FOSTERING COLLABORATION AND LEARNING IN PROJECT DEFINITION

A CASE STUDY IN WORKPLACE PLANNING

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ABSTRACT

Effective project definition requires process conditions to support group collaboration and learning. This paper presents a case study showing how a project definition methodology provides such conditions. The case was selected because it offered the opportunity to compare traditional architectural programming with an alternative workplace planning approach. Traditional programming was not successful in controlling project needs within budget constraints and failed to produce a cost-feasible definition. The workplace planning approach was successful. The study shows how project stakeholders were enabled to work within project constraints. The case study shows the group learning about their various needs and the ability to fulfil those needs within project constraints.

This study demonstrates a set of management practices that engage multiple stakeholders in collaboration that resolves the purpose of projects, often in environments where collaboration was not evident before. The ability of the workplace planner to steer the problem solving process is instrumental in facilitating group learning and the group's ability to make innovative changes in their operational functions and, in the workplaces required to perform those functions.

Future research is proposed to develop and generalize the project definition methodology.

KEYWORDS

Collaboration, customer needs analysis, dialogue, emergence, learning, project definition, purpose, shared understanding, value generation, workplace planning.

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INTRODUCTION

Project definition is known to the construction industry as strategic facility planning, client briefing, needs assessment, requirements processing, and project programming as traditionally practiced by architects and planners[4]. In building facilities, project definition is the process that understands and formalizes the relationships between the purpose of the owner and user organizations and the purpose of the physical facility project.

The difficulties in managing an effective project definition process arise from the complex nature of the problem to be solved: defining the purpose of a building facility. Rittel and Webber's (1972) seminal work illuminates the complexity of design and planning processes describing many design problems as so ill-defined and complex that they can only be called "wicked problems". These types of problems are prevalent in construction projects that have multiple stakeholders with diverse and competing interests. Whelton and Ballard (2002) further explore project definition as a wicked or messy problem. This paper focuses on a planning methodology that acknowledges the complexity of defining the purpose of an organization's workplace strategy and subsequent facility requirements.

This research describes the Haahtela workplace planning process (Pennanen, 2004) through a project case, the City of Jyväskylä Cygnaeus High School, which illustrates the adaptive management principles by which Haahtela create effective workplace planning statements. The Haahtela workplace planning system is designed to measure owner needs such as user functions, geometrical and temporal needs, spatial performance and associated costs. The process seeks early and frequent feedback from facility owner groups to establish new information about the state of needs and values. The feedback is based on focused dialogue with the stakeholder groups and the workplace planner.

The process displays evidence of supporting group collaboration in terms of fostering stakeholder engagement, developing high quality information, supporting innovation in the owner's functions, and the appropriate sharing of facility spaces among owner groups operating with limited resources.

In the Cygnaeus High School project, the traditional architectural programming approach was not effective in consensus making, in that there was stalemate in the project development, primarily because of the project costs being too high. The traditional method was not successfully controlling the project needs within budget. The case study describes the group dialogues that took place within operations management to resolve the workplace issues. These dialogues subsequently resulted in positive changes in the operations design for the education facility and consensus on the project.

Whelton (2004) tests the proposition that effective project definitions are possible through managing the process as one of collaborative learning. The case study reveals the group learning involved about the state of needs and their ability to satisfy these needs within the project constraints.

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[4] Whelton (2004) provides a comprehensive literature review of management approaches associated with project definition activity. It is not within the scope of this paper to document the broad literature base associated with this subject area.

CYGNAEUS HIGH SCHOOL JYVÄSKYLÄ

GENERAL BACKGROUND

The City of Jyväskylä is located 300km north of Helsinki in Central Finland. It is a regional city with a population of 250,000 inhabitants. The public entity, the City of Jyväskylä, is responsible for developing and managing real estate to support its public customer base in the city. The leader of the "Investments and Maintenance" division of the Real Estate group oversees the project development process. In this case their customer is the Cygnaeus High school in Jyväskylä which requires facility changes to support increased education demands and to improve functionality of the existing structure.

