VISION IMPLEMENTATION TEAM

Report to the
School of Dentistry Community

October 5, 2011

Paul H. Krebsbach (Chair)
Stephen C. Bayne
Dennis E. Lopatin
Charlotte M. Mistretta
Jacques E. Nör
Phil S. Richards

Carol Anne Murdoch-Kinch
(joined VIT September, 2010)
Table of Contents

--. Title Page ......................................................................................................................... 1
--. Table of Contents .............................................................................................................. 2

--. Executive Summary ......................................................................................................... 4

A. Path to New Curriculum Design ..................................................................................... 6
A1. Internal Stimuli for Change ............................................................................................. 6
A2. External Stimuli for Change ........................................................................................... 7
A3. Vision Implementation Team ........................................................................................... 8

B. Desired Outcomes ............................................................................................................ 9
B1. Analytical processes examining present and future outcomes ...................................... 9

C. Curriculum Concept Map ................................................................................................ 12
C1. Developing a Curriculum Concept Map ........................................................................... 12
C2. Rationale and Integration of the Concept Map Components .......................................... 13

D. Formation and Reports of Planning/Implementation Teams (Concept Teams)

Engagement of the Faculty to Shape the New Curriculum .................................................. 14
D1. Science Foundation Team ............................................................................................... 14
D2. Clinic Foundation Team .................................................................................................. 17
D3. Clinical Sciences Team ................................................................................................... 18
D4. Clinic Implementation Team ........................................................................................... 21
D5. Pathways Team ............................................................................................................... 23
D6. Grand Rounds Team ....................................................................................................... 26
D7. Flexible Time .................................................................................................................. 28

E. Implementation Procedures ............................................................................................... 29
E1. Proposals from Concept Implementation Teams to VIT .................................................. 29
E2. Reviews by Curriculum Committee .................................................................................. 30
E3. Adoption of New Curriculum Calendar Year .................................................................. 30
E4. Development of New Curriculum Calendar Semesters .................................................. 30
E5. Phase 1 Implementation .................................................................................................. 31
E6. Phase 2 Implementation .................................................................................................. 31

F. Critical Components Yet To be Implemented .................................................................. 31
F1. Outcome Assessment System .......................................................................................... 31
F2. Faculty Development System .......................................................................................... 32
F3. Curriculum Management System ................................................................................... 33
F4. Efficient Communication System .................................................................................... 34
F5. Model for Cost Analysis of Curriculum ......................................................................... 34

G. Sustainability of the Vision ............................................................................................... 35
G1. Continual Reinvention of the Curriculum ....................................................................... 35
G2. Financial Viability ........................................................................................................... 35
G3. Future Leadership ........................................................................................................... 35
G4. Future Vision ................................................................................................................. 36
Appendices ........................................................................................................................................... 37
AP1. VIT Meeting Activities .................................................................................................................. 37
AP2. Summary of 2009-2010 Old Curriculum .................................................................................... 37
AP3. Supplemental Materials ................................................................................................................ 37
AP4. VIT Implementation Committees: Extended Comments .............................................................. 37
AP5. Agendas/Highlights of Faculty Retreats, Forums, Special Faculty Meetings ................................. 37
AP6. Special Presentations to Interest Groups ....................................................................................... 38
AP7. Summary of 2010-2011 New Curriculum – Phase 1 Transition (D1 Year) ................................. 38
AP8. Financial Modeling Considerations ............................................................................................... 38
Executive Summary

Dental education should be exciting and reflect the responsibility of academic dentistry to continually improve future dental care. A dental curriculum that is successful should celebrate these attributes. The School’s community of faculty, students, staff, and others involved intensively examined the existing curriculum efforts and proposed a look to the future and the development of new ideas for dental education. To accomplish this, the Dean appointed a Vision Implementation Steering Committee, later known as the Vision Implementation Team (VIT) that constructed a concept map for the Vision and mobilized faculty efforts to transform the curriculum. This is the Report of that group after more than two years of work.

The Vision Implementation Team proposed: (1) a set of goals and defining characteristics for the new graduate, (2) a framework (new curriculum concept map) for accomplishing these goals, (3) a series of operational principles for the achievement of this Vision for a new type of DDS curriculum and 4) a new academic foot print with an earlier start for the curriculum. The broad goals for the new curriculum were to produce a graduate grounded in scientific evidence for critical thinking and problem-solving who was very effective in diagnosis, risk assessment, treatment planning, and technical skills. The curriculum concept map inter-related the emphases and continuity of components of basic science, clinical science, preclinical foundations, clinic, grand rounds, pathways, and flexible time throughout the four-year DDS curriculum. Operational principles included condensing content to the major points a dentist needed to know to practice, decompressing schedules by eliminating unnecessary content and spreading the schedule into a broader academic year, creating pathways for individual students to customize their education, focusing on patient care relationships from the outset, and creating continual opportunities for students to observe and apply what they were learning. The broader academic footprint included four academic terms (7-14-14-7 = 42 weeks) to be scheduled in parallel with the University calendar and start anew in June-July with a D1 summer semester. This design was to quickly engage students in all major components of the new curriculum, introduce early participation in patient care, and immediately begin to connect basic science and clinical decision-making.

Success of any Vision depends on it being shared and supported by all stakeholders. Well over half of the full-time faculty served on core teams (basic science foundation, preclinical foundation, clinical science foundation, clinic implementation, pathways, and grand rounds). Their ideas were shared at committee levels, with the VIT, in faculty forums, in meetings with student leadership and in all-School retreats. Those people and those ideas are building the new curriculum as various phases are approved and initiated.

Many new curriculum components are in place at this writing, while others will take more time for development and implementation. Any successful curriculum is dynamic and includes content that is continually in evolution and teaching approaches that are constantly being re-considered. Details of all goals, current progress, and important future considerations for this curriculum design are contained within the text of this white paper.

Below is a list of major recommendations to the faculty from the VIT for future curriculum activities. While some of these recommendations are already implemented, many are not yet launched and may depend on lessons from final stages of phasing-in the curriculum.

1. **Vision Leadership**: The Vision defined by the new curriculum is a framework for the predoctoral educational program and not a set of requirements or courses. It requires that faculty and students continually aspire to achieve the Vision.
   a. **Faculty**: It is critical that faculty members continually review their roles, communicate among each other and be committed to evolving future effective learning strategies for students.
b. Associate Dean for Academic Affairs: For curriculum success, it is crucial that the Associate Dean support a process for continual focus on the Vision.

c. Renewal: There should be continual School of Dentistry participation in reviewing the Vision, discussion of needed updates, and definition of sustainability.

2. Assessment: To determine successes or challenges of the curriculum design, it is crucial that there be continual assessment.
   a. Assessment levels: Assessment should include the (a) overall curriculum, (b) curriculum components, (c) teaching effectiveness and (d) student learning.
   b. Feedback mechanisms: Information should be timely and constructive in order to continually adjust the processes occurring in the curriculum.
   c. Stakeholders: Feedback should be collected from students, faculty, staff, patients, and alumni.
   d. Reporting: A summary of assessment processes, outcomes, and proposed curriculum modifications should be presented annually.

3. Resources: There should be continual evaluation for effective resource management. Core resources include the following:
   a. Students: correct skill sets and pre-requisites for the curriculum plan
   b. Learning environment: classrooms, laboratories, clinics, and off-campus opportunities
   c. Faculty composition: skills to contribute effectively and cover needed responsibilities
   d. Patients: continual source of patients to match student learning needs
   e. Staff: support for the full range of student and patient services
   f. Finances: balance between available revenue and costs to achieve the school’s mission

4. Communication Systems: All stakeholders in the curriculum should have timely and detailed access to information about all aspects of the curriculum.
   a. Curriculum management system: an online management system that provides access to all the details of course syllabi, faculty/staff/room schedules, clinic management tools, outcome assessment management tools, and other embedded curriculum activities.
   b. Teaching committees: system for course directors to routinely meet and assess the progress of curriculum components.
   c. Faculty retreats, forums, newsletters, and curriculum meetings

5. Faculty/Staff Development: All personnel (full-time and adjunct) should be continually involved in professional growth to optimally contribute to the educational process.
   a. Teaching/learning methods: during retreats, faculty meetings, or other opportunities, faculty and staff should be constantly exposed to new ideas for teaching and learning.
   b. Expertise with digital tools: faculty and staff should be capable of using modern digital tools that are part of developing and managing the curriculum.
   c. Educational programs: opportunities should be provided for faculty/staff to learn about educational theory, course design and instructional methods, course management systems, evaluation strategies, and other core educational processes. These programs might require special faculty/staff release time but also could be scheduled during flexible time.

The process of review, exploration, and reinvention of the dental curriculum by the faculty, staff, and students has clearly been positive overall. While some challenges remain and new ones may yet arise, the process has improved communication and collaboration among faculty. This new experience has been an enriching one. Pursuing the recommendations listed above should preserve this new spirit.
A. Path to New Curriculum Design

To remain outstanding and ever responsive to academic, societal and practice-based changes and challenges, it is imperative that professional schools re-examine core missions and goals for curricula on a regular basis. In this context the University of Michigan School of Dentistry undertook a major exploration of basic DDS education with a Vision to reshape its approach to dental education for the 2010 decade.

A1. Internal stimuli for change:

In 2005 Dean Peter Polverini charged a Strategic Assessment Facilitating Committee to initiate a comprehensive self-assessment to ensure that the University of Michigan School of Dentistry sustains a clear view of its intellectual directions and priorities, its strengths and weaknesses, and its comparative advantages over other institutions. Over the course of two years, the School of Dentistry community, with input from Internal and External Review Committees, completed its wide-ranging work and generated a report in February 2007 entitled: “Strategic Assessment of the School of Dentistry.”

Between March 2007 and March 2008, Dean Polverini worked with the School of Dentistry Chairs, Deans, and the University Provost to synthesize the ideals of a Vision and to begin planning for its implementation. While the University of Michigan’s School of Dentistry had an outstanding predoctoral curriculum, the feedback from both faculty and students obtained during the Strategic Assessment process suggested that the School could do even better and that the School should consider opportunities for change that would insure future excellence. Dean Polverini set the stage in his Vision Statement and Strategic Imperatives in 2008 that included, among other things, ideas about curriculum enhancement.

At the conclusion of that process, in a Town Hall Meeting in March 2008, Dean Polverini stated a series of challenges facing dental education in the next decade that deserved special consideration. The Dean stated that if the School is to remain among “the leaders and the best,” the faculty must transform itself in a manner that will support exploration of new academic opportunities, provide academic leadership in dentistry and the other health sciences, and simultaneously continue to enable the graduates to deliver the highest quality, patient-centered oral health care to an increasingly diverse and multicultural population.

