North American Veterinary Medical Education Consortium

"Roadmap for Veterinary Medical Education in the 21st Century: Responsive, Collaborative, Flexible"

Draft Submitted by
NAVMEC Board of Directors
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1.0 Executive Summary

The profession of veterinary medicine is known as one of the most fulfilling, interesting, and challenging professions in existence, and offers an exciting and broad spectrum of career choices to those aspiring to enter the profession. Veterinarians can pursue careers in companion animal medicine, food animal medicine, rural veterinary practice, wildlife veterinary medicine, public health, food safety, biomedical research, military, corporate/industrial practice and more. Yet, as important challenges to veterinary medical education and the profession at large are changing and increasing, and the relationships between humans, animals, and environmental health evolve, many agree that the profession and veterinary medical education are at a significant cross-road.

Given the changing landscape of veterinary medicine and education, and in follow-up to the publication of the Foresight Report by AAVMC in 2007, the AAVMC established the North American Veterinary Medical Education Consortium (NAVMEC) in 2008. The Consortium was established to bring together the broadest spectrum of stakeholders of veterinary medical education ever assembled to:

1) further identify changing societal demographics and needs of veterinary medicine,
2) create a shared vision for what core competencies every graduating veterinarian should have irrespective of the field they would pursue, and
3) identify what changes in veterinary medical education would be needed in the near to long-term future to graduate veterinarians with these core competencies in order to meet evolving societal needs.

Importantly, in addition to colleges of veterinary medicine, AAVMC reached out to engage two critical groups in this initiative that yield considerable influence over veterinary medical education : accreditors of veterinary medical colleges by the AVMA, and testers and licensers of new veterinary medical graduates. From the beginning it was understood that for real change to occur, leadership by all three groups would be necessary.

Over the course of three national meetings in 2010, approximately 400 stakeholders of veterinary medical education convened to discuss, identify and agree upon evolving societal needs for veterinary medicine, core competencies needed by all graduating veterinarian irrespective of the field of veterinary medicine they were intending to pursue, cost effective approaches to educating veterinarians, and ways that accreditation and testing/licensure could best support achieving the core competencies. Participants agreed that this was the opportunity to effect change, and that a plan to move from recommendations to action would be essential.

Following the three national meetings, the nine-member NAVMEC Board of Directors, comprising three members each from academia, accreditation, and testing/licensure groups convened to:

1) identify a set of NAVMEC Strategic Goals,
2) confirm the core competencies required by all veterinary medical school/college graduates,
3) identify information gaps in research and a research agenda; and
4) develop and act upon implementing a series of recommendations to advance veterinary medical education from this time going forward.

NAVMEC Five Strategic Goals:

- Graduate Career-Ready Veterinarians Who are Educated and Skilled in an Agreed Set of Core Competencies
- Ensure that Admissions, Curricula, Accreditation and Testing/Licensure are Competency-Driven
- Strive for a Veterinarian's Education that is Maximally Cost-Effective
- Ensure that an Economically Viable Education System for Veterinary Medical Education is Sustained
- Stimulate a Profession-Wide Sense of Urgency & Focus on Action

Core Competencies of all Graduating Veterinarians Agreed Upon by NAVMEC Participants

Multi-species clinical expertise	This competency, with its emphasis on comparative medicine, distinguishes the veterinary profession from other health professions Diagnostic, prevention, and therapeutic skills, animal behavior, wellness, and welfare
Public health/One Health knowledge and expertise	Prevent, diagnose & control zoonotic diseases; food safety & security, emergency preparedness & response, human-animal bond benefits
Interpersonal communication	Effective interactions with clients, team, colleagues & community
Collaboration	Work within a healthcare team to achieve optimal patient care, client service, or other desirable outcome
Management (self, team, system)	Efficient operation of business; financial literacy; resource management
Lifelong learning, scholarship, value of research	Critical thinking, problem solving & curiosity; self-directed learning
Ethics & professional leadership	Committed to health & welfare of patients, needs of clients
Diversity/multicultural awareness	Understanding and accepting of all societal diversity, including (but not limited to) racial, ethnic, gender, sexual orientation, socio-economic and cultural; working in multicultural teams, knowing how to provide the most appropriate veterinary medical advice to a diverse clientele
Adapt to changing environments	New technologies; role of animals; societal norms

Recommendations
(Numbers Refer to Section and Recommendation Number in the Full Report)

Core Competencies for Career-Ready DVMs	
6.1.1	CVMs use the NAVMEC core competencies to create their curricula
6.1.2	All competencies are integrated and taught in every year of the curriculum
6.1.3	The NAVMEC set of core competencies and their descriptions are incorporated into the standards of accreditation and required outcomes measurement
6.1.4	NAVLE is revised to optimize evaluation of these core competencies

Admissions and Curricula	
6.2.1	Create a multi-CVM academic panel to analyze and propose a uniform core of pre-veterinary academic course requirements for all AVMA accredited CVMs in North America
6.2.2	Multiple CVMs collaborate to define pre-veterinary education programs to make entry into a veterinary medicine degree program in less than 4 years, a feasible option
6.2.3	All CVM curricula to be competency-driven, science-based and delivered in a flexible & time-efficient format
6.2.4	Clinical skills and SKAs to be taught in an integrated way, using a spectrum of learning techniques, including problem-based learning and case-based methodologies – enables graduates to hit the ground running on day 1
6.2.5	Demonstrate proactive leadership: initiate discussions with human and environmental medicine education professionals, in order to create a One Health curriculum

Ensure Cost-Effective Quality Education	
6.3.1	Create an expert panel to thoroughly analyze ways to share education resources - identify best practices from platforms that provide for sharing of educational resources across institutions, e.g., faculty, VetICE*, VEC*,MedEdPortal, etc. - explore the economics, applicability, logistics of Centers of Excellence[1] - recommend implementation strategies
6.3.2	AAVMC creates and maintains an inventory of shareable courses from all North American accredited schools
6.3.3	AAVMC creates an Education Technology Support Center, to provide advice to and coordination among CVMs, facilitating sharing of information - IT expert(s), current in the technology and financially savvy - use NAVMEC web-based forums to share knowledge real-time among CVMs

Economically Viable Veterinary Medical Educational System	
6.4.1	Initiate a national PR campaign in partnership and collaboration with national veterinary organizations and state VMAs to raise funds for CVMs - target federal and state agencies; veterinary, food, and environmental industry; animal-owning public - promote value of veterinary medicine to human, animal and environmental health - explore use of a VME foundation for endowments, scholarships, etc.
6.4.2	Accelerate & expand eligibility in student loan re-structuring and loan-forgiveness programs at the state, federal and local government levels
6.4.3	Provide financial counseling to all veterinary medical students in each year of study
6.4.4	Advocate that employers are able to pay pre-tax deductions, re: student debt[2]

[1] The Regional Centers of Excellence program was enacted in the Food, Conservation, and Energy Act of 2008, commonly known as the Farm Bill (PL 110-246); the Foresight Report recommended a similar concept, referred to as Centers of Emphasis

[2] The Economic Growth and Tax Relief Reconciliation Act of 2001 (PL 107-16) extended the Education Assistance Plan until 2010

Urgency & Action	
6.5.1	Form NAVMEC Teams at CVMs: maintain focus on change initiatives at each CVM
6.5.2	Adopt use of a NAVMEC web-based discussion forum and other open forums to facilitate and accelerate sharing of best practices among the NAVMEC Teams at the CVMs
6.5.3	Initiate the Implementation Plan: maintain heightened momentum and measure progress annually
6.5.4	Attract investment from all stakeholders to NAVMEC-Implementation: an AAVMC-led implementation program, that provides strategic momentum

Research Agenda

The dearth of peer-reviewed research on factors impacting on veterinary medical education was acknowledged, thereby limiting an evidence-based approach to addressing the challenges to education described in the report. Some of the highest priority items for research that were identified during the NAVMEC process were as follows:

- What teaching and learning strategies in higher education (including 'blended' programs) are emerging as most effective?
- What are the most reliable pre-admission assessment criteria, and how can they best be evaluated?
- How do other professions test for competence in Skills, Knowledge, Appitudes?
- What are the real capital and operating costs associated with 'distance learning' to achieve given educational outcomes?
- Are self-directed learning models applicable in the education of veterinarians?
- What is the experience in Canada with regard to country-wide licensing of veterinarians (and other professionals)? Are there parallels in the EU also?
- How to incentivize, reward and credit faculty members, to develop and share educational materials among CVMs?

