



# EMEASEC 2014

27 - 30 October 2014

Cape Town, South Africa

## *Systems Engineering: Exploring New Horizons*

### PROGRAMME DIRECTORY



The 9th Biennial EMEASEC 2014 hosted by the INCOSE South Africa Chapter

# CONFERENCE 2014 THEME

The theme of the Conference, **Systems Engineering: Exploring New Horizons**, is inspired by the Millennium Project commissioned by the United Nations Secretary General in 2002 to develop a concrete action plan to address key global challenges such as poverty, hunger and disease facing humanity across the globe. The conference applies Systems Thinking and Systems Engineering theory, principles, processes and tools to the 15 global challenges identified by the Millennium Project. Papers, presentations and tutorials on Engineered Systems, Natural Systems and Social Systems are presented in the following sub-themes:



- Sustainable Development and Climate Change
- Science and Technology
- Global Convergence of IT
- Energy
- Health Issues
- Peace and Conflict
- Transnational Organized Crime
- Systems Engineering Education
- Systems Engineering Principles, Processes and Standards

## CONFERENCE 2014 SPONSORS

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AFRICAN AGENDA

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# INCOSE MISSION

## Overview

The International Council on Systems Engineering (INCOSE) is a not-for-profit membership organization founded to develop and disseminate the interdisciplinary principles and practices that enable the realization of successful systems.

## Mission Statement

Share, promote and advance the best of systems engineering from across the globe for the benefit of humanity and the planet.

## Vision

The world's authority on Systems Engineering.

## Goals

To provide a focal point for dissemination of systems engineering knowledge.

To promote international collaboration in systems engineering practice, education, and research.

To assure the establishment of competitive, scaleable professional standards in the practice of systems engineering.

To improve the professional status of all persons engaged in the practice of systems engineering.

To encourage governmental and industrial support for research and educational programs that will improve the systems engineering process and its practice.

# INCOSE 5-YEAR OBJECTIVES

## **Growth**

INCOSE doubles its membership and embraces the healthcare, mobility, and energy business sectors.

## **Alliances**

INCOSE amplifies its ability to achieve its mission through diverse alliances.

## **Education**

INCOSE curricular recommendations are widely adopted around the world, raising the quality of engineering education.

## **Products**

INCOSE produces and brokers the most impactful systems engineering forums in the world.

## **Forums**

INCOSE produces and supports the most impactful systems engineering forums in the world.

## **Competency**

INCOSE teams with industry to raise systems engineering competency across their supply chains.

## **Transformation**

INCOSE accelerates the transformation of systems engineering to a model-based discipline.

# WELCOME BY THE INCOSE EMEA SECTOR DIRECTOR

As Director of the Europe, Middle East and Africa (EMEA) Sector of the International Council on Systems Engineering (INCOSE), I take pleasure in welcoming you to EMEASEC 2014, our Sector's flagship Systems Engineering Conference of 2014.

This conference succeeds the EuSEC (European Systems Engineering Conference) and is being held for the first time outside Europe. It has multiple challenges which make it even more attractive. Those challenges are:



**Jean-Claude Roussel**

- As the main event of EMEA sector in 2014, we do expect a wide participation in volume as well as diversity (19 countries are today part of EMEA Sector) from EMEA sector, but also from the Americas and Asia & Oceania sectors and we fully realize the difficulties to attend the conference in the face of travel costs and budgetary pressures in companies and organizations.
- This is our first INCOSE conference at EMEA Sector level in Africa, a huge continent where INCOSE is not yet very present even if South Africa is today a very active and mature Chapter in INCOSE. We expect in a short term to extend our activities through the creation of new chapters in North Africa such as the recently announced Tunisian startup Chapter, and Nigeria in Central Africa where an INCOSE point-of-contact has already been established. Others will follow in the rest of Africa and also in the Middle East where some startup Chapters have been identified in the past few years.

- The theme of the conference, application of Systems Thinking and Systems Engineering to the 15 global challenges facing Humanity gives a new dimension to Systems Engineering. This is fully in line with the major objective of INCOSE which is to extend the scope of Systems Engineering beyond the classical Aerospace and Defense domain where Systems Engineering was born. The recent initiative in the Healthcare domain is a perfect example, and there are others with Energy, Transportation and Societal problems as clearly mentioned in the INCOSE Systems Engineering Vision 2025 released this summer at IS 2014. We will particularly focus on those new domains in EMEASEC 2014.

I would like to thank my predecessor Asmus Pandikow for having strongly supported this event, René Oosthuizen as Project Leader for initiating and leading the Conference, the EMEASEC 2014 Project Team for their impressive task to make it happen, and finally the INCOSE South Africa Chapter and its President Braam Greeff for hosting this event in Cape Town.

I wish you a fruitful conference and exchanges during those days, and don't forget to enjoy South Africa's curiosities and hospitality if, like me, you are just discovering this wonderful country.

**Jean-Claude Roussel**



# WELCOME BY THE INCOSE SOUTH AFRICA CHAPTER PRESIDENT

You are part of a historic event, the first international Systems Engineering conference on the African continent – the 9<sup>th</sup> Biennial EMEA Sector Systems Engineering Conference hosted by the South African Chapter.

Welcome to Cape Town, one of the many scenic jewels of our country, a region where you will experience typical South African hospitality, warm and sincere, from all the cultural communities living in the region.

The South African Chapter has, since its inception, grown from strength to strength into an active chapter as the result of the support from a diverse active membership. With an initial chapter membership base, mostly practicing SE in the defence and aerospace domains, the South African Chapter has since grown into a chapter with a diverse chapter membership demographic, active in various non-defence industry sectors.

South Africa, as a developing country, is often referred to as one of the social laboratories of the world, with 11 cultures living and working side-by-side. The many opportunities, and challenges experienced in our country and the wider Africa need a fresh approach towards exploiting and solving them for the good of society.

New horizons need to be explored to overcome current challenges – hence the inspiration for the theme of this conference. New systems approaches to address humanity's challenges such as poverty, hunger, disease and economic growth need to be developed. The



**Braam Greeff**

African continent, as the cradle of humankind, could well be the place to plant the seed for a more holistic systems approach towards addressing society's challenges.

This conference could provide that opportunity to plant the seeds for a fresh approach and launch a new debate on how to solve societal problems.

Enjoy our South African hospitality, cultures, cuisine and wine; we are here to ensure that your time with us is a memorable and creative experience – to ensure your speedy return to our shores.

**Braam Greeff**

# WELCOME BY THE EMEASEC 2014 CONFERENCE CHAIR

The EMEASEC 2014 journey has been a long and fulfilling experience. I recall sharing an idea with INCOSE board members in July 2009 at IS2009 in Singapore – the possibility of hosting a regional conference, the erstwhile European Systems Engineering Conference (EuSEC), at the southern tip of Africa was a mere glimmer in the eye.



**René Oosthuizen**

The dream transformed into a vivid concept and firm objective in May 2010, when I mooted the idea of a conference theme focusing on real wicked problems such as hunger, disease and poverty during a lively debate with INCOSE President, Samantha Brown, on an after-dinner bus trip in Stockholm, Sweden. We were on our way to the hotel from the City Hall, venue of the Noble Prize banquet ceremony, where the EuSEC2010 welcoming function was hosted.

The concept crystallized into reality when the South Africa Chapter bid to host the regional INCOSE systems engineering conference in South Africa was accepted. In the spirit of addressing wicked problems, the conference theme, *Systems Engineering: Exploring New Horizons*, aptly expands the engineered systems domain to embrace social systems and natural systems. The 15 Global Challenges facing Humanity formulated by the United Nations-funded Millennium Project were adopted as framework for inviting submissions.

EMEASEC 2014 proudly brings the latest developments and offerings of systems thinking and systems engineering to the African continent, thereby expanding the presence of INCOSE into new territory and supporting its mission “*Share, promote and advance the best of systems engineering from across the globe for the benefit of humanity and the planet*”.

The conference has a focus on youth outreach, because therein lies the future. To this end the offering includes a feature on innovation at school level, as well as a systems engineering training roundtable to discuss tertiary level Systems Engineering Education in South Africa. We thank the INCOSE Board and other INCOSE leaders, as well as leaders from the South African academia and industry for facilitating and participating in this event.

We are grateful to our sponsors and exhibitors for their contributions toward making the conference an affordable event and complementing the conference proceedings with the display of their services and products. We are hugely indebted to our guest speakers and authors of the impressive line-up of conference papers, tutorials and the panel discussion.

Above all, we thank our delegates and their sponsoring organizations who, despite travel costs and budgetary pressures, have supported the conference – without you there would be no conference. It is our wish that you will find value in the conference and also take the time to savour and enjoy some of the beauty and hospitality South Africa has to offer. The quality of the technical programme and the level of participation achieved by EMEASEC 2014 pave the road for higher goals – it should provide inspiration for hosting an INCOSE International Symposium on the African continent. Alta Pete!