Therefore, Dean Polverini charged a committee to lead a comprehensive transformation of the dental school curriculum. The desired features for this initiative were:

The need for a deeper understanding of the scientific underpinnings of dental practice
The rapid advancement of scientific discovery and the desire to translate these findings to improved health care will require a knowledge base that is well beyond what current dental graduates are expected to know. Therefore, the new curriculum would integrate science and clinical practice throughout the four years of our dental school curriculum and new methods of integration would be developed (Grand Rounds, Case Studies, New Oral Health Sciences courses, etc.)

The need to improved critical thinking and decision-making skills
Faculty recognized there was often a failure to translate information from the classroom to the clinics. Students could pass exams, but had difficulty using this information in the context of patient care scenarios. These observations lead to the development of ideas for new methods of integrating science and clinical material. Teams of faculty modified course content and modes of delivery with this idea that knowledge in content areas should be conveyed in the context of critical thinking that leads clinicians and scientists to devise next steps against a
background of evidence and alternative explanations – the steps that generate testable alternative hypotheses and differential diagnoses.

The desire to develop new, flexible learning tracks that provide expanded professional opportunities

The school leadership sought to develop a curriculum that would enable students to pursue pathways in a variety of professional and career development foci with “selectives” including public health, public policy, research, leadership, community outreach and pre-specialization areas.

A2. External stimuli for change:

The external drivers and motivators to charge a Vision Steering Committee were many and included:

Societal:

- The national definition for a new biology that outlines the need to re-synthesize biology and integrate information across many organisms, across multiple levels of the organism, and across systems.\(^1\)
- Technological advances including ready access to genomic data and approaches that can lead to integrative applications in science and new paradigms in practice; and practical applications heretofore not attainable, for example brain-machine interfaces.\(^1\)
- Personalized treatment approaches that mandate understanding of the new biology and application of strategies for research and practice, for example, biomarker identification and use.\(^2\)
- Economic factors that embed the country and our state in a prolonged economic recession leading to expanded numbers of underserved populations
- Shifts in population dynamics that necessitate treatment of increasingly complex dental cases in an aging client base. Collaborative approaches across care providers become essential for optimum treatment of this challenged and challenging patient cohort.
- Costs of clinical care delivery that are escalating in the complex, often technology-driven, care environment.
- Demand that research and training products emerge with defined clinical, economic and health impacts. Incremental gains no longer are acceptable. That is, the DDS student must be educated and trained not in isolation but with deep understanding of developing health outcomes and products.

Academic:

- The sustained expectation for our graduates to provide the highest quality, patient-centered oral health care.
- The need to provide academic leaders in dentistry and other health sciences.
- The national goal to educate dentist-thinkers, dentist-scientists and dentist-leaders who will revitalize the practices and approaches of oral health care and disease prevention, diagnosis and treatment.
- An imperative to rethink educational approaches in a resource-sensitive and resource-constrained environment.
- The need to develop cross-discipline and cross-school programs to fully utilize modern scientific, clinical and technological advances.

\(^2\) Science, April 21, 2010.
In the context of the U-M Reaccreditation Review of 2010 by the Higher Learning Commission, the School must remain embedded in U-M missions, for example with a focus on increased international engagement and the sustained commitment to diversity throughout the University.

The need to comply with the updated CODA standards.

Professional:

- Delivery of care considerations that include incorporation of the increasing number of patients who have limited or no access to dental care.
- Cross professional care and practice explorations and ideas to expand dental care provider responsibilities beyond the dental professional.
- Revolution in information access and sharing that necessitates new educational approaches.
- Technical advances in collecting, storing and analyzing medical data.
- The need to improve critical thinking and diagnostic skills to educate clinicians who will readily translate information from the classroom and research setting to the clinic.

A3. Vision Implementation Team

With these ambitions goals in mind, Dean Polverini charged a Vision Implementation Steering Committee (subsequently referred to as the Vision Implementation Team or VIT) with the “responsibility of overseeing the implementation of the Vision for a predoctoral education program that [would] without a doubt transform dental education and the profession.” (That charge and announcements are documented in the appendix.)

Team Charge: To put in place a structure and path to enable faculty members to develop a new curriculum model that includes: (a) an enhanced teaching and learning environment that results in student independent decision making and critical thinking, (b) development of new, flexible learning pathways that provide for expanded professional opportunities, and (c) better use of limited financial resources in the future. The major role of the VIT is to facilitate planning and implementation of the Vision by the faculty.

Team members: Paul Krebsbach (Chair), Steve Bayne, Dennis Lopatin, Charlotte Mistretta, Jacques Nör, Phil Richards.

A Vision Implementation Team (VIT) explored potential changes from 2008 through 2010 that include the following core concepts:

1. Enhancing the link between basic and clinical sciences within the curriculum;
2. Enabling students to better apply advances in science to clinical care throughout their careers;
3. Allowing flexibility in the delivery of curriculum to allow students individualize paths through the content;
4. Exploring enhanced learning experiences that allow preparation for new oral health careers of tomorrow; and
5. Considering the economic realities in which academic institutions must operate in the future.

VIT Activities:

With a backdrop of these external and internal drivers and motivators, the VIT went to work to consider construction and implementation of a Vision for the DDS curriculum for the 2010-2020 decade. A basic structure, curriculum concept map, operational principles, schedules, and implementing guidelines were developed in extensive discussions. Above all else, the VIT continually affirmed that any Vision must be led with ideas from the School’s faculty members. To insure that process, teams of faculty members were broadly constructed and charged with particular aspects of curriculum development. Reports from these Teams form a major part of this report.
The VIT was careful throughout its work to establish the correct degree of tolerance for risk. A true Vision for curriculum in the 2010 decade would require bold ideas and execution. The VIT grappled also with potential resource needs and financial prudence in taking new steps in dental education. That is a healthy tension, and it needs to be continued during the implementation phases for the new curriculum and as new components are evaluated and adjusted.

A timeline for the major milestones in the work of the VIT and faculty of the School of Dentistry is diagrammed below.

B. Desired Outcomes

B1. Analytical processes examining present and future outcomes

With a view to crafting ideas for a curriculum where the creative energies of faculty members would focus on developing innovative educational programs to redefine the dentist of the future, several working principles and guidelines emerged in VIT discussions. The VIT always sustained an outlook that any new curriculum would emanate from the faculty members of the School and would be successful only if the faculty were engaged in the development and implementation process. The guidelines served to anchor, focus and, when necessary, redirect VIT work, and to make a base for charging faculty committees with specific goals.

The following guidelines directed the VIT work:

- **Strive for Excellence**
  - Be clear that the standard bearer for all proposed changes should carry excellence as the key concept.

- **Support innovative change in clinic and course approaches for educating the modern dentist**
  - Encourage and support bold ideas in reshaping both clinic and didactic courses for the
new dentist.

Focus on essential knowledge and skill development
- Always ask “what does the dentist need to know” and in doing this be ruthless in trimming content detail and emphasizing instead where and how key knowledge elements derive.

Support sustainable resources
- Be resource savvy in approaching new curriculum ideas.
- Be transparent in resource commitment.

Foster School of Dentistry faculty ownership of courses
- Have an increased involvement of School of Dentistry faculty members in all foundation courses.
- Have more continuous teaching from one or two faculty members in the courses; that is, eliminate large numbers of guest lecturers.
- Instill a new sense of responsibility for all teaching roles and mechanics that goes hand in hand with the privilege of being a professor.

Respect faculty members’ talent
- Instill a sense of boldness in faculty members for innovation and experimentation of alternative curricular models.
- Instill a sense of tolerance and appreciation for different approaches.
- Understand that there is no one ‘right’ way to train outstanding dentists: A diversity of teaching methods and formats including lectures, small group sessions, experiential learning, on-line, and off site mechanisms are included among the many ways to deliver an exciting curriculum.
- Suggest processes to make possible a culture shift where faculty members understand that they are valued for their new and sometimes dissonant ideas in curriculum development.

Ensure content integration across vertical themes and horizontal boundaries
- Make obvious threads or themes of content that students would see again and again throughout four years of the DDS curriculum, albeit in different forms and settings.
- Devise and make obvious the many cross-disciplinary opportunities for referencing content and interacting in courses across the curriculum.
- Devise and make obvious the many opportunities for referencing content and interacting in course and clinic experiences throughout the curriculum.

Enable flexibility
- Consider a curriculum that is not packed with structured hours but has openness and flexibility.

Engage students as partners in effecting major curriculum change
- Construct ready and continuing communication lines with students about curriculum changes.
- Devise structures that include formal student participation.

Support a sustainable process
- Exercise patience and an openness to living with proposed changes.
- Create tolerance among faculty members and students for a logical flow of process.

Employ assessment processes to ensure sustained excellence and flexibility
Only through an ongoing assessment process will the faculty know that the many new and varied approaches employed in the new curriculum are achieving the desired educational outcome.

- Encourage new faculty driven modes for course assessment and teaching effectiveness.
- Encourage new faculty driven modes for assessing the new curriculum models.
- Encourage reliance on other schools, colleges and units at the UM in thinking about assessment.

With grounding in these guidelines, the VIT came forward with the “Defining Characteristics of the New Graduating Dentist” (see B2) and the “New Curriculum Concept Map” (C).

Core problems and needed outcomes were obvious at an early point in Vision and curriculum implementation.

1. Full development of the four year curriculum, incorporating the guidelines above.
2. Accounting of resource impact of new curriculum for full faculty review and understanding.
3. Proposed structure(s) for a ‘Vision’ gatekeeper function, to ensure periodic review to sustain original Vision.
5. Development of streamlined structures for enabling vertical and horizontal integration in the curriculum that would not be overly burdensome on faculty energy.
6. Renewed attempts to implement innovative ideas in delivery of clinical education.
7. Outline process for including students in a consistent and frequent communication loop.

For all of the above, it is essential that resource management stay at center stage and that faculty members drive not only content construction and delivery but also provide the leadership for addressing identified core problems and needed outcomes.

**B2. Defining characteristics of a University of Michigan graduating dentist**

The University of Michigan DDS graduate should be a highly skilled and self-motivated clinician who applies scientific knowledge and critical thinking to achieve optimal oral health. The University of Michigan School of Dentistry graduate should:

1. Have a deep knowledge and understanding of the science that underpins diagnosis, risk assessment, prevention, management, and treatment in the practice of dentistry:
2. Practice with the understanding that the orofacial complex is an integrated system and serves as the gateway to the body with principal roles in regulating life-essential functions;
3. Interact within other health professions to represent and promote oral health as a key component of total health;
4. Be prepared to influence policy for the profession through the ability to evaluate competing claims and positions, and through active participation in local and national organizations;
5. Model integrity and professional responsibility through ethical behavior in professional practice and daily life.
C. Curriculum Concept Map

In response to the early discussions by the VIT, a series of faculty teams were convened (science foundation, clinical foundation, clinical science, clinic implementation, grand rounds and pathways) with charges to examine opportunities for restructuring each part of the curriculum. Each team was presented with the overall goals and a set of specific charges. Each of the teams met a significant number of times and developed proposals for new components, organization, and implementation strategies. These ideas were initially shared with the School of Dentistry community at the convocation (September/2009) and were more broadly shared for input among faculty during three half-day faculty retreats (October/2009, December/2009 and December/2010), four faculty forums (March 24, April 7, April 21 and May 7, 2010), and meetings with the Curriculum Committee, student leadership and Executive Committee.