Putting Recommendations into Action
(Numbers Refer to Section and Recommendation Number in the Full Report)

NAVMEC Recommendations: Implementation	
8.1	Current NAVMEC Board of Directors continues to provide direction until April 2011; NAVMEC-Implementation is overseen by AAVMC, as it progresses into implementation including collaboration with stakeholders
8.2	Initial activities to include: – Refining recommendations through feedback from partners and stake-holders at meetings, conferences, and using web-based forums, to create the final NAVMEC report – Define metrics for success; conduct initial survey to collect baseline data on metrics against which progress will be measured; ensure progress is communicated regularly to all stakeholders – Identify required staffing resources for implementation – Develop implementation schedule, actions, milestones, budget – Continue engagement with change implementers (e.g. faculty), to build commitment ('leading change') – Develop an educational research agenda, and its resource requirements (see Section #7) – Expand existing AVMA outreach programs to inform and excite K-12 students and their advisors – Recommend that the 2012 Global Health Summit at the AVMA Convention be a AVMA/AAVMC partnership focusing on education – Create a web-based discussion board and forums, to enable open sharing of innovation
8.3	Maintain a North American focus, while finding opportunities to participate in international educational forums
8.4	Plan initial phase of the proposed PR campaign to raise funds for veterinary medical education
8.5	AAVMC creates a competitive grant program, encouraging CVMs to work together to implement NAVMEC recommendations
8.6	Consider partnerships with IT entities, for example Gates Foundation, Google, Microsoft, IBM, Apple, etc.
8.7	Review and assess NAVMEC progress annually – at each AAVMC annual conference, time is devoted to CVMs sharing NAVMEC successes, and assessing the progress of the initiative as a whole At least every three years, convene a forward-looking NAVMEC summit involving educators, employers, accreditation, testing, licensure, and students for sharing best practices, monitoring progress, and ensuring this progress is broadly distributed

2.0 The Case for Change: The Changing Landscape of Societal Needs, Veterinary Medicine, and Veterinary Medical Education

The profession of veterinary medicine is known as one of the most fulfilling, interesting, and challenging professions in existence, and offers an exciting and broad spectrum of career choices to those aspiring to enter the profession. Veterinarians can pursue careers in companion animal medicine, food animal medicine, rural veterinary practice, wildlife veterinary medicine, public health, food safety, biomedical research, corporate/industrial practice and more. Yet, as important challenges to veterinary medical education and the profession at large are changing and increasing, many agree that the profession and veterinary medical education are at a significant cross-road.

Changing Relationships Between Humans and Animals, and Evolving Societal Needs

For centuries, animals have been a critically important source of animal protein in the human diet, of power for plowing fields and packing goods and supplies, of energy for cooking and heating homes, of assistance to search and recovery efforts in times in emergency, of assistance to the disabled, and of companionship to humans. Wild animals on land, in rivers and lakes, and the sea, have contributed to our planet's rich and bio-diverse ecosystem. Veterinarians have been privileged to oversee the health of animals, and the diagnosis, prevention, treatment, and control of diseases that afflict them; and the intersection of animal, human, and environmental health has served as the underpinning of veterinary medicine since its inception.

Over time, as the relationship between humans and animal populations has evolved, so has the focus of veterinary medicine. At the turn of the 20th Century, the health and caring for horses—the main mode of transportation at the time--was the primary focus for the education, skills, and services of the majority of veterinarians. Veterinarians also served important roles in improving sanitation and food safety. As automobiles came into existence, but with the majority of the North American population still living in rural areas, the focus of veterinarians—most frequently working in "solo" clinical practices—turned predominantly to the care of small family holdings of dairy cows, beef cattle, pigs, sheep, and meat and egg-laying poultry. As veterinarians cared for food animals, they occasionally looked after the health care of barn cats and family pet dogs and cats. The typical veterinary medical student of the day was a young Caucasian man coming from a farming and hunting family living in rural areas, with the goal of becoming a rural food-animal or mixed animal practitioner.

By the turn of the 21st Century, only 2% or less of the US population lived in rural areas, with the rest living in urban and peri-urban environments. The U.S. population has diversified in race/ethnicity, with currently 16% of the US population self reporting as Hispanic and 13.5% as African American. Globalization of food, goods and services, information, and rapid movement of people and animals has occurred. The world's population has grown from 1.5 billion people in 1910, to now approaching 7 billion people[3]. To feed people at an affordable cost, food animal production units have consolidated and grown in size with many small farm holdings intensifying into large agri-businesses, or having gone out of business.

Pets in more developed countries of the world have moved from the backyard, into the house as family members, and pet owning populations have sought increasing levels of care from

[3] 2010 World Population Data Sheet. Population Reference Bureau. Accessed on line October 5, 2010 at: http://www.prb.org/pdf10/10wpds_eng.pdf

veterinarians practicing in urban settings. "Solo" practicing veterinarians have increasingly joined with others to work in multiple-owner practices, where partners can share knowledge and costly equipment more effectively, and provide better all-around services to their clients. Moreover, an increasing number of veterinarians have elected to become specialists, where more sophisticated skills and expensive equipment are required, leading to higher fees accompanying increased costs of services, and offering the potential to receive higher incomes commensurate with their advanced education and skills.

International trade, by both developed and developing countries, has increased significantly in recent years. The global climate is changing with the average temperature increasing, and many countries experiencing extremes in temperature, rainfall and drought. Diseases that are transmitted between animals and people have been on the rise, with the majority of human food-borne and other emerging infectious disease outbreaks the past 20 years originating from animal sources of infection[4].

The typical veterinary medical student of today in North America is a young Caucasian woman, coming from an urban background[5].

Changes in Financial Support of Veterinary Medical Education

In North America, some of the earliest veterinary medical schools were established in the late 1800's, as part of the Land-Grant University System, which was established in 1862[6]. With an early emphasis on agriculture at national and state/provincial levels, important financial and popular support for colleges of veterinary medicine in the U.S. and Canada came mostly from State and Provincial departments of agriculture, respectively, thereby assuring the health of beef, dairy, swine, and poultry populations raised for food and trade. This financial support paid for faculty salaries, new facilities, and other costs of infrastructure, and helped to keep tuition costs and fees to students and their families low. With time, and the shift of the North American population to urban settings, financial support by State agriculture to Land-Grant Universities, including veterinary medical colleges and schools, has declined sharply. The US Federal Government in the late 1970's and early 1980's invested in veterinary medical education in funding the establishment of several new veterinary colleges and schools. However, federal support since that time has been close to non-existent, in stark contrast to what has been provided to schools of human medicine, dentistry, and nursing.

Land-Grant universities have had to raise student tuition to recoup loss of public support in order to keep their doors open, resulting in students and their families shouldering more and more of the actual cost of their education. This has meant students taking out larger student loans, so that in 2010, the average student loan debt of a graduating veterinarian approached $134,000[7]. Incomes for newly graduated veterinarians also have increased with time, with the greatest gains coming

[4] IOM (Institute of Medicine) and NRC (National Research Council). 2009. Sustaining global surveillance and response to emerging zoonotic diseases. Washington, DC: The National Academies Press,

[5] AAVMC unpublished data

[6] Act of July 2, 1862 (Morrill Act), Public Law 37-108, which established land grant colleges, 07/02/1862; Enrolled Acts and Resolutions of Congress, 1789-1996; Record Group 11; General Records of the United States Government; National Archives

[7] Shepherd, Alison J., Majchrzak, Sue. "Employment, starting salaries, and educational indebtedness of year-2010 graduates of U.S. veterinary medical colleges". 2010. JAVMA 237 (6): 795-798

from the field of companion animal practice in urban settings. However, in most cases starting salaries immediately post graduation have not increased at a rate quickly enough to permit even the highest earning newly graduated veterinarians to service their significant student loans and to maintain a reasonable quality of life. The majority of newly graduated veterinarians including those interested in food animal medicine, rural mixed animal practice, public health, food safety, and biomedical research, out of financial necessity are electing to pursue careers in urban companion animal medicine.

Moreover, the applicant pool to veterinary medicine for the past several years has remained level rather than increasing as it has for other health professions, although why this is occurring is not known due to lack of research. Nonetheless, it is clear that the growing cost of education to students and families, balanced against future potential earnings by graduates, is playing an important role in decision making of potential veterinary medical school applicants. Most in the profession see the economic challenges currently being confronted as unsustainable for a growing and thriving profession.

Changes in Information Technology, Options for Sharing, Exchange of Information

Advances in information technology have enabled the rapid, real-time dissemination and exchange of information. These newer technological advances have not only impacted on how information is shared, in terms of magnitude, quality, and speed, but on how learning can occur more efficiently. Open source systems of information, and on-line courses and instruction are revolutionizing approaches to higher education.

Evolving Competency-Based Veterinary Medical Education—Curricula, Accreditation, Testing and Licensure

In North America, all veterinarians take the following oath at graduation: *"Being admitted to the profession of veterinary medicine, I solemnly swear to use my scientific knowledge and skills for the benefit of society through the protection of animal health, the relief of animal suffering, the conservation of animal resources, the promotion of public health, and the advancement of medical knowledge. I will practice my profession conscientiously, with dignity, and in keeping with the principles of veterinary medical ethics. I accept as a lifelong obligation the continual improvement of my professional knowledge and competence."*

This oath intuitively makes clear several core competencies that every graduating veterinarian should know in order to meet societal need. The responsibility and mandate for developing and delivering the veterinary medical curriculum that assures the competencies learned by every student, has been under the purview of the veterinary medical faculty. Over the past several decades, as the number of veterinary specialties has increased, the proportion of veterinary medical faculty that is board certified as specialists has grown as well. In addition, the number of veterinary specialists setting up practice in the very towns and cities where veterinary medical colleges and schools are located has grown, so that the number of cases, including both companion and food animal and other species, coming into a veterinary medical teaching hospital has decreased. Taken together, the proportion of time devoted to a case load appropriate to educating students in primary veterinary medical care in the typical veterinary medical curricula—comprising the main focus of care provided in companion animal practices-- has decreased over time. Moreover, many schools have found it challenging to incorporate sufficient time into the curricula on topics of

primary clinical care, preventive medicine, animal welfare, public health, zoonotic infectious diseases, emergency preparedness and response, and biomedical research.

