



*Dr. Irving Engelson,
President, IEEE EMS*

President's Corner

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Without a destination we don't know if we are lost or the need for strategic planning

Last October I attended IEMC-2004 in Singapore. Our annual international conference on engineering management was a great success, with attendees from some forty countries. I had occasion to speak with many conference attendees who expressed their satisfaction with EMS, and others who planned to become EMS members. The enthusiasm at the conference was contagious, and I returned invigorated with a new commitment to make our society even more successful. This year IEMC-2005 will be held in St John's Newfoundland, Canada. We again predict an exciting program and strong attendance. In addition to the presentations; EMS conferences provide you with the opportunity to meet your peers, and grow your network of information sources – factors critical to your career success.

Strategic planning (SP) is, and should remain, a visible part of our EMS activities. I have been involved in strategic planning for the not-for-profit sector. Over the past ten years I served on various SP committees within IEEE, and am now running pro bono seminars on the subject. At a recent meeting I was asked why we should engage in strategic planning if we know where we are and where we intend to go. My reply was short and simple. Without a strategic plan and a well-defined mission and vision we really don't know where we are going, and will not be able to determine if and when we arrive at our destination.

I remember 25 years ago when IEEE had 32 societies and councils (S/C's). Now there are over 40 S/Cs, and the number keeps growing. I am not opposed to the creation of new technical entities, but I am opposed to the way some of them are created or proposed. As EMS President I am a member of the IEEE Technical Activities Board (TAB). It is TAB's responsibility to review any proposal for the creation of a new S/C, and to approve its creation. But TAB, like other deliberative bodies, does not always act objectively. Political considerations and old friendships may play a role in decision making. New entities may be proposed and acted upon without clear and objective criteria. Such societies frequently continue to operate without a set of well-defined objectives and goals. If left unchecked, these organizations can lose their direction and purpose.

The operation and existence of most societies can easily be justified on the basis of their activities, but this justification often remains illusive. A society's Field of Interest provides some but not sufficient justification of its existence. We must go back to the beginning and examine for what purpose the society was formed. If the criteria

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In November 2004, the IEEE Technical Activities Board (TAB) approved our modified EMS Field of Interest (FOI) Statement, which is being published in this issue of the Newsletter. The old statement, that remained largely unchanged for some two decades, needed to be updated and edited to remove redundancies. TAB members congratulated us for simplifying and modernizing it while preserving its significant content. We have a number of EMS members who are actively engaged in strategic planning, but this was not explicitly part of our FOI Statement. At the suggestion of some members, we included Strategic Planning in our new FOI. We are always interested in your feedback. This helps us to ensure that we are meeting your needs as a valued member.

for its formation remain unclear, its continued operations become increasingly difficult to justify.

To help ameliorate this situation, I have developed a set of criteria based on five Principles that must be met for the creation and continuance of a society. I shared these Principles with several colleagues who agree that they cover all the required criteria. I

plan to disseminate the document for review.

Our revised Field of Interest Statement, and the subsequent review of the EMS Mission and Vision statements, should act as a compass directing us where we want to go, and helping us to assess where we are. I invite you to become active in EMS activities. We need new and commit-

ted members to help us navigate to our destination. If you have interest in becoming an active EMS volunteer, we want to hear from you.

Since our society constitution permits no more than two consecutive terms, this will be my final term as president. I look forward to another productive year with EMS, and wish you all success in 2005.

Revisions to the Field of Interest Statement

At its August 1, 2004 meeting, the IEEE Engineering Management Society Board Governors (BoG) approved a revision to our Field of Interest Statement (FOI).

Why the change

The previous FOI statement was about a quarter of a century old, and was unclear to many. The revised FOI statement preserves all the relevant parts, and makes it shorter and clearer. It also includes strategic planning that was not explicitly stated in the old statement. The IEEE Technical Activities Board (TAB) unanimously approved the revisions, and many TAB members congratulated EMS for having done an excellent job of simplifying its FOI description without loss of substance. EMS members who have concerns about the new FOI statement are invited to communicate to any EMS officer about it.

Old EMS Field of Interest

The field of interest of the Society

encompasses the management sciences and technology applicable to individuals and organizations engaged in or overseeing the management of engineering or technology including: technology policy development, technology assessment, technology transfer, research, development, design, evaluation, production, commissioning, operation or decommissioning of technical, electrical or electronic equipment/systems, and allied activities. Areas of interest include: the management of engineers, scientists and technologists; their characteristics; effective laboratory or work environments; the process and economics of invention, innovation, and application of technology; relations between engineering and other functions in an organization; techniques for program/project management, including schedule and cost controls; the structure of engineering and technology driven organizations; and related subjects. Other important interests are training and education for, or transition to, the professional discipline

of engineering management, entrepreneurship and the socioeconomic impacts of engineering and technology management on society.

EMS Revised Field of Interest

The field of interest of the Society encompasses the management sciences applicable to individuals and organizations engaged in or overseeing the management of engineering and technology.

Scope: Topics of interest include but are not limited to: technology policy development, assessment, and transfer; strategic management and strategic planning; issues related to research, development, design, evaluation, production, and operations; innovation and entrepreneurship; program and project management; education and training related to engineering and technology management; transitioning to management; and the socioeconomic impact of engineering and technology management.

Transactions Announces New Department Editor

by George Farris, Editor-in-Chief

IEEE Transactions on Engineering Management is pleased to announce that Fariborz Damanpour is the new editor of the Technology and Innovation Department. He replaces Alden Bean, who had to resign due to family health problems. During the transition Professor Damanpour will conduct the reviews of all new manuscripts, while Professor Bean will conclude the reviews of manuscripts already under review. Manuscripts should be submitted to <http://tem-ieee.manuscriptcentral.com/>.

Fariborz Damanpour received his Ph.D. from the Wharton School of the University of Pennsylvania. He is Professor at the Department of Management and Global Business, Rutgers Business School – Newark and New Brunswick, Rutgers University. He served as the chairman of the department from 1996–2002. Prior to his academic career, he worked as an engineer, organizational development consultant, and manager of a start-up unit in a large organization.

His research interests are in the management of innovation and technology in organizations, and organization design and change. His papers have been published in several scholarly journals including the Academy of Management Journal, Administrative Science Quarterly, IEEE Transactions on Engineering management, Journal of Engineering Technology and Management, Journal of Management Studies, Organization Studies, Management Science, and Strategic Management Journal.