C1. Developing a Curriculum Concept Map:

The ideas generated from these faculty discussions and meetings with the Executive and Curriculum Committees, and input from Dean Polverini, provided the background and impetus for the VIT to develop a curriculum concept map that would form the foundation for the changes in the curriculum. The new curriculum should reshape and transform this institution to meet the future needs of patients and profession. The following concept map for the new University of Michigan Dental Curriculum was generated as the result of the collective work of a large number of colleagues of the School of Dentistry community.

The curriculum concept map incorporates the following key concepts:

1. Empower graduating dentist in using scientific knowledge and evidence that informs prevention, diagnosis, treatment planning and patient care.
2. Integrate oral and systemic health concepts throughout 4 years.
3. Enhance critical thinking and clinical problem solving skills.
4. Apply patient care concepts continuously from day one.
5. Enable accelerated progression to patient care.
6. Achieve flexibility for alternative learning pathways.
C2. Rationale and Integration of the Concept Map Components

**Clinics:** The positioning of “clinics” in the center of the concept map represents the absolute commitment of the school to outstanding clinical training. The beginning of the clinical training coincides with the beginning of the D1 year, representing the concept that students will be exposed to health care delivery as soon as they begin their training at the University of Michigan. Notably, clinical experiences are by far the largest component of the new curriculum, which represents the fact that students will be provided with sufficient opportunity and time to learn the practice of Dentistry. A portion of the clinical training will be delivered through outreach experiences, where students will have the opportunity to provide dental care in clinics throughout the state of Michigan under the supervision of dental school-affiliated faculty. The clinical practice will be supported by, and integrated with, the basic and clinical sciences disciplines as well as by the preclinical training delivered in a series of clinical foundation disciplines.

**Science Foundation:** The largest component of the science foundation will be delivered in the first year and a half of the curriculum. This reflects the recognition that the clinical practice of Dentistry must be supported by solid and contemporary scientific evidence. Therefore, there is a need to rapidly bring the students up to speed with the state-of-the-art in health sciences. Notably, the concept map calls for sustaining a strong presence of basic sciences in support of clinical training throughout the 4 years of the curriculum. This will be achieved by disciplines of the Oral Health Sciences core that will be delivered in a patient-centered approach for the duration of the program. A concerted effort is being made to bring together faculty with basic sciences and clinical sciences background to teach the science foundation courses. The intent is to maximize the clinical applicability of the basic science knowledge.

**Clinical Foundation:** Similar to the science foundation, most of the clinical foundation training will be delivered in the first year and a half of the program. In addition to the standard training with lectures, demonstrations and hands-on experiences with extracted teeth and typodont-like approaches, technology will be used extensively to deliver and reinforce content. Collectively, these pedagogical approaches will be conducive to early mastery of clinical skills and early transition of the students to the clinic to deliver care to patients. Basic sciences will be integrated with clinical foundation and clinical practice through the use of patient simulations. The concept map also calls for availability of opportunities for clinical foundation re-tooling or additional training throughout the 4 years of the program. One can envision a sub-group of students that would benefit from additional clinical laboratory experiences, after they have been exposed to clinical practice. Alternatively, the training for certain advanced clinical procedures (e.g. dental implants) might be better positioned towards the latter stages of the curriculum.

**Clinical sciences:** The teaching of the fundamentals of clinical disciplines (e.g. Cariology, Restorative Dentistry, Periodontics, Prosthodontics) will start in the beginning of the first year and will continue throughout the 4 years of the program. The sequence and timing of these disciplines will be coordinated with the opportunities for pre-clinical and clinical practice. The clinical disciplines constitute a major component of the 2nd and 3rd year of the new curriculum.

**Grand Rounds:** This is a new course series designed to integrate basic and clinical sciences in a format that is more interactive than a typical classroom setting. It will employ complementary approaches to present and discuss the scientific underpinnings of clinical decision-making and practice. Grand rounds may involve the discussion of a clinical case by a team of faculty with expertise in both the clinical as well as the basic sciences related to this particular patient. Alternatively, Grand Rounds may employ the strategy of point and counterpoint debate by two faculty with opposite views of the same clinical scenario. The unifying theme will be the expectation of strong student participation in the discussions and student peer teaching (D2s paired with D1s; D4s paired with D3s). Ideally, the themes discussed in Grand Rounds should be timed and sequenced in coordination with the concepts being taught in the remaining disciplines. This course will run throughout the 4 years of the curriculum.
Pathways: The development of individualized pathways is a major and new component of the Vision for the future of the University of Michigan Dental School. The Pathways originated from the desire to support the exploration of new academic opportunities, provide academic leadership in Dentistry and the other health sciences while enabling graduates to deliver the highest quality, patient-centered oral health care to an increasingly diverse and multicultural population. The individualization of the curriculum is centered on the opportunity of offering a defined set of “selective” experiences throughout the curriculum. The main pathways of the 4-year dental school program are Healthcare Delivery, Research, and Leadership. Students will be paired with a faculty guide who will provide advice and support to the student through the process of committing to one of these pathways. Students will then have the opportunity to work with a faculty mentor throughout the remainder of the program. Additionally, students could choose a 5-year dental curriculum for a combined DDS/MS degree or the 7-8 year DDS/PhD program. The year-out programs would include MS in clinical research, MPH in public health, MBA in Business, MPP in Public Policy or a year-out research experience (e.g. at the NIH). The DDS/PhD program is ongoing and integrates the DDS training with the PhD program in Oral Health Sciences at the University of Michigan School of Dentistry.

Flexible Time: Flexible Time is designed to enhance the curriculum by providing opportunities for independent student work and facilitate student-student, student-faculty and faculty-faculty interactions. By the Fall of 2011, all DDS classes will have a designated half day per week free of scheduled activities, including undergraduate clinics. This designated flexible time shared by students and faculty is intended to create a window throughout the four-year curriculum. Notably, flexible time is an integral component of the curriculum and does not represent a half-day off for students, faculty and staff.

D. Formation and Reports of Planning/Implementation Concept Teams

The VIT made the strategic decision to form specific committees (concept teams) charged with planning the specific details of the concept components of the Vision and implementing plans for each component (e.g. Clinics, Basic Science Foundations, Pathways, etc.). Each committee was chaired by a faculty member and had broad representation of the school community. Committees reported periodically to the VIT, as well as to the entire school community. The following sections report the details of the individual committees.

D1. Science Foundation Team

Team Charge: Design a curriculum that empowers the graduating dentist in using scientific methods and evidence that informs diagnosis, treatment planning, and patient care.

The goals for the science foundation curriculum are to:
- provide advanced contemporary science knowledge while taking into consideration what a contemporary dentist needs to know
- apply critical thinking to diagnosis, treatment planning, prevention and therapy, and emphasizes independent decision making
- integrate the science foundation with preclinical and clinical experiences
- allow flexibility for Michigan curriculum (pathways)
- decompress the delivery of content in the classroom
- own, design, and execute with School of Dentistry faculty with expert colleagues from other schools and disciplines
- be sustainable with continuous assessment and development

Team Members: David Brzezinski, Ron Heys, Jan Hu, Vesa Kaartinen, Eric Krukonis, Carol Anne Murdoch-Kinch (Co-Chair), Jacques Nør (Co-Chair)
Key characteristics of the new science foundation curriculum: The organizational structure of the new science foundation curriculum was based on three cores. Each core consists of course components that are presented in a logical and coherent sequence.

A) Foundation Sciences Core: This core consists of discipline-based content that provides to the graduating dentist a foundation to understand and study the scientific basis of mechanisms underlying health and disease (e.g. cell and molecular biology).

B) Biomedical Sciences Core: This core consists of biomedical sciences delivered in an integrated systems format that provide the graduating dentist with an understanding of the function and pathophysiology of the human organ systems in health and disease (e.g. nervous system).

C) Oral Health Sciences Core: This core consists of biomedical sciences delivered in an integrated patient-centered format, specific to the orofacial complex, to provide the graduating dentist with the science foundation for clinical dentistry, the function and pathophysiology of oral health and disease within the context of the patient (e.g. the patient with caries).

Each core is led by a core director, while each course will typically have two co-directors. The core director and the directors of each course within the core will constitute a committee that will meet regularly to ensure continuity of content, elimination of unnecessary redundancies, and optimal integration of basic science and clinical concepts.

The role of a Core Director is to work with course directors:
- To ensure continuity and integration of the content within the core and among the cores
- To ensure clinical applicability of content
- To eliminate unintended redundancies
- To develop consistent and effective outcome assessment strategies

The role of a Course Director is, in addition to the usual duties of a course director:
- To work with the other course directors within the “core” to ensure continuity and integration of the course content.
- To work with the remaining faculty of the course to ensure adequacy of content and outcome assessment methods. Whenever possible, the SFT recommends that the number of faculty within each course be limited to a manageable number. In general, it is felt that less faculty results in improved continuity and integration of the content delivered in the course.
- To apply consistent and effective outcome assessment strategies

The key principles used for identification of Course Directors are:
- Match the talent and the qualifications of faculty school wide with the needs of disciplines/courses
- Broad representation, across departmental lines
- Invest in School of Dentistry faculty for these leadership positions
- Conscious attempt to match a senior faculty with more junior faculty, whenever possible
- Conscious attempt to match a faculty with strong clinical perspectives with basic science faculty, whenever possible

Foundation sciences core:

Core director: Renny Franceschi
Core topics:
- Cell and molecular biology
- Intro to the profession
- Head and neck anatomy
- Infection and immunity
- Genetics, development, tissue regeneration
- Dental anatomy
- Biomaterials
- Dental materials
- Radiology
- Behavioral sciences
- Pharmacology
- Evidence-based Dentistry

**Biomedical sciences core:**

Core director: David Brzezinski/Domenica Sweier
Core topics:
- Nervous system
- Musculoskeletal system
- Cardiovascular system
- Respiratory system
- Gastrointestinal system
- Genitourinary system

**Oral health sciences core:**

Core director: Carol Anne Murdoch-Kinch
Core topics:
- The orofacial complex in health
- The patient with caries
- The patient with periodontal disease
- The patient with orofacial pain, masticatory dysfunction, altered oral sensation
- The patient with oral neoplasia, oral mucosal disease
- The patient with infection, inflammatory, reactive disease of the oral cavity
- The patient with special dental needs
- Oral/systemic interactions

While most of the content of the Foundation Sciences and Biomedical Sciences core will be delivered within the first 18 months, the content of the Oral Health Sciences core will be delivered throughout the four years of the dental school curriculum. The content in the Oral Health Sciences core will be delivered in a series of introductory courses in the initial stages of the curriculum that will be followed by more advanced courses (within the same theme) in the second half of the curriculum. Ideally, the content of the Oral Health Sciences core runs in parallel and is well integrated with the themes of the Grand Rounds/Case Studies. The Oral Health Science core and the Grand Rounds are examples of the intent to integrate scientific concepts throughout the 4 year curriculum.