Non-clinical skills in areas such as verbal and written communication; multi-cultural awareness, understanding and acceptance; and leadership skills, interpersonal skills, management of diverse medical teams, business skills, and others are now understood to be essential for success by all newly graduated veterinarians, irrespective of the discipline new graduates intend to pursue.[8]

Studies of Veterinary Medical Education

The understanding that veterinary medical education must adapt and change over time for the profession to remain relevant to society has existed since the profession's earliest days. In 2005, the Association of American Veterinary Medical Colleges (AAVMC), following on several seminal studies of veterinary medical education in the 70's and 80's (Pew Report[9], KPMG report[10], Agenda for Action[11], other reports) launched a special study to explore the changing landscape of society and what changes in veterinary medical education would be needed to assure that the profession was well positioned to meet societal needs into the future. The analytical method of "foresight analysis" was applied by 95 experts from academia, practice, and industry to look 25 years into the future and to identify what changes would be necessary for the profession to remain relevant to society. "The Foresight Report: Envisioning the Future of Veterinary Medical Education" was published in 2007[12]; and the findings and recommendations quickly connected with several key stakeholders of the profession. Immediately following the publication and dissemination of the Foresight Report, calls went out for further exploration on which of the 45 recommendations should be acted upon.

[8] For example, Lloyd JW, King L, Mase CA, Harris D. Future needs and recommendations for leadership in veterinary medicine. 2005. JAVMA 226 (7): 1060 – 1067.
[9] Pritchard WR. Future Directions for Veterinary Medicine. Durham, NC: PEW National Veterinary Medical Education Program, Institute for Policy Sciences and Public Affairs, Duke University, 1988.
[10] KPMG LLP. *The current and future market for veterinarians and veterinary medical services in the United States.* Washington, DC: American Veterinary Medical Association/American Animal Hospital Association/Association of American Veterinary Medical Colleges, 1999.
[11] AAVMC. An Agenda For Action: Veterinary Medicine's Crucial Role In Public Health And Biodefense And The Obligation Of Academic Veterinary Medicine To Respond. 2003; JVME 30(2).
[12] Envisioning the Future of Veterinary Medical Education: The Association of American Veterinary Medical Colleges Foresight Project, Final Report. 2007; JVME 34 (1).

3.0 Establishing the North American Veterinary Medical Education Consortium (NAVMEC): Engaging Education, Accreditation, and Testing/Licensure

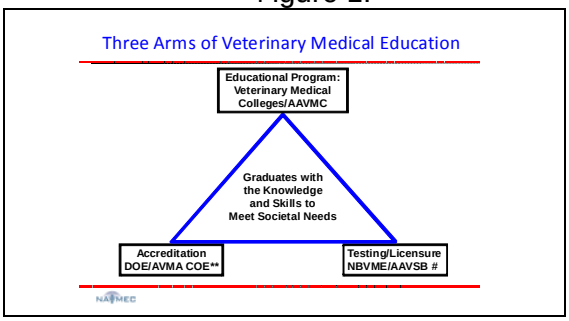
NAVMEC Comprising Education, Accreditation, and Testing/Licensure: the Three Arms of Veterinary Medical Education

Given the changing landscape described above, and in follow-up to the publication of the Foresight Report, the AAVMC established NAVMEC in 2008. The Consortium was established to bring together the broadest spectrum of stakeholders of veterinary medical education ever assembled to:

1) further identify changing societal demographics and needs of veterinary medicine,
2) create a shared vision for what core competencies every graduating veterinarian should have irrespective of the field they would pursue, and
3) what changes in veterinary medical education would be needed in the near to long term future to graduate veterinarians with these core competencies in order to meet evolving societal needs.

Importantly, AAVMC reached out to engage two critical groups that yield considerable influence over veterinary medical education in this initiative: accreditation of veterinary medical colleges by the AVMA Council on Education, and testing and licensure of new veterinary medical graduates under the oversight of the National Board of Veterinary Medical Examiners and the American Association of Veterinary State Boards. From the beginning it was understood that for real change to occur, given the intersection, relationships, and influence among these three groups (i.e., education/curricula, accreditation, testing/licensure (Figure 1)), leadership by all three groups would be essential.

Figure 1.



**DOE/AVMA: U.S. Department of Education/American Veterinary Medical Association Council on Education
National Board of Veterinary Medical Examiners/American Association of Veterinary State Boards

Although it was understood by all members of the Consortium that the Consortium in and of itself would not have the authority to change veterinary medical education, given the broad spectrum of stakeholders involved (educators, broad range of employers, veterinary professional groups, industry, students, etc.), it was anticipated that NAVMEC could influence those institutions and groups that possess authority to institute significant changes in curricula, accreditation standards, and the composition of testing/licensure exams. Thus, NAVMEC holds great promise to affect change and achieve more integrated, coordinated and effective educational outcomes when compared to the efforts of singularly academic groups and individuals addressing educational challenges of the past.

4.0 NAVMEC: Stakeholder Engagement, Goals, Objectives, Process, and Anticipated Outcomes

4.1 Stakeholder Engagement, Consortium Members, NAVMEC Leadership, the NAVMEC Board of Directors

From the onset, reaching out to a broad spectrum of stakeholders of veterinary medical education was thought essential for a successful outcome to NAVMEC. When a group of blindfolded people are asked to quickly describe an object in a room they variously respond: a braided rope; a tree trunk; a snake-like hose; a sharp spear; a huge boulder. Their perceptions of the object (an elephant, or veterinary medicine, veterinary medical education in this analogy) are determined by their personal interactions with it. There are many and varied stakeholders of veterinary medicine (Figure 2a) that impact, and are impacted by, veterinary medical education. Each stakeholder has different expectations and requirements, but all can influence how future veterinarians are educated. When these stakeholders are asked to define what a veterinarian is, there is a wide diversity among their replies: animal doctor; food safety expert; bio-medical researcher; animal welfare advocate; environmental protector; business partner; educator; community leader; public health expert; etc.

Herein lies the opportunity and the challenge: with these many, diverse, important roles, veterinarians have the potential of being more highly valued by society; however, it is challenging to continue to provide a high quality education to the best pool of students in all these disciplines in a ”reasonable” time & at an “affordable” cost.

Educators, students, employers, practitioners, regulators, specialists, veterinary industry, animal welfare personnel, livestock commodity organizations, and other stakeholders were invited to join NAVMEC; and many were represented at and participated in each of three national meetings (See Section 4.3). Although the majority of participants were from academic veterinary medical education, significant numbers of representatives/employers from clinical practice, government agencies, and industry participated as well (Figure 2b). Although clients of veterinary medical practitioners (e.g. food animal producers, companion animal owners, the public in terms of corporate veterinary practitioners) were not directly involved in the NAVMEC Meetings, the importance of their perspectives and priorities was widely acknowledged and reflected in participant contributions. Interest in NAVMEC and participation in the process grew with each meeting, so that by the third meeting, approximately 400 members representing over 150 groups in the veterinary medical community had participated in one or more of the three meetings (Figure 2).

Figure 2. Stakeholders of Veterinary Medical Education and those who Participated in NAVMEC

Figure 2a. Stakeholders of Veterinary Medical Education

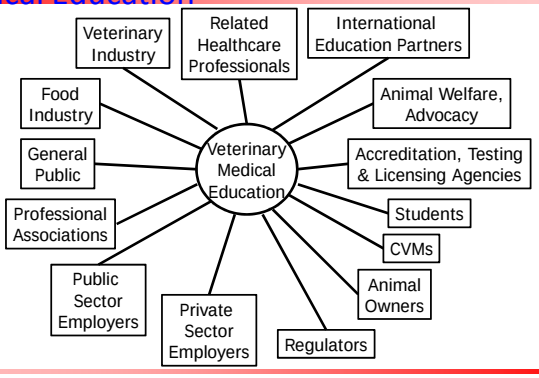
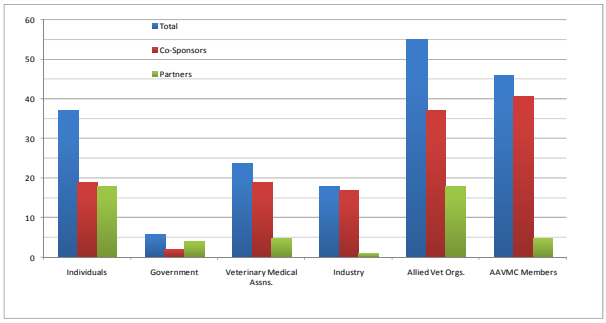


Figure 2b. Background of NAVMEC Participants



Total Number of Participating Groups: 186

NAVMEC is led by a nine-member Board of Directors comprised of 3 representatives from education (AAVMC), the accrediting body of Colleges of Veterinary Medicine (CVMs), AVMA Council on Education (COE), and testing/licensure [American Association of Veterinary State Boards (AAVSB) and National Board of Veterinary Medical Examiners (NBVME)]. Details of the nine-member NAVMEC Board of Directors are provided in Appendix A. The work of the Consortium was funded completely by generous financial contributions of NAVMEC members, as shown in Appendix B.

4.2 NAVMEC Goals, Objectives and Anticipated Outcomes

The overall goal of NAVMEC was to identify a cost-effective veterinary medical educational system that would produce graduates with competencies on Day 1 post graduation that are required and valued by society, including the public and employers.