He received the 2000 Best Paper Award from the IEEE Transactions on Engineering Management, 2003

Best Paper Award from the Social Issues in Management Division of the Academy of Management, and

2004 Bright Ideas Award from the NJPRO Foundation and Stillman School of Business.

The IEEE Engineering Management Society's Annual International Engineering Management Conference



IEMC 2005

A Strategic View of Engineering and Technology Management



11 - 13 September 2005

Fairmont Hotel, St. John's, Newfoundland, Canada

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IEMC is the annual Conference of the IEEE Engineering Management Society

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IEMC2005 Co-Sponsors:

IEE Management Professional Network

IEEE Canada (Region 7)

IEEE Newfoundland and Labrador Section

Second Call for Papers



IEMC brings together engineering and management professionals, and academics from around the world. This year we are very pleased to be hosting IEMC05 in St. John's, Newfoundland, Canada. St. John's blend of old and new extends far beyond old world charm and modern, world-class facilities. The location of such engineering "firsts" as the first transatlantic cable and receipt of the first transatlantic wireless communication, it is particularly appropriate for an engineering management conference. St. John's is also the headquarters and nucleus of leading edge multi-billion dollar resource development projects in mining and offshore oil/gas. Non-stop flights from various cities in Canada, from London's Heathrow and from New York/Newark make St. John's very accessible.

We encourage attendance from engineers, managers, business and management consultants, academics and researchers. IEMC is a forum for the exchange of ideas, experience, theories, and knowledge between all persons involved in engineering management.

Topics for papers include

- Rebuilding from Devastation
- Environmental Management
- Supply Chain Management
- Quality Management Six-Sigma
- Building & Managing High Performance Teams
- Knowledge Management
- Technology/Innovation Management
- Managing "Mega-Projects"

All interested persons should submit one page abstracts (500-750 words) through the conference website at:

<http://www.iemc2005.org>

Conference hotel information can be found at:

<http://www.fairmont.com/newfoundland/>

Information on St. John's can be found at:

<http://www.stjohns.ca>

<http://www.gov.nf.ca/tourism>

Early Bird Registration: June 15, 2005
Other information can be found on the conference website:
<http://www.iemc2005.org> or email us at: info@iemc2005.org

Live Seminar via Internet have you organized one lately?

John Grefford, P.Eng.
Governor, EMS

There is nothing new with seminar via Internet. It has been around for more than a decade. Should you plan to put one together, read on.

A one day seminar on Intellectual Property, as outlined in your Fall 2004 IEEE EMS Newsletter was held in Ottawa on 26 Nov 2004. This seminar was offered to all IEEE EMS Chapters globally. The event content is described at

<http://ottawa.ieee.ca/ems/ipseminar.html>. Toronto and Montreal responded and offered the opportunity to participate to their members. Each were responsible to arrange for the site, food, notes and local fees to cover costs. Free access of the seminar delivery via Internet was offered to their members. A test of the RealPlayer software used at our Communication Research Center (CRC) location in Ottawa and the local internet access connections were conducted before the event. No problems emerged and a live TV signal was reproduced with excellent results.

Supply and Demand (Inverted Curves?)

The live audience fee at IEEE Ottawa was \$60 to cover the facility, food and reproduction of the notes (\$30 for students, retired or "in transition"). The Montreal Section members cost to participate was \$30 (\$15 for students). The Toronto Section offered their members the seminar at no charge to attend the broadcast in a University setting. The event was publicised by e-notice to all Section

members. Toronto has about 3,000 members, Ottawa 2,500 and Montreal 2,000. 60 members signed up in Ottawa, 30 members registered for the Montreal session.

Technical Challenges

A number of volunteers with different bandwidth access capabilities to the internet reported on the live feed. Those with less than a T1 bandwidth connection had sever problems. The facility of the CRC server was challenged to provide a clear picture and reliable connection. Voice reproduction degraded at "dial up" speed of 56 kb/s. Questions could be asked to the presenters via internet submissions.

Independent Comments and Spin

Here is a candid feedback from Eric Holdrinet at Centre Recherche Industriel Montreal:

Things went fine in Montreal. CRIM has a T1 connection on the net, which may have helped (I received on a 10Mbps line). The image was not of the highest quality but it was OK. Slides with text 24pt or larger was quite readable; some of Mrs. Breton's were more difficult for the media used and readability on printed handouts (6 slides per page). There were some sound interruptions of 1 to 3 seconds, 1 to 5 times per presentation, which was annoying but not a show-stopper. Attendees accepted the format limitations. Maybe we can test with other transmission tools (i.e. QuickTime instead of RealPlayer, other parameters changed, etc.) for future presentations.

This event was a great success, attendees

were positive about the quality of presentations and we had about 30 people - 1/3 of which IEEE members, 1/3 CRIM members, 1/3 NRC-IRAP clients (my personal audience...) This is quite good for a stand-alone event, one for which we haven't built a habit of attendance for part of the audience. Admittedly the price structure for videoconference was quite cheap. There is a potential to start a very good series of such events, originating in many IEEE Sections and with an audience in several of our cities.

Previously, the Ottawa EMS Chapter delivered five, full-day seminars on a variety of Management topics and four evening seminars. The day seminars received the better feedback. Their contents have been captured on video in addition to PowerPoint slides and notes with IP provided for IEEE member use. The presentations will be made available for IEEE EMS members to access via internet. The bandwidth compression to facilitate downloads especially for those with limited bandwidth access are being investigated. We are open to suggestions from other EMS Chapters who plan to offer such seminar via the internet. I urge and encourage everyone reading this report to support your EMS Chapter Chair to organize seminars. You may even wish to provide a presentation. Your peers are interested in your experiences and sharing theirs. Develop a seminar and Invite you Colleagues to it. This is a unique advantage that EMS membership provides you – a global network of associates that you can reach out to for information, career advice, and emotional support when things get tough.

THEME SECTION: Workplace Health and Wellness

Editors Note:

This issue of IEEE Engineering Management represents another stage in the growth of this publication to provide value to you, the EMS member. Two issues, annual-

ly, will focus on a topic of emerging and current interest to you, our valued EMS member. The focus of this issue is workplace health and wellness. The next theme issue will be Q3 (Fall, 2005). I invite you to

submit topics that feel would be of interest to your EMS colleagues for the theme of future issues. Perhaps you might even be interested in being a guest editor for an issue? – it's good for your resume.

