planning process, the time period covered by the strategic plan, how often the strategic plan is to be updated and how the planning process is to move forward; (ii) how the stakeholders can be involved in planning efforts; and (iii) analysis of data collected through questionnaires, personal interviews or public documents.

*Step 1: Clarifying Values and Guiding Principles, Defining Mission and Vision statements:* The written values and guiding principles might for instance be summarized by words such as integrity, teamwork, pride, honor, persistence, commitment, and accountability. In the formulation of mission and vision statements, variables such as the reason for being of the institution, its environment, resources, objectives, fields of service, and the needs the institution aims to address should be taken into consideration. The accountability of an institution should provide evidence of compliance to its mission, vision and values in both operations and assessments.

*Step 2: Identifying Strategic Goals and Objectives:* Defining specific and measurable goals and objectives, based on goals provided by the functional units’ plans.

*Step 3: Environmental Scanning:* It includes analysis and evaluation of both internal and external environments to help to align the strengths and weaknesses of the institution with opportunities and threats in the environment (SWOT analysis).

*Step 4: Strategic Analysis:* Formulating strategies is an interactive, dialectical process that requires nonstandard thinking and creativity. The process of strategy making is continual, takes place in real time, and involves generating strategic alternatives, defining and integrating the evaluation criteria, analysis and evaluation of strategic alternatives and finally, strategy decisions. The strategic planning units provide the information on possible ways to implement the goals to the strategic planning office, where the processes of strategic analysis of the institution are centralized.



**Fig. 2.** Strategic Planning Process in HE institutions.

*Step 5: Action Plans:* Action (operational) plans are very detailed plans that execute specific strategies that will lead the organization closer to the goals and objectives identified in step 2. Without specific strategies and action plans, developed at the functional unit level, the strategic plan tend to be little more than a vision statement of what the institution wishes to become without any concrete strategies to get it there.

*Step 6: Link to Financial Plan - Resource allocation:* This is an important step in the strategic planning process because it is the only way to make sure that adequate funding is available for the institution to achieve its goals and objectives.

*Step 7: Link to Performance - Quality management:* The action plans contribute to the link between strategic planning and performance management. The individual goals and objectives, developed by the institution's functional units, should become the foundation of the performance management system.

*Step 8: Monitoring and Reporting:* Including record and controlling of the action plans' implementation, analysis and evaluation of the results of the action plan implementation and using the results of the analysis and evaluation. That enables the institution to adjust strategies as needed, to evaluate progress, and to reward the accomplishment of goals and objectives [13] [14].

### 3 Strategic Planning Activities at different Institutional Levels

The coordination of strategic planning activities at the different institutional levels is done by integrating goals and resource requests from individual plans of the functional units of the institution, in order to ensure their compatibility with the strategic goals and financial plan of the institution. Figure (3) presents a collaborative framework for development of the integrated strategic plan in a public university campus, which is based on a common organizational structure for public universities and is designed to address issues that arise from the lowest institutional level.