NAVMEC's objectives were to--

- Identify current and evolving societal needs
- Identify a set of Day 1 core competencies that would ensure each graduate is prepared to meet societal needs, irrespective of the discipline and field they intend to pursue
- Develop a "road map for education, accreditation, testing & licensure" that would
  - Assure the achievement of core competencies by all graduates
  - Provide for innovation and flexibility by CVMs

- Build on strengths of veterinary medical colleges/schools, and leverage best-practices among CVMs and accelerate system-wide reforms[13]

- Encourage and facilitate partnering, collaboration, and sharing of educational resources among colleges

- Identify ways in which accreditation and testing/licensure would support educational change and reform

4.3. NAVMEC Consultative Process

NAVMEC adopted a consultative process, convening stakeholders in three national meetings, each having a different focus and consisting of stimulus presentations by invited experts, and breakout activities for teams to consider a variety of issues in depth. This meeting format offered stakeholders and beneficiaries of veterinary medical education and other interested parties the opportunity to openly discuss the skills and competencies needed by tomorrow's veterinarians, bringing a variety of perspectives to the discussion.[14]

The focus/objectives of the three national meetings were as follows:

- Meeting 1 (February 2010, Las Vegas): Identified the societal needs and the skills required by veterinarians to meet these current, emerging and future needs. The societal needs are very broad, and demanding of veterinarians, including: health and welfare of animals; the human-animal bond; food safety engagement; community leadership; and technology adeptness – more details are in Appendix C. An initial set of core competencies required by all graduating veterinarians on day #1 to meet these societal needs was also developed – see Appendix D.

- Meeting 2 (April 2010, Kansas City): Participants reviewed and analyzed eight current veterinary medical education models (VMEMs) (i.e., a traditional veterinary medical teaching hospital, "Two plus Two", Non-tracking, Tracking, U.S. Distributive, Canadian Distributive, Caribbean, and European models) and one conceptual model. Their charge was to determine how each model could best develop the core competencies of their respective graduates ('start with the end in mind'), and how they might better meet the needs of students, employers and society in the coming years. At this meeting, a number of additional models were provided in background materials made available to participants. Details of the VMEMs and an overview of generic improvements to these models that were identified during group discussions are provided in Appendix E.

- Meeting 3 (July 2010, Las Vegas): Explored how the veterinary education community, accreditation, testing and licensing bodies can work together to meet the profession's goals for the future. Specifically, 'innovation discussion teams' were tasked with creating curricula that would better and more efficiently achieve core competencies of graduates (see Appendix F), amidst a host of challenges (e.g. student debt, information overload, admissions, cost of

[13] Consortium participants recognized that many CVMs have already made and are continuing to make important changes that are in line with the direction of NAVMEC discussions at the national meetings
[14] Detailed NAVMEC Meeting reports are available on-line and can be accessed via Hyperlinks provided in Appendix G.

education & diversity). Consortium participants were briefed on the roles and processes of accreditation, testing & licensure in the context of enhanced education of future veterinarians, and discussion ensued on the relationship between these entities and how they could support educational change. Finally, time was devoted to understanding and implementing a change process, and discussion of possible next steps for putting NAVMEC recommendations into action.

4.4 Anticipated Outcomes of NAVMEC

From the earliest discussions at NAVMEC National Meeting #1, Consortium members were emphatic that NAVMEC must result in moving from recommendations to action. Participants requested specifically, that recommendations be made that allow, encourage, and facilitate creativity by schools/colleges of veterinary medicine, and continual incorporation of changes over time to meet evolving societal needs.

5.0 Summary Overview of NAVMEC Findings from the Three National Meetings

Early in discussions, NAVMEC participants identified two possible pathways for veterinary medical education to follow, given the cross-roads the profession is confronting:

Path (A): *Continue with the status quo, 'business as usual'* – Individual colleges would continue to try to be everything to all students in terms of faculty expertise and coverage of educational programs; accept as a fact the declining financial support from government (State & Federal) agencies; balance the books of our veterinary medical colleges by increasing class sizes and freezing investments in facilities, technology and expertise, and reducing staff; hope that the trend of a static applicant pool (compared to other health professions) reverses; accept that increasing student debt load cannot be ameliorated; and believe that being the "gold standard" for veterinary medical education in the world will continue without change. The outcome of this path is a veterinary medical profession that will at some time be starved of high quality graduates, putting at risk animal care and welfare, environmental health, human health, the safety of the human food supply, and high quality biomedical research. Although this outcome may not be detectable or measurable for several years, reversing this course at a later date will be increasingly difficult and expensive.

Path (B): *Re-energize Veterinary Medical Education in North America* – attract investment into education by elevating the value of the whole veterinary medical profession in the eyes of the public, employers, and government agencies; be creative in collaborating to produce cost-effective education methods and materials; show leadership in finding ways to address student debt issues; excite and attract the very best talent into veterinary medical education programs; continue to develop, share and leverage innovative changes currently being adopted at many CVMs; and embrace change as the vehicle to maintain a global leadership position. The outcome of this path is a vibrant education system producing outstanding graduates, ready to contribute to employers, clients and society on the first day post graduation (Day 1).

Consortium members strongly endorsed Path (B). However, participants recognized that many organizational development experts have found that people inside many different types of organizations usually believe that things are just fine as they are, and that change is unnecessary, disruptive and will lead to more work/stress. Such a prevailing culture will result in a reactive approach, changing only when forced to do so. NAVMEC participants concluded that a transformational set of changes, based on a proactive approach, will be essential at all levels of the educational system to position the profession to meet societal needs.

5.1 Change Drivers of Veterinary Medical Education

Private and public organizations are most frequently stimulated to change through pressures exerted by external factors or drivers, including: economic, competitiveness, environmental, technological, political, and or public opinion. Taking the current environmental climate of evolving societal needs and challenges confronting veterinary medical education that were described in Section 2.0 into account, four critical change drivers for veterinary medical education emerged from discussions and brainstorming by participants at the three NAVMEC National Meetings (Table 2). These drivers were thought to significantly influence how veterinarians will be educated in the coming decade.

Table 2. Change drivers of veterinary medical education that emerged from discussions at NAVMEC National Meetings 1, 2, and 3.

Change Driver	*Commentary*
Evolving Societal Needs	• Expectations that veterinarians will take more of a leadership* role in issues relating to: food safety; animal welfare; environmental health; One Health ** leadership = the ability to take direct action and influence others to take action* • Global food & energy shortages will put the spotlight on choices relating to food production • Health and wellness will assume a growing importance in society – all healthcare providers will be expected to provide more integrated services • Veterinarians will play a broader healthcare role in cases of zoonotic disease outbreaks, wellness programs relating to the human-animal bond, and responding to natural or induced disasters • As the cultural diversity of North American society expands and differences need to be recognized among people there is an expectation this should be understood, embraced by and reflected in the population of veterinarians
Financial Challenges	• Reduced financial support to CVMs from state resources, and reduced income from veterinary teaching hospitals' case loads • Societal expectations will increase the content to be delivered by the curriculum – there is a real risk that this will inflate the cost of education to students • Using current starting salaries, many veterinary graduates find it difficult to service their accumulated debt and further their education, while paying their living expenses • The current generation of students is more likely to switch careers (i.e. leave the veterinary profession) than their predecessors, particularly if personal economics are at risk • The national ratio of applicants to positions in professional veterinary programs has trended downward since ~1990 and is currently 2.1:1[15]. A number of CVMs are experiencing declining applicant numbers. Both these trends suggest we may be dangerously close to reaching a "tipping point" with the quality and quantity of applications.
Technology	• The technologies of veterinary medicine are expanding exponentially: diagnostics, therapeutics, genetic engineering, etc. More time will be needed in the curriculum to educate in these areas • Knowledge is no longer synonymous with power; information has become ubiquitous; the ability to find and analyze information, and draw conclusions are becoming increasingly important skills • In all fields of education, the basic premises of teaching and learning are going through a renaissance, enabled by on-line, on-desk, and in-hand technology. While it is certain that these technologies will greatly impact the education of veterinarians, it is unclear how these changes will affect the cost and quality of this education, and what their impact will be on

[15] AAVMC unpublished data, 2010

	staffing and resources at North American CVMs
21st Century Students' Attitudes and Aptitudes for Learning	• Tomorrow's students will expect to receive a high quality education at a time and location that facilitates achievement of learning objectives in the most efficient process possible • Students ('digital natives') are also becoming more attracted by online, virtual educational facilities, where the quality of the training is growing in leaps and bounds • Students find CVM's admissions criteria & processes complex and inconsistent, and make their educational choices confusing

Highlighted at all 3 NAVMEC National Meetings were the innovative changes already underway at many of our North American colleges of veterinary medicine, and that were in line with the direction discussions were taking. Nonetheless, Consortium members expressed a strong desire to continue to take these CVM initiatives further and to start experimenting with new concepts as early as possible. It was agreed that many of the recommended initiatives will require unprecedented collaboration among and between the leadership, faculty and administration staff of all CVMs, as well as the accreditation, testing and licensure bodies.

5.2 Identification of core Day1 Competencies Needed to Meet Societal Needs – Outcomes of NAVMEC National Meeting 1

The following evolving societal needs were identified at the first NAVMEC Meeting. These needs are broad and demanding of veterinarians. They include:

- Strong comparative medicine primary clinical skills for different species
- Career ready, business savvy professionals at graduation, skilled in business foundations of clinical practice, communication
- Increased leadership in food safety, zoonoses, animal welfare
- Globalization, food shortages, new agritech require new roles
- Convergence to One Health
- Leadership in understanding and accepting cultural and societal diversity
- Interdisciplinary problem solvers, critical thinkers
- Leaders in disaster management and public communication
- Technological adeptness

Following the identification of important, significant evolving societal needs, Consortium members agreed upon a set of Day 1 core competencies for all veterinarians, irrespective of the discipline and or field they chose to pursue. These competencies are presented in Section 6.1 of this Report—NAVMEC Recommendations. Details of the discussions and outcomes of NAVMEC National Meeting 1 are presented in Appendices C and D.