Exercise and the Bottom Line

by Terrance Malkinson

The increasingly competitive work environment and multiple, often conflicting, demands on our time are taking its toll on the wellness of the human family. Stress, anxiety, fatigue, poor nutrition, and depression are reducing the quality of life for many. Many are facing a shortened life span as the body becomes fatigued and predisposed to illness. Many employees are working excessive hours and some are not even taking their annual vacations. Many are taking excessive and unnecessary medication. Some employers and managers do not understand the invisible drain and the substantial hidden business costs of productivity loss resulting from a poor workplace health and wellness policy.

The research is clear; by bringing balance to your life you proactively mitigate the damage caused by the complexities of our society. The research is also clear that those employees who take time for themselves and exercise regularly are able to perform at a much higher level – creativity, performance in teams, and effective use of time are but a few of the proven benefits.

Every person regardless of age, gender, occupation, state of health and genet-

ics requires some degree of physical activity. Engaging in physical activity and reaping the resulting benefits is an important factor for personal and career success. The research is clear – those who commit to regular exercise, a sensible diet, and healthy lifestyle have stamina, energy, positive self-image, and a sense of well-being. They will be successful in their journey through life.

As health care costs escalate, employers are finding it increasingly difficult to provide coverage as an employee benefit. More and more pressure is being put on the individual to be accountable for their own health and well-being. It is easy to create barriers and excuses – not enough time – too expensive – too difficult – no opportunities – lack of knowledge – fatigue – fear of failure – perception of being too old – embarrassment – a lack of willpower – why change a "comfortable" lifestyle.

Information provided in this theme issue is a broad overview of the issues related to workplace health and wellness. At the end we have provided a bibliography of references used and sources of further information. Many

of the articles are downloadable from the journal website, are available in libraries or available for purchase from the publisher. All are written by authorities in the field. There is a plethora of other books and websites that can also serve as sources of further information to you. Always assess the credentials of the author.

Always have a discussion with your physician prior to starting a fitness program. It is also a good idea to have a discussion with a strength and conditioning professional. Their training and experience will help you with setting appropriate and realistic training goals that will assist you in meeting your objectives. Testing can be used to determine your current level of fitness and provide you with a benchmark for evaluating your progress.

The Engineering Manager as a role model and having responsibility for productivity has a particularly important role in promoting workplace health and wellness. For a small investment of 30-40 minutes each day, you and those you supervise, will achieve an enriched lifestyle. Take the time. You will benefit enormously.

The Aging Body

by Terrance Malkinson

In the U.S. there has been a rapid population increase in the age category 35-54 yr. from 63M in 1990 to 83M in 2000. One in every three people in our society is a "baby boomer". Male individuals in the developed world can expect to live to 75.0 years and females 83.1 years. Due to better socioeconomic, nutrition, and medicine; quality of life in terms of health status, energy, vitality and physical function is excellent. Many adults are embracing a more active lifestyle and there is a considerable body of knowledge supporting a direct relationship among exercise,

quality of life, and longevity. As we age we must adjust our activity levels and accept the inevitability of decreasing strength, endurance, health and other abilities.

Anthropometry

Aging is associated with changes in the anthropometry of the body. Height increases until about age 25-29 and then begins to decrease slowly. Body weight increases until about age 40-45 and then slowly decreases. Body mass index peaks in males between the ages 45-49 and in women 60-70 years. As men and

women age there is an increase in body fat. Around age 35 the rate of bone formation begins to fail to keep pace with resorption causing bone to become more mineralized, brittle and subject to micro-fractures.

Cardiovascular Function

Cardiovascular wellness is dependent on the structure and function of the heart, the aorta, the arterial and the venous systems, as well as the chemistry and volume of blood. The most significant changes are those of decreased maximum heart rate and stroke work index. The heart cannot

achieve the maximum heart rate levels possible during youth. This is the basis of the formula $[\text{age in years} - 220]$ widely used for determining maximal heart rate. Exercise maximal heart rate therefore decreases with age and as well recovers slower after the exercise. Baroreceptors are not as responsive; meaning that rapid movement from lying to standing may result in dizziness, confusion, weakness or fainting.

Pulmonary Function

The pulmonary (respiratory) system acts as an exchange mechanism through which oxygen can enter the blood stream and carbon dioxide can be expelled. Most pulmonary volumes change very little with aging with the exception of forced vital capacity (the maximum amount of air that can be exhaled after a maximum inhalation), which declines as the body ages. Aging reduces the elasticity of the lung tissue and chest walls. Chest wall compliance decreases significantly with age.

Aerobic Capacity

Aerobic capacity is the ability of the cardiopulmonary system to deliver blood and oxygen to active muscles and the ability of these muscles to use oxygen and energy substrates to perform work during maximal physical activity. Aerobic capacity is determined by measuring the maximal oxygen uptake (VO₂ max) that may be achieved during exercise. This test is usually performed on a bicycle ergometer or treadmill. It is well documented that VO₂ declines with age and this occurs even in physically active individuals. The rate of decline is about 10% per decade. For physically active individuals the decline drops to about 5% per decade. The age related decline in VO₂ max is similar between males and females. It is important to note that older adults can achieve a 10–30% increase in VO₂ max with prolonged endurance exercise training.

Anaerobic Capacity

Anaerobic glycolysis is used to produce energy during exercise in the absence

of oxygen. Anaerobic capacity is important, as it is a determining factor in endurance performance. This is a short-term "energy" system in which stored energy in the form of glycogen is used, incurring an oxygen debt and producing lactic acid. Anaerobic capacity is generally measured indirectly by blood lactic acid levels. Lactic acid production and removal both decline with age.

Thermoregulation

Basal core temperature during resting and thermo-neutral conditions has been shown to decrease slightly with age and has a greater variability. Some investigators report decreased amplitudes and shorter periodicity in the circadian body temperature profile. Basal metabolic rate, which is related to basal heat production decreases 20% during age's 30–70 years primarily because of the loss of active muscle mass. This may be associated with a decreased capacity for shivering thermogenesis.