Last, but not least, I take this opportunity to extend my sincere gratitude to the project team and the distinguished review panel, as well as other volunteers who generously contributed, for their time and efforts to bring this challenging project to fruition. It was a privilege and an honour to serve you and INCOSE.

**René Oosthuizen**

# WELCOME BY THE TECHNICAL CHAIR

I am delighted to welcome you to the inaugural EMEA Sector conference, EMEASEC 2014. Not only is this the first time that the conference name reflects the whole EMEA Region of INCOSE, but it also is the first time that such a large systems engineering conference is held on the African continent.



**Jörg Lalk**

Having received almost 100 paper and tutorial submissions we selected 56 papers and 6 tutorials spread over four parallel tracks and over three days. Although the conference focuses on the EMEA Region of INCOSE we received submissions from many other INCOSE regions, this being testimony of the attraction of not only EMEASEC 2014 but also of the Cape of Good Hope, one of the most popular holiday destinations in the world.

I believe that those papers and tutorials selected for the conference represent some of the best work in systems engineering today. It was incredibly difficult having to turn down some excellent submissions simply because the programme could only accommodate so many. In selecting these I was supported by some 42 reviewers, all of whom volunteered their valuable time to ensure that we can offer you a high quality conference. I cannot thank these individuals enough, especially those who by far exceeded what one would see as a fair number of submissions to review.

The topic of the conference is based on the United Nation's Fifteen Global Challenges Facing Humanity. Of these we managed to include papers into the programme covering seven challenges; *Sustainable Development and Climate Change, Science and Technology, Global Convergence of IT, Energy, Health Issues, Peace and Conflict, and Transnational Organized*

*Crime*. We also included two topics that are always of interest to both practicing systems engineers and academics; *Systems Engineering Education*, and *Systems Engineering Principles, Processes and Standards*. Both of these spill-over into a forum where invited representatives from academia and industry address issues pertaining to systems engineering education. We also offer the opportunity to sit for a Trial CSEP Exam on the soon to be released Version 4.0 update of the INCOSE Systems Engineering Handbook. Those who pass the exam can apply for INCOSE SEP certification. To add further value we included a panel discussion on the Water/Energy Nexus, a relevant topic in today's world of energy and water shortages.

Each year a World Design Capital is selected; the World Design Capital for 2014 is Cape Town. For a city to be chosen it needs to demonstrate its recognition of design as a tool for social, cultural and economic development. In this the city is hosting some 460 design projects. As our topic for EMEASEC 2014 happens to be closely aligned with these goals I think that you are attending a truly memorable conference!

EMEASEC 2014 offers you an Opening and Closing Keynote for each of the three days, six keynotes in all! We trust that you will find these keynote addresses intriguing and interesting. Two of these add some local flavour to EMEASEC 2014; do not miss the keynote on systems engineering and wine at the end of the first day and the keynote on the San people at the end of the second day!

I trust that you will find the three days of the conference challenging and valuable. Please enjoy the programme and do not forget to experience some of what South Africa has to offer! It is for good reasons that the tourism industry refers to South Africa as a “world in one country”.

**Jörg Lalk**

# GENERAL INFORMATION

## Safety Guidelines for Visitors

South Africa has a high crime rate but visitors can be quite safe by observing a few simple guidelines.

- Be vigilant. Call the police (**on 10111 or on 112 from a mobile phone**) at the first sign of danger.
- Beware of pick-pockets or persons unofficially offering various services (such as carrying luggage).
- Keep valuables on your person when flying. Plastic-wrap luggage intended for the aircraft hold as a safe-guard. Facilities are available at the various airports.
- Store valuables in your hotel or guest-house safe. Be diligent with personal and financial information.
- Do not visibly display expensive jewellery, large amounts of cash and other expensive items, especially items that may identify you as a tourist.
- Do not carry large amounts of money. Use ATMs in busy areas and decline any assistance from “good Samaritans”.
- When paying for meals at restaurants, the waiter should bring the credit card machine to your table.
- Where possible, move around in groups rather than alone.
- Visit townships only in guided tours.
- After dark:
  - Avoid deserted and dark areas.
  - Do not walk about in quiet areas.
- When travelling by car:
  - Keep doors locked and windows closed, especially when driving in cities.

- Ignore and disregard strangers and beggars that may come up to your car.
- Do not leave any valuables in plain sight.
- Ensure you have enough fuel when travelling long distances.
- Use up-to-date maps or GPS. Consult your guesthouse or hotel concierge for best route information.
- Be aware of mini-bus taxis as these regularly disobey traffic rules and may drive on road shoulders and even skip intersections.
- Refrain from offering road-side assistance to seemingly distressed vehicles and persons.
- In rural areas, watch out for farm and wild animals on the roads, especially at night.



# ADVICE TO FOREIGN VISITORS TO SOUTH AFRICA

by Robert Halligan

Advice to Foreign Visitors to South Africa by Robert Halligan. South Africa, officially the Republic of South Africa, is an amazing, modern, technology-savvy country way better than some of the negative images portrayed in the western press. Located at the southern tip of Africa, its beautiful coastline stretches along the South Atlantic and Indian oceans. To the north lie the neighbouring countries of Namibia, Botswana and Zimbabwe; to the east are Mozambique and Swaziland; and within South Africa lies Lesotho, an enclave surrounded by South African territory. South Africa, with close to 53 million people, is the world's 24th most populous nation.

South Africa is a multi-ethnic society encompassing a wide variety of cultures, languages, and religions. Its pluralistic makeup is reflected in the constitution's recognition of 11 official languages, which is among the highest number of any country in the world. Two of these languages are of European origin: English and Afrikaans, the latter originating from Dutch and serving as the first language of most white and coloured South Africans. Though English is commonly used in public and commercial life, English is only the fourth most-spoken first language.

About 80 percent of South Africans are of black African ancestry, divided among a variety of ethnic groups speaking different indigenous languages, nine of which have official status. The remaining population consists of Africa's largest communities of European, Asian, and multiracial ancestry. All ethnic and linguistic groups have political representation in the country's constitutional democracy, which comprises a parliamentary republic and nine provinces. Since the end of apartheid, South Africa's unique multicultural character has become integral to its national identity, as signified by the Rainbow Nation concept. South Africa is ranked as an upper-middle income economy by the World Bank, and is considered to be a newly industrialised country. Its economy is the largest and most developed in Africa, and is the 28th-

largest in the world. South Africa hosts one of the biggest and most successful Chapters of INCOSE.

Acknowledgement: <http://creativecommons.org/licenses/by-sa/3.0/>

## **About Cape Town**

Cape Town - beyond description. From lavish and luxurious to back-packing on a budget, Cape Town has something wondrous for everyone. From the landmark beaches of Clifton and Camps Bay to the vibrant V&A Waterfront and Cape Town city centre - time spent in Cape Town will not be forgotten. Cape Town is the quintessential melting pot: it is a city alive with creativity, colour, sounds and tastes.

While walking through the city's streets and meeting its people, you will join those in awe of its natural beauty, creative freedom and incredible spirit. Cape Town is a city where the unexpected is always just around the corner.

Cape Town, with 3.8 million people, is the second largest city in South Africa, after Johannesburg. Cape Town is the provincial capital of the Western Cape. As the seat of the National Parliament, it is also the legislative capital of the country.

Cape Town is the hub of the dynamic Western Cape Branch of the South African Chapter of INCOSE, frequent events being conducted in Cape Town itself and in the region around Stellenbosch.

## **About Somerset West**

Somerset West is situated in the Hottentots Holland area, about a 30 minute drive from Cape Town along the N2 motorway.

Close to Stellenbosch, this residential centre has a delightful setting and many of Somerset West's residents commute to Cape Town daily. Somerset West was named after an English governor of the Cape Colony during the 1800s, Lord Charles Henry Somerset, with the suffix 'West' being added to differentiate it from Somerset East, another South African town in the Eastern Cape.

Somerset West lies within easy reach of several beaches bordering the

Atlantic Ocean and lying within False Bay. The nearest, the beach at Strand, approximately 6 km from the centre of the town, is popular with families and holidaymakers.

Somerset West is home to the wine farm, Vergelegen, an impressive 18th century farmhouse built in Cape Dutch style. The farm is now owned by a subsidiary of the large mining company Anglo American, who have restored the farmhouse to its original magnificence and continue to produce some of South Africa's best wines there.

## **About the Stellenbosch Region**

Stellenbosch, about 15 minutes by car from Somerset West, is the second-oldest and undoubtedly the most scenically attractive and historically preserved town in southern Africa. The name conjures up images as few other towns or cities can. History is reflected in the neo-Dutch, and modern-Victorian architecture that encompasses simple lines, fine detail and elegant proportions that bear witness to a proud and dignified heritage. Set snugly against the foothills of majestic mountains, a more idyllic setting is difficult to imagine. The unsurpassed scenery, with views over vineyards, mountains and orchards, offers excellent photographic opportunities.