5.4 Opportunity and Challenges to Veterinary Medical Education

Consortium members agreed that with the broad spectrum of contributions that veterinarians make to society, veterinarians have the potential of being very highly valued by society; however, educating students in the many disciplines comprising veterinary medicine is difficult to accomplish in a 'reasonable' time frame and at an 'affordable' cost. Consortium members

agreed that strategically, therefore, there is an urgent need to:

- Make societal and funding leaders more appreciative of the broad value of the veterinary profession. Although veterinarians are consistently in the upper ranks of all professionals, in terms of respect and trust, starting salaries for veterinarians are in the lower ranks, well below some of the other allied health professions.

- Review the scope of topics within the 4-year curriculum, focusing on primary/preventive care and on both clinical and non-clinical competencies. This review may lead to a broader curriculum to deliverentry-level core competencies of all veterinary medical graduates, enabling them to meet societal needs and to lead fulfilling, successful careers. By necessity, however, this broader curriculum will necessitate a concurrent decrease in curricular depth with greater emphasis on basic principles, critical thinking and problem solving, rather than rote memorization of more facts across the broader scope of topics required for the broad set of competencies.

- Facilitate increased sharing of educational resources among CVMs, which will be essential for system-wide success. Sharing of resources were identified as critical to assure that the education delivered by CVMs continues to be of the highest quality, while achieving greater affordability, which will be critically important to attracting a strong applicant pool of the best students.

5.5 Additional Key Findings from NAVMEC National Meetings 1, 2, and 3 [16]

- The needs of society and employers are driving the development of a broader set of core competencies, with increasing emphasis on food safety, wellness and prevention programs, emerging zoonotic diseases, animal welfare, environmental health, public health and overall stronger links to human health

- Non-clinical competencies (SKAs) are increasingly recognized as essential for successful private and public veterinary practitioners, and need to be fully integrated throughout the curriculum

- Employers are expecting new veterinary medicine graduates to be ready to apply their skills on Day 1 post graduation ('career-ready')

- A broader curriculum in the same 4-year timeframe will require changes in how clinical and pre-clinical courses are designed and delivered

- Different veterinary medical education models each have strengths and weaknesses, however, there are several common themes that can be considered for change:

    - More uniform pre-veterinary core course requirements to simplify the application process are needed
    - More emphasis is needed on student-centered education

[16] Additional details on the discussions and outcomes of NAVMEC National Meetings 1, 2 and 3 can be accessed via hyperlinks that are provided in Appendix G

  - Flexibility in course design, delivery is essential for innovation and efficiency
  - Broader educational curricula are needed to provide graduates with the necessary technical and non-technical competencies for all career paths.

- CVMs are coming under increasing financial pressure due to state funding cuts and reduced veterinary teaching hospital (VTH) case load and accompanying revenue. These financial support shortfalls are leading to serious concerns about quality of education the CVMs are able to deliver

- There is growing concern that student debt load has become a deterrent to entrants to veterinary medical education programs, when considered along with expected early career income

- There is a strong understanding, need and desire to share educational resources among CVMs, and to elevate the quality of education while pursuing more cost-effective approaches to delivering a quality education. Guidance on the logistical framework for the CVMs to undertake this sharing, is expected from NAVMEC

- Information overload is a growing concern. How can the current curricula focus on essential information, and how might the curricula include ways for students and graduates to acquire and use new information on-line? How much information needs to be memorized and tested vs. learning how to effectively access information?

- 'Diversity,' having to do with differences that need to be recognized among people and open-mindedness, embracing non-conformity, and breaking down barriers, must receive more attention, and be deeply embedded in the curriculum. There is also a need to attract students from all sectors of an increasingly diverse society in order to meet its needs more effectively

- New information technology can and likely will impact how veterinarians are educated. How can this be advanced to ensure quality, and potentially to lower costs?

- Accreditation standards that are linked to outcomes based on the core competencies can serve as a powerful driver/agent of change in development of veterinary medical educational curricula that will deliver graduates with the agreed upon core competencies

- Little advantage is seen in moving toward limited licensure. The current system of licensure provides career flexibility and a consistent process across state jurisdictions

6.0 NAVMEC Vision and Recommendations

Transformational changes require strong leadership + clear direction + bold vision. As created by all partners in the NAVMEC consortium, this vision is intended to:

a) Attract and retain the very best students
b) Motivate and inspire outstanding educators
c) Create value for financial investors in the education system
d) Excite and engage all stakeholders, including employers of veterinarians

Society currently holds veterinarians in high regard and trust. Using graduates' starting salaries as the metric, there is the potential – not yet achieved – for them to also be considered as valued community leaders. There is also a necessity to create greater economic stability and viability for the veterinary medical education system. Our proposed vision is:

"Educating Valued & Valuable Veterinarians"

With regard to providing strong leadership, NAVMEC recommends its focus remain targeted on the development of strong recommendations, through approval of this report by the AAVMC Board of Directors, anticipated for spring, 2011. NAVMEC participants recommended that following final approval of the report, the NAVMEC concept continues to exist and act as a catalyst for positive change as the initiative moves into an implementation phase, in a structure yet to be defined ('NAVMEC-Implementation').

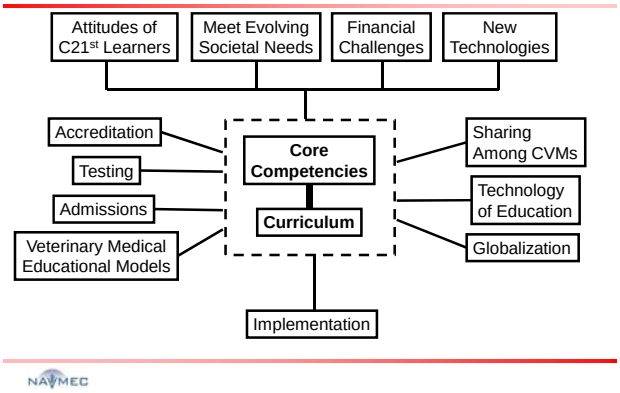
Five Strategic Goals Proposed by NAVMEC

Based on discussions and outcomes of the three National NAVMEC meetings, the NAVMEC Board of Directors proposes 5 strategic goals (Box 1), accompanied by 20 recommendations (Figure 3), to advance veterinary medical education in order to ensure that each graduating student is proficient in a set of core competencies, to meet societal needs.

Box 1: NAVMEC's Proposed 5 Strategic Goals:

- Graduate Career-Ready Veterinarians Who are Educated and Skilled in an Agreed Set of Core Competencies
- Ensure that Admissions, Curricula, Accreditation and Testing/Licensure are Competency-Driven
- Strive for a Veterinarians' Education that is Maximally Cost-Effective
- Ensure that an Economically Viable Education System for Veterinary Medical Education is Sustained
- Stimulate a Profession-Wide Sense of Urgency & Focus on Action

Figure 3. Mapping of Relationships Between Drivers and NAVMEC Recommendations



NAVMEC recommendations focus on entry-level core competencies and other drivers of veterinary medical educational curricula. NAVMEC's goals, objectives, and recommendations are based on and driven by entry-level core competencies required for new graduates to meet societal needs. These competencies then would drive admissions, curricula, accreditation, and testing/licensure. There are several influences on curricula, including: different ways of delivering the curricula (veterinary medical educational models); the type and level of sharing among the CVMs; new information technology; learning aptitudes of 21st Century students; and financial challenges facing CVMs and students.

6.1 Graduate Career-Ready Veterinarians Proficient in Core Competencies

The primary objective of veterinary medical education is to graduate veterinarians with the skills which are highly valued by employers and by society in general. NAVMEC participants concluded that approaches to veterinary medical education revolve around a strong, well-defined set of core competencies for all graduates. All stakeholders would benefit from this approach. For example,

- Students acquire a broad set of skills, which increases their value in the veterinary medical market
- The public will be better served by veterinarians with the most relevant skills
- Employers can hire veterinarians ready to contribute on Day 1
- Educators know where to invest time and resources to optimize the breadth and depth of the curriculum

Each of the NAVMEC Meetings considered the definition of the core competencies for entry-level veterinarians, and how these would be delivered to students and assessed. More specialization will require additional education beyond 'day 1 core competencies'. The following set of core competencies was agreed upon by NAVMEC participants*:

Box 2: Proposed Core Competencies for all Veterinary Medical Graduates

Multi-species clinical expertise	*This competency, with its emphasis on comparative medicine, distinguishes the veterinary profession from other heath professions.* *Diagnostic, prevention, and therapeutic skills; animal behavior, wellness, & welfare*
Public health/One Health/Global Health knowledge and expertise	*Prevent, diagnose & control zoonotic diseases; food safety & security, emergency preparedness & response, human-animal bond benefits*
Interpersonal communication	*Effective interactions with clients, team, colleagues &*

	community
Collaboration	*Work within a healthcare team to achieve optimal patient care, client service, or other desirable outcome*
Management (self, team, system)	*Efficient operation of business; financial literacy; resource management.*
Lifelong learning, scholarship and value of research	*Critical thinking, problem solving & curiosity; self-directed learning*
Ethics & professional leadership	*Committed to health & welfare of patients, needs of clients*
Diversity/multicultural awareness	*Understanding and accepting of all societal diversity, including (but not limited to) racial, ethnic, gender, sexual orientation, socio-economic and cultural; working in multicultural teams, knowing how to provide the most appropriate veterinary medical advice to a diverse clientele*
Adapt to changing environments	*New technologies; role of animals; societal norms*

* Because the definition of entry-level core competencies is central to these recommendations, the NAVMEC Board of Directors has convened a special multi-stakeholder panel to consolidate current definitions, include new/emerging competencies (e.g. technology, environment), and create an agreed listing. A strong representation of employers (public and private sector) on this panel will ensure that the expectations of animal-owning clients and society will be addressed. The findings of this panel will be incorporated into the next version of the draft NAVMEC report. More details of the listing created at Meeting #1 are provided in Appendix D.