The client-based project stakeholders broadly consist of the City of Jyväskylä, the Department of Education, and Cygnaeus High School teaching staff and students. The city is the ultimate decision maker in terms of sanctioning the project for further development. The city normally works with the Department of Education and they plan the city's education facilities. In education projects, the real estate group first discusses with the department their needs and then makes preliminary plans. The closest client representative in this case is the school principal. The preliminary plans go to the board of education which decides whether to continue development. If deemed suitable, then the group takes the plan to the city executive committee, which sanctions the project development. This committee is made up of politicians, who work on a part time basis.

The preliminary plan typically describes the problem context; i.e., who is involved; who the advocates for the project are; what it means for the client; how the city can finance the investment, maintenance costs, an outline design scheme, and cost estimates for the project development. A decision is then made on whether the project is deemed viable for further development.

THE CYGNAEUS HIGH SCHOOL PROJECT DEFINITION PROCESS

The early project development process for the high school went through a number of iterations. The head of Project Managers in the City of Jyväskylä is responsible for investments and maintenance of capital projects in the City's real estate organization. He was responsible for the overall planning of the Cygnaeus High School Renovation and Program Extension project. In 1997 the City Real Estate Group began the project primarily due to a renovation need. The existing building was built in the 1960's and the existing school did not support user capacity or perform functionally. The department of education also initiated a strategic planning study for a central high school. The city council made a decision to establish a large high school on the present building site based on their forecasts for education.

The 1st preliminary plan started in 1997. The City originally hired a local architectural firm to perform programming services for the school. The selected architectural programmer specialized in renovations, and was commissioned to do the first programming draft. Regarding the programming process, the architect tried to "create a problem statement in writing or black and white". The architect felt it was his job to put the project into context, - "how big the project may be". The city wanted a visualization to understand the site, so a

massing model was developed. The architect mainly focused on client needs. The school stressed the need for specialist teaching subjects; e.g., music. The plan was made according to direction from the teachers, with little apparent regard for the city's objectives and funding constraints. The city was not as involved, but encouraged testing possibilities. Design schemes revealed general layout, circulations, where valuable spaces were located, and what they looked like. They used visualization to get feedback. Their programming process considered building materials ideas and they provided general knowledge about construction methods.

The city had their own cost estimators assess the program. It was deemed too expensive and was not used or developed any further.

A new program development started in 2002. Again technical and size issues triggered the new program planning. The 2nd version was a continuation of the 1st version from 1997. The results again were similar in that the project scope exceeded available resources. A 3rd version of the program was developed with little change from the previous version. Based on experience, the project coordinator found the new programs too expensive. Once the architect established a square footage, he guessed from the size that they could not support the project financially. The project was again put on hold. At this stage, when the process ended in stalemate, the city employed Haahtela to redevelop the program for the school.

EMPLOYING THE HAAHTELA WORKSPACE PLANNING PROCESS

In 2003 the Haahtela group was finally brought into the process when the project reached a stalemate. The city real estate group already used the Haahtela cost management programs in their project development services. They met with Haahtela and then decided to make a test case to use the workplace management system for this project, as it was the biggest investment project for the school system and it badly needed resolution. Haahtela began to implement their process by gathering information as defined in Table 1.

Table 1 Cygnaeus High School Appraisal Study Information

Workspace Planning Information acquired by Haahtela		
Program 20.11.2002	**Program 7.1.2003**	**Data for Haahtela workplace planning**
- done by teachers and architect	- done by teachers and architect	- previous programs
- "wish" 6763 m^2 usable area	- "wish" 6734 m^2 usable area	- 650 pupils (from Jyväskylä city)
- with plant rooms, corridors etc. about 8 150 net m^2	- with plant rooms, corridors etc. about 8 150 net m^2	- courses (from headmaster)
	- included 3 possible design solutions	- teachers vision of "high school without permanent classes"
		- survey of the technical condition of building
		- the rooms and their sizes in existing building (from city)
		- adult high school courses

This information was then used to build the initial workplace models and to begin a series of communications with the teaching staff at the school. The focus of discussion was on the activities to take place in the facility's spaces.