Oak-lined streets, where jagged lines of trees etched against white walls transform the streets of Stellenbosch into soft, shady tunnels, offer welcome relief from the warm sun. A stroll along the streets and secluded lanes, mingling with the locals at an open-air coffee shop or bistro, or titillating your taste buds with fine local fare or international cuisine at one of the many restaurants and eateries, are a few of the many pleasures of Stellenbosch. In an atmosphere where art, music, theatre, outdoor living and adventure reigns, what more could anyone want?

A small-town atmosphere and leisurely lifestyle surrounded by nature's bounty characterise Stellenbosch, yet Stellenbosch is no more than half an hour's drive from the cosmopolitan buzz of Cape Town. And endless stretches of pristine white beach are within 15 minutes' drive.

The town's academic history has its roots in the early nineteenth century

when the forerunner of today's internationally renowned centre for education, the Stellenbosch University, was established. South Africa's first undergraduate Winter School on Systems Engineering took place at this university in June 2013.

Stellenbosch is a centre for 'clean' industry and is a sought-after location for business, ranging from entrepreneurs to major international companies, many of which have their head office in the Town of Oaks.

The mild weather and unique terroir are ideal for wine-growing and the region has amassed many international awards over the years. The first Wine Route was established in 1971 and comprised 17 cellars; today the Stellenbosch American Express® Wine Routes boasts more than 200 members. Brandy, one of South Africa's finest products, is distilled in many cellars throughout these winelands.

## **Some Practical Stuff:**

### **Anyone for a Show?**

Cape Town is a vibrant centre in South Africa for music and theatre, with world-class productions commonplace. Significant venues include The Fugard Theatre in District Six, Theatre in the District, Alexander Bar Upstairs Theatre, Richard's Supper Stage, Theatre on the Bay, the Baxter Theatre, Jou Ma Se Comedy Club, The Artscape Theatre, Villa Pascal Theatre, The Maynard Open-Air Theatre, and, near Somerset West, The Barnyard Theatre. Somerset West itself boasts the Playhouse Theatre.

### **Arriving at Johannesburg International Airport**

You may arrive in South Africa at the OR Tambo International Airport, Johannesburg. This airport is very well served by many international airlines, including Air China, Air France, Alitalia, Austrian Airlines, British Airways, Cathay Pacific, Emirates, Etihad Airways, Iberia, Lufthansa, Qantas, Qatar Airways, Saudi Arabian Airlines, Singapore Airlines, South African Airways, Swiss, TAP-Air Portugal, Thai Airways, Turkish Airlines and Virgin Atlantic.

The OR Tambo International Airport is large, modern and efficient. Upon arrival, most visitors will take the “Other Passports” lane towards the right hand side of Immigration. The queue can sometimes appear very long, but clears very quickly. There are frequent, economic flights between Johannesburg and Cape Town, on South African Airways and British Airways, together with low cost carriers.

## **Arriving at Cape Town International Airport**

Cape Town airport offers an excellent entry point to South Africa, as well as being within 20 minutes by motorway of the Conference venue. This airport is served by many international airlines, including Air France, Alitalia, Austrian Airlines, British Airways, Comair-Delta, Lufthansa, South African Airways, Swiss, Turkish Airlines and Virgin Atlantic.

Like OR Tambo International Airport (Johannesburg), clearing immigration and customs in Cape Town is straight forward and quick.

## **Buying Airline Tickets**

Tickets to and from South Africa can be easily purchased online via the usual booking engines. The cheapest fares for flights within South Africa may be obtained on the domestic airlines’ websites, however, consider any need to allow time to recheck baggage at your point of entry if transferring to a domestic flight on another airline.

## **Cell-phone Connection**

SIM card prepaid starter kits are available for around R1. You will need a passport and a proof of residential address and your service has to be registered before you can call or receive calls. If you visit a Vodacom or MTN store on arrival at the airport with your passport and drivers licence, you can be connected on the spot. Have the seller demonstrate that you can make calls with your newly purchased service. You can buy credit for prepaid phone services just about everywhere.

## **Currency**

South Africa’s currency is the rand, which offers visitors great value for money. The rand comes in a range of coins (R1 = 100 cents) and note

denominations of R10, R20, R50, R100 and R200. As at 3 March, 2014, 1 EUR = 14.83 rand, 1 USD = 10.77 rand.

## **Departing South Africa by Air**

Security and immigration on departure at South African airports generally take 5-20 minutes. An allowance of 30 minutes is suggested, to be safe.

Security of baggage at South African airports has improved considerably over recent years. But some theft still occurs - stolen items include anything from electronic devices to designer perfumes. Assume that any obviously valuable object in your checked bags may be stolen, and pack accordingly.

A service to wrap luggage in cling-wrap film is available at major airports. Use this service if you must include valuables in your checked luggage. You may also cable-tie the zip fasteners to deter easy access to the contents of luggage.

## **Disability**

There are facilities for disabled people, although fewer than in many parts of Europe or the United States. Major hotels will have facilities for disabled people. When renting a vehicle, discuss special needs and parking dispensations with the rental car company.

## **Driving in South Africa**

It is compulsory to carry your driving license with you at all times in South Africa. If your driver's licence is in any of South Africa's 11 official languages (e.g. English) and it contains a photo and your signature integrated into the licence document, then it is legally acceptable as a valid driver's licence in South Africa.

## **Otherwise you may need an International Driver's License.**

Road traffic in South Africa (and its neighbouring countries) drives on the left. South Africa has an extensive road infrastructure including national highways and secondary roads. Speed limits are 120km/h on highways,

100km/h on secondary roads, and 60km/h in urban areas. Roads in the Cape Town/Somerset West area are all of a high standard of surface and signage.

Driving in South Africa is generally easy compared to driving in many countries, the main unusual feature being the propensity of some drivers to travel at very low speeds on national highways (and elsewhere). Be careful to avoid rear-end collisions! Keep left, pass right. A special kind of intersection is the “four way stop” where the car that stops first has right of way.

As you would do in any other country, always be alert when driving. The safest way is to drive defensively and assume that the other driver is about to do something stupid / dangerous / illegal. You may well be right!

The wearing of seat belts is compulsory. The front seat occupants of a car are required to wear seat belts while traveling. For your own safety, it is recommended that those in the rear seats do so as well. Should you find yourself waiting at a red traffic light late at night in an area where you do not feel safe, you could (illegally) cross over the red light after first carefully checking that there is no other traffic. If you receive a fine due to a camera at the traffic light, you can sometimes have it waived by writing a letter to the traffic department or court explaining that you crossed safely and on purpose, due to security reasons.

The fact remains that, for whatever reason, you have broken the law. Do not make a habit of this!

When stopped at a traffic light at night, always leave enough room between your car and the car in front of you so you can get around them. It is a hijacking manoeuvre to box your car in. This is relatively prevalent in the suburbs of Johannesburg.

Law enforcement (speed and other violations) is usually done by portable or stationary radar or laser cameras. In general, the police are reasonably honest, and they do respond to politeness and deference to their authority. Not speeding is a safe policy, in more ways than one!

Road tolls are being introduced in cities in South Africa - check with your rental car company as you rent.

## Electricity

The South African electricity supply is 220/230 volts AC 50 Hz. Mains power outlets are mostly to a standard rare in the rest of the world; see the graphic.

Power adaptors may be bought on arrival at OR Tambo International Airport (Johannesburg) or Cape Town International Airport, or in advance at <http://www.amazon.com/Grounded-Adapter-Africa-Ireland>.



Accommodation providers may provide adaptors, but it would be unwise to rely on them doing so unless you check in advance.

## Entry Requirements

For visa requirements, contact your nearest South African diplomatic mission. South Africa requires a valid yellow fever certificate from all foreign visitors and citizens over one year of age travelling from an infected area or having been in transit through infected areas. Infected areas include Zambia and Angola in southern Africa.

## Health

South Africa has been well known for its medical skill since Professor Christiaan Barnard performed the first successful human heart transplant in 1967. There are many world-class private hospitals and medical centres around the country, such as those of the Netcare Group, especially in urban areas.

State hospitals can also offer excellent care, among them Groote Schuur Hospital in Cape Town. Seek advice from your accommodation provider or Conference organisers if you need medical attention.



## **Hotels and Guest Houses**

Hotels in South Africa are usually very comfortable and well-priced. Most hotels have a parking lot which is gated and guarded 24 hours. If you are well-dressed and appear respectable, the guard on duty will usually take your word that you are a guest (and if your appearance does arouse suspicion, showing your room keycard or your reservation will be sufficient).