Muscular Strength and Endurance

Maximal muscular strength is achieved during young adulthood, plateau's until the mid 40's and then declines at a rate of about 5% per decade. The decline in muscular strength is not lost uniformly across all the muscles or types of movement. Function deteriorates less rapidly in the upper limbs.

Muscle mass declines with age. Muscle strength is closely related to the cross-sectional area of active muscle, irrespective of age. There is a decline in the number of muscle fibers. The quantity of muscle motor units decline with age so both contraction time and half-relaxation time are prolonged.

Muscular endurance is the capacity of the muscle to contract continuously at submaximal levels. Muscular endurance declines with aging but not to the same degree as the loss of muscular strength. Mechanisms limiting endurance performance are task dependent and include factors such as subject motivation, the pattern of muscle activation, the inten-

sity and duration of activity and the extent to which activity is sustained continuously.

Flexibility

There is a considerable loss in flexibility starting around 30 years. Decreased range of motion of joints and increased joint stiffness occur. The ability to bend down decreases. The range of movement of a joint depends on bone, muscle, and connective tissue structure and function. Other factors include pain and the ability to generate sufficient force. Aging causes a crystallization of the collagen fibers and increases the fiber's diameter, thereby decreasing extensibility. There are age associated skeletal changes such as degenerative joint disease and osteophyte formation.

Balance

Balance is the ability to maintain the body's position over its base of support, whether that base is stationary or moving. Aging leads to impaired balance with a decrease in event detection and speed of postural adjustment. Postural hypotension, resulting from shifts in body fluid volumes can lead to problems with both static and dynamic balance resulting in an increased tendency to fall.

Locomotion

Adult locomotion is a complex process requiring control at many levels. With aging the speed of walking slows, more so for women than men. In both cases this is the result of a shorter and broader stride distance more limited ankle movement and lower swing-to-stance time ratios. There is considerable evidence to suggest that individuals select a gait speed that is economical in terms of energy consumption. With age an individual is more cautious when crossing over obstacles, utilizing a slower crossing speed and a shorter step length. Their risk of tripping or falling while negotiating an obstacle is higher.

Response/Movement Speed

Response speed refers to the speed with which individuals can react to

environmental stimuli. A reduction in the response speed occurs with aging so that it may take longer to complete physical tasks. Reaction time is the interval between the onset of a stimulus to the initiation of a response. A very wide individual variation exists in reaction times at all ages. Movement speed – the speed at which an individual can move their digits and limbs decreases with age. Cataracts, macular degeneration, glau-

coma, near or far-sightedness are common visual challenges as people age resulting in difficulties with eye-hand coordination.

Cognitive/Emotional Functions

Cognitive refers to the functioning of the brain and in particular the operations used in the processing of information by the central nervous system. These include such things as

memory, attention, association, perception and problem solving. Not all aspects of cognition decline at a similar rate with advancing age. Actions that require a rapid and quick response and those that require focus and concentration decline whereas those that are automatic or can be performed at a self-paced rate continue to function well. The relationship between activity and cognition is highly task dependent.

The Workforce

by Terrance Malkinson

With the exception of physically demanding occupations chronological age is not a reliable index of an individual's ability to perform work. This is important as an increasing number of retirement age workers wish to remain working, either in the same job or in another career; part-time or full-time. In some cases it has become a human rights issue. In cases where mandatory retirement is abolished there is a need to develop reliable and valid indicators of work performance. The lengthening of the average human life span, the increasing percentage of elderly in the population, and the increasing cost of providing publicly funded health care, is driving the need for increased research on aging.

Weight Management

There is no question that being overweight is a serious health issue for many. This is not just isolated to North America but is increasingly becoming a global issue as fast-food replaces traditional diets. Physicians and scientists in general no longer use standards of "ideal weight". Today, the best measure of normal weight and body composition is Body Mass Index (BMI) defined as an individual's weight in kilograms divided by their height in meters squared. Published tables will assist you in interpreting the result. In adults, BMI strongly correlates with total body fat.

Overweight individuals are often discriminated against in the workplace

and excessive weight is often a negative evaluation factor in hiring, job assignments, and advancement. The evidence is overwhelming that there is a direct link between chronic disease and both physical inactivity and inappropriate diet. Exercise and good nutrition are the real performance enhancers. Start by informing yourself on what good nutrition involves. You may be shocked when you realize how much more you eat than your body really requires – and think of the money that you will save.

Back Pain

Research suggests that 60-80% of the population suffer from back pain at some point in their life. It is estimated that headaches, backpain, arthritis, and other muscle and joint pain cost US employers more than \$60B a year in lost productivity. Some are partially and others are permanently disabled. It is the most frequent cause of activity limitation for those under 45 years of age. Lower back pain is second only to the common cold as a reason for visits to the primary care physician. The etiology of back pain for many is the result of individual and occupational risks, which we can avoid by preventative measures. Prevention is possible through learning how to move effectively, creating an ergonomically designed worksite, and regular exercise that includes abdominal, side and back strengthening and flexibility activities. Core strengthening and stability classes using tech-

niques like Pilate's and Yoga are valuable preventative measures.

Business Travel

Many of us are required to travel nationally and internationally as part of our work. Travel related illnesses affect many. Common complaints include trauma, diarrhea, respiratory illness, and skin disorders. Crossing multiple time zones, motion sickness, and altitude illness also contribute to illness when travelling. Resynchronization of your body takes approximately one day for each time zone crossed. Guidelines for minimizing the negative effects of jet lag include:

- Do not allow distractions such as delayed flights, or standing in lines for long periods to cause unnecessary stress. Keep things in perspective. Take a book with you to read.
- Set to your watch to the local time at the destination as soon as you get on the plane. This will help you adjust your sleeping and eating patterns. Get as much sleep as possible.
- Get up and walk around the cabin every couple of hours. Simple stretching exercises can be performed while in the seat or in available aircraft spaces.
- Wear comfortable loose-fitting clothing on the plane. Avoid alcohol and drink lots of water as the plane's environment accelerates dehydration. Dehydration is a major contributing factor to jet lag. Eat only when hungry. Avoid overeating.

- Air travel usually means cramped conditions. Request seating where there is more legroom such as near the bulkheads or emergency exits.
- Ensure that you have the appropriate immunizations for your destination, and a small general medical kit con-

taining medications that you are familiar with.