The discussions provided Haahtela with new information to develop their workplace model. The states of the workplace needs are measured by first defining a list of user functions and activities with operations management. The workplace planner then defines temporal and geometric needs for the facility operations. This leads to a definition of the working environment which includes room schedules, performances, details on the potential for use and spatial utilization degrees. Space utilization is a primary indicator of space performance. Low utilization of space often becomes an indicator to discuss in needs analysis meetings. The solutions are budgeted and associated costs are traced the back to activities through the use of activity-based cost management.

There were a lot of comments by the teachers concerning almost every specialised classroom. The importance of specialised subjects was raised. For example, the principal informed Haahtela that Cygnaeus High School emphasized the importance of music-teaching in their teaching curriculum. In the first calculation only one music-teaching area was deemed necessary with maximum utilization. The principal wanted more flexibility and lower utilization. Therefore a second music space was allocated.

Haahtela then presented their space model to the teachers and administrative staff at the high school at an Operations and User Workshop in Jyväskylä. A set of new issues was raised based on the feedback from the presentation. For example, the vice-principal informed Haahtela that the initial workplace model did not take into account the teacher's desire to use several classrooms at the same time. The teachers would like to have lessons in one classroom for a half an hour and then split pupils for the rest of the hour into 2 classrooms.

The principal acknowledged Haahtela's comment that this request led to lower utilisation. At this point there was an initial agreement on the space program needs.

Strategic Project Meeting

Once Haahtela had consensus on operational needs, they were in a position to approach strategic stakeholders with new information at a strategic client meeting in Jyväskylä city. This meeting included the school principal, the vice-principal, the city management of real estate, the city management of schools and the Haahtela team. At this meeting the principal said that workplace planning program was acceptable with minor corrections and they, the teachers accepted it. They said they would prefer program version 3 that had a spatial area of 6926 net m^2. The city management had Haahtela make a suggestion on how the school program could be reduced further without losing functions and activities. Haahtela had prepared a program version 3.1 (space size: 6089 net m^2) prior to the meeting.

The city proposed a target cost that would make the project feasible for further development. Through the use of the workplace information, they had a dialogue on different approaches to make the project work financially. After much discussion the city and school agreed. The group negotiated a target between versions 3 and 3.1. This decision to create a target allowed the project to progress. The city left it to Haahtela to work with the school groups to make the necessary spatial changes without losing user functions. Haahtela agreed to work with the school operation stakeholders to establish a revised program based on this agreed target.

OPERATIONS WORKSHOPS

Haahtela arranged a final workshop with the teaching group leaders to make the necessary changes to the workplace. This meeting included the school principal, the vice-principal, the principal of adult education, and the Haahtela Workplace Planners. In this meeting the group had a clear target; i.e., a mean value target of program versions 3 and 3.1 which meant achieving 6508 m^2 net area of program space. The city management had agreed that the school operations make decisions to achieve the target. In this meeting Haahtela had to allocate spatial resources to the user activities. The group had a set of discussions during the day to seek means of reducing the program space demand.

Haahtela began the workshop by examining spaces with low utilization. They initiated a dialogue about an auditorium space for 217 students (273 m^2 in version 3.1). Haahtela recognized that the need for an auditorium for education is low (2 % utilization) and in return it uses a lot of resources. The principal responded by saying that he wanted to use the facility space for large groups undertaking final examinations before graduation. Smaller groups need too many teachers for supervision which then disturbs educational operations during the exam period. Examinations use few temporal and a lot of spatial resources. Equally there is a high priority for this need; i.e., to perform student examinations. Then an architect on the Haahtela team informed the group that he had experience with flexible classroom design in another school facility[5]. In his experience, that facility invested in portable walls with good

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[5] Here is an example of innovation on the part of the Haahtela team which showed how the requirement can be met in a cost effective way as opposed to providing a large and expensive auditorium space.

sound insulation and it enabled the school to create one big area from three 80 m^2 classrooms when needed. The idea of specifying adaptable classrooms was accepted.