NAVMEC Recommendations: Core Competencies for Career-Ready DVMs	
6.1.1	**CVMs use the NAVMEC core competencies to create their curricula**
6.1.2	**All competencies are integrated and taught in every year of the curriculum**
6.1.3	**The NAVMEC set of core competencies and their descriptions are incorporated into the standards of accreditation and required outcomes measurement**
6.1.4	**NAVLE is revised to optimize evaluation of these core competencies**

6.2 Make Admissions Requirements and Curricula Competency-Driven and Time-Efficient

NAVMEC proposes a broadening of the CVM curriculum, while limiting the depth of some pre-clinical and clinical courses. The objective is to produce career-ready veterinarians with a broader set of well-defined core competencies, in a timeframe no longer than the current 4-year professional program. Achieving these competencies will increase the value of veterinarians to their employers (and society), while affording them more choice in career directions, i.e. 'more valued and more valuable'. Some examples of increased curricular breadth identified by NAVMEC

Innovation Teams are:

- "Teach commonly-seen clinical conditions uncommonly well" – focus on primary care, wellness and prevention in clinical courses

- Expand content on food safety, public health, disaster response and preparedness, to stimulate interest in careers outside of clinical practice

- Create & update course materials on 'ethics and leadership' for consistent use in each CVM

- Embed the understanding and acceptance of cultural diversity in and throughout the curriculum. Create & provide CVMs with diversity orientation teaching materials for faculty, staff & students - information on how different cultures regard animals & animal welfare

- Add: technology tools for diagnostic and therapeutic functions; eco-system health; risk assessment and communications; teaching Skills, Knowledge, and Aptitudes (SKA's); 'technical literacy'

Additionally, there is a strong desire to simplify and strive for uniformity of admissions requirements among and across all CVMs, and to identify ways to accelerate the completion of pre-veterinary course requirements in less than four years.

NAVMEC Recommendations: Admissions and Curricula	
6.2.1	**Create a multi-CVM academic panel to analyze and propose a uniform core of pre-veterinary academic course requirements for all AVMA accredited CVMs in North America**
6.2.2	**Multiple CVMs collaborate to define pre-veterinary education programs to make entry into a veterinary medicine degree program in less than 4 years, a feasible option**
6.2.3	**All CVM curricula to be competency-driven, delivered in a flexible & time-efficient format**
6.2.4	**Clinical skills and SKAs to be taught in an integrated way, using a spectrum of learning techniques, including problem-based learning and case-based methodologies – enables graduates to hit the ground running on day 1**
6.2.5	**Demonstrate proactive leadership: initiate discussions with human and environmental medicine education professionals, in order to create a One Health curriculum**

6.3 Increase Sharing Educational Resources Among CVMs to Ensure Quality, Flexibility, and a Cost-Effective Education for Veterinarians

NAVMEC participants reported growing enthusiasm and need for sharing of expertise and resources among the CVMs, and with other university colleges. This is driven by the desire to

continually improve the quality of education for veterinarians in accordance with the core competencies, while making the educational process as cost-effective, and as affordable as possible[17] for a highly diverse pool of applicants. Various education delivery technologies are being explored and adapted by several schools. While this information is shared informally, it is believed that there are significant opportunities to do much more – once some important logistics and political challenges are addressed (e.g. faculty recognition, tuition revenue and cost sharing, assignment of credits and degrees, support by state legislatures, etc.).

NAVMEC is an opportunity to thoroughly address these logistics and create an equitable working model for collaboration in expertise (inside & outside CVMs), course materials, and technologies.

NAVMEC Recommendations: Ensure Cost-Effective Quality Education	
6.3.1	**Create an expert panel to thoroughly analyze ways to share education resources** **- identify best practices from platforms that provide for sharing of educational resources across institutions, e.g., faculty members, VetICE*, VEC*, MedEdPortal, etc.** **- explore the economics, applicability, logistics of Centers of Excellence[18]** **- recommend implementation strategies**
6.3.2	**AAVMC creates and maintains an inventory of shareable courses from all North American accredited schools**
6.3.3	**AAVMC creates an Education Technology Support Center, to provide advice to and coordination among CVMs, facilitating sharing of information** **- IT expert(s), current in the technology and financially savvy** **- use NAVMEC web-based forums to share knowledge real-time among CVMs**

* VetICE=Veterinary Internet Content Exchange; VEC=Veterinary Educator Collaborative

[17] Tuition is often determined by universities at large, outside the influence and authority of CVMs.

[18] The Regional Centers of Excellence program was enacted in the Food, Conservation, and Energy Act of 2008, commonly known as the Farm Bill (PL 110-246); the Foresight Report recommended a similar concept, referred to as Centers of Emphasis

6.4 Promote a Sustainable, Economically Viable System of Education for Veterinary Medicine

As noted in Section 2.0, the Veterinary Medical Education (VME) system is facing significant challenges, as are all education systems in North America.

- Financial support for CVMs from government (state & federal) agencies continues to seriously decline; this is putting pressure on the quality of education CVMs deliver through increased class sizes and lack of investment in facilities, faculty and education technology. All NAVMEC participants were anxious to redress this situation as quickly as possible.

- Many veterinary teaching hospitals are experiencing decreasing case loads for some species and disciplines.

- The ratio of student debt to graduate starting salary is increasing to a level where it will impact the numbers and quality of students prepared to invest in a veterinary medical degree.

NAVMEC considers it imperative for all stakeholders of veterinary medical education and veterinary medicine to address these financial challenges directly, aggressively and expeditiously.

NAVMEC Recommendations: Economically Viable VME System	
6.4.1	**Initiate a national PR campaign in partnership and collaboration with national veterinary organizations and state VMAs to raise funds for CVMs** **- target federal and state agencies; veterinary, food, and environmental industry; animal-owning public** **- promote value of veterinary medicine to human, animal and environmental health** **- explore use of a VME foundation for endowments, scholarships, etc.**
6.4.2	**Accelerate & expand eligibility in student loan re-structuring and loan-forgiveness programs at the state, federal and local government levels**
6.4.3	**All CVMs to provide financial counseling to all veterinary medical students in each year of study**
6.4.4	**Advocate that employers are able to pay pre-tax deductions, re: student debt[19]**

[19] The Economic Growth and Tax Relief Reconciliation Act of 2001 (PL 107-16) extended the Education Assistance Plan until 2010

6.5 Create a Profession-Wide Sense of Urgency & Focus on Action

NAVMEC participants enthusiastically reviewed and became familiar with innovations in curricula that are already being adopted in US and Canadians CVMs, and that are addressing many of the recommendations proposed in this report. Nonetheless, there was universal commitment among NAVMEC participants that NAVMEC recommendations must quickly be put into action, and that the actions essential to the sustainability of VME are taken. Specifically, it was underscored by all involved that NAVMEC must not result in 'a report gathering dust on a shelf'. This will require attention, commitment, and investment at the operational level of each CVM, regionally by groups of CVMs, and at the system-wide strategic level of all CVMs. Innovation and flexibility will also be required on the part of the accreditation and testing/licensure regulatory groups. Coordination, communications and networking on a new and much broader scale will be essential.

To lead and achieve change, creating and maintaining a 'sense of urgency' is one of the most important characteristics required. This will require engagement and participation among all stakeholders, most importantly including faculty members who will create and deliver the lion's share of the changes recommended by NAVMEC.

NAVMEC Recommendations: Urgency & Action	
6.5.1	**Form NAVMEC Teams at CVMs: maintain focus on change initiatives at each CVM**
6.5.2	**Adopt use of a NAVMEC web-based discussion forum and other open forums to facilitate and accelerate sharing of best practices among the NAVMEC Teams at the CVMs**
6.5.3	**Initiate the Implementation Plan (see Section 8.0): maintain heightened momentum and measure progress annually**
6.5.4	**Attract investments to NAVMEC-Implementation: an AAVMC-led implementation program, that provides strategic momentum**

6.6 Mapping of NAVMEC Recommendations to Change Drivers

To facilitate consideration of the 20 NAVMEC recommendations proposed in this report, each recommendation above has been mapped to the drivers of educational change in Table 3 below.

Table 3. NAVMEC Recommendations Mapped to Change Drivers (●=strong impact; ○=moderate impact)

#	*Recommendation*	*Suggested Primary Coordinating Group**	*Meet Societal Needs*	*Financial Challenges*	*Technology Changes*	*Attitudes of C21 Learners*
6.1.1	Adopt NAVMEC core competencies	CVMs	●	○	○	●
6.1.2	All competencies integrated across curriculum (all years)	CVMs	●	○	●	●
6.1.3	NAVMEC competencies are in standards	AVMA Council on Education	●	●		○
6.1.4	NAVLE review for optimal assessment of competencies	NBVME	●		○	○
6.2.1	Uniform admissions requirements	AAVMC/CVMs		○		●
6.2.2	Collaboration on pre-veterinary programs for the option of early entry	AAVMC/CVMs	○	●	●	●
6.2.3	Competency-driven curricula	CVMs	●	○	○	●
6.2.4	Integrated teaching, PBL	CVMs	○		●	●
6.2.5	Create One health curriculum	AAVMC/CVMs	●		○	○
6.3.1	AAVMC panel to review 'education sharing models'	AAVMC	○	●	●	
6.3.2	AAVMC creates inventory of shareable courses	AAVMC		●	●	
6.3.3	Create AAVMC Tech Support Center	AAVMC		●	●	○
6.4.1	PR campaign for fund raising	AVMA/AAVMC	○	●		●
6.4.2	Student loan-restructuring, debt forgiveness	AVMA/AAVMC		●		●
6.43	Schools provide financial counseling	CVMs		●		●
6.4.4	Advocate pre-tax deductions	AVMA/AAVMC		●		●
6.5.1	NAVMEC Teams at all CVMs	CVMs		○		
6.5.2	Web-based networking	AAVMC		○	●	○
6.5.3	Initiate the Implementation Plan	AAVMC	●	●	●	●
6.5.4	Attract investments for NAVMEC-Implementation	AAVMC	●	○	○	○

* AAVMC's and AVMA's primary roles will be as catalysts, conveners, facilitators, advocates, and information collectors, and as builders of coalitions, according to the needs of their memberships.