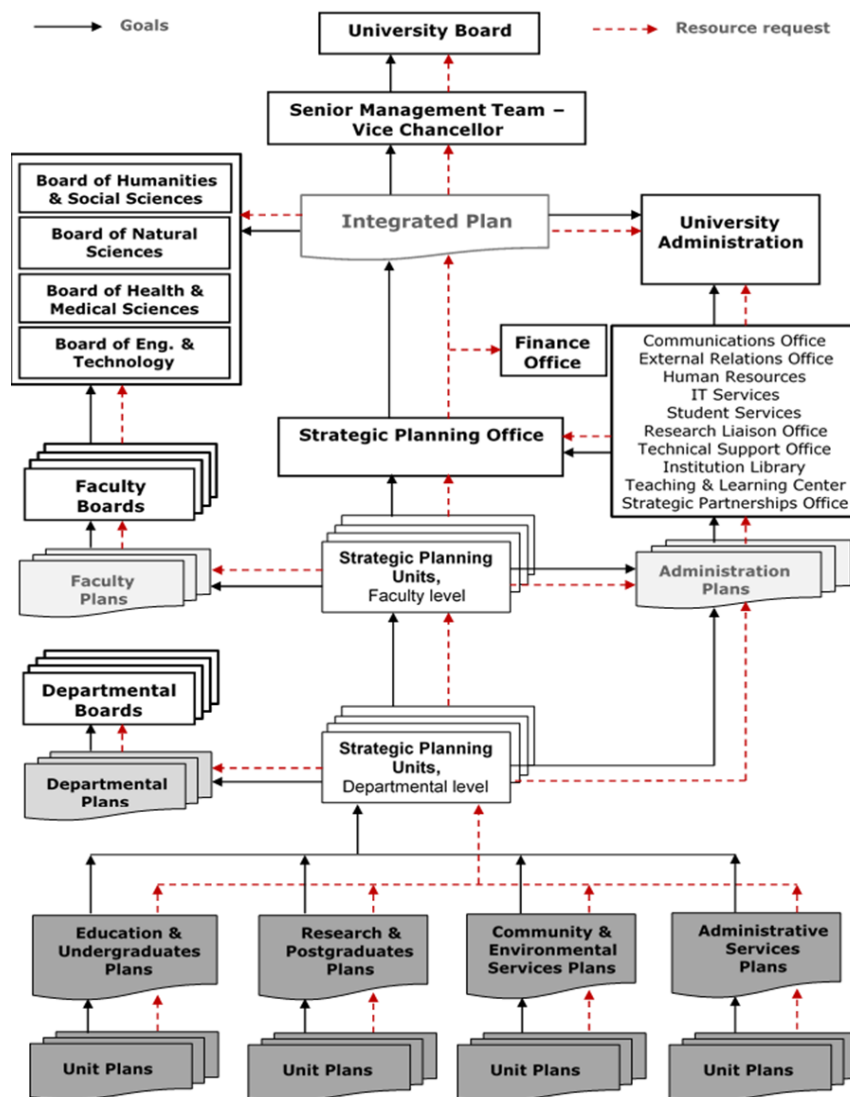


Fig. 3. Framework for Strategic Planning Activities at institutional levels

In our framework, the institution's strategic planning office and institutional levels' strategic planning units are presented as permanent entities providing a broad support for the strategic planning process, with the following responsibilities: (i) facilitating the process by scanning and monitoring the environment; (ii) assisting the functional units of the institution in developing goals and strategies; (iii) defining the roles of the institution's boards, authorities, and functional units; and (iv) developing the strategic plan document and setting timelines and criteria for evaluating and implementing the plan. The lowest institutional level is the unit level, which is a functional unit, a committee, an academic program, a research center or an administrative unit within a department. The unit's plans demonstrate the different programs and projects implemented within the unit and can be categorized into: Education, Research, Community services and Administrative services plans. The strategic planning units on the departmental level are responsible for developing the departmental plans based on goals and resource requests from the units' plans. The same for the strategic planning units at the faculty level by receiving the departments' plans. The scientific boards integrate and approve the faculties' plans. Administrative plans are integrated based on administrative plans from the departmental and faculty levels and offices of the university administration. The university's strategic planning office develops the integrated plan building up on the faculty and departmental levels' plans to be approved by the university board.

#### 4 DSS Framework

The main components (modules) of the strategic planning DSS can be derived from the proposed strategic planning process model and are described as follows:

*Module 1: Strategic Direction: (Tasks: Step 1 & Step 2)*

*Mode of decision support:* Group support and Expert support. *Methods:* [ToP facilitation methods – Collaborative Visioning for Strategic Planning – Goal structuring methods]. *Participants:* University board, scientific boards, faculty boards and departmental boards (including representatives of stakeholders).

*Module 2: Environmental Scanning: (Tasks: Step 3)*

*Mode of decision support:* Group support. *Methods:* [methods for information gathering, analyzing and interpreting – Delegation Technologies – intelligent scanning approaches]. *Participants:* Strategic planning office, strategic planning units and the institution's functional units.

*Module 3: Strategic Analysis: (Tasks: Step 4)*

*Mode of decision support:* Individual decision support and expert support. *Methods:* [Strategic options development and analysis SODA – Strategic Choice Approach – Robustness decision-making – Scenarios – Futures matrix - Normative Forecasting – Multi-criteria decision Analysis]. *Participants:* Strategic planning office and strategic planning units.

*Module 4: Implementation: (Tasks: Step 5 & Step 6 & Step 7)*

*Mode of decision support:* Individual, Group decision support and expert support. *Methods:* [Methods of collective decision-making – Quality management frameworks

– Financial planning models – Resource allocation models – Enrollment models].  
*Participants:* Strategic planning office, Finance Office and the institution's functional units and quality assurance units.

*Module 5: Monitoring and reporting: (Tasks: Step 8)*

*Mode of decision support:* Individual, Group decision support and expert support.

*Methods:* [Project management methods – Performance evaluation models – Criteria definition methods – Methods of multi-criteria evaluation – Ranking methods].

*Participants:* Strategic planning office and strategic planning units.

Through the suggested decision support methods for the different modules of the DSS, we can integrate data, modelling, simulation, analytical capabilities, environmental scanning information and experts' knowledge to provide the institution's decision-makers with hindsight, insight and foresight.

Figure (4), provides the standard structure of the DSS components and their integration. We consider that the DSS database is fed from all databases of the institution's information systems (educational, research, administrative services, human resources, finance, e-learning portal ... etc.). The model base of the DSS integrates different quantitative models, which enables the DSS to support decision-making regarding the institution's strategic decision variables (mission, vision, strategic goals, constituencies, resources, and governance and quality management procedures). The DSS knowledge base will contain the formal ontology of a higher educational system, definition of the roles, relationships and interactions among participants (analysts, experts, and decision makers) questionnaires, model variables and meta-knowledge (justification/explanation).