The discussion moved on to computer labs. The teachers explained that a lot of education occurs in computer teaching areas. They wanted to enable computer work and normal class work with manuals, writing etc. to occur at the same time. The vice- principal said that in future they would use laptops, which are more portable and that normal classrooms should also provide internet access. This conversation created the option to relocate temporal load from computer areas to normal lecture areas.

The Haahtela group then noted that the school had two big music workplace areas with rather low utilizations (2 x 45 pupils (250 m2), 37 % + 37 % utilization degrees). Haahtela enquired whether it would be possible to manage with one area but acknowledged utilization would be rather high (74%). The principal said that the school speciality was to provide good music education, and he would prefer low space utilization and high flexibility.

Haahtela then moved the group discussion to the issue of support activities such as food service. They found that the school could remove kitchen operations and operate with a food distribution space only. The city representatives and principal had earlier discussed bringing food from a city-run central kitchen. A catering expert from the city was asked to the meeting. Together members of the group defined a restaurant environment. They made new changes to the operation of food preparation by planning for a distribution kitchen, and not a preparation kitchen. A smaller eating area was regarded as adequate for the users.

Once the first iteration was completed midway through the workshop, the principal recapped their decisions:

- the need for the auditorium was replaced with flexible spaces;

- the Music education areas were planned for smaller groups;

- half of the biology education hours originally planned in the biology area were transferred to a normal lecturing space;

- half of the education hours originally planned in the computer areas were transferred to a normal lecturing area. The rationale for this decision was that in 5 years the school could provide certain classrooms with wireless internet technology.

The following changes to supporting and other operational activities were agreed upon at this stage:

- One tutor would have to be added to the education staff to support operations.

- Shelf storage was reduced to 10 m/teacher.

- The kitchen was planned for "line distribution" capability and a smaller eating area.

- The adult high school original plan for a children's playroom (for 24 children) was reduced to accommodate 12 children.

- Finally a shower/dressing area for teachers was planned.

Haahtela transferred the measurement data to the web-based workspace planning system and then printed the results for review with the representatives. The workplace plan was named Version 4. The new workplace planning calculation (version 4)[6] resulted in a new net area of 6104 net m^2. The result was closer to version 3.1 and the group found that approximately 400 m^2 could be added to the program and still achieve the negotiated target. Haahtela initiated a new set of dialogues to allocate this space. After further discussion the group and the principal made new decisions:

- Examination areas were needed in the natural science education areas.

- Stores for student instruments were added to the music area.

- Two normal classrooms were planned to support larger groups and to add flexibility (32 pupils >>40).

- The vice-principal's room was planned to have a meeting area for 4 persons.

- A waiting area close to teachers, tutors and administration was planned for students.

Haahtela re-calculated the model and established version 4.1. The net area was 6 272 m^2. The group could still add 236 m^2. The principal sent e-mail correspondence to Haahtela requesting the enlargement of normal lecturing rooms. The Haahtela team then finalized the workplace planning (version 4.2)[7]. Table 2 shows a tabular output of information generated. The table defines the space, the number of users, square footage and the degree of utilization.

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[6] Based on the group dialogues, the planner does not know the exact state of the new program. The correlation between the magnitude of the decision and the timing of calculation is intuitive to the planner.

[7] The research does not follow this process beyond at this point.