Exercise and your Brain

Exercise impacts nearly every system in the body and the brain is no exception. Research shows that exercise enhances and protects brain func-

tion. A regular exercise program facilitates creativity and makes you a more effective employee. The research is clear, supporting the hypothesis that physically fit individuals are able to process cognitive information more effectively and that this continues regardless of age.

Fitness is about "The Numbers"

by Cory Fagan BPE(Hons), MSc
PeakPower Sport Development
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Information emerging from research, new technologies and materials science is playing an increasing role in health and wellness. This is facilitating the participants ability to not only move faster, higher and be stronger, but more importantly safer, reducing the risk of injury. Equipment that you wear, the surface upon which you impact, the training equipment that you use, and innovative monitoring devices all contribute to effective, efficient, and safe training. New knowledge allows you to satisfy the nutritional needs of your body.

Treadmills and bicycle trainers are available for improving your endurance. These range from basic machines to high technology trainers that incorporate sophisticated electronics, measuring, and display technologies. Inexpensive wireless heart rate monitors are available that accurately measure your heart rate continuously during exercise. Again, these range from a simple display of heart rate to very sophisticated technology that provides a wealth of information related to your workout including predicted maximal oxygen uptake, and energy consumption. Some incorporate GPS technology displaying rate and distance traveled. Electronic pedometers are available that measure distance walked. Handheld blood lactate testers provide accurate information on blood lactate levels during endurance exercise. Video analysis opens up opportunities to improve your performance.

Application of technology to your train-

ing should be seriously considered as you design your program. A simple but effective training room can be set up in your home for those who do not have access to, or wish to travel to a facility.

If you work as an engineer, computer consultant, geologist or in the finance industry, this article is for you. Many professionals who work with "numbers or data" make their living and key decisions based on hard facts. Quite often these people also lead busy lives that does not leave a lot of time for fitness or active living. The time they do have for working out is precious and needs to be maximized. What do you need to do? How do you stop junk training? What is the best bang for your buck?

You need to take your fitness and make a "numbers" decision. Determine what is the best Heart Rate for burning fat and losing weight. What is also the best Heart Rate for burning a tonne of calories and improving your heart and lung capabilities? You could buy a fitness book and try some of the formulas within it, but most people do not fit the "general population" training guidelines and then become frustrated. Do you actually have time to read about effective training? End result, your brief stint at fitness ends due to mediocre training and average results.

Think of your health and fitness as a business or engineering decision. You need some direct facts and numbers that are specific to you. Research the Internet or local university and

inquire about Metabolic –VO₂ testing. A VO₂ test will provide you with an in depth analysis of your health and subsequent plan of attack for your fitness. You will receive "the numbers" for fat-burning, high calorie burning, how to strengthen your heart and expand your lung volume. You'll also receive data on whether or not you need to do strength training for the bike or run. An array of facts will be printed out for you, which will then direct your training. Do you see the logic? If your brain likes the numbers, you'll love training with metabolic information and find it intriguing. A run or bike workout now has a specific focus, intensity and duration.

You'll need to buy a decent heart rate monitor which range from \$150-450 in order to use the metabolic-VO₂ data. Most of the new monitors download into a computer to provide you with even more data and numbers. You can then analyze your workout to see if you are in the correct zone! Heart rate monitors are also great for distracting you while you are working out which means you burn more calories and get even better results. A metabolic-VO₂ test will cost about \$125-150. This may sound a little expensive, but how much is your health worth to you? The individual data you will receive will make your training "black and white" without the guesswork and confusion. Remember that you do not have a lot time to waste, go get the numbers!

Use the numbers to improve.

Yoga

Michael Savill, and Nora Maskey
Ki Essentials Inc.
www.kiessentials.ca

Yoga originated in India many thousands of years ago. Yoga has been practiced for thousands of years, its roots steeped in Eastern Philosophy. The ancient Yogi's had an understanding of man's essential nature and of what he needs to live in harmony with himself and his environment. The word Yoga is loosely translated as "union" – it is a drawing together of heart, mind, and body that integrates all of the parts of ourselves into a unified whole.

Yoga refines the mind, using the body as its instrument, with self-realization as its ultimate goal. It is inextricably associated with the essence of our being – respect for life, truth, and patience. The practice of Yoga promotes physical stability, energy, flexibility, and relaxation while at the same time improving concentration, balance, and tranquility. The teachings of Yoga are based on an intricate and precise understanding of the healthy functioning of the human body and mind.

Although there are many books and videos it is best to learn Yoga with a qualified instructor. Each instructor has something unique to offer. In North America, an estimated sixteen million people engage in the practice and participation is growing for children, women, and men.

There are many different styles of Yoga. There is a style suitable for everyone. In the West Hatha Yoga is the most popular. Hatha is a Sanskrit combination of the word "ha" (sun) and "tha" (moon). Today's Hatha Yoga postures are less than one hundred years old and can be traced to Tirumalai Krishnamacharya a South Indian man born in 1888. Yoga poses have been documented as far back as the 13th century.

Stamina is gained by stretching and strengthening the body in the various Yoga physical postures (asanas), while

calmness is achieved with consistent rhythmic breathing. Yoga postures stretch, extend and flex the spine. Joints and muscles are exercised in a way that makes the body supple and strong. Breath control quiets the emotions, calms the mind, and brings you in touch with yourself at a deep level. Yoga improves overall health and flexibility in a balanced way in both body and mind.

The guiding principles of Yoga were first codified and recorded about 2000 years ago. C.E. Patanjali is considered the father of modern Yoga. He described the eight aspects of a Yogic lifestyle. These eight limbs are practical guides to a person's personal development to achieve the harmony of the mind, the body and the spirit which leads to Samadhi or enlightenment. The eight limbs of Yoga include:

- Yama - Virtues that govern our relationships with others.
- Niyama - Observances that govern our relationship with ourself.
- Asana - Postures of Yoga poses. These are designed to free mind and body from tension and stress.
- Pranayama - Rhythmic control of the breath.
- Pratyahara - Inward focus and immersion in your pose.
- Dharana - Focused concentration.
- Dhyana - Meditation, withdrawing the consciousness into the soul.
- Samadhi - Enlightenment is the ultimate goal of the eight limbs of Yoga. It is characterized by a state of ecstasy and the feeling that you and the universe are one. It is a state of peace and completion, awareness and compassion.