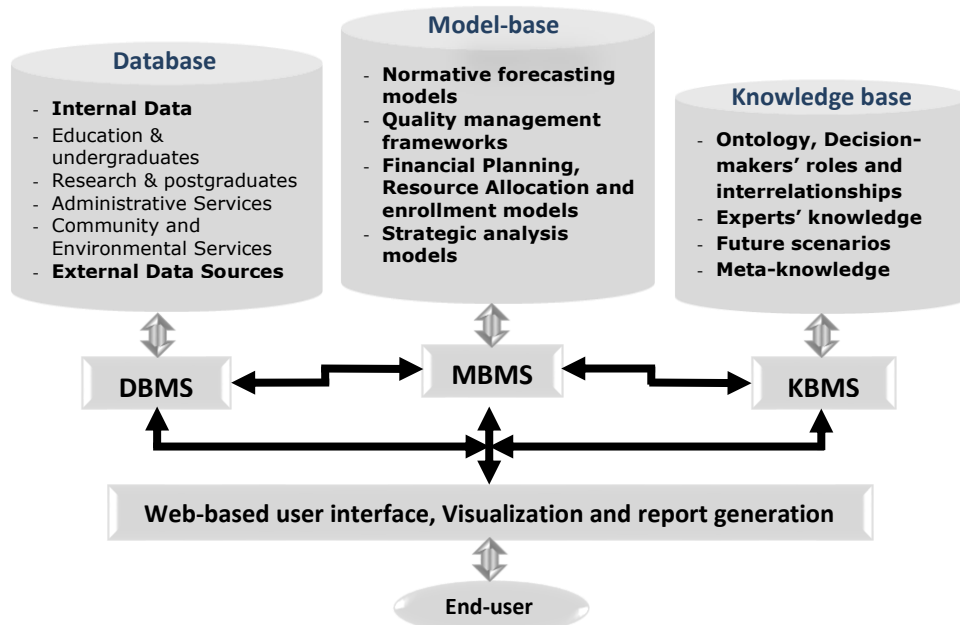


Fig. 4. DSS Structure

## 5 Defining Mission and Vision Statements, A Sample Model

The process of defining mission and vision statements in HE requires collaboration among participants from the University board, scientific boards, faculty boards and departmental boards (including representatives of Faculty, employees and students). In order to allow participation of these large, asynchronous and distributed groups, a dynamic workflow is required, which should consist of relatively independent modules that can be iterated through as the group moves from the beginning of the brainstorming stages to the end reaching to the goal of the collaborative work. That reflects the ToP strategic planning approach adopted in this research. A Group Support System (GSS) is proposed here to achieve this end. It is designed in a manner similar to the notion of thinkLets in the collaboration engineering approach introduced in [15]. An intelligent support to the GSS, based on the Participant-Driven GSS approach [16], is that the system itself has thresholds identified and set to automatically route participants to different modules as they log into the system. In addition the system can analyze the behaviour and productivity of the participants within the different modules of the system.

Figure (5) illustrates the modules of the GSS: *Brainstorming*, allows users to input ideas to the system and to perform peer- reviewing of ideas; *Evaluating brainstorming ideas*, allows participants to judge and sort ideas; *Clustering*, categorizing brainstorming ideas; *Reviewing clusters*, refining clusters (determine if any need to be split or consolidated); *Naming clusters*, providing names or labels for identified clusters; and *Rating clusters*, allows participants to evaluate and rank clusters. Each module of the GSS represents a basic collaborative activity that the group needs to complete in order to achieve the end goal of the collaborative efforts. In this manner, each user can contribute to the overall goal of the group.

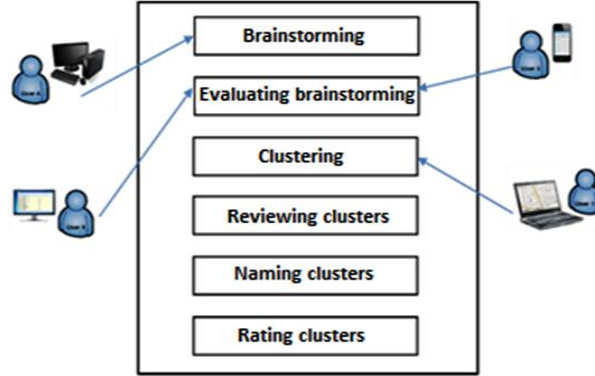


Fig. 5. GSS for defining mission and vision statements - Modular design

## 6 Conclusion

This research forms a basis for more focused future researches on designing the different modules of the DSS that implement the suggested decision support methods.



Through this DSS, we will design several decision models and explain the criteria for selection of a best fit model for each of the strategic planning steps.

Our proposed strategic planning process model and the collaborative framework have the potential to contribute to the application of strategic planning in HE institutions. The final section presented and discussed a specific sample model or subcomponent of the system where Technology of Participation is incorporated in order to involve the institutions' decision-makers and stakeholders.

The development and integration of a strategic DSS with the university's information communications technology (ICT) systems will attain a reduced cost and time needed to resolve key issues of complex strategic decisions. The framework of the DSS is under further development and improvement. Preparations are underway to implement and test the different modules of the DSS using a case study.

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