Guest houses often provide outstanding accommodation and a cultural experience, at very reasonable rates. A guest house is either a converted house or manor, etc. adapted to accommodate overnight guests, or it may be a purpose-built facility. A guest house is run as a commercial operation and is often owner-managed. A guest house has areas that are for the exclusive use of the guest. The owner/manager either lives off-site, or in a separate area within the property.

## **Measurements**

All measurements use the metric system; distances on road signs are in kilometers (1.6 km =1 mi) and fuel is sold by the litre (3.8 litres=1 U.S. gallon).

## **Parking a Car**

For all street parking, and with some unmanned car parks, you will normally get someone coming to you and offering to “Watch your car, boss?” Some will be paid security staff, some won’t be. Annoying as it may be, it is best to go along with it, paying ZAR2 to ZAR5 when you return to your car. Make sure you keep coins for this purpose.

**Never under any circumstances leave valuables in the car, including the boot (trunk).**

## **Refuelling a Car**

Fuel stations are full service, with lead free petrol, lead replacement petrol and diesel available. Pump attendants will offer to wash your windscreen and check oil and water in addition to just filling up the car.

It is usual to tip the attendant approximately ZAR5. Most fuel stations are open 24 hours a day.

## **Religion**

About 80% of South Africa's population is Christian. Other major religious groups include Hindus, Muslims, Jews and Buddhists. Places of worship are easily accessible from the Conference location. Ask your accommodation provider, search the web, or check with Conference organisers.

## **Renting a Car**

Renting a car in South Africa is easy. Rental costs can range anywhere from US\$15 per day and upwards of US\$200 per day depending on the car group, location and availability. Some major rental agencies are First Car Rental, Avis, Hertz, Budget Car Hire, Europcar, Tempest Car Hire, Thrifty Car Rental, and Dollar Rent A Car. The car rental agencies maintain branches around South Africa, including smaller towns and game reserves and national parks. Rental for pick-up and return to Cape Town International Airport is a breeze!

Most rental fleets in South Africa have largely manual transmission vehicles; vehicles with automatic transmission are more limited and tend to be more expensive.

## **Restaurants**

South Africa is a culinary paradise, no more so than in the Somerset West/Stellenbosch area. High to outstanding standards of food, wine and service are the norm, at amazingly low prices by international comparison.

## **Security in General**

Use common sense and take basic safety precautions. Keep valuables locked away and don't wear expensive watches or jewellery, flash expensive cameras, or walk in deserted or visibly low-income areas. Do not accept offers from friendly strangers. Taking an evening stroll or walking to venues after dark can be perfectly OK, or very risky. If in

doubt, ask your accommodation provider or Conference organisers for safety guidelines.

## **Security When Driving**

Most visitors to South Africa have no problems whatsoever regarding security when driving in the country. But, the threat from criminal elements is higher than in, say, Oslo or Munich.

So it's best not to tempt fate. Do not leave your anything significant, especially valuables, in plain sight, even when driving in your car, as "smash and grab" attacks do sometimes occur at intersections. Don't have bags visible on the passenger seat or the rear seat, or even on the floors. The same applies, but even more so, when parking your car. Normally keep your car doors locked, and windows closed. Keep an eye out via your mirrors - maintain awareness. Know where to go so that you avoid getting lost or needing a map. GPS can be included in your car rental and can help considerably with navigation. If someone does try to take possessions or even your car, the guidance is to give it to them without a struggle or aggression.

In the cities/towns, you will often get people coming up to your car, trying to sell you anything from fruit to clothes hangers to small electronics and cleaning materials. Official guidance is not to buy from them (it's also illegal).

If you break down, it is not advisable to get out of your car on the shoulder of the road. You're probably safer inside the car with doors locked. Consensus is to pull over as far as you can, put your emergency indicators on, and wait inside the car, with the doors locked, and ring the police on 112 on your mobile. Or ring the conference organisers or your hotel. If it's a tow-truck you need, ring directory enquiries on your mobile, or the number provided by your car rental company – normally in the glove box of your car (called a "cubby-hole" in SA), or on your key ring.

## **Smoking**

Smoking is banned in all enclosed public spaces; these include airports,

pubs, shopping malls and theatres. But there are usually designated areas where people can smoke. Under-18s may not enter a designated smoking area or buy cigarettes.

## **Taxis**

You can hire a pre-booked taxi service or a chauffeur driver from the various service providers in the industry. These are fairly safe and reliable, especially if they have an active online presence and have received reviews from reputable sources. The safety of taxi services in South Africa has improved enormously in recent years, and using a hotel-endorsed on-demand taxi service will be ok. Otherwise, caution is recommended.

## **Tipping**

As a rough guide, 10% is expected in restaurants.

## **Travelling Between Somerset West and Downtown Cape Town**

Travelling by car between Somerset West and Cape Town is a breeze, except when the traffic is heavy (week day mornings into Cape Town, evenings in the other direction). A thirty minute drive can become two hours!

## **Travelling With Children**

Most places welcome children and many establishments have special facilities such as family rooms or children's entertainment programmes. Enquire about these when you book.

## **Using an ATM**

Automated Teller Machines (ATMs), linked to all major international networks, are available throughout the country and will generally dispense money in a mixture of denominations between R200 and R10, with about 80% of the value requested being high value notes and the rest in smaller denominations. You can use all major credit and debit cards at the ATMs. South African bank ATMs do not charge any fees above those levied by your own financial institution.

It is best to use only ATMs that are inside a mall or other building. Always be careful to make sure no one is watching you enter your PIN, and be vigilant about scams (e.g. machines that seem to eat your card and won't give it back after you enter the PIN). Do not accept help from strangers when withdrawing money at an ATM. If you are approached and offered unwanted help, rather cancel the transaction immediately and go to a different ATM.

VISA and MasterCard are accepted almost everywhere. American Express and Diners Club are also accepted, but not as widely.

Most retail stores accept credit cards and PIN based debit cards as payment. It is best to notify your bank in advance of your travel plans, to avoid rejection of charges.

## **Water**

In urban areas such as Cape Town and Somerset West, tap water is of high quality and safe to drink. It's quite safe to have ice in drinks and to eat salads. However, when travelling to remote rural areas and the bush you should take your own drinking water along or buy bottled water.

## **Wi-Fi on the Run**

Internet Cafes are plentiful around South Africa, and access rates are cheap. Even cheaper and more mobile would be to buy a prepaid cell phone starter pack (less than ZAR10) and access the Internet with GPRS or 3G.

For a really good and flexible connection, consider buying at the airport a pocket Wi-Fi dongle from MSN or Vodacom. The SIM card that you get with the dongle will have a phone number - just like your cell-phone.

When you buy and register a data package, the network is simply made aware that your phone number has xMB of data available. You then select the Wi-Fi dongle SSID from your computer, and enter the supplied password. Have the seller demonstrate that you can connect to the internet with your newly purchased service. It can take a few minutes for registration to take effect.

# SOCIAL EVENTS

## Welcoming Function

The welcoming function on **Monday evening 27 October 2014** is complemented by a wine tasting sponsored by several prominent wine estates, which represent several wine regions in the country and were hand-picked to present to delegates some of the finest wines on offer in South Africa.

Each delegate will receive a complimentary wine glass with EMEASEC 2014 branding for the wine tasting and as a future reminder of the event and the fine wines savoured.

Participating estates are:

- Arendsig, Robertson
- Beaumont, Botrivier
- De Krans, Calitzdorp
- Diemersdal, Durbanville
- Flagstone, Somerset West
- Lanzerac, Stellenbosch
- Le Riche, Stellenbosch
- Springfield, Robertson
- Sumaridge, Hemel & Aarde
- Thelema, Stellenbosch
- Wildekrans, Botrivier

## Conference Function

In keeping with the homely atmosphere of the conference, the conference function on **Tuesday evening 28 October 2014** will take the form of a traditional South African braai.

# SPONSORS

## Platinum



The Graduate School of Technology Management (GSTM) at the University of Pretoria is the first graduate school of its kind in South Africa and also the largest in Africa. The GSTM offers internationally recognised postgraduate programmes at honours, masters and doctoral level. The masters degree programmes allow for domain specialisation to address specific industry needs. Programmes and research activities relate to the disciplines of technology, engineering and project management for practising engineers and scientists. The School maintains strong links with industry and government and has also developed a good research network with local and international researchers. A portfolio of continuous education offerings also ensure that the latest knowledge reaches the broader market.

**Visit: [www.up.ac.za/gstm](http://www.up.ac.za/gstm)**

## Gold



**ESTEQ is:**

- a family of companies dedicated to driving success through innovation during the entire Product Lifecycle.
- passionate about creating an environment in which to develop and grow people to their full potential and to invest in, develop, and grow technology based companies. ESTEQ PLM and ESTEQ Engineering are subsidiaries of ESTEQ Group.
- focussed on supplying the Virtual Product Development (VPD) requirements of local and global manufacturers, technology companies, research institutions, and universities.