Many mistake Yoga as being a religion. It is not. It is your own personal journey toward physical and mental strength; improving your understanding of your capabilities and allowing you to fully achieve your personal and professional potential.

Yoga is increasingly seen by the west as an important component of a healthy lifestyle. There is a style for everyone and you benefit right from your first experience. Yoga is beneficial for physical and mental health. It develops a sense of self-reliance and assurance. Human resource trainers view Yoga and similar practices as having value as the techniques and philosophy facilitate decision-making.

Athletic trainers increasingly see the practice of Yoga as an important tool for high performance athletics. Scientific studies have documented the medical benefits of Yoga. Yoga is continuously evolving to meet the needs of participants. Yoga is an entire system with its own set of moral codes, breathing disciplines and meditation techniques that will enrich your life. You learn and grow.

Men also participate in Yoga classes to achieve a healthier body and mind helping them meet life's increasing demands. Weight training combined with Yoga is a good program design. Yoga adds flexibility, the ability to focus and decreases the effect of stress to the strength and muscle toning one gets from weight training. It will improve concentration, and contribute to weight loss and redistribution of fat. Yoga can also help develop the body-mind coordination which is a vital part of a person's health and general well-being. The practice of Yoga can also lessen the risk for age related illnesses

Anyone can practice Yoga. You don't need any special equipment, clothing, or lessons; all you need is the will to pursue a healthier and happier lifestyle. The Yoga Postures and Asanas exercise every part of your body.

Yoga is but one of many non-traditional ways that can be used to improve your health and wellness and

add variety to your program. Some others include:

- Pilates – strengthens, lengthens, and tones core and postural muscles building alignment, stability, and mobility in your spine, shoulders, and hips.
- Martial Arts – develops your mind power to acquire a calm spirit and enhance mental focus. Emphasizes motion and the dynamics of movement teaching self-control, concentration, and commitment.

- Plyometrics – Plyometric exercise involves activities that improve a muscles ability to reach maximal force in the shortest possible time. This power is the combination of strength and speed. Using Plyometric techniques increase the power of subsequent movements by using both the natural elastic components of muscle and tendon and the stretch reflex.

New technologies and computerization of the workplace has led to a massive increase in repetitive strain

injuries. Increasingly we are finding evidence that poor posture is resulting in chronic injury. By practicing these techniques periodically during the day you will lessen your risk for injury.

There is a wide range of sports and fitness pursuits available to suite all levels of participation, your goals, and personality. Check out your local educational providers and choose something that you feel that you might enjoy. Your choice is an individual one – you will find a good match.

Training Guidelines

by Terrance Malkinson

As a manager you know that when feedback is provided in an appropriate manner performance improves. Well-educated and certified trainers can design programs custom-made to meet each participants level and goals. A good book to start with is the [ACSM Fitness Book](#) published by Human Kinetics. This is a well-written easily understood introductory book written by the fitness experts from the American College of Sports Medicine. A second highly recommended text is [Essentials of Strength Training and Conditioning](#) also published by Human Kinetics. There are four main categories of exercise that comprise a balanced training program:

Pre- and Post Exercise Stretching

A pre-exercise warm-up and post-exercise cool-down with an emphasis on stretching is an often-neglected component of a well-designed training program. This prepares you for your exercise session; decreasing the risk of injury, speeding recovery, and reducing post-exercise soreness. The warm-up period generally consists of two components. A period of 10-15 minutes of increased activity comprised of slow jogging, or riding a stationary bike. This increases your heart and respiratory rate, blood flow, deep muscle temperature, and lubricates your joints. A period of 10-15 minutes of activity or sport-specific stretches follows.

Endurance

Endurance building activities focus on cardiovascular exercise – those that increase your breathing and heart rates. This results in improved stamina and is commonly called aerobic endurance training, improving your body's ability to meet the energy demands of exercise by increasing your ability to use oxygen. Increasing your ability to use oxygen requires a training program of running, cycling and swimming. 2-3 sessions per week at your heart rate target zone for a minimum of 30 minutes is suggested.

Strength

As we age our muscles become smaller and weaker. Strengthening exercises build and restore muscles – giving us the capacity to do more. Strengthening is accomplished through resistance using free-weights and machine exercises. All of these exercises require correctness of body and limb position, movement range and speed and method of breathing. It is essential to use proper technique and you are advised to learn this through instruction by a qualified professional. If you do not, you will likely not receive the benefits and will risk injury. You will also receive advice on the design of a strength training program suitable to your current level of fitness, that matches your time available, and that will achieve the results that you are looking for. Resistance training

should be progressive, individualized and provide a stimulus to all muscle groups. To gain muscular strength training must be within the range of 60-100% of the one maximal repetition. Three sets of 8-10 repetitions of each movement – 2-3 sessions per week is suggested.

Flexibility

Flexibility is defined as the range of motion available to a joint or series of joints. Stretching optimizes mobility and improves function. If done properly, stretching increases flexibility and this translates into reduced risk of injury. Should be performed a minimum of 4-5 days/week. In reality it is something that you can do anytime you have a few minutes. Include both static and dynamic stretches involving all muscle groups moving from an easy stretch where you feel a mild tension to a controlled developmental stretch, avoiding the stretch reflex. Stretching exercises increase tendon flexibility through mechano-receptor mediated reflex inhibition and viscoelastic strain.

A personal trainer can assist you in your program design and setting attainable goals in addition to teaching proper technique. Ensure that your provider has the scientific training and experience. Ensure that they are certified by a recognized organization.

Adventurism

by Terrance Malkinson

Adventure isn't hanging on a rope on the side of a mountain.

Adventure is an attitude that we must apply to the day-to-day obstacles of life - facing new challenges, seizing new opportunities, testing our resources against the unknown and, in the process, discovering our own unique potential.

John Amatt, 1995

A growing number of middle-aged adults have the time, health, and discretionary income to participate in wilderness adventure experiential learning experiences. Adventure wilderness experiences are seen as a valuable and unique professional development method for executives, managers, and employees. Many corporations utilize such growth experiences for developing the skills of their staff particularly with regard to self-awareness, risk-taking, team-building, and leadership. Recent issues with regard to the ethical conduct of business reinforce the importance of bringing the philosophy of the wilderness to the place of work.