Table 2 Workplace Room schedule – Select output

	Amount	Unit	Usable area (m²)	m²/Unit	Utilization
CORE ACTIVITIES					
Spontaneous studying / Sch Senior high school (650,0 stud)					
Individual work					
Team work, 19 stud	1	Pcs	31,7	31,7	73%
Team-work/ individual work, computers, 6 stud	1	Pcs	16,3	16,3	73%
		Usable area:	48,0 m²		
Senior high school mandatory courses / Sch Senior high school (650,0 stud)					
Senior high school optional courses / Sch Senior high school (650,0 stud)					
Drawing classroom, 40 stud	1	Pcs	112,7	112,7	23%
Storage for drawing classroom	1	Pcs	14,5	14,5	46%
Darkroom, 5 stud	1	Pcs	7,0	7,0	29%
Music classroom, 40 stud	1	Pcs	113,3	113,3	66%
Music classroom, 20 stud	1	Pcs	62,6	62,6	31%
Storage for music classroom	1	Pcs	37,0	37,0	37%
Clay and design classroom, 11 stud	1	Pcs	22,2	22,2	27%
Drawing teachers' room, 1 pers	1	Pcs	11,0	11,0	23%
Studio for music classroom	1	Pcs	37,0	37,0	37%
Storage for music instruments	1	Pcs	18,1	18,1	37%

CASE STUDY DISCUSSION

The Haahtela workplace planning system acknowledges that facility owner organizations are complex, and owner groups often operate in isolation from each other. The workplace planning system brings fragmented owner groups together in a shared forum to discuss their needs and values. The iterative problem solving approach is interactive, with the owner groups providing frequent feedback.

The groups communicate primarily through a workplace planning language. The workplace planner facilitates these dialogues where common needs and the means to share resources are identified. He manages this process through understanding the operations of the owner groups and then representing their needs in a workplace model. The workplace planner uses spatial performance measurements to identify project constraints and to seek means of resolving the needs within these constraints.

MANAGING SELF ORGANIZING STRATEGIES

Project stakeholders try to promote their own interests when engaged in project definition. This case study revealed the inability of traditional programming to reconcile the self interests of stakeholders. Initial attempts at project definition ended in stalemate and the project stalled due to excessive costs.

Multiple core interests of the stakeholders had to be integrated in the workplace planning process. School Operations management was concerned about developing a Learning Environment. The Department of Education was concerned that the regional Education Strategy would be fulfilled through this project. The City Executive was concerned that their resource allocation supports the City's Development Strategy. The City real estate group was concerned that their budget allocation would be met. The Workspace planner was concerned

that the workplace performance was adequate developed to support the project budget and the user needs.

Initially strategic management and operations management did not understand each other's interests, nor how to align those interests. This group behavior inevitably came into conflict with the fact of shared resources (money; perhaps space). These interest groups had to align with the global workplace strategy and satisfy their interests within the larger environment in which they operate.

The original architect expressed reservations about how to best understand and manage the user needs. The city's project development process followed a traditional linear approach, where important cost information was developed too late in the process to be effective in the overall project definition. As a result, conflicts of interest did not get expressed in a way that allowed them to be worked out earlier in the process.