**Key changes introduced:** The following are some of the significant changes introduced by the new sciences foundation curriculum:
- The oral health sciences core was created to bridge the gap between basic and clinical sciences using a patient-centered approach. The conceptual framework for this core is to have a course that brings together the content required for informed diagnosis and treatment planning of a patient with a certain dental condition. For example, a new course on “the patient with caries” brings together contents such as histology, microbiology, salivary gland biology, and prevention within the context
of a patient with caries. This integrative approach to teaching aims at providing the scientific evidence to inform clinical decisions throughout the 4 years of the program.

- New courses were created for the science foundation core. For example, a new course on “Evidence-based Dentistry” was developed to provide a more focused teaching of how to assess and how to “filter” the solid scientific evidence to support clinical decisions. Another course that was created was a course in Genetics and Development.

- In recognition of the value of teaching biomedical sciences within the integrative structure of “systems”, a decision was made to continue to use this approach in the biomedical sciences core. However, instead of grouping several “systems” within 2 very large (>140 hours/term) courses, a recommendation was made to teach each individual system as an independent course that runs for a half term using at most 6 hours/week. This change intends to make these courses more manageable and return the ownership of the courses to dental school faculty while maintaining the strong participation of colleagues from other schools.

D2. Clinic Foundation Team

**Team Charge:** The following are the goals of this team.

- Deliver the foundations curriculum in an effective, efficient and cost conscious manner.
- Develop flexibility to allow faster progression to clinics that will provide opportunities for alternative pathways.
- Develop technically prepared students with improved critical thinking and evidence-based decision making skills.
- Apply health science concepts throughout foundations curriculum.
- Use of faculty time and resources in the most efficient manner possible.

**Team Members:** Jill Bashutski, James Boynton, Scott Conley, Renee Duff, Robert M. Eber, Dennis Fasbinder, Furat M. George, Mary Ellen McLean, Gisele De Faria Neiva, Mathilde C. Peters, Berna Saglik, Mark Snyder (Team Leader), Woosung Sohn

**Working Principles and Background:**

- Maintain the excellent aspects of the current clinical foundations curriculum
- Early mastery of basic clinical skills
- Early transition to clinic to deliver care to patients
- Use of technology whenever feasible to deliver and reinforce content
- Integration of basic sciences into clinical simulations
- Focus on evidenced based dentistry approach
- Flexibility to allow students to move back and forth from pre-clinic to clinic as needed to develop, master and reinforce skills.
- Peer teaching and mentoring
- Should be less faculty intensive

**Summary of Team Activities:**

- Removal of the A / B split - previously, only ½ of the D-1 and D-2 dental students occupied the pre-clinic during each session. This change away from the A / B split allowed for the change in the D-1 start date and accommodated the scheduling difficulties associated with the simulation clinic.
- Reorganization of course content - The D-1 course content has been re-arranged and compressed to provide all of the necessary content to be delivered in a more timely and efficient manner. The D-2 course content has also been compressed and moved to begin Spring term and be completed at the end of Fall term. This will allow D-2 dental student to obtain a patient family sooner and move to clinical patient care during the D-2 Winter term. Pre-clinical periodontics has been completely redesigned and is being delivered in the 3rd floor Foundation Clinic during the D-1 Winter term. In addition, more complex clinical procedures are being added to the pre-clinic content, delivered in the sim-lab, which may extend learning possibilities beyond current D-2 time frame.
Use of technology - Development and utilization of web content, computer based student assessments, simulated patients and MiDent are all being added to the D-1 and D-2 foundations curriculum. This will provide a much easier transition to the patient care clinic and the use of the newly developed electronic record.

Utilization of D-4 Dental Students as Faculty Assistants - Selected D-4 dental students will assist the pre-clinic faculty in the oversight of pre-clinical procedures in the simulation clinic. This will provide educational value as well as develop mentoring skills for students.

Remaining goals and challenges:
- Develop modules - Procedural content, Health Sciences content, MiDent content combined together into bundles of information. As students master content, test cases and/or gateway exams will be taken prior to students moving to next module. Would allow individual students to progress through technique content at a faster rate, thus allowing them to move to patient care more quickly.
- Develop content - There has already been significant development and implementation of content in the area of “evidence-based decision making” early in the D1 year and caries detection and risk assessment skills during their D1 year. (lecture/discussion groups and sim-lab exercises) Continued evaluation and development is encouraged.
- Apply health science concepts throughout the clinic foundations curriculum - Integrate patient related health sciences information into the skill development period to allow students to understand the relationship of health science information in patient care.
- Create and implement a student mentoring program - In order to maintain excellence in teaching and have a reasonable student to instructor ratio, a new or revised student mentoring program will need to be implemented. This will involve selection of outstanding students who have demonstrated excellent technical skills in the foundations courses and have the ability to properly interact with faculty and students to provide appropriate instruction. This program may also be a way to attract future young clinical track faculty.
- Increase use of new technology - Continued development of teaching and learning through the use of technology will be critical as the School moves forward with this curriculum. The School must develop a process that allows the students to advance themselves through the use of independent learning.
- Integration of the Vision - VIT recommended strategies that will allow students the opportunity to progress to patient care faster, participate in alternate tracks, and utilize current technology in teaching, learning and dental techniques, while maintaining the excellent aspects of the current clinical foundations curriculum. The challenge will be to coordinate clinical and research faculty from different departments in the continued development of a foundations curriculum that maintains excellent dental content and integrates the health sciences into the dental course work, utilizing the latest technology in content delivery. To develop courses that will provide the student with the ability to develop their critical thinking, independent learning and problem solving skills and to develop assessment tools that will provide feedback on the effectiveness of the new curriculum.

D3. Clinical Sciences Team

Team Charge:
- The team identifies what clinical science knowledge is required by students to be competent by graduation. This begins by identifying the necessary core/foundation information students need to acquire prior to clinical science courses and patient care activities.
- The team identifies the best sequence for students to acquire this knowledge.
- The team identifies means to have a more substantive and efficient clinical science curriculum by eliminating redundancies and examining new methods to deliver course content. This could include modalities such as grand rounds, case studies, online learning, etc.
- The team identifies how all clinic science courses can foster improved diagnostic/critical thinking/problem solving skills for students.
**Main Objectives:** Achieve the outcomes outlined by the VIT emphasizing:

- Increasing integration of clinical sciences into the basic science, pre-clinic and clinical curriculum.
- Increasing inter-disciplinary integration in the clinical sciences with a patient-driven approach and minimum isolation of disciplines.
- Strengthening problem solving skills with an emphasis on evidence based decision making in the clinical setting.
- Maintaining basic science and medicine concepts throughout clinical care.
- Increasing student sense of responsibility for their education and for patient care and well-being.

**Team Members:** Jill Bashutski, Scott Conley, Paul Edwards, Mark Fitzgerald (2nd Team Leader), Margherita Fontana, Marilyn Lantz (consultant), Carol-Anne Murdoch-Kinch (consultant), Phil Richards, Berna Saglik, Steve Stefanac (1st Team Leader), Daler Tarrazzi

**Working Principles/Background:**

- Create an inter-disciplinary competency based approach to teaching clinical sciences.
- Include all aspects of the curriculum in the pre-clinic, didactic and clinical teaching environment with an emphasis on:
  - Evidence based decision making in a patient-centric, general dentistry environment.
  - Development of integration of information across all disciplines and problem solving skills.
- Utilize a helical progression education design:
  - Introduce basic concepts early and at an introductory level.
  - Repeatedly revisit concepts in increasingly more complex levels.
- Link daily patient care procedures more closely to the scientific concepts upon which they are based.
- Emphasize risk assessment/management and the development of independence and problem solving skills.

**Summary of Team activities:** The Clinical Sciences Team held 35 formal meetings from September, 2009 through December, 2010. The Team will continue to meet as the curriculum is defined and designed into the D2, D3 and D4 curriculum years. The major discussion and action items for the Clinical Sciences Curriculum Team included:

- Developing a Process for Patient Care concept flow chart to be used as a central focus for all clinical sciences courses.
- Concentrating and enhancing early clinical related multi-discipline learning opportunities.
- Developing a standardized course template to be used by clinical science courses, particularly those focused on treatment planning.
- Developing a helical course progression model for connecting the clinical science content to the growing knowledge base of students as they progress through the curriculum.
- Defining simulated patient class types that represent increasing challenges and opportunities for integration of new knowledge and experience for the student learner.
- Maximizing competency based coordination of content with the other curriculum teams: Clinic Foundations, Basic Science, Oral Health Science Core.

**Clinical Science Curriculum Changes and Initial Outcomes:**

- Course Progression Concept: Patient(s) with common needs and conditions are used to allow students to apply the patient care process in addressing their treatment needs. As student knowledge expands, the complexity and interconnection of the patients' needs increases to permit higher level integration and application of knowledge.
Process for Patient Care: Standardized “process flow” that can be used in all patient care environments that serves as a “Map” to guide the learner through patient care whether the patient has minimal or complex needs and conditions.
Increased integration across disciplines within courses and across courses being taught in the same term. In August of 2010, a new clinical Science curriculum design, developed cooperatively between the Clinical Science Curriculum Team and course directors of various courses was initiated. Four courses closely shared time and coordinated content throughout the term: Introduction to the Profession 501B, Clinical Foundations I 519, CompCare 522 and Cariology I 532. Each course emphasized evidence-based problem solving and self-directed learning using simulated patients or clinical scenarios and built on knowledge gained in the other courses. This design has been and will continue to be carried over to subsequent terms.

Lessons Learned and Remaining Challenges:
- Process for Patient Care “Map” is effective in providing a common focus point within and between courses that have multidiscipline designs.
- Increased integration across disciplines within courses and across courses being taught in the same term is a reasonable goal.
- Continuing the integration and helical design throughout the D2 and D3 years will be a challenge.
- Ensuring cross discipline topic areas such as Occlusion and Practice Management are not lost.

D4. Clinic Implementation Team

Team Charge/Main Objectives: Excellence in patient care delivered by clinical care teams.
- Patient families managed by student teams directed by Team Leaders.
- Discipline-specific competencies achieved in specialty teams.
- Referrals back to specialty teams for advanced care based on discretion of generalist team leader following guidelines set by disciplines.
- Centrally managed scheduling and appointing of operatories.
- Strengthen linkages with other health care providers.
- Maintain basic science and medicine concepts throughout clinical care.