Regular exercise, a sensible diet, and healthy lifestyles are major contributing factors for success in business. This is particularly so as you advance in your career because of the stamina and energy required to fulfill demanding

responsibilities. Many are re-examining their life and embracing a more active and balanced approach. They are getting in touch with their core values and basic beliefs, exploring spirituality, building ethical wisdom, enjoying the moment, and stretching themselves to achieve their own personal Everest's. Some upon introspection are experiencing the realization that winning at work may mean losing at life.

Globalization and the necessity of environmental sustainability, requires that the Engineering Manager have an increased understanding of the importance of establishing new relationships with the natural environment and learning from the aboriginal and ancient cultures. There is a spiritual satisfaction in the reward emanating from physically and emotionally challenging experiences.

There is a strong case for each of us to schedule regular career breaks. Some enlightened employers are providing "sabbaticals" as an employment benefit. They have benefited enormously from this re-energizing investment in their employees. Many of us are taking a gap-year between jobs – and why not? We are all mortal. Take the time early in your life while you have the health and energy to pursue your own personal Everest.

Leave the cell phone and e-mail behind.

Your fellow adventures may in many cases be informal or formal community and business leaders and people of influence with the government and business policy and decision-makers. As mature adults many have achieved substantial accomplishments prior to their adventure experience. As the adventure continues you will share experiences and learn. All are engaging in the experience because they are highly motivated, willing to invest the time and take the risk. These individuals also may have a role in increasing global understanding among the people of the world and making it a better and more peaceful place in a way congruent with the values and philosophy of the outdoors.

Two well-recognized providers of such programs include Outward Bound (www.outwardbound.com) and the National Outdoor Leadership School (www.nols.edu). Check out their websites, and take the jump. You will never regret it. You will grow; developing self-awareness, confidence, communication skills, teamwork, leadership, assessing options, goalsetting, and taking risks. New and unexpected personal strengths and qualities will emerge. You will surprise yourself with what you are capable of doing.

Concluding Remarks

by Terrance Malkinson

The growth of fitness centers and improvement in exercise equipment facilitates increased awareness and ability to achieve wellness by anyone at any age. Well-trained kinesiology graduates, and physicians specializing in exercise medicine means that the most effective and scientifically based training programs can be designed for anyone who has the motivation to improve their health.

The information provided in this theme issue represents a broad-overview of knowledge based on the "average" individual. Individual varia-

tions and circumstances have a significant effect on the body's basal levels and response to physical activity. The reader is advised to consult with their physician and/or sports medicine specialist for a professional opinion. The reader is also advised to consult with the published literature in sports medicine and exercise physiology and critically evaluate the information located therein. Always consult with your medical care providers before engaging in an exercise program. For the beginner and the experienced; expert advice on designing your program is always advisable.

The research and experience is clear, workplace health and wellness is important. As engineering managers we have a responsibility to ensure that we ourselves and those we supervise are able to perform well. Working longer and harder is not necessary productive. Achieving balance will facilitate happiness and productivity.

Engage your mind, body and spirit in everything that you do. The return on this investment may not be measurable financially – rather it is measured in currency that is more important – a well lived life.

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Board of Governors Meeting, January 29-30, 2005

by Celia Desmond

Summary of BoG Caucus Meeting, January 29, 2005

The EMS BOG is concerned with the need to generate new revenue. Current revenue sources are not covering the full expense of supporting the Society. Overhead and operating costs are increasing. The primary source of income for the society is memberships followed by revenue from our publications and conferences. The meeting started out with reports from four working groups who have been developing proposed solutions over the past six months. Ideas proposed included:

- Offering tutorials by experienced facilitators, both live and electronically to our members, working directly and through our Chapters.
- Market the EMS Society through conferences and meetings of other organizations.
- Present talks on technical management at meetings of other organizations, communicating our field of interest, the value of membership, and products/services we offer.
- Establish a certification program, with recognized certification providers.
- Establish an EMBOK (Engineering Management Body of Knowledge)
- Provide assistance to new and established engineers in areas in which they need help – technical writing, mentorship, success in the global workforce, business models and opportunities in the developing economies.
- Look into possible further cost con-

tainment, such as more frequent, smaller regional conferences rather than one large one.

- Working jointly with other small IEEE Societies to gain economies of scale.
- Develop case studies in technology management. These would be offered directly or online to educational providers, students, and a variety of other groups as an educational and career development product/service.

In the afternoon, results of the morning presentations were discussed and critically evaluated. Possibilities were reduced to two projects to be further developed and implemented as a valued product to our members and to facilitate growth in membership.

- Develop a series of one-day workshops that will meet current and urgent needs of our members. These workshops would have the flexibility to be offered in a variety of ways to best meet the career growth of our members. Subjects would include topics that are not currently being addressed in the marketplace – information that you do not find in the books, information based on “real world” experiences.
- Develop and offer case studies. Once again, these would reflect “real world” practical experiences that we are all facing as we journey through our careers. These would be offered initially to our members, and educational providers. This revenue generating project has a low

start-up cost, is scalable, and has a high growth potential. The cases would focus on areas not currently being met in the marketplace and provide a unique niche for your Engineering Management Society and value to the members.

BOG members volunteered to work on developing each of these proposals further. It was emphasized that quality and implementation "as soon as possible" is of utmost importance. Should you be interested in working with either of these two groups please contact us. EMS is your society and member involvement in an activity and level of your choice is important to us.

In the membership presentation, Celia Desmond, VP Membership presented information about EMS membership. She also presented the major directions from the IEEE Membership focus, including building a relationship with and subsequent services and product offerings targeted to industry, changing the title of Associate to Associate Member, offering free Society membership to graduate students, and extending IEEE offerings to interested industry professionals, such as healthcare or IT professionals. Celia proposed a motion to hold a Chapter Chairs workshop in conjunction with the July BOG, to allow networking of the Chapter Chairs amongst themselves and with the BOG, and to allow the BOG members to present information in IEEE, EMS and programs to the Chapter Chairs.

Chor Tan from ASME addressed the Board providing information and answering questions on their Engineering Management Certification program. Surveys reveal that engineers are interested in the certification. They are building an EMC-BOK with 8 domains, 49 knowledge areas, 170 sub-knowledge areas. The domains include: Market Research, Planning Strategies, Developing Products, Operations, Finance, Marketing and Sales, Team Leaders, Other issues. They see benefits for industry – global recognition, standardization measure for skills. There are enormous benefits for the engineers, including portable credentials, prestige, competitive edge, continuing professional development. There are two levels of certification. They have developed courses to assist in preparing for the exam, on-line as self study, on-line instructor led, and in person. Four universities have agreed that they will grant credits to people who have achieved the certification towards their Master's degrees.