Groups organize around self interests. A change in one part of the system affects the other interacting agents in the system. For example, the city follows its real estate policy and strategy, and the High School follows its education policy and strategy. Brought in after the initial failure, Haahtela had to engage the stakeholder groups and re-define the project mission statement. It is hardly surprising that the workplace strategy changed after Haahtela's intervention; indeed, it seems appropriate to say that there was no one strategy previously.
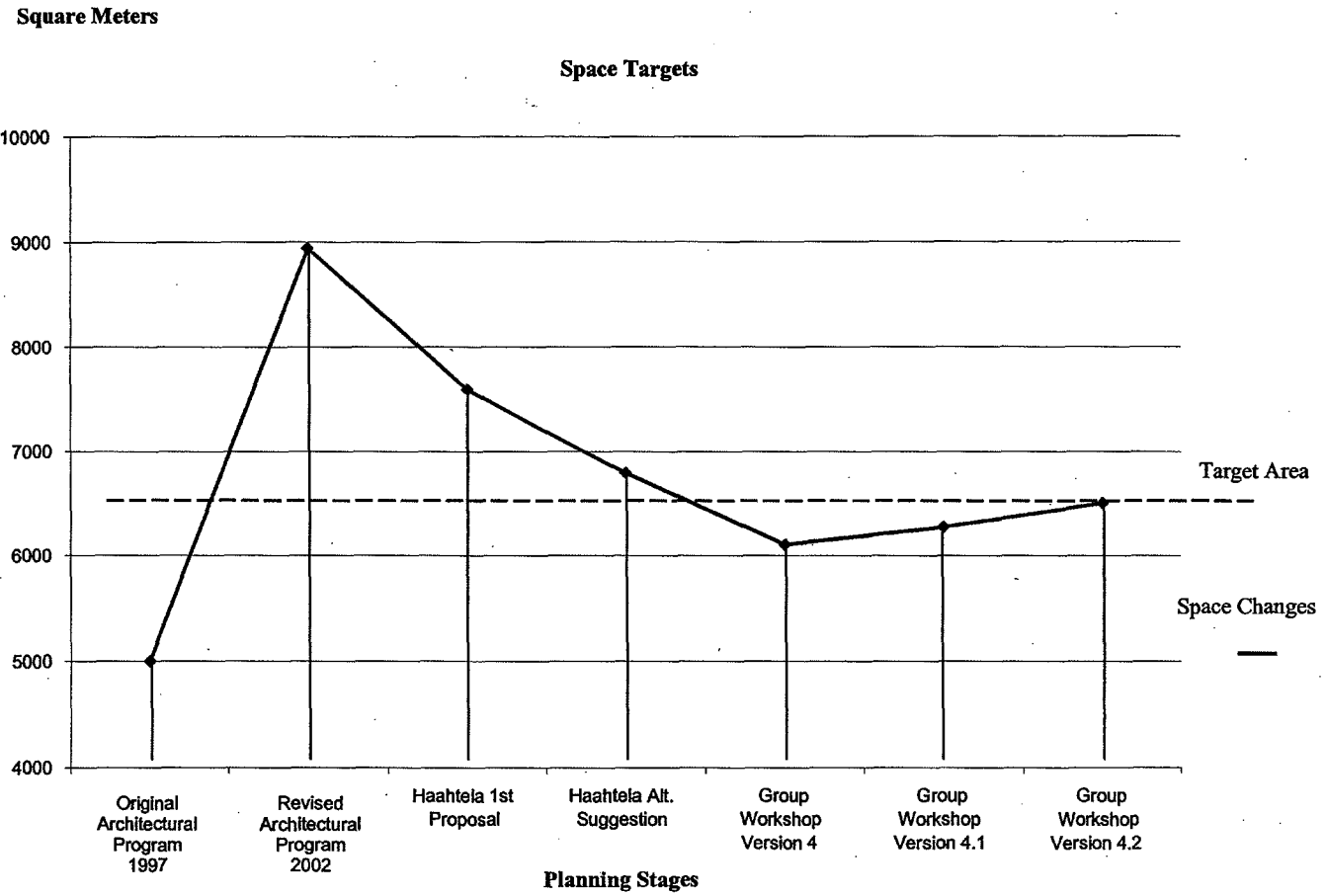
In general, the self interests of stakeholder groups are discussed through the medium of the workplace planning process. The workplace information is the basis for discussion. The planner relates how workplace information directly affects stakeholder interests. The workplace planner can only ask about stakeholder interest and how it influences the workplace planning model. The process of inquiry leads to new information which can change the workplace model or perhaps change the stakeholder's perception of need; e.g., by creating new ways for the stakeholder to function in the workplace.

The perspective of teachers and administrators changed over time as they came to understand, or perhaps better, as they created the real vision for the project. For example, the initial vision of a standard renovation project changed to a vision of student learning in the next century. The Haahtela management system facilitated the emergence of this shared vision.

STEERING THE PROBLEM

Figures 1 shows how the workplace planner steered the group dialogues toward a negotiated program target for the Cygnaeus High School. In both cases the overall objective was to reduce the space program to work within a strict budget. To achieve the intended space target, the planner initiated a cycle of client dialogues and workplace measurement. Through operations and workplace redesign, along with measurement of the decision impacts, the group finally converged on solutions that were satisfactory to all stakeholders.