Team Members: Renee Duff, Dan Edwards, Mark Fitzgerald, Margherita Fontana, Mary Garrelts, Anne Gwozdek, Preetha Kanjirath, Wendy Kerschbaum, Laurie McCauley, Phil Richards (Team Leader), Marianella Sierraalta, Steve Stefanac (consultant), Nikki Sweier

Working Principles/Background:
- Create a discipline-focused clinical teaching environment that supports a general dentistry concept.
- Link daily patient care procedures more closely to the scientific concepts upon which they are based.
- Emphasize risk assessment/management and the development of independence and problem solving skills.
- Enhance the quality, frequency and continuity of early (D1 and D2) patient care experiences.
- Utilize D3 and D4 students as peer educators/mentors for D1 and D2 students.
- Attain/maintain better control over student/faculty ratios to optimize effectiveness/efficiency.

Summary of Team activities: The Clinic Implementation Team held sixty-six formal meetings from January, 2009 through November, 2010. Team members also participated in several Town Hall meetings for faculty and students during the planning for and initial implementation of the clinic design changes that were implemented during 2010. The major discussion and action items for the Clinic Implementation Team included:
- Creating team-based clinical groups, goals and activities.
- Concentrating and enhancing early clinical learning opportunities.
- Consideration of multiple options for defining and creating environments for discipline-based clinical instruction.
- Creation of patient care guidelines for the types of clinical procedures that can/should be supervised at various stages of student skill development in discipline-specific versus general dentistry environments.
- Definition of the potential role that a “Director of Predoctoral Clinical Education” could play in coordination and management of the clinical curriculum in the future.
- The need for enhanced clinical faculty in-service training/calibration and potential strategies for delivery.
- Goals and barriers regarding the infusion of enhanced science focus into the clinical patient care process.
- Consideration of the potential value of pre-treatment clinical meetings for enhancement of both team-awareness and team-building as well as enriched science discussions to augment patient care.
- Consideration of the potential value of pre-cleaning new patients' teeth during initial treatment planning appointments (to potentially enhance diagnostic accuracy).
- Consideration of a “required attendance” policy for students in the clinic, whether or not they have a scheduled patient to treat on any given day.
- Consideration of potential ways to even out the erratic highs and lows of patient care activity for faculty while preserving the desired level of patient care scheduling flexibility for students.

**Clinic Design Changes and Initial Outcomes:** In June of 2010, a new clinic design, developed largely by the Clinic Implementation Team, was initiated. In this design, each clinical floor had designated areas for patient care and instruction in prosthodontics and in periodontics located in separate main clinics, as represented in the graphic below. The blue on the left is for prosthodontics, the red on the right is for periodontics and the green is for most diagnosis, treatment planning, restorative and other general dental care.

Students were no longer assigned to specific cubicles or specific half days in the clinic; patient care opportunities were always available for any D3 or D4 student based on submission of appointment requests. Student and patient chair assignments for each session were managed by clinic support staff by floor, based on the information provided on the appointment requests that were submitted. During the same period of time that the above changes were being implemented, chairside electronic patient care data entry was also being significantly expanded in the predoctoral clinics.

The clinic design change immediately provided enhanced proximity and supervisory awareness for faculty teaching within the disciplines, generally allowing for more efficient use of faculty resources. The general dentistry areas also began to function in a more independent manner, seeking consultations from the disciplines more strategically and selectively than had previously been the norm.
However, some new challenges were also experienced. Significant problems that were encountered and associated with the clinic design changes included:

- Perceived insufficient available space and faculty, specifically for prosthodontic patient care, particularly on the 2nd floor (the endodontic cubicles are also located on the 2nd floor).
- Perceived inflexibility (based on chair designations) that prevented students from performing procedures in multiple disciplines during a single patient visit.
- Some students tended to continue to seek out the discipline-specific faculty for any and all clinical work within those disciplines, whether or not discipline-specific clinical supervision was required.
- Lack of consistent and effective cubicle maintenance and stocking of consumable products in cubicles due to students no longer being assigned to cubicles where they worked consistently.

Based on these and other concerns, the localization of discipline specific procedures into designated clinics per floor was discontinued and prosthodontic, periodontal and general dentistry patient care was once again planned and implemented in all main clinics beginning in November, 2010.

**Major Team accomplishments:**

- At the suggestion of the Clinical Implementation Team, the former 3rd floor “Orange” clinic was refurbished and re-equipped to allow routine patient care and renamed the “Foundation Clinic.” This environment is where most (if not all) D1 and D2 patient care procedures will be performed.
- Team activities based on clinical patient care targets and activities have been incorporated into the Practice Management curriculum.
- Pre-treatment patient care discussions (“huddles”) have been piloted in periodontics.
- Centralized management of clinical appointments has been successfully piloted in the D2 clinical program.
- A questionnaire to characterize clinical faculty “comfort zones” for supervising discipline-specific clinical care procedures has been distributed and preliminarily analyzed.

**Lessons Learned and Remaining Challenges:**

- The dual goals of a generalist-driven patient care program and discipline-determined competency guidelines are frequently in conflict.
- The current physical plant, organizational structure, patient assignment system and/or clinic culture may not support a discipline focus for early clinical learners.
- The current physical plant, organizational structure, patient assignment system and/or clinic culture may not support many desirable team-based clinical activities.
- While enhanced consideration of science that underpins patient care should certainly be addressed within the clinical environment, it may be challenging to efficiently include the desired level of student/faculty interaction of this type DURING the actual patient care process.
- All clinical leaders, student stakeholders and support staff must be intensively engaged in the planning and implementation of any proposed clinical changes if they are to be successful.
- The clinical curriculum is tightly interwoven with ongoing patient care activities and the clinical foundation and didactic curricula; based on this, proposed changes in one area cannot and should not be implemented without consideration of and coordination with the other elements.
- The need for and role of a “Director of Predoctoral Clinical Education” has not yet been solidly endorsed or defined, but should remain under consideration by the School administration for the future.

**D5. Pathways Team**

**Team Charge/Main Objective(s):** To develop three pathways to enhance the DDS curriculum to earn the DDS degree at Michigan:

- 4-yr DDS/Selectives Track;
- 5-yr DDS/MS Track; and
• 7-8-yr DDS/PhD in Oral Health Sciences Track.

Team Members: Bob Eber, Will Giannobile (Team Leader), Tom Green (consultant), Nan Hatch, Darnell Kaigler, Catherine Krull, Charlotte Mistretta (consultant), Carol Anne Murdoch-Kinch (consultant), Bill Piskorowski, Woosung Sohn, Russ Taichman, Marilyn Woolfolk

Working Principles/Background:
To develop an integrated curriculum that will enable students to pursue tracks in a variety of professional and career development foci with “Pathways” including public health, public policy, research, leadership, community outreach and pre-specialization areas. These emphasis tracks will be made available to all students, and these students would be required to choose a selective area by the end of their first year in the enhanced 4-yr dental curriculum.

Additionally, students could also choose training in a 5-yr dental curriculum for a combined DDS/MS degree. The year-out programs would include MS in clinical research, MPH in public health, MPP in Public Policy or a year-out research experience.

The 7-8-yr DDS/PhD program is an already existing integrated PhD program in Oral Health Sciences. Below is an example of the enhanced 4-yr DDS track with 4 different selective pathways.

Table. Working/draft proposal: DDS 4-year Enhanced DDS Pathway with 3 Selective tracks (Research, Leadership and Health Care Delivery):

<table>
<thead>
<tr>
<th>Course Types</th>
<th>Research Cohort* (13 students)</th>
<th>Leadership Cohort* (8 Students)</th>
<th>Health Care Delivery Cohort* (84 Students)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seminars, Grand Rounds and Practice Management or research responsibilities</td>
<td>Seminars - Journal Club (as seminar in core group)</td>
<td>Seminars - Focused on Leadership modeled after Scholar’s Program (SPDL) Leadership (including policy, practice mgmt)</td>
<td>Seminars - Journal Club EBD seminars / policy in healthcare delivery Practice Mgmt -sub selectives in specialty areas, community outreach, etc.</td>
</tr>
<tr>
<td>Selective Project</td>
<td>Research project elective</td>
<td>Policy-making models</td>
<td>Health care delivery system models</td>
</tr>
<tr>
<td>Flexible Timing in curriculum (clinical or research time)</td>
<td>Blocks of Research time in laboratory or clinical centers</td>
<td>Externships (governmental, professional organizations)</td>
<td>Enhanced clinical opportunities in pre-specialty areas, private practice, etc.</td>
</tr>
</tbody>
</table>

*Data from the Dec. 2010 declarations. Note these students would be eligible to transit into the DDS/MS or DDS/PhD programs if they choose. The MS program is a 5-year combined program and the DDS/PhD is a 7-8 year program. For the 2010 entering class, 1 student is a DDS/PhD. It is anticipated some students may migrate over to the MS programs in the D2/D3 years

Summary/Integration with Vision:
In summary, this integrated program will enable students to choose more specialized tracks for their clinical, professional and career development experiences within the DDS program. The utilization of tracks will help break the cycle of the historical "lock-step" model of dental curriculum. In the end, all of the students will attain the necessary competencies to become excellent dentists from a technical perspective, while also possessing individual strengths in the above selective tracks. This enhanced
training model will develop the next generation of leadership in dentistry and will help to further elevate Michigan’s standing as an innovator in dental health education.

*Timing of Events for Pathways Program (See Figure)*

**Timing of Events for Pathways Program**

**Timing of Events for the Pathway Program**

- **D1**
  - Introduction to Pathways
  - Fall Pathways

- **D2**
  - Leadership Pathway and Health Care Delivery (mentors)

- **D3**
  - Pathways Day

- **D4**
  - Joint Pathways Course and Pathway Time
  - Research Pathway Proposal (mentors)

---

**Timing of Events for Pathways Program: Faculty Guides**

- **Qualifications for Assigned Faculty Guides:**
  - Full time faculty members at School of Dentistry (clinical and non-clinical voting faculty)
  - Assignment of ~1 student per year/faculty member
- **Assignment of Pathways Guides:**
  - Early January 2011
- **Guide Roles and Responsibilities**
  - Ensure sufficient progress throughout the pathways program
  - Guide/assist students towards Pathways project mentors
  - Meet with students a minimum of once per month until a student identifies a Pathways Project Mentor; then meet a minimum of once per term to make sure the students meet their milestones
  - Ensure project mentoring relationship is functional with the students making reasonable progress
  - For students interested in engaging in additional pathways activities outside of their focus area, facilitate opportunities with the student and pathway director(s)

**Timing of Events for Pathways Program: Faculty Mentors**

- **Pathways Project Mentor(s):**
  - Individual(s) who are Full time or Adjunct faculty members or individuals approved by the Pathways Directors. For example, could include several individuals supporting specific areas of expertise relevant to the project.
  - Meet with students a minimum of once per month to where the student provides a progress report of his/her activities both to the Pathways Guide and Director.
- **Pathway Specific Activities: Winter Term**
  - Winter D1 – ½ day per week
  - Spring D1 – 1.5-2.5/days per week
  - Fall D2-D4 rest of program – ½ day per week
  - Guide meetings, academic home time, meet as a group on background/seminar information
• Identification of mentors (when appropriate)
  o Research by end of Mid-Winter Term D1; Project proposal approved by end of Winter term
  o Leadership and HCD by beginning of D3 Fall Term
  o Weekly seminars P/F course, based on attendance
  o General topical areas related to fundamental areas of scholarship
  o Development of Pathways projects/proposals with mentors

• Approval of Pathways Project:
  o Research: end of Mid-Winter Term D1
  o Leadership and HCD: beginning of D3 Fall Term

• Declare HCD Focus: Fall of D3 Year

• Presentation of Pathways Project Completion:
  o D4 Year Pathways Day, Spring 2013 (Graduation Requirement)

Anticipated challenges:
• A major challenge will be the allocation of time in the curriculum to implement the “pathways” in the 4-year DDS program. The 5-yr DDS/MS/year out and 7-8-yr DDS/PhD programs already have a good track record for integration.
• In addition, faculty resources will be required to individually manage students going through each of the 4-year “selective” tracks.