**Silver**

AFIS is an affiliate member of **the International Council on Systems Engineering (INCOSE)** and thanks to a protocol signed in 1999 it is its official representative in France. **Constituted in 1999** by 13 big French corporations, AFIS is a non-profit organization. Today, it consists of big corporations, small and middle-sized enterprises, teaching and research establishments including individual members.

#### **In 2014 AFIS gathers:**

- 40 companies members or education and research members
- 500 individuals members

#### **AFIS Main objectives**

**To promote Systems Engineering** via the presentation and the explanation of its principles as well as its multi-disciplinary approach aiming at successful systems and equipment achievement.

#### **Technical activities**

The AFIS Technical Committees are coordinated by the Technical Management. They offer to the members the opportunity to compare their own experience and to work as a network on various topics:

- Training and skills
- Safety, Validation, Systems support
- Global Processes
- Human Factors
- Systems of Systems and Services – Architecting and Engineering
- SE research and innovation
- Systems Engineering management
- Model Based System Engineering

**AFIS draws up and disseminates technical sheets and handbooks, organize Technical Days, the Academic / Industry Conference and Forum, and the RobAFIS competition.**

**Visit: [www.afis.fr](http://www.afis.fr)**



The South African Agency for Science and Technology Advancement (SAASTA) is a business unit of the National Research Foundation (NRF) which aims to advance awareness, appreciation and engagement of science, engineering and technology in South Africa. Among other projects, SAASTA manages and implements outreach and awareness programmes funded by the Department of Science and Technology (DST), such as the Nanotechnology Public Engagement Programme (NPEP) and Hydrogen Public Awareness and Demonstration Platform (HYSA PADP).

The Nanotechnology Public Engagement Programme was launched in 2008. The programme was born out of the government's National Nanotechnology Strategy (NNS). The main objectives of NPEP are to promote public understanding of nanotechnology and facilitate engagement with the new emerging scientific discipline. NPEP also assists in the translation of academic research in nanotechnology for the public, industry and the policy makers, being a service to these diverse groups of stakeholders.

The Hydrogen South Africa Public Awareness and Demonstration Platform aims to create broad awareness, visibility and acceptance amongst public, stakeholders, entrepreneurs and key decision makers in South Africa about the benefits and challenges of using Hydrogen and Fuel Cell Technology in the alternate energy industry. The platform further aims to introduce this field of expertise to the youth of South Africa in order to stimulate an interest in the field by showcasing cutting-edge research and profiling current and future careers this sector has on offer.

PO Box 1758, Pretoria 0001, South Africa  
Tel: (012) 392 9300, Fax: (012) 320 7803, Int. Code: +27 12  
[info@saasta.ac.za](mailto:info@saasta.ac.za)

**Visit: [www.saasta.ac.za](http://www.saasta.ac.za)**

## Silver



The CSIR (Council for Scientific and Industrial Research) is one of the leading R&D, technology and innovation institutions in Africa, with a track record spanning close to 70 years. The CSIR undertakes scientific research and technological development in areas identified as national priorities. These are the natural environment, safety and security, health, the built environment, energy and industry development. Delivering its contribution across the research and innovation value chain, and with the objective to achieve evident impact, the CSIR strives for excellence in all its endeavours in order to increase the global competitiveness of industry and the quality of life of people in South Africa - as well as in the region through collaborative partnerships.

**Visit: [www.csir.co.za](http://www.csir.co.za) or contact us at 012 841 2000.**

## Bronze



Project Performance International (PPI) has earned a worldwide reputation for providing training of the highest quality, in the major disciplines necessary to achieve successful project outcomes, in all sectors.

We work with clients of all sizes (e.g. Fortune 100 companies to small start-up companies). Consider joining the ever-growing cadre of quality PPI clients.

### **Our most popular topics:**

- Systems Engineering
- Requirements Analysis and Specification Writing

- Engineering Management
- OCD & CONOPS in Capability Development
- Software Engineering
- Human Systems Integration

**Visit: [www.ppi-int.com](http://www.ppi-int.com)**



The Wits Transnet Centre of Systems Engineering (TCSE) is a significant, value-adding and trusted partner, continuously successfully addressing and resolving significant challenges, across techno-disciplinary and organizational boundaries in a harmonized, integrated fashion to provide solutions, as well as developing a feeder stream of highly qualified and contributing engineers and related staff towards empowering South African corporates to pursue and succeed in their strategic goals of economic growth, sustainability and upliftment of the country in general.

### **TCSE core activities centre on:**

- Training and education
- Research
- Projects
- Enterprise development and
- SE advocacy through

Co-operating and work-shopping with Transnet leadership , identifying, undertaking and coordinating fundamental and applied research and development in areas of importance, fostering and improving graduate and post-graduate education and human capacity in SE and other relevant disciplines, be the “one stop shop” through which the transfer of knowledge and expertise is enabled via local and overseas channels with industry, HEI’s and research organizations and developing technology advancement for Transnet into the future.



DENEL DYNAMICS

Denel Dynamics, a division of Denel SOC Ltd, is an innovative leader in advanced systems technology. Its core business includes tactical missiles, precision guided weapons, unmanned aerial vehicle systems, integrated systems and space solutions. Our products are designed, developed and manufactured in South Africa. Denel Dynamics is a strategic partner of the South African National Defence Force. The company also promotes collaboration and partnerships with other developing nations such as Brazil and the United Arab Emirates. Denel Dynamics' products are also in service with other defence forces in Africa, the Middle East, Europe, Asia and South America. As South Africa's top engineering intellectuals work for Denel Dynamics, local and international partnerships with educational institutions have been established to create exciting opportunities in the fields of maths, science, engineering and technology. Quality skills transfer, mentoring and bursaries are of key importance to enable retention of South Africa's pool of talent while transforming our business and people. Our aim is to build upon our world-class expertise and continue creating intellectual property which will sustain our growth as innovative technology leaders. The true character of the business of Denel Dynamics is advanced technological prowess and the evolution of innovative ideas into high-quality, reliable and robust products and systems for end-users.

**Bronze**



Blue Stallion Technologies was founded in 2001 to import, distribute and support technical, scientific and business software in the Southern African market. It is our objective to identify the best-of-breed software solutions available internationally and to offer it to local users, backed by training, support and consulting services.

## **Our product range includes:**

### **Wolfram Mathematica - analytics and interactive reporting**

Visualize and model your data using built-in machine learning, Statistics, Control Systems, etc. The latest version also includes GIS features.

### **Wolfram System Modeler – multi domain modeling**

Using drag-and-drop from the large selection of built-in and expandable modeling libraries, you can build industrial strength, multidomain models of your complete system

### **Anylogic - Simulation Modeling**

The only tool offering integration between Discrete Event, Systems dynamics and Agent based simulation modeling. Applications range from logistics, to manufacturing and transport

### **Expert Choice – Decision Support**

The original AHP tool for group decision making and resource allocation.

Please visit exhibition stand during the conference and attend our presentation on Tuesday 28<sup>th</sup> October at 9H40 as part of the INCOSE Initiatives track

Details: Tel: 011 4479916, [info@bluestallion.co.za](mailto:info@bluestallion.co.za)

**Visit: [www.bluestallion.co.za](http://www.bluestallion.co.za)**

## **Bronze**



At IBM Southern and Central Africa, we strive to lead in the creation, development and manufacture of the industry's most advanced information technologies, including computer systems, software, networking systems, storage devices and microelectronics. And our worldwide network of IBM solutions and services professionals translates these advanced technologies into business value for our customers.

For answers to general questions about IBM from within South Africa, call 0861 999 111; from outside South Africa, call 27 11 302-9111.

## Other



De Krans Wine Cellar is situated along the upper reaches of the picturesque Gamka River Valley near Calitzdorp. The history of the farm dates back to 1890, when it was bought by the Nel family. Since 1985, most of the classic Portuguese port and wine varieties have been planted. De Krans is widely known as one of the leading port producers, as well as one of the most innovative cellars in South Africa. De Krans was the first in South Africa to produce a Touriga Nacional as a dry red wine, made the first Pink Port, as well as the first perlé Moscato wine in South Africa. De Krans has recently been awarded for its innovation, winning the Most Innovative Wine Award for the De Krans Espresso at the Michelangelo International Wine Awards.

Tel: +27 44 2133 314, Fax: +27 44 2133 562

Visit: [www.dekrans.co.za](http://www.dekrans.co.za)

## Other



Established in 1994 as a Systems Engineering consultancy company, Monzé specializes in capability management, systems engineering and project management on major acquisition programmes, and the application of modelling and simulation for acquisition decision support. Based in Pretoria, South Africa, its customer base includes Armscor and the CSIR.