7.0 Research Agenda

In preparation for and during discussions at the NAVMEC National Meetings, the dearth of peer-reviewed research on factors impacting on veterinary medical education was acknowledged, limiting an evidence-based approach that could be adopted in addressing the challenges to education described in this report. Some of the highest priority items for research identified during the NAVMEC process were:

Teaching & Learning	What teaching and learning strategies in higher education (including 'blended' programs) are emerging as most effective?
Pre-Admission Assessment	What are the most reliable pre-admission assessment criteria, and how can they best be evaluated?
SKA Testing	How do other professions test for competence in Skills, Knowledge, and Aptitudes?
Distance Learning Costs	What are the real capital and operating costs associated with 'distance learning' to achieve given educational outcomes?
Self-Directed Learning	Are self-directed learning models applicable in the education of veterinarians?
Nationwide Licensing	What is the experience in Canada with regard to country-wide licensing of veterinarians (and other professionals)? Are there parallels in the EU also?
Incentives for Courseware Sharing	How to incentivize, reward and credit faculty members, to develop and share educational materials among CVMs?

8.0 Recommendations for NAVMEC Implementation

The NAVMEC Board of Directors recommends that the recommendations contained in this report be vetted with Consortium members and other stakeholders of veterinary medical education to obtain feedback and further input, to ultimately develop a final set of recommendations to be shared with the AAVMC Board of Directors and other partner organizations, beginning in March 2011. Following approval of the recommendations by the AAVMC Board of Directors and leadership of Consortium organizations, steps should begin immediately to put the recommendations into action, including identification and confirmation of those groups responsible for overseeing change.

Great ideas have no impact unless they proceed to an implementation phase. The NAVMEC Board of Directors proposes that concepts and motivations behind NAVMEC be continued and that a continuing or related structure and process be developed to act as a catalyst for positive change, and evaluate overall progress in achievement of recommendations. The following recommendations are proposed to transition NAVMEC into an implementation phase ('NAVMEC-Implementation'):

NAVMEC Recommendations: Implementation	
8.1	Current NAVMEC Board of Directors continues to provide direction until April 2011; NAVMEC-Implementation is overseen by AAVMC, as it progresses into implementation including collaboration with stakeholders
8.2	Initial activities to include: – Refining recommendations through feedback from partners and stakeholders at meetings, conferences, and using web-based forums, to create the final NAVMEC report – Define metrics for success; conduct initial survey to collect baseline data on metrics against which progress will be measured; ensure progress is communicated regularly to all stakeholders – Identify required staffing resources for implementation – Develop implementation schedule, actions, milestones, budget – Continue engagement with change implementers (e.g. faculty), to build commitment ('leading change') – Develop an educational research agenda, and its resource requirements (see Section #7) – Expand existing AVMA outreach programs to inform and excite K-12 students and their advisors – Recommend that the 2012 Global Health Summit at the AVMA Convention be a AVMA/AAVMC partnership focusing on education – Create a web-based discussion board and forums, to enable open sharing of innovation

8.3	Maintain a North American implementation focus, while finding opportunities to participate in international educational forums
8.4	Plan initial phase of the proposed PR campaign to raise funds for veterinary medical education
8.5	AAVMC creates a competitive grant program, encouraging CVMs to work together to implement NAVMEC recommendations
8.6	Consider partnerships with IT entities, for example the Gates Foundation, Google, Microsoft, IBM, Apple, etc.
8.7	Review and assess NAVMEC progress annually – at each AAVMC annual conference, time is devoted to CVMs sharing NAVMEC successes, and assessing the progress of the initiative as a whole At least every three years, convene a forward-looking NAVMEC summit involving educators, employers, accreditation, testing, licensure, and students for sharing best practices, monitoring progress, and ensuring this progress is broadly distributed

9.0 Next Steps (for this report revision)

Since its formation, the core principles of NAVMEC have been inclusion, engagement, collaboration and consultation. Many person-hours of thought have gone into the recommendations in this report and there is a great determination to not only 'do it' but also to 'do it right'. This report and its recommendations will be presented to the AAVMC Board of Directors for initial review and discussion in October 2010. The report will then be given broad distribution for vetting, consultative and feedback purposes during the period November 2010 – February 2011. In March 2011, the NAVMEC Board will prepare the final revision of this report and submit it to the AAVMC Board of Directors for consideration.

All NAVMEC presentations and reports will continue to be posted at www.navmec.org, in addition to information on the process for stakeholders to provide feedback.

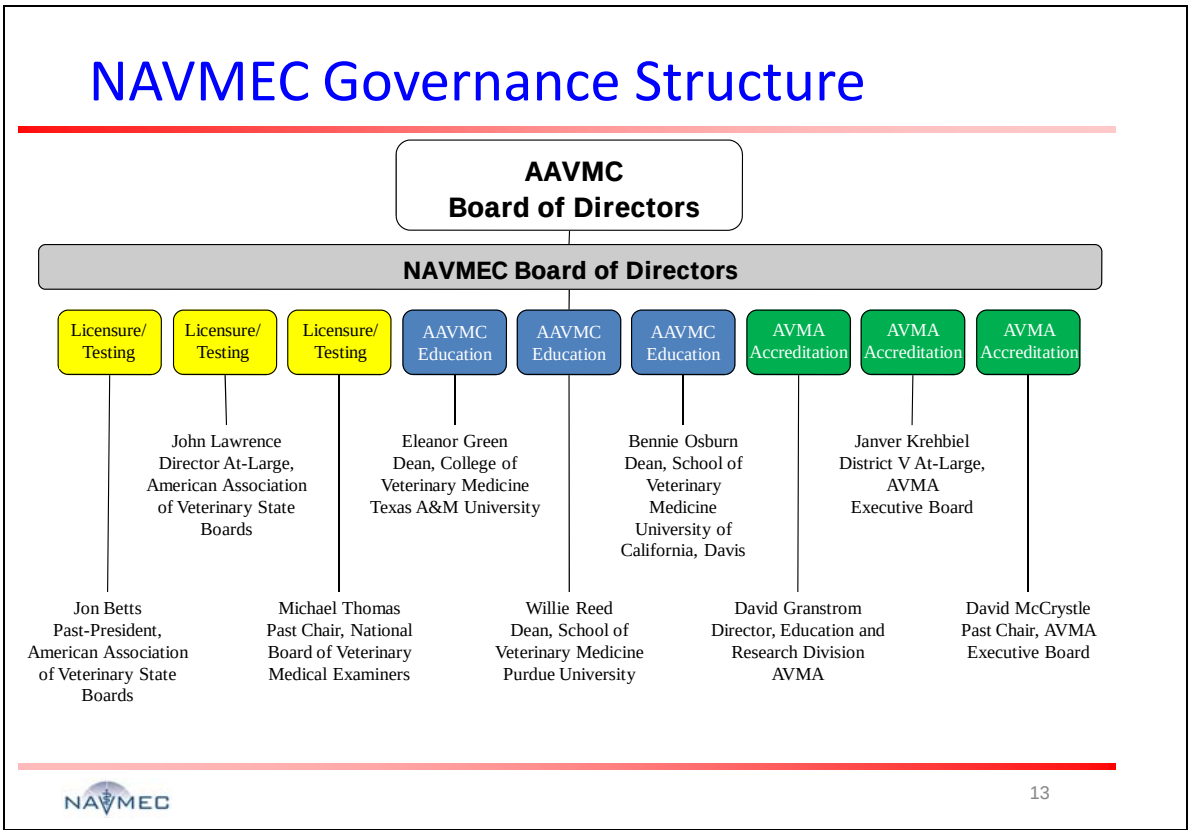
Report prepared by:

Dr. Ken Andrews, NAVMEC Facilitator on 19 October 2010

Submitted by NAVMEC Board of Directors, 20 October 2010

Received and approved for draft release to NAVMEC stakeholders, by AAVMC Board on 31 October 2010