D6. Grand Rounds Team

Team Charge/Main Objectives/Working Principles: Propose 2-3 all-school models for synthesizing basic and clinical science information from the curriculum in grand rounds presentations throughout the entire four years. Be creative and consider many potential ideas. Presentations can have many styles and definitions. The content can vary in scope and depth. Audiences can be students only, students and faculty, or the entire School of Dentistry community. The events can be weekly, monthly, or annually depending on the goals. As part of the models consider the following characteristics: (1) Create an energy and excitement for the community in the School. Envision this as a strong mentoring vehicle that can provide opportunities for critical thinking. (2) Propose ideas/mechanisms for embedding clinical cases within all courses of throughout the curriculum and collecting the content in a library for the curriculum.

Team Members: Robert Bradley, Kitrina Cordell (1st Team Leader), Dennis Fasbinder (2nd Team Leader), Margherita Fontana, Don Heys, Nan Hatch, Laurie McCauley, Henry Temple

Dental Grand Rounds: The event development timeline includes the following:
• Summer 2010, #505 – Introduction to Grand Rounds: The first Grand Rounds course was implemented for the incoming D1 class for July-August 2010. The course was designed to introduce students to the format of the Grand Rounds courses to follow. The concept of the course was based on a three-part sequence. Preparation – students would be advised of a specific topic and they would independently search the dental literature to educate themselves on the topic. Speaker abstracts were provided to the students in advance to help them focus their exploration for information. Presentation – an expert panel of 2 to 3 presenters presented the topic with each speaker having 20 minutes followed by a question/answer, class discussion about the topic. Assessment – during the class session following the presentation, the topic was reviewed with input from the class. The discussion focused on the evidence for perspectives presented by the experts and the potential impact on dental treatment. A significant effort was made to integrate basic science concepts into the topics.
• Fall 2010, #515 – Grand Rounds: This course applied the three-part sequence of Grand Rounds (preparation-presentation-assessment) to small working groups of D1 students. Each group of 6
students also had a Faculty Mentor that met with them several times during the course to help students focus their exploration and assessment of the topics. Each group submitted a single written assignment for each of the four presented topics and topic assessments. The submitted written assignments served as the basis for the topic assessments discussed in class.

- Winter 2011, #515/#616 – Grand Rounds: The fall term course concept of student groups advised by a Faculty Mentor has been expanded to include D1 and D2 students in 20 groups of 11-12 students. The groups are composed of students from both classes to integrate collegial exploration of information between classes rather than the usual concept of within a single class of students. Four topics will be presented over the course of the winter term. Specific time was made available during the course schedule to allow for groups to meet with their Faculty Mentors.

_Mega-Grand Rounds:_ The first Mega-Grand Rounds session was held on 25 March 2011 from 1:00 – 5:30 pm at the Rackham Auditorium. The entire undergraduate student population attended the program as well as interested faculty and graduate students. The program was listed with the Continuing Education office and promoted to dentists interested in participating in an ongoing aspect of the dental curriculum. Several local dentists and hygienists attended the event. The Department of Oral and Maxillofacial Surgery hosted the program on the topic of oral cancer. The program followed a similar three-part sequence with students expected to prepare for the program, participate in the discussion during the program, and then will assess the topic afterwards during the #515 / #616 course.

This Grand Rounds encouraged discovery, exploration, and discussion of the diagnosis and management of oral cancer. A panel discussion following presentations by the featured speakers is designed to encourage audience participation and discussion of ideas and recommendations. The invited speakers included:

1. Peter Polverini, DDS, DMSc; Professor and Dean, University of Michigan School of Dentistry. Topic: Recent Developments in Tumor Angiogenesis and the Detection and Diagnosis of Oral Cancer.
2. James J. Sciubba, DMD, PhD; Professor, John Hopkins School of Medicine. Topic: Developments on the Clinicopathology of Oral Cancer.
3. Brent B. Ward, DDS, MD, FACS; Assistant Professor of Dentistry and Oral and Maxillofacial Surgery Fellowship Program Director. Topic: Surgical Management of Oral Cancer and Reconstructive Options Available to Patients with Oral Cancer.

_#710 / #810 – Comp Care Seminars/Grand Rounds:_ A pilot program will be introduced during the Winter 2011 Term in one of the Comp Care Seminars in an effort to morph them to a Grand Rounds concept course. The Comp Care Seminars include D3 and D4 students divided into four sections based on the VIC assignment. One of the sections (Dr. Don Heys/2 Blue) will be divided into groups of 3 students and they will research and present a topic to their clinic class similar to the Grand Rounds preparation-presentation format described above. The presentations will last 20 minutes and the remaining class time will be devoted to participatory discussion of the topic. The intent of the pilot program is to continue to foster the Grand Rounds concepts while having the students take greater control of content delivery and discussion. Should the pilot prove to be successful, it is planned to integrate the concept into the #710/#810 courses for Fall 2011. This will allow the current D2 students enrolled in the #616 course to continue developing the Grand Rounds concept as they move to the D3 year and not have a break in their curriculum.
Table: Grand Rounds Curriculum plan

<table>
<thead>
<tr>
<th>Jul – Aug</th>
<th>Sep – Dec</th>
<th>Jan – Apr</th>
<th>May – Jun</th>
</tr>
</thead>
<tbody>
<tr>
<td>#505 = D1</td>
<td>#515/#615</td>
<td>#515/#616</td>
<td>#710/#810</td>
</tr>
<tr>
<td>introduction to the Grand Rounds concept</td>
<td>combined D1/D2 course graded</td>
<td>combined D1/D2 course graded</td>
<td>Comp Care Seminar/GR D3’s observe; P/F D4’s present topics; graded</td>
</tr>
<tr>
<td>P/F grading</td>
<td>#515/#615</td>
<td>#515/#616</td>
<td>#710/#810</td>
</tr>
<tr>
<td></td>
<td>combined D1/D2 course graded</td>
<td>combined D1/D2 course graded</td>
<td>Comp Care Seminar/GR D3’s observe; P/F D4’s present topics; graded</td>
</tr>
<tr>
<td>#710/#810</td>
<td>#710/#810</td>
<td>#710/#810</td>
<td>#710/#810</td>
</tr>
<tr>
<td>Comp Care Seminar/GR D3’s observe; P/F D4’s present topic; graded</td>
<td>Comp Care Seminar/GR D3’s present topic; graded D4’s observe; P/F</td>
<td>Comp Care Seminar/GR D3/D4 present topics; graded</td>
<td>Comp Care Seminar/GR D3’s observe; P/F D4’s present topics; graded</td>
</tr>
<tr>
<td>#710/#810</td>
<td>#710/#810</td>
<td>#710/#810</td>
<td></td>
</tr>
<tr>
<td>Comp Care Seminar/GR D3’s observe; P/F D4’s present topics; graded</td>
<td>Comp Care Seminar/GR D3’s present topics; graded D4’s observe; P/F</td>
<td>Comp Care Seminar/GR D3/D4 present topics; graded</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mega-Grand Rounds</td>
<td>Mega-Grand Rounds</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Half day, all school event Plan for one in the Fall term</td>
<td>Half day, all school event Plan for one in the Winter term</td>
<td></td>
</tr>
</tbody>
</table>

D7.  Flexible Time

Dental curricula are very intense and tend to schedule every daytime hour of every day. Flexible time is a formal preservation of 4 hours per week for student-student, faculty-student, or faculty-faculty interactions that are required for more effective learning and teaching. Learning requires prime time for student-student interactions in groups, teams, or individual opportunities for daytime study, or breaks from the daytime routine. Just as students require time for student-student interactions, faculty require time for faculty-faculty and faculty-student interactions for planning, managing, and re-inventing the curriculum.

Schedule in Week and Term:  To make flexible time useful for all involved, it was planned to occur at the same time for everyone (D1, D2, D3, D4, Faculty). Only by having coincidental times could opportunities for all interactions be preserved. At present, planners are struggling with finding the best half-day of the week. Ideally, the same half-day would occur in every term throughout the year. However, the process will still work as long as the same half-day exists for all in any term.

Activities: For each group, there are wide ranges of activities that are possible during the flexible time. VIT members discussed many of these in detail. There are pros and cons for many of these activities. VIT had a strong sense that flexible time should not become a highly scheduled time. While there were many activities that will fit within this framework, the general sense was that the School should explore the use of the block slowly and discourage this becoming the home for the plethora of meetings. Some meetings clearly could fall into this time, but there should be some oversight here to make sure that this time allows the full range of intents to be explored.

For students, flexible time creates a chance for students to study together, meet with faculty, work in small groups as they choose, work on projects, or just disconnect for a brief time from the rigors of studying. Students also have other responsibilities beyond just their curriculum. Some students are on committees (Curriculum Committee). Sometimes the class needs to meet as a whole and conduct business (Class Meetings). Other times, individual students might need to make up a single missed
exam. Students might use this time to meet with faculty mentors. Teams might meet to plan grand round presentations. Any of these would meet the intent for this block.

Faculty members desperately need flexible times to meet in planning and administrative groups that have key responsibilities for reinventing the curriculum (teaching committees), reviewing curriculum content (curriculum committee), or planning curriculum activities. Faculty members need times for all-faculty discussions (Retreats) of important curriculum issues and ideas. Faculty members need time to develop professional teaching skills by participating in special seminars, courses, tutorials, and the like.

There are also special events that could require all-school participation. As part of the Grand Rounds activities, the VIT anticipates that 2-4 Mega-Grand Rounds would occur per year with all students and all faculty attending, during which the group might meet in a large auditorium such as Rackham for up to 4 hours. Flexible time could be used to allow these to be cooperatively scheduled.