Tel: +27 82 808 3334

E-Mail: [monze@mweb.co.za](mailto:monze@mweb.co.za)

## Other



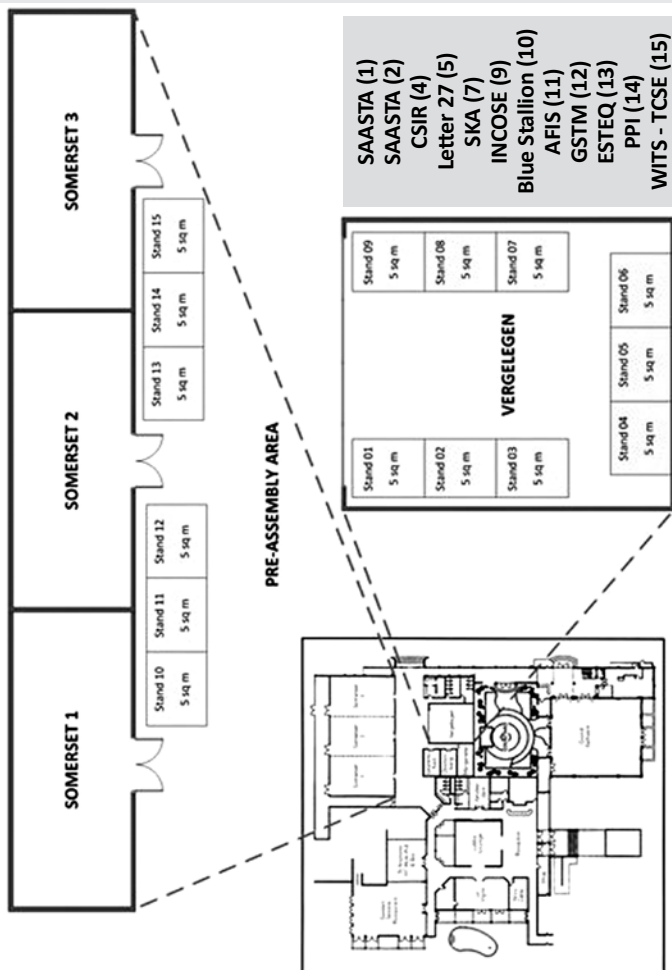
Distell was created in 2000 by the merger of Stellenbosch Farmers' Winery (SFW) and Distillers Corporation. SFW has long been a major force in the wine industry in South Africa. This company was the brainchild of William Charles Winshaw, an American medical doctor who came to South Africa in 1900 at the time of the Anglo Boer War. In 1925, SFW was created with Winshaw remaining as the MD of the organisation until 1962 when, at the age of 92, he retired. SFW, as the name implies, excelled at producing quality wines for the full spectrum of consumer needs. This company was also instrumental in the creation of a major new segment in our alcoholic beverage industry - ciders or alcoholic fruit beverages as we know them. One of the company's key strengths has always been innovation.

Distillers Corporation, the brainchild of South African business giant, Dr Anton Rupert, was registered as a corporation in 1945. Distillers expanded energetically and very quickly set up marketing relationships and partnerships in the wine and spirits industry. Soon this company also became a major producer, focusing on distillates and in particular on the brandy market that it developed from relative obscurity to its current level of prominence. It is renowned for its Bergkelder concept, a marketing innovation that invited wine estates to make use of Distillers' bottling, sales and marketing expertise. In addition, it created a new African icon, Amarula Cream, which today is one of the top-selling cream liqueurs in the world.

In the ensuing years, both SFW and Distillers effectively managed wine and spirits growth in South Africa, despite a restrictive business climate. The successes of both companies contributed largely towards the development of the liquor industry into a major force in the South African economy. In so doing, the companies became major creators of employment opportunities and wealth in South Africa. These two companies joined forces to form the Distell Group, a move that would benefit the industry as a whole through its rationalisation, refocusing and effective pooling of resources.

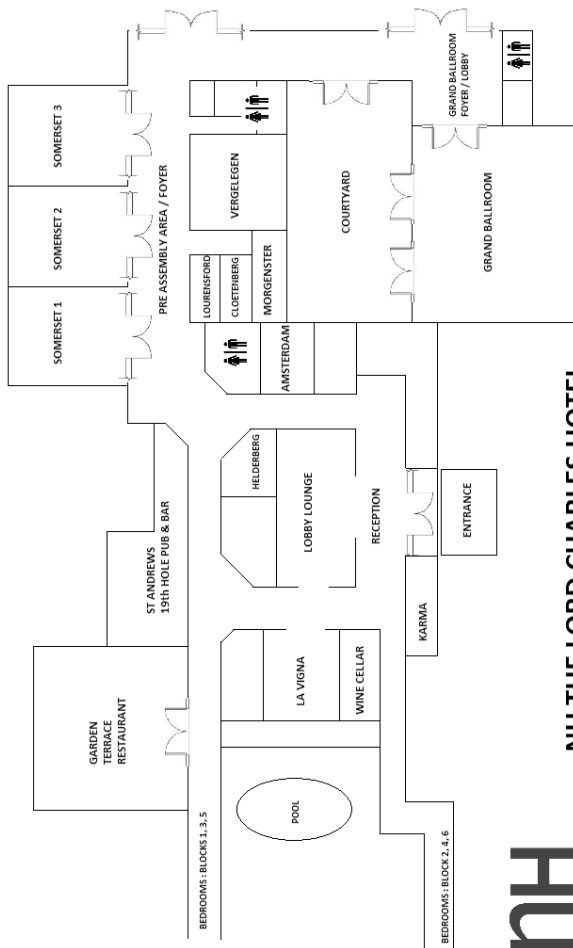
**Visit: [www.distell.co.za](http://www.distell.co.za)**

# EXHIBITORS HALL MAP





# CONFERENCE FLOOR PLAN



NH THE LORD CHARLES HOTEL

**nH**  
HOTELS

# TUTORIALS

**Day 1: 27 October 2014, Track D1-4, 10:10 to 12:35**

## **Attaining a system perspective**

**Presenter: Brigitte Daniel Allegro, (CESAMES, ISAE and ENSTA, Paris, France)**

Gaining a system perspective is a prerequisite for learning to think and act in terms of systems. The book “A Journey Through the Systems Landscape” provides a basis for building a systems perspective by introducing relevant concepts, principles and paradigms. In this tutorial some of the central concepts and paradigms are presented. As a result of attending the tutorial the participant will be able to:

- analyze a situation through the perspective of a “System-Coupling Diagram” in different contexts;
- use the “System Survival Kit”;
- recognize the Behaviors of the System Thinker among the ISO 15288 processes

Attendance Prerequisites: ISO 15288: 2008: acquaintance, familiarity with this standard. No other specific knowledge is required to attend this tutorial.

## **Notes**

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**How to apply System Engineering principles to the built environment ensuring that technical, financial and leadership decision-making leads to a feasible schedule of projects in a portfolio**

**Presenters: Dr Johan Coetzee (CP2C (Pty) Ltd), Collins Sekele (South African Treasury)**

Many organisations claim to have an effective management system. A few are focusing on project portfolio management and applying systems engineering management principles at their higher levels of management system. Then it is not clear how a “balanced” organisation should manage and integrate the technical and financial input; and what is required for leadership to make informed decisions (whether they have decision-support or not).

Although there could be a portfolio of projects (not necessarily a project portfolio management function) the assessment of current portfolios and decision to take –up new projects into the portfolio remains a question. Budgetary constraints are always an issue which should be addressed by the project portfolio function in an organisation.

In general, there are a number of areas that needs to addressed or established when managing portfolios.

Namely:

- What management system needs to be put in place and how will the top management, finances, the portfolio management, and the programme/project and systems engineering management interact
- The way technical input is provided on the costing of all stages/phases, the time value of these costs and how the complete life cycle of the project is cost and scheduled in the portfolio
- The financial input e.g. the annual available budget in current (nominal) terms or a ceiling budget for each project
- And finally, what is needed and when in your management process

for leadership to make informed decisions in order to get to a preferred schedule of projects in the project portfolio

The above requires an integrated approach to concurrently involve and interact between the leadership, finances and the technical teams.

The objective is to establish improved management systems in which the planning, costing and budgeting can be of a greater accuracy with consequential ease and cost-effective delivery of projects.

## Notes

[illegible]

**If space engineers could learn how to meet any deadline, couldn't you too?**

**Presenter: Niels Malotaux, (NR Malotaux Consultancy, The Netherlands)**

Do you think that delivery time is not your responsibility, but rather the responsibility of project management? Do you think that the system is ready only if “all” requirements have been met? The existence of this thinking is one of the reasons for this tutorial. Where “other” engineers may be accused of silo thinking, systems engineers are supposed to overcome silo-thinking, taking responsibility for a multidimensional variety of issues: whole lifetime (cradle to cradle), all disciplines, including human behaviour, balancing all systems requirements, including performances, and optimizing the design decisions over all requirements, including delivery time.