Square Meters

Space Targets

Figure 1 Cygnaeus High School Space Developments (Whelton, 2004)

Target Area

Space Changes

Planning Stages

Once the workplace planner identifies constraints with the group, this triggers a subsequent search to work with the constraint. The search process typically extends across the boundaries of the organization horizontally and vertically, and also external to the organizational boundary. The workplace planner facilitates this group process when discussing possible changes in organizational function and workplace strategy.

Normally the workplace planner uses a combination of approaches to reduce the overall space quantity. The decision process may be difficult to steer precisely towards an exact target, given the unpredictability of the group's feedback on a specific space issue. In this case (See Figure 1, version 3 and version 4), the workplace planner and the group made significant changes to individual workspaces. When the workplace planner made a calculation of the total workplace, they found that they were below the intended target, and subsequently made new changes to increase the space quantity.

Table 3 associates problem-solving strategies with the change in square footage. The selection of the approach is dependent on the nature of the problem and the preferences of the stakeholder groups. Use of these strategies creates greater understanding of the problem.

Table 3 Cygnaeus High School Workplace Program Changes

Outcome of Group Workshop	Problem Solving Strategy	Changes to Functions and Workplace	
		Core Activities	Supporting Activities
Version 4	Reduce Drivers. Combine Activities. Change Space Layout. Relocate Activities.	Removed an auditorium space for 217 students. Specified adaptable wall structures to support changeable functions and student numbers. Transferred teaching functions to general classrooms.	Reduction of storage space. Omitted food preparation. Changed dining arrangement. Reduced number of children in kindergarten.
Version 4.1	Increase Drivers. Change Space Layout.	General Classroom sizes increased to support larger group sizes. Examination areas added to natural science laboratories.	Increased storage area for Music. Student and teaching waiting areas increased.
Version 4.2	Change Space Layout.	Increased size of general classrooms to support larger group sizes.	

CONCLUSIONS

The Cygnaeus High School case study reveals how an earlier, traditional architectural programming process failed to create a feasible program solution for project development. That process lacked explicit methods to measure the performance of the workspace and associated costs. In contrast, the Haahtela workspace planning process produced a program

that met the strategic goals and financial constraints of 'strategic' management, while also generating a consensus regarding spatial requirements and space usage on the part of 'operational' management.

Key elements in the Haahtela process that account for its success are:

- The workplace planning process demonstrates effective group learning in that it engages the client groups to first reflect on their needs, and then generates alternative means of fulfilling their needs;

- The role of the workplace planner is instrumental in steering the group process to understand local needs and constraints, along with the global project needs and constraints;

- Close alignment between the needs analyst (in this case, the workplace planner) and project management is necessary to steer the creative process of purpose development;

- New understanding of a stakeholder's own purpose and the purposes of their project counterparts can be developed using participative group methods;

- Innovations in the workplace can develop along with new collaborative partnerships among project stakeholders; and

- Stakeholder needs and values along with the product specifications (concept solutions) undergo parallel changes, so to create alignment and subsequently a feasible project.

We see two areas for future research and development; generalization of the Haahtela process beyond its current domain and the development of a client education module.

The Haahtela process has primarily been applied to public institutions. Its clients are from the education, government, law and security, and healthcare sectors. While satisfied clients provide some evidence of Haahtela's capacity to manage a range of diverse client types operating with different organizational strategies and operational goals, it is not yet clear to what extent the process can be extended beyond the domain of public institutions. That research needs to be done, as it is vitally important to determine if the Haahtela process can be applied generally in the project definition phase of all types of projects.

As regards the development issue, stakeholders in the Cygnaeus High School project voiced their need to understand better how the Haahtela process worked in terms of decision-making and problem-solving. This implied that the Haahtela process could be more transparent to the project participants, so they could better position themselves in the decision process and understand the rationale behind workplace decisions. A client education module may well improve stakeholder understanding of the Haahtela problem-solving process.

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