Monitoring Use of Flexible Time: At first, people will explore different uses for flexible time, but most likely will require some feedback for proposed uses. This time is not designed to be a supplement to normal course time. It is not for giving exams. It is not for “scheduled activities.” To make sure that this evolves in an appropriate manner, all formal activities need to have the approval of the Associate Dean for Academic Affairs. An easily accessible calendar will be developed to enable posting and viewing of events scheduled during flexible time. The guiding principle in the use of this time will be that faculty and students may use the time as they best see fit to support their professional, educational and personal needs (with the exclusions identified above), with the understanding that this time may be co-opted for “community” events or activities that span multiple constituencies and require a common meeting time.

E. Implementation Procedures

Relatively early in the process, the VIT made the decision to begin the implementation of the first year of the new curriculum prior to completing the course-by-course details of the entire plan. Two important reasons drove this decision. First, VIT expected that the curriculum would take multiple iterations to become refined, stable, and fully integrated. The VIT believed that experience is gained by engaging components as soon as practical. Second, the VIT believed that implementation should be a continual process, rather than a end point and a phased implementation of the existing curriculum content and sequences was consistent with that belief, thus the VIT wanted the transition as soon as possible. It also provided important feedback to the faculty to demonstrate that curriculum change was actually occurring and they could begin to see their hard work realized. The VIT was convinced that the major architecture laid out by the Concept Map was sound and that the pieces would take time and some experience with the new curriculum to hone to the final design.

The following provide a perspective of the steps, challenges, and goals for implementation.

E1. Proposals from Concept Implementation Teams

Before the full engagement of the Curriculum Committee, the Implementation Teams reported their ideas, progress, and challenges to the VIT. While team leader(s) generally met individually with the VIT, there were occasional full meetings of Implementation Chairs with the VIT. Each of the Implementation Teams managed clusters of new courses, goals, proposed resources, course directors, hours, and proposed integration of efforts. The old curriculum contained approximately 120 graded courses over 4 years that included didactic, preclinical, and clinic activities. While many courses were transformed, the new curriculum still contains about 120 graded courses. The challenge was to clearly define the (1) goals for each, (2) number of hours, (3) course directors, and (4) positions within the curriculum framework based on the goals for the overall curriculum.
The VIT adopted a two-step process to roll out the curriculum. First, course-by-course details received a full review by the Curriculum Committee. Then, as each semester was courses were finalized, the proposed courses, hours, and schedules in that semester were presented to the faculty of the School of Dentistry for affirmation.

E2. Reviews by Curriculum Committee

In order to assure that the global goals would be met, the Curriculum Committee performed a detailed review of structured syllabi while discussing individual elements with proposed course directors. The curriculum was viewed as a “work in progress.” An important goal for the curriculum was to become one with the ability to continually change content, adjust courses, and/or modify learning opportunities in response to the changing landscape of dental practice. The Curriculum Committee anticipated that they would most likely see quite a bit of evolution during the first few iterations of the new curriculum.

The Curriculum Committee approved all the courses for any semester starting with the new D1 summer Semester for 2010. The operational plan (see E5) has been to implement the curriculum semester by semester, make an effective transition from old to new curriculum, and conduct outcome assessment to make adjustments.

E3. Adoption of New Calendar Year

The semesters in the 2009-2010 calendar for the School of Dentistry were variable in length (34-37 weeks) depending on the DDS class year. The VIT and Academic Affairs were both aware of this situation and there were attempts to standardize the school year for consistency with the University calendar. The approach was to create a new summer semester that would engage the students earlier in the curriculum and to use 40-44 weeks of the year. This supported the underlying design goal to engage students earlier in the clinical curriculum, to decompress necessary content and to eliminate unnecessary content.

E4. Development of New Calendar Semesters

Several semester variations were discussed to accomplish the goal of alignment with the University calendar. VIT considered summer-fall-winter-spring semesters of 11+11+11+11 weeks and 14+14+14 weeks before setting on 7+14+14+7 weeks as the most well-matched to both the new curriculum needs and the University calendar patterns.

Once the University accepted this proposal, the dividing line for each year was proposed as May 1st. Students in the D1 year would have summer, fall, and winter semesters. All other years would have spring, summer, fall and winter semesters through until graduation. The new academic calendar has triggered a discussion of a new tuition model that is under review with the University.
E5. Phase 1 Implementation

Significant discussion went into imagining how to transition from the current old curriculum to the new curriculum. Obvious options included, complete transformation in a single year – with all the hazards for the existing old designs and student progress. The counterpart was to phase in only the new curriculum with new student classes. That would involve substantial double teaching and at least a 4-year path to the new footprint.

In the end, a hybrid was imagined with two distinct phases. Phase 1 would involve the new incoming class would be fully vested in the new curriculum design. The current D4 class would be unaffected by the new curriculum. [Preliminary work was conducted by the Vision Teams starting in 2009, and Phase I planning started in January 2010 after the Faculty Assembly approved the Concept Map for the Vision. It should be completed by May 2014.]

The Phase 1 responsibility lies with the Associate Dean for Academic Affairs. It includes the following management steps.

1. The design of both the vertical and horizontal curricular components by the Vision Implementation Teams and the new course directors. This process is ongoing
2. Review, revision, scheduling, and approval of courses semester-by-semester by the Curriculum Committee with full dialogue with the course directors
3. Periodic review and approval of the details of the curriculum concept map courses semester-by-semester by the Faculty of the school.
4. Integration and coordination of course content semester-by-semester by newly created Course Director Committees in meetings held before and after each semester and facilitated by an electronic Curriculum Management System (to be obtained and implemented by July 2011) to allow everyone to see everything in the curriculum at any point in time.
5. Assessment of progress using several tools:
   a. Student learning outcomes reviewed by the course directors.
   b. Effectiveness of implementation and integration of courses by Course Director Committees.
   c. Effectiveness of curriculum elements and their revision moving forward over the next 4 years as facilitated by all groups participating in assessment (see G1 below).

E6. Phase 2 Implementation

In Phase 2, the School would transition as many students in the then D3 and D4 versions of the old curriculum toward the new curriculum design. After this transition, the new curriculum would be fully in force in the third year. VIT imagined that there certainly could be other unanticipated challenges or evolutionary changes that would require other changes. In the worst-case scenario, they would push the transition to a third year.

Phase 2 Implementation starts a new pattern of curriculum development that emphasizes continual revision of the curriculum starting with the Class of 2015. This will be largely the responsibility of the Course Directors (and Cores), Curriculum Committee, Assessment Committee, and Office of Academic Affairs. The Vision Implementation Teams will be consulted on an as needed basis in Phase 2.

F. Critical Components Yet To Be Implemented

F1. Outcome Assessment Systems

Outcome assessment systems are indispensable for measuring the success of the Vision. These systems need to be in place and operating all the time.
**Outcome Levels and Assessment Strategies:** Outcomes must be monitored from a broad level down to the specifics of individual courses or units within the curriculum. Examples of some of these are provided below.

Graduates of the new curriculum should be followed to assess the effectiveness of the curriculum in preparing them for practice or subsequent training. It would be appropriate to survey them at graduation and one year and five years after graduation. Core characteristics for graduates (see section B2) such as critical thinking and problem-solving abilities should be measured.

Global goals of the curriculum should be assessed periodically throughout the 4-year curriculum with a focus on competency and mastery. Students should be excellent at diagnosis/risk-assessment/treatment-planning, clinically competent, ethical professionals, committed to lifelong learning, focused on professional development, able to think critically, and able to assess new knowledge. Assessment of clinical competence, professional development and critical thinking require higher level assessment strategies including OSCEs, portfolios, student self-assessment and reflective journaling, triple jump examinations, test cases, and procedural practical exams in addition to traditional lower level assessments of content knowledge such as multiple choice examinations. A variety of methods and repeated sampling are required to ensure an accurate assessment of the graduates’ competency to practice independently.

Course, Unit or Clinic-level activities should be assessed from both the teacher and learner perspective. The assessment of effectiveness of didactic courses should consider appropriateness, management, effectiveness, and interrelationships to other content. Teachers should be evaluated in terms of effectiveness, efficiency, style and attitudes.

**Outcome Cycles:** Regardless of level of assessment, outcome cycles operate essentially in the same way. There must be a (1) defined goal (e.g., successful graduation rate), (2) a metric for measuring it (e.g., number of 4-year students completing successfully), (3) a performance target (e.g., greater than 95% completion), (4) analysis of assessment data (e.g., collection of data each year and comparisons over the last 5 years), (5) plan for future actions (e.g., modification or adjustment of problems in the curriculum impacting graduation rates), and (6) reporting and re-cycling for assessment (e.g., annual analysis and reporting). The outcome assessment cycles will vary depending on the activities but are generally annual ones.

### F2. Faculty Development System

The faculty are challenged by the need to remain contemporary, continue to have fresh discussions about new teaching/learning strategies, function at a high technological level, and maintain comfort with the styles of new students. This is vital in maintaining a vibrant faculty, engaged in continual curriculum revision, inspired to experiment with new learning methods, and committed to managing a complex curriculum.

On many occasions, the VIT discussed the importance of continual investment in faculty professional development. Here are just a few examples of programs that need implementation and continuation.

**Core concepts:** Some of the core concepts of the curriculum need to be much more fully explored by the faculty – such as evidence-based dentistry, critical thinking, problem-solving, and continual outcome assessment. These mean very different things to different individuals. To provide a curriculum with coherence and some degree of consistency, it is important that at least basic understandings of these be shared by faculty.

**New technologies:** Technologies for learning that involve online learning, digital management of small groups, online assessment tools, and ePortfolios, just to name a few, require that faculty develop new
skills. The opportunity for introductions to these exists because of flexible time. CRLT and other resources are available to support many of these options.

**Teaching skills**: Faculty participation in teacher education opportunities (e.g., Med Ed Scholars’ Program) needs to be encouraged and, whenever possible, facilitated. Several options exist both on campus and off campus or online (e.g., ADEA Leadership Institute, ELAM).

**Computer skills**: More and more learning opportunities involve high level computer skills or support systems. Faculty members need chances to explore these, experiment, and apply those tools of interest.

**Faculty engagement**: Management of curricula involves faculty. It requires that faculty meet on a regular basis in extended sessions (mini-retreats) to discuss major elements of the curriculum or alternative strategies for accomplishing curricular goals.

**Scholarship**: At the same time, changes or experiments deserve scholarly analysis, presentation, and publication. Publication and participation and presentation in core educational meetings (ADEA, ADEE, or others) should be encouraged. Time for faculty scholarship must be part of the planning process.

**Mentorship**: There is constant turnover of faculty with a continual need for entrance level training and mentorship of new faculty.

**F3. Curriculum Management System**

Curriculum management systems (CMS) are often confused with content management systems. The latter is any database offering different options for collection, management and delivery of information. The former implies that there are several clients for the curriculum information – the general faculty and staff as users, the course directors, the students as learners, the curriculum committee as managers, the Commission on Dental Accreditation, and other stakeholders that might include the public. Special attributes are key for a curriculum management system. It should be searchable, it should be easily archived, and it should manage the most recent, current, and planned curricula at the same time. The details are described as follows.