Leslie Martinovich, Chapter Chair from Austin presented a proposal to the Board for hosting and organizing IEMC - 2007. Your BOG was very pleased with the completeness of her presentation.

Tariq Duranli presented the report be the Strategic Planning Committee. He has prepared the full report for the Society Review Committee as the EMS will be reviewed at the February meeting of TAB. Reviews of all of the IEEE societies occur every five years.

He requested that the BOG approve a bylaw to make the SPC a standing committee of the BOG, and that the BOG accept their proposed charter.

Joe Bellefeuille, VP Conferences, presented the conference report. IEMC 2004 in Singapore was a success with 320 participations. IEMC 2005 in Newfoundland is under development. Assistance is needed from everyone to help to bring in good papers, and attendees. Two venues have been proposed for 2006 – Bahia, Brazil and Eindhoven, Netherlands.

Summary of highlights from EMS BOG Meeting, January 30, 2005
The Board approved a slate of candidates for your consideration for election to the BOG.

The Board selected Austin Texas as the site for the 2007 conference. The BOG was sincerely appreciative of the earlier presentation of Leslie Marti-

novich, Chapter Chair from Austin. The BOG selected Bahia, Brazil as the site of the 2006 conference.

The Board approved the expenditure of up to \$15K to establish the first series of educational seminars as recommended in the caucus for new revenue generation.

The Board also agreed to hold a Chapter Chairs workshop in conjunction with the BOG meeting in 2005, and to support Chapter Chairs to attend this, up to \$500 per chapter, with receipts.

Treasurer Lou Luceri presented the current financial status of expenditures.

The Board agreed to hold the July meeting in Quebec City, Canada. Board of Governor meetings are open to all of the members. Should your plans permit please feel free to attend as an observer.

Please feel free to contact any members of your Board of Governors. Email addresses are provided on the back of the newsletter. We govern for you, the member, and we want to provide the best value possible for your membership.

Chapter News

EMS Seminar on New Product Development in Munich

by Gerald Anleitner

On November 27, 2004, the German Chapter of the IEEE EMS provided a seminar about "New Product Development" in Munich. The seminar was well accepted with fifteen participants from various industries out of the Munich area. The seminar discussed aspects of product development from different viewpoints.

In the first talk, Dr. Axel Richter (Steag HamaTech AG) presented the approach towards product development from a process view and discussed the influence of corporate cul-

ture on the process of product development. Highly acclaimed was his notion of the "boss bypass" as a general short-cut disturbing the development process and disturbing the necessary elements of a positive innovation culture like motivated employees, free space for innovation, flexible structures and tolerance towards failure.

In the second talk, Dirk Weidemann (Cap Gemini Deutschland GmbH) talked about development lifecycles in industry automation. He discussed the aspects of product planning, support, maintenance and enhancement of the respective product. In his summary, he underlined that key factors include

competence within the development team on a long-term basis, standards for sustainable products to be up-to-date in the market on a long term basis and finally the availability of accepted processes to ensure a safe product development process.

After a short coffee break, Andreas Beu from User Interface Design GmbH presented his view on the topic of product development focusing on design issues that arise while working in the early stages of product development. Early, "touchable" prototypes thus are a very necessary part of the development process to be able to find any flaws in the design and correct any errors as early as possible.

Finally, the notion of prototyping picked up in the final talk by Daniel Moses (Hilf! GmbH). In a number of case studies, Mr. Moses gave answers from the field of extreme programming which would have helped to avoid the problems. Even though many of the case studies provided a quick laugh on first sight, the consequences of the presented problems and flaws show the immense difficulty in product design within complex systems and demanding time constraints.

After the final lecture, the participants sat together for lunch and had the opportunity to further discuss the different aspects of product design and development.

Dallas Chapter: *by Bob Bishop*

January, 2005 - Planning meeting at Technology Alliance of Dallas. Accelerating High-Tech Entrepreneurship, UTD, with Elevator Pitch Contest, Business Plan Competition, many gems on how to do things right, as

well as what to avoid!

February, 2005 - Dr. Larry Chasteen, Stephen F. Austin College: History and Future of Engineering Management- The EMS has recently celebrated its 50th Birthday. The roots of EMS began at MIT in 1950, with Dr. Al Rubenstein, and then spread to Northwestern University. Dr. Chasteen reviewed the early history of EMS and why it is important to engineers today.

Future Presentations include:

- Ms. Valerie Warm-Pelan, Integrated Focus, Inc: How to be a Manager with Emotional Intelligence.
- Mr. Rusty Cone, President, Alliance Systems: Being the Best! Giving Structure for the Entrepreneur.
- Mr. C.J. Comu, Chairman/CEO, Humitech, Humidity Control Systems to Reduce Energy Costs.

Singapore Chapter *by M Xie*

The Singapore chapter of IEEE Engineering Management Society

has been active in organizing international conferences. IEMC2004 followed up the success of IEMC1995 and ICMIT2000. Another event is being planned. In 2003, the core committee members of EMS Singapore chapter, decided to launch a new journal called International Journal on Innovation and Technology Management. This journal is aimed at developing and promoting the fields of innovation and technology management by providing a platform for reporting, sharing as well as the exchange of ideas, research findings, industry best practice and trends in the selected fields. World Scientific Publisher agreed to publish this and HK Tang (ehktang@ntu.edu.sg) the past Chair of Chapter and General Chair of IEMC2004 became the Editor-in-Chief. One volume of four issues has already been published. Interested contributors could check out the publisher's website (<http://www.worldscinet.com/ijitm.html>) for more information. The first issue of the journal is free.

**Build Better Balance
Become Injury Free
Lose Weight Effectively
A Renewed Foundation
Adventures That Last a Lifetime
Set Smart Goals
Surge
Faster Fun
Get the Edge
Go the Distance**

Board of Governors

Your Board serves the interests of the Society and promotes Excellence in Engineering Management. The EMS Board needs your input to help determine if the Society meets your needs. Please contact any Board member for additional information, for expressing opinions, or raising issues that need to be addressed by the Society.

Irving Engelson, President
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