We will discuss why delivery time is so important and how to get and keep the timing of the project under control while improving the results, using a combination of techniques to organize the work, to check the validity of the requirements and our assumptions, and to control the time span of the project. With these techniques we can, even after a few weeks in the project, quite accurately predict what will be done when. If this prediction shows that the project will be late, we actively deal with it.

Many measures people intuitively apply for getting a project on time, however, don't work, on the contrary. We'll warn you for these deceptive measures and we'll confide less intuitive measures that do work. Your projects will be more successful faster. If systems engineers in a company developing space systems very quickly learnt how to do this, couldn't you too?

**The overall systems engineering value stream**

**Presenter: Dr Dieter Scheithauer, Dr Kevin Forsberg**

Since its invention value stream thinking has been a central concept within systems engineering. Value stream thinking in systems engineering is not limited to the development itself, but reaches out to the whole system life cycle. Meanwhile systems engineering has accumulated an impressive body of knowledge. Many systems engineering narratives exist in parallel. Systems engineering seems to be convoluted with competing and sometimes conflicting positions, factions and schools.

Our discussions will provide a solid framework upon which to build a consistent approach and viewpoint. As a common denominator, the V-model is an accepted hallmark within the systems engineering community. We will initiate this tutorial with a short review of the basic concepts underlying the V, and then prepare the attendees for new powerful insights. When the V is strictly interpreted as the overall systems engineering value stream in accordance with lean thinking principles, a consistent systems engineering narrative results. In the tutorial, this narrative is introduced and discussed. For the benefit of the attendees, particular systems engineering approaches and methods are then easier to evaluate regarding their role, their value, and their limitations.

## **Notes**

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**Day 3: 29 October 2014, Track D3-4, 09:40 to 12:25**

**Design of human services and public health interventions  
using systems engineering principles**

**Presenter: Prof Tak Igusa, (Johns Hopkins University, USA)**

The goal is to learn how basic systems engineering principles can be used to guide the development of interventions in human services and public health. We begin with a description of existing and concept interventions that were developed in public health. This description is initially given from the public health practitioner perspective, then is translated in terms of basic components and functions in systems engineering. Next, we show how these interventions can be redesigned using the systems engineering process.

Some of the challenges in applying systems engineering to human services are identified, and strategies for addressing these challenges are described. Finally, tutorial participants will apply the basic concepts of the tutorial to develop outlines of the systems engineering process for interventions in other areas of human services. These interventions would be selected from a menu of options, depending on participant interest.

## **Notes**

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## **The principles of evolutionary acquisition**

**Presenter: Prof Ad Sparrius, (Ad Sparrius System Engineering and Management, South Africa)**

The system acquisition process is the context within which system engineering takes place. However, there are number of serious problems with that acquisition process which form a major obstacle to its success, especially for unprecedented systems. These are: Uncertain, unspecifiable and rapidly-changing requirements; Volatile technology; and Incremental allocation of funds.

These problems have a crucial impact on development. Since these problems persist throughout the life cycle, development should also persist throughout the life cycle. Evolutionary acquisition provides a robust solution by doing precisely that. This tutorial will describe those various problems with acquisition, how evolutionary acquisition helps solve them, and the variations on evolutionary acquisition. It is an excellent illustration of how software engineering has fundamentally changed system engineering; but also shows its inherent dangers.

## **Notes**

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# EMEASEC 2014

27 - 30 October 2014

Cape Town, South Africa

## PROGRAMME

### DAY 1: MONDAY 27 OCTOBER 2014



# CONFERENCE OPENING KEYNOTE

## Building for Tomorrow: 21<sup>st</sup> Century Systems Engineering

**Speaker: David Long**

For over twenty years, David Long has focused on enabling, applying, and advancing model-based systems engineering (MBSE) to help transform the state of the systems engineering practice. David is the founder and president of Vitech Corporation where he developed and commercialized CORE®, a leading systems engineering software environment used around the world. A committed member of the worldwide systems community, David is president of the International Council on Systems Engineering (INCOSE), a 9000 member professional organization focused on sharing, promoting, and advancing the best of systems engineering. Throughout his career, David has played a key technical and management role in refining and extending systems engineering to expand the analysis and communication toolkit available to systems practitioners. He continues to lead the Vitech team as they deliver innovative, industry-leading solutions to help organizations develop and deploy next-generation systems. David has served INCOSE since 1997 including a term as the Washington Metropolitan Area chapter president and international roles including Member Board Chair, Director for Communications, and Director for Strategy. He is a frequent presenter at industry events worldwide delivering keynotes and tutorials spanning introductory systems engineering, the advanced application of MBSE, and the future of systems engineering. His experiences and efforts led him to co-author the book *A Primer for Model-Based Systems Engineering* to help spread the fundamental concepts of this key approach to modern challenges. In 2006, David received the prestigious INCOSE Founders Award in recognition of his many contributions to the organization. David holds a bachelor's degree in Engineering Science and Mechanics, as well as a master's degree in Systems Engineering from Virginia Tech.



**David Long**

# DAY 1: MONDAY 27 OCTOBER 2014

In case of any problem with the arrangements speak to Wessel Joubert (cell: 082 459-6814)  
A 5 minute change-over time is provided for between tracks

## SESSION 1A: CONFERENCE OPENING PLENARY

Registration & Coffee

Opening statements and Welcome:  
EMEASEC 2014 Conference Chair (René Oosthuizen)  
INCOSE SA Chapter President (Braam Greeff)  
EMEA Sector Director (Jean-Claude Roussel)

Conference Opening Keynote: "Building for Tomorrow: 21<sup>st</sup> Century Systems Engineering"  
David Long (INCOSE President)

Introduction to the programme for the day  
Jörg Lalk (Technical Chair)

## SESSION 1B: TRACKS AND TUTORIALS

TRACK D1-1  
SYSTEMS ENGINEERING  
PRINCIPLES, PROCESSES  
AND STANDARDS

Systems engineering  
value stream modelling  
Author:  
Dieter Scheithauer

TRACK D1-2  
PEACE AND CONFLICT  
& TRANSNATIONAL  
ORGANIZED CRIME

Towards combating  
poaching in the South  
African abalone fishery  
Authors:  
Suja Joseph-Malherbe,  
Achmed Giesler

TRACK D1-3  
GLOBAL CONVERGENCE  
OF IT

Implementation of  
information technol-  
ogy in a South African  
construction company:  
A case study  
Authors:  
Albert Eicker, Richard  
Weeks

TRACK D1-4  
TUTORIAL TRACK

Attaining a system per-  
spective  
Presenter:  
Brigitte Daniel Allegro

Coffee/Tea

SESSION 2: TRACKS AND TUTORIALS				
Start Time	End Time			Attaining a system perspective (cont.)
11:20	11:55	Structuring requirements in standard templates <u>Authors:</u> Andrew Pickard, Richard Beasley, Iain Cardow & Michael Hartley	A case study into the status of requirements management in the South African defence industry <u>Authors:</u> Sunil Surju, Siebert Benade	The integration of talent management practices and computer aided engineering in new product development <u>Authors:</u> Wynand Louw, Siebert Benade
12:00	12:35	From requirements management to re-requirements authoring <u>Authors:</u> Gerard Auvray, Jean-Claude Roussel, Juan Llorens	Engineering design of an environmental management system: A trans-disciplinary response to the rhino poaching problem <u>Authors:</u> Henk Roodt, Hildegarde Koen	A template for solving wicked problems <u>Authors:</u> Henson Graves, Robert Garrett
12:40	13:25	Lunch		

SESSION 3: TRACKS AND TUTORIALS					
Start Time	End Time	The life cycle of a requirement <u>Author:</u> Ad Sparrius	Aligning force planning and systems acquisition <u>Authors:</u> James Thaba, Siebert Benade	Definition of a data model to support risk analysis in the frame of critical infrastructure protection <u>Authors:</u> Lucio Tirone, Claudio Calisti	How to apply systems engineering principles to the built environment ensuring that technical, financial and leadership decision-making leads to a feasible schedule of projects in a portfolio  <u>Presenters:</u> Johan Coetzee, Collins Sekele
13:30	14:05				
14:10	14:45	Effective SE communication through models and representations <u>Author:</u> David Long	Application of systems engineering: An acquisition agent perspective <u>Authors:</u> Adrian Niken, Louwrence Erasmus	Architecture-driven design study of an electrically- powered UAV <u>Authors:</u> Yves Lemmens, Wouter Dehandschutter, Ivan Becuwe, Thierry Olbrechts	
14:50	15:15	Coffee/Tea			
SESSION 4A: TRACKS AND TUTORIALS					
Start Time	End Time	Introducing the INCOSE Systems Engineering Handbook Version 4 <u>Authors:</u> David Walden, Garry Roedler, Kevin Forsberg	Addressing large national problems in South Africa <u>Author:</u> Duarte Gonçalves	TOPASE: Tools for operability assessment and support enhancement for life cycle system performance optimisation <u>Authors:</u> Christophe Ducamp, Charles Elegbede	How to apply systems engineering principles to the built environment ensuring that technical, financial and leadership decision-making leads to a feasible schedule of projects in a portfolio (cont.)
15:20	15:55				