**General faculty and staff access**: Routinely, faculty and staff need to review information contained within the curriculum as part of their planning. Faculty may need to check for the content learned by students in the planning of their lectures. Staff members need to anticipate course activities requiring preparations in the preclinic or clinic.

**Course Directors**: All course materials should be accessible to all students, all faculty, and key staff throughout the entire year. Course directors should provide syllabi (and course schedules) along with session handouts or other learning materials (video vignettes, precasts, podcasts, and other online links). These must be easily loaded into the CMS and revised as needed in a timely fashion.

**Students**: Access to syllabus materials and all supporting materials should be constant and extend to times before and after courses. A student in anticipation of an upcoming course should be able to view all the materials in advance. Likewise, a student wanting to refer to the latest versions of materials should be able to always access them while in dental school.

**Curriculum Committee**: All operations for monitoring the curriculum should be able to automatically access content in the CMS and provide reports to the curriculum committee. This should include determination of all course numbers, numbers of hours by activity type, course directors, faculty schedules by activity type, determination of content associated with each competency, grades or
evaluations of all students in the system, assessment reports (for the curriculum as a whole, the courses or units, and the participating teachers), and determine potential problems.

Commission on Dental Accreditation: Content in the system should be easily archived for access or links during accreditation site visits.

Program Applicants and Other Interested Parties: Applicants to DDS programs would like to see the organizational structure of the curriculum. The CMS should allow top level access (course names, schedules, and syllabi) to prospective students and other public audiences.

Schedules: Activities within the curriculum require complex management of schedules for DDS students, faculty, staff, rooms, clinics, patients and rotations. While all of these do not need to be managed at the same time by the same system, there must be crosstalk among these management systems and a means of identifying potential problems. Schedules must be managed in a way that it is relatively simple to migrate from year-to-year to re-schedule things without starting all over again.

F4. Efficient Communication System

During the processes for development of the Vision, design of the details of the concepts for the Vision, re-engineering of the curriculum components, and implementation, everyone realized that existing communication systems were not satisfactory. Communication patterns in the current School of Dentistry operation tend to be primarily verbal and person-to-person. Complexity and intensity for the curriculum demand a more robust and reliable system than has traditionally existed. The goal for communication should not be to document every single detail of an operating system, but rather relay information about major systems, deadlines, decision-making, remaining challenges, and impacts to all faculty or staff who need to know. This process should be relatively efficient, rapid, obvious, and searchable. It is critical that the new curriculum include a (1) communication model (documenting all activities), (2) information database (making available all communications and meetings), (3) timely communication (1-3 day turn-around times on documentation), (4) information access (faculty, student, staff, and others), (5) information distribution system (smart way to distribute information to those who need/want to know).

F5. Model for Cost Analysis of Curriculum

True financial costs for the educational process continue to be elusive. There has been no operational model for determining the costs of the present system along with principles to allow application for analysis of the newly proposed curriculum. We need to be able to financially model the impact of curriculum changes. The model should look at both component costs and component inter-relationships. This model should be reviewed continually by the faculty for potential gains in the benefit/costs ratio.

There are four financial results that could then be calculated: (a) expenses of the original curriculum, (b) expenses for the transitional phases, (c) expenses of the new curriculum, and (d) educational cost/benefit ratios. Some detailed analysis is still required for the new curriculum and it needs to include both planning and operational costs for the faculty and staff involved. This is needed as a means of providing advice for choices on the basis of financial impacts of designs and for planning for changes in curriculum designs. Unfortunately, a true baseline for beginning curriculum costs is not available.

Other considerations discussed by the VIT regarding the financial implications for the New Curriculum are listed in Appendix AP9.
G. Sustainability of the Vision

G1. Continual reinvention of the curriculum

Concept Teams that were created by the VIT will continue to be involved in the implementation of the curriculum through Phase 1 and Phase 2, as appropriate. The course directors will be the key individuals driving this process. However, it is essential that there is oversight to ensure that the original intent and Vision for the curriculum is clearly articulated, understood and achieved. Current teams are broad-based and interdisciplinary. These qualities are essential to ensure that the curriculum Vision continues to evolve as integrated and interdisciplinary as was intended.

The Associate Dean for Academic Affairs should meet periodically with the concept team leaders to discuss ongoing roles of each one. Membership of individual teams should be revisited as the curriculum evolves and individual roles may change over time. Student representation should be considered for all of the teams.

The scope of responsibilities for the Curriculum Committee include: (1) constant assessment of curriculum outcomes, (2) revision and reinvention of pieces of the curriculum, and (3) constant monitoring of the curriculum map and schedules. Working committees (permanent or ad hoc) should be created to support the Curriculum Committee and to ensure that these processes occur in a timely manner. All activities of the Curriculum Committee need to be documented appropriately, reported to the faculty and especially the course directors in a timely fashion, and reviewed by the faculty at frequent times during the year. These processes need to ensure that accreditation processes are in line with the curriculum design.

The Executive Committee of the School has the responsibility to “investigate and formulate educational and instructional policies for consideration by the faculty” and to “act for the faculty in matters of budget and other financial affairs.” In both duties, the Executive Committee should be central in all considerations for moving the new curriculum forward and monitoring financial and other resource implications.

We should revisit and revise the Competency Document to ensure that it is consistent with the goals of the new curriculum and meets the recently revised CODA standards. The “University of Michigan School of Dentistry Competencies for the Graduating Dentist” is a living document that is expected to require revision on a regular basis. This Competency Document defines broadly the outcomes that the curriculum is intended to achieve.

G2. Financial Viability

This curriculum must be as close as possible to revenue neutral (appendix 8).

G3. Future Leadership

All of the stakeholders contributed to the process of curriculum redesign. To ensure that the process of continual reconsideration and evolution of the DDS curriculum continues, there are key roles for leadership that must happen as well. Faculty members must remain committed to the general principles outlined in this document (characteristics of graduates, global goals for the curriculum, concept map). Resource and budget decisions must be coupled to the components of the Vision. Deans and Department Chairs must always recognize the priority for Vision. To insure continuing focus to achieve the Vision, the major responsibility for review and management falls on the Office of Academic Affairs.
G4. Future Vision

Faculty members will change. New types of students will arrive in dental education. The professional landscape will be different. Patients will demand new things. Economics of dentistry and dental education will fluctuate. What the VIT has attempted to do in carrying out its charge is to create a framework for constant change, a reference system (concept map), and a path for involvement of all the stakeholders so that the School of Dentistry would always be able to maintain a contemporary and effective dental curriculum.
APPENDICES

White Paper Supplemental Information: Only summaries or outlines of materials are presented within this White Paper. All core documents (with their dates) are available in full form from a digital library that goes with this report as indicated below.

AP1. VIT Meeting Activities:
http://www.dent.umich.edu/sites/default/files/departments/Appendix%201%20Binder.pdf
Town Hall, Dean’s Vision for School of Dentistry (03-24-2008)
Web Posting of School of Dentistry Strategic Plan
Dean’s Announcement of VIT to Faculty (10-03-2008)
Charge and Membership

AP2. Summaries of 2008-2010 Old Curriculum
http://www.dent.umich.edu/sites/default/files/departments/Appendix%202%20Binder.pdf
Analysis of Integrated Medical Sciences
List of curriculum courses, 2009-2010
Curriculum Schedules
Clinic Schedule
External Rotation Schedule
Academic Calendar

AP3. Supplemental Materials:
http://www.dent.umich.edu/sites/default/files/departments/Appendix%203%20Binder.pdf
SAFCo Executive Summary (08-26-2007)
Deans and Department Chairs Retreat (08-20-2008)
New Curriculum FAQs

AP4. VIT Implementation Committees: Extended Comments
http://www.dent.umich.edu/sites/default/files/departments/Appendix%204%20Binder.pdf
Basic Sciences Implementation Team – Presentation to VIT (02-09-2009)
Clinical Sciences Implementation Team
Clinic Implementation Team

AP5. Agendas/Highlights of Faculty Retreats, Forums, Special Faculty Meetings
http://www.dent.umich.edu/sites/default/files/departments/Appendix%205%20Binder.pdf
Faculty Convocation Presentation (08-28-2009)
Faculty Meeting, SFT Presentation (03-10-2010)
Faculty Retreat-1 (10-10-2009) – Presentation Table Summaries
Faculty Retreat-2 (12-17-2009) – Presentation, Report
Faculty Retreat-3 (12-17-2010) – Report
Faculty Forum-1 (03-25-2010) – Summary
Faculty Forum-2 (04-07-2010) – Summary
Faculty Forum-3 (04-21-2010) – Summary
Faculty Forum-4 (05-05-2010) – No Summary, Agenda Only
Faculty Meeting (09-09-2009), Concept Map Presented
Faculty Meeting (01-06-2010), Concept Map Approved
Faculty Meeting (03-10-2010), D1 Summer Semester Presented
Faculty Meeting (05-12-2010), D1 Summer Semester Approved
Faculty Meeting (05-12-2010), New Curriculum Year Presented
Faculty Meeting (06-09-2010), D1 Fall Semester Presented
Faculty Meeting (07-28-2010), D1 Fall Semester Approved
Faculty Meeting (11-10-2010), D1 Winter Semester Presented and Approved
Faculty Meeting (02-16-2011), D1 Spring/Summer Semesters Presented and Approved
Faculty Meeting (05-18-2011), D2 Fall Semester Presented and Approved

AP6. Special Presentations to Interest Groups
http://www.dent.umich.edu/sites/default/files/departments/Appendix%206%20Binder.pdf
VIT Update (06-10-2009), Department Chairs (on Concepts)
VIT Update (06-16-2009), Curriculum Committee
VIT Update (06-24-2009), D1-D2-D3-D4 Class Officers
VIT Update (07-01-2009), Dental Classes
VIT Update (07-27-2009), Department Chairs (on SFT)
VIT Update (03-05-2009), School of Dentistry Alumni Advisory Board [Oral Presentation]
VIT Update (12-17-2009), Executive Committee
VIT Update (09-13-2010), D1 and D2 Students

AP7. Curriculum Committee Activities
http://www.dent.umich.edu/sites/default/files/departments/Appendix%207%20Binder.pdf
Curriculum Committee – New Course Template and Challenge Questions
New CODA Accreditation Standards (04-06-2011)
Curriculum Committee -- D1 Summer 2010, Schedule Syllabi Exec Summary
Curriculum Committee -- D1 Fall 2010, Schedule, Syllabi, Exec Summary
Curriculum Committee – D1 Winter 2010, Schedule, Syllabi, Exec Summary
Curriculum Committee – D2 Spr/Sum 2010, Schedule, Syllabi, Exec Summary

AP8: Financial Modeling Considerations