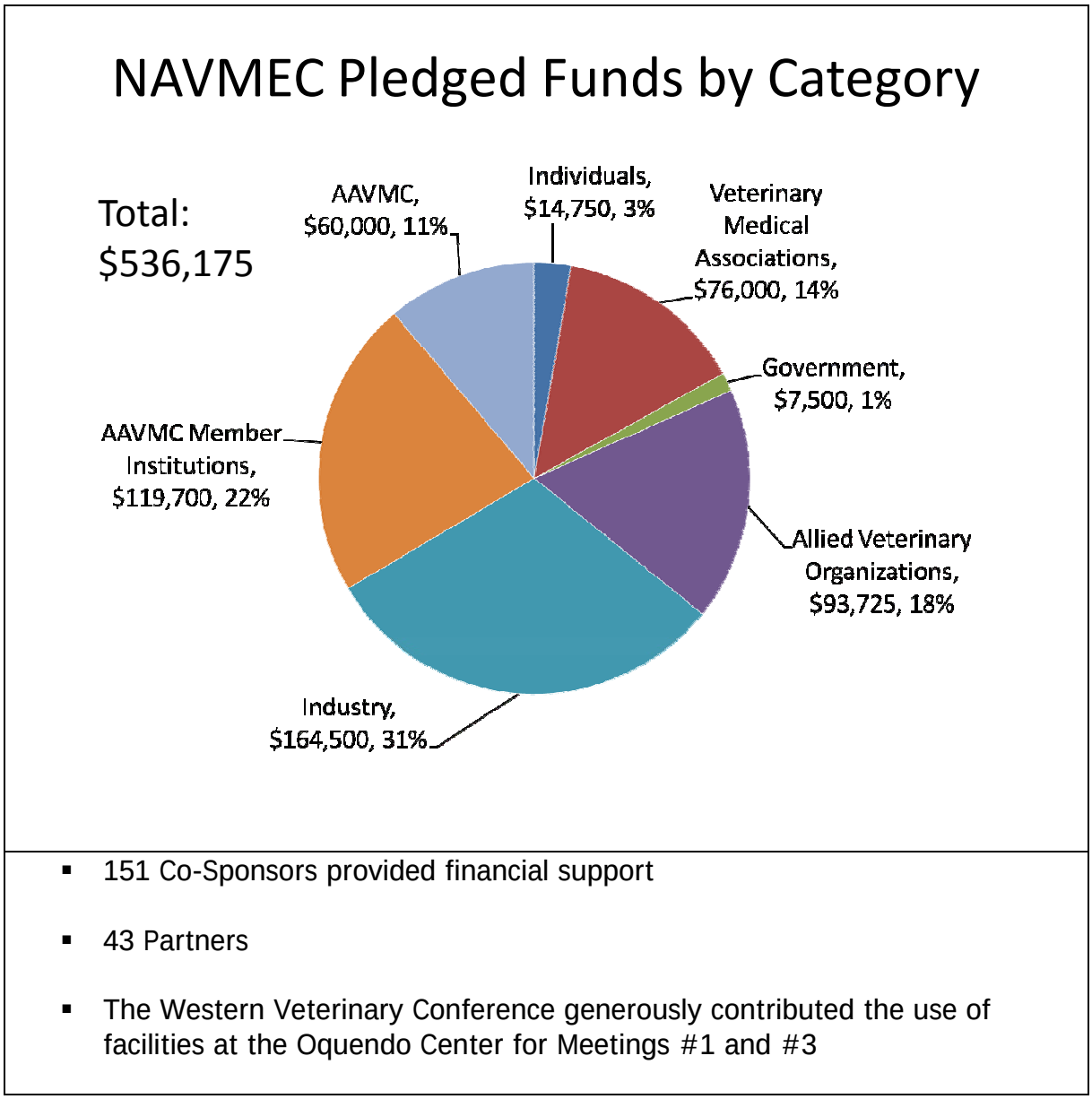
Appendix A: Board of Directors & Project Management



Project Team

- Dr. Mary Beth Leininger – Project Manager
- Dr. Marguerite Pappaioanou, AAVMC
- Dr. Mike Chaddock, AAVMC
- Dr. Ken Andrews – NAVMEC Facilitator

Appendix B: Funding & Sponsorship



- 151 Co-Sponsors provided financial support
- 43 Partners
- The Western Veterinary Conference generously contributed the use of facilities at the Oquendo Center for Meetings #1 and #3

Appendix C: Societal Needs Overview (Meeting #1)

Societal Needs: Public Community

- Technology changes
  - *Veterinary skills will be expected to be much broader (zoonotic diseases, wellness & preventative programs, emergency preparedness, human-animal interactions)*
  - *Clients will have even greater access to information on the Internet*
  - *Clients may have access to diagnostic technologies*
- Food Safety
  - *Veterinarians will need to assume greater leadership roles as 'protectors of food safety', animal welfare and public health*
  - *Food shortages will create new roles and pressures*
  - *New agriculture technologies will change food animal production*
- Community Leadership
  - *Human & animal health, and food safety issues will merge (One-Health)*
  - *Cultural diversity will create animal welfare challenges*
  - *Veterinarians must be sensitive to cultural and societal diversity*

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Societal Needs: Veterinary Community

- Employers of Veterinarians Expect Veterinarians to be ..
  - *At the intersection of human, animal & environmental health*
  - *Leaders of an interdisciplinary effort on food supply medicine*
  - *Critical thinkers & problem solvers*
  - *Respected leaders in disaster management*
  - *More involved in public communication, risk communication and education*
  - *Engaged in "One Health, One Medicine" as it evolves*
- Finance & Economic Pressure
  - *Decreased government funding to CVMs: increased tuition & class sizes*
  - *Trends in increased student debt may not be sustainable in near-term*
  - *~40% of graduating veterinarians choose to pursue additional training*

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Appendix D: Core Competencies Overview

Skills & Competencies I

- Multi-Species Clinical Expertise
  - *Diagnosis and therapeutic skills; animal behavior, wellness, and welfare*
  - *Prevention and treatment of common health problems*
- Interpersonal Communications & Education
  - *Facilitate doctor-patient-client relationship*
  - *Effective interactions with team members, colleagues & community*
  - *Oral & written communications, and use of e-media (social networking)*
  - *Perform compassionate health care delivery*
- Collaboration
  - *Work within a healthcare team to achieve optimal patient care*
  - *Partner with interdisciplinary healthcare providers, policy makers, etc.*
- Management (Self, Teams, Systems)
  - *Efficient operation of business; financial literacy*
  - *Resource allocation, delegation, prioritization & investment decisions*

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Skills & Competencies II

- Public Health & One Health Promotion
  - *Prevent , diagnose & control zoonotic diseases*
  - *Knowledge of food safety and security*
  - *Human-animal bond benefits*
- Life-Long Learning
  - *Critical thinking, problem solving & curiosity*
  - *Invest in self-directed learning to develop and expand competencies*
- Ethics & Professional Leadership
  - *Committed to health & welfare of patients*
  - *Protection of human health through ethical practice*
- Diversity Competence
  - *Understanding and accepting of all societal diversity, including (but not limited to) racial, ethnic, gender, sexual orientation, socio-economic and cultural; working in multicultural teams, knowing how to provide the most appropriate veterinary medical advice to a diverse clientele*
- Adaptable to Changing Environments
  - *Able to quickly acquire technology expertise*

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Skills & Competencies: Emerging & New

- Competency in a much broader spectrum of digital technology: communications, diagnostic & theraputic
- Knowledge of eco-issues, climate change, 'green'
- Increasing awareness on ethical issues, including genetic modification
- Increased political engagement & advocacy
- 'One Health' may provide opportunities for new roles, requiring new skills (medical and non-medical)

Appendix E: Generic Improvements to Veterinary Medical Education Models

- Consideration of Problem Based Learning (PBL) and learner-managed, self-paced delivery
- More visibility on the importance of non-private practice specialty
- Non-technical and technical skills to be integrated throughout the curriculum, not considered as separate discrete courses
- There was some discussion on selection of students with 'desirable' SKAs on admission – although uncertainty remained concerning the efficacy of this strategy
- Increase the teaching competencies of faculty, particularly in the use of technologies in the 'blended' learning environment
- More emphasis on primary care and wellness
- Use of distance learning, specifically to accelerate and reduce the cost of completing required admission pre-requisites
- Mini-sabbaticals to refresh and develop faculty
- Placing greater value on teaching outcomes in evaluating the performance of faculty at CVMs
- Flexible programming to allow for career changes later in life and second career students
- Standardized pre-requisites and entrance exams in North American CVMs
- Broader adoption of shared education processes, such as the VetICE concepts
- Increased use of stakeholder partnerships (e.g. industry, state VMA's)
- Costs of delivering most re-modeled VEMs were perceived to be somewhat higher, due to faculty training and technology investments. The length of the educational process was mainly unchanged.
- Teams recommended that changes be implemented incrementally, suggesting that CVMs would be unlikely to completely switch over to a new model

Appendix F: Consistent Themes for Innovative Curricula

Consistent Themes for Innovative Curricula

- Technical skills & non-technical SKAs fully integrated, in all years
- 'Clinical Proficiency' taught using comparative techniques
- Benchmarking, partnering & sharing of material among CVMs
- Combo of didactic learning & practicum/problem-based learning
- Increased use of on-line tools & information sourcing (vs. memorization)
- Use faculty from other schools & colleges within the university (management, communications)
- Integrate new technologies & learning methodologies
- Self-directed learning
- Exposure to animals and animal health from year one
- Use of veterinarians who have specialized adult education skills

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Appendix G: Internet Links to Meeting Reports & Other Information

Meeting	Report	
1	Executive Summary Only	
	Full Meeting Report	
	Stimulus Presentations	
2	Executive Summary Only	
	Full Meeting Report	
	Stimulus Presentations	
	Innovation Team VEM Analysis:	Tracking Model Non-Tracking Model US Distributive Model Canadian Distributive Model European Model Veterinary Teaching Hospital Model Caribbean Model 2 + 2 Model New Concept Model
3	Executive Summary Only	
	Full Meeting Report	
	Stimulus Presentations	
	Innovation Team VEM Analysis: of Core Competencies and Optimized Curricula	Multi-species clinical expertise Interpersonal communication Collaboration Management (self, team, systems) Public health/One Health Lifelong learning/scholarship Ethical professional leadership Adaptability to changing environments
	Innovation Team VEM Analysis: Of Environmental Factors	Delivery Methods & Learning Styles Information Overload Admissions Pre-Requisites Diversity
Other Important Links	NAVMEC Co-Sponsors The Western Veterinary Conference	