SESSION 4B: SAASTA YOUTH OUTREACH		
Start Time	End Time	
16:00	16:35	1. The role played by SAASTA in the advancement of science, technology, engineering, mathematics and innovation in South Africa <u>Speaker:</u> Mthuthuzeli Zamxaka
		2. Creating a brighter New Horizon for our Youth in Science, Technology, Engineering, Mathematics and Innovation <u>Speaker:</u> Dr Ron Beyers
Start Time	End Time	SESSION 4C: PLENARY
16:40	17:40	A systems perspective on the wine industry Dr Willem Barnard
Start Time	End Time	CONFERENCE WELCOMING FUNCTION
17:45	21:00	Ice Breaker & Wine Tasting

# PLENARY

## A systems perspective on the wine industry

**Speaker: Dr Willem Barnard**

### Academic Qualifications

- 1 BSc Eng (Mech): University of Pretoria 1969
- 2 MSc Eng (Nuclear): University of Cape Town 1971
- 3 DSc Eng: University of Pretoria 1977

### Career Particulars

1969 - 1991 Several positions in engineering, research and management in high technology sectors

1992 - 1994 Dorbyl: Managing Director: Heavy Engineering

1994 - 2007 KWV: Chief Executive Officer

1994 - Present University of Stellenbosch: Extraordinary Professor

1994 - Present: Director of Companies

2010 - Present Vastech: Executive Chairman



**Dr Willem Barnard**

### Professional Membership

- 1 SA Council for Professional Engineers
- 2 Institute for Systems Analysis
- 3 South African Academy of Engineering
- 4 University of Pretoria – Alumni
- 5 Professor Extraordinary-University of Stellenbosch

### Boards, Institutes

- 1 KWV SA (Pty) Ltd: Chairman (Retired)
- 2 KWV International: Chairman (Retired)
- 3 KWV Investments: Director (Retired)
- 4 Remgro/KWV Investments: Director (Retired)
- 5 AHI: Council of Trustees (Past President): Trustee

- 6 Chairman on the board of THRIP (Retired)
- 7 Advisory Board: University Stellenbosch Business School
- 8 Several Government appointments to Technology Audit and Fore-sight
- 9 Member of the Council, University of Pretoria (Retired)
- 10 Member of the Board: SA Wine & Brandy Company (Retired)
- 11 Namib Management Services (Pty) Ltd: Director
- 12 Ngwane Mills (Pty) Ltd Swaziland: Chairman (Retired)
- 13 Director: Caledon Dairy (Pty) Ltd.
- 14 Vastech (Pty) Ltd: Chairman

## **Abstract**

Global industries are complex hierarchical systems with a common objective to find the optimum balance between art and science, between social and natural sciences, algorithms and paradigms or physical laws and legalities in order to be successful. The wine industry is no exception. The South African Wine Industry conforms to the general rules and also needs science and technology, engineering, social sciences and management to provide the added value which the market demands. The South African Wine Industry however has unique features, amongst others, it has a definite date of birth on 2 February 1659 when the first wine was made from grapes grown locally by the Dutch in there refreshment post on the Liesbeeck river.

The wine industry allows for participation of a wide spectrum of operators ranging from micro producers, the so called garagists, to massive international producer/distributors. In addition to the very important branding strategy, origin also plays an important role, especially in the “old world” wines. In “new world” wines there is emphasis on cultivar as well as process, making the “specification” of the product more precise. The wine industry is controlled by conventions and mutual agreements. Wine can only be made from the *vitis vinifera* grape. No additions except for sugar and tartaric acid (chaptalization) and oils extracted from the wood which barrels are made of, may be added. Policing these regulations is a daunting task. Rejection by the industry, naming and shaming of transgressors can destroy brands. This ancient industry currently benefits from arguably the fastest growing technology sector, i.e. microbiology. From the invention of cold fermentation



the conventional cellar has rapidly developed into a chemical plant operating under strict process control to tight quality standards. Equally so did distilleries evolve to supply the derivative products in commercial volumes to required specifications.

Being a supplier of a potentially harmful product the industry, in addition to technological and commercial expertise, also has to provide for social responsibility in its offering to the market. There is good reason to believe that the wine industry is keeping up with the demands of the modern global society.

## Notes

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[illegible]



# EMEASEC 2014

27 - 30 October 2014

Cape Town, South Africa

## PROGRAMME

**DAY 2: TUESDAY 28 OCTOBER 2014**



# PLENARY

## **Systems engineering in complex international programmes**

### **Speaker: Felix Mehler**

He was born in Frankfurt, Germany and raised in Toronto, Canada, where he completed his studies with a Masters in Applied Science (Aerospace) from the University of Toronto, Institute for Aerospace Studies. He joined Daimler-Benz Aerospace (now Airbus Defence and Space) in September 1997 and held various engineering and management positions in different large multinational programs: Systems Engineer for the A400M transport aircraft, Head of System Test & Integration for the Eurofighter Flight Control Systems, Chief Engineer SIDM / Harfang Male UAV, Head of Systems Definition across a variety of Air Systems projects, and in 2013 Chief Engineer for a large C4I Defence project.



**Felix Mehler**

He currently leads the Integrated Systems Engineering team, covering civil and defence C4ISR projects for customers in Europa and abroad. During his career, he has lived in Germany, France and briefly in the UAE whilst working on projects across North America, Europe, Israel, the Middle East, India and Brazil.

### **Abstract**

Large complex platforms naturally encompass a wide scope of Systems Engineering challenges not only during their development and production phases but also during operation and maintenance.

Airbus Group, through its multiple locations around the world, has mastered many of the challenges facing large platform design, integration deployment and support. Within the portfolio of civil and military aircraft

together with satellites and launchers systems extensive interfaces exist between a large number of internal, partner and subcontractor entities around the world. These not only span the technical domains but also complex logistic challenges transporting large, high technology modules on a daily basis.

The presentation aims to give a short insight into how these Systems Engineering challenges have been addressed and mastered on our large projects including some lessons learnt.

Systems Engineering will continue to play an ever increasing role in all future Airbus products so with a short excursion we will look at some of the Systems Engineering challenges that arise due to the use of new technologies and platform concepts.

Finally, Systems Engineering on large systems conducted in many locations by many nationalities requires extremely good commutation, team work, a common understanding and a common methodology. Some insight into these important aspects will be addressed.

## Notes

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# DAY 2: TUESDAY 28 OCTOBER 2014

In case of any problem with the arrangements speak to Wessel Joubert (cell: 082 459-6814)  
A 5 minute change-over time is provided for between tracks

SESSION 5A: PLENARY	
End Time	
07:30	08:30
Registration & Coffee	
08:30	09:30
Systems engineering in complex international programmes Felix Mehler	
09:30	09:35
Introduction to the programme for the day Jörg Lalk (Technical Chair)	
End Time	
SESSION 5B: TRACKS AND TUTORIALS	

SESSION 6: TRACKS AND TUTORIALS				
Start Time	End Time			
11:10	11:45	SKA1 telescope manager: Challenges and opportunities Authors: Paul Swart, Gerhard le Roux	Systems engineering - difficult?...but useful! An integration case study Author: Terje Fossnes	TRACK D2-3B HEALTH ISSUES  Healthcare service delivery efficiency: Performance of Gauteng hospitals Authors: Oliver Nwauka, Richard Weeks
		Reconfigurability in decision-centred system design Author: Marc Houllier	Generic model-based systems engineering methodology Author: Bernhard Meyer	
11:50	12:25			A systems engineering perspective on eHealth implementations' efficiency and effectiveness: A case study involving suppliers Authors: Getnet Fanta, Louwrence Erasmus
12:30	13:15	Lunch		
If space engineers could learn how to meet any deadline, couldn't you too? (cont.)				

SESSION 7: TRACKS AND TUTORIALS				
Start Time	End Time			
13:20	13:55	Modelling methodology for engineering of complex sociotechnical systems <u>Authors:</u> Rudolph Oosthuizen, Leon Pretorius	Common terminology, well established techniques and methods are key success factors of requirements engineering: The contribution of RE certification to project success <u>Authors:</u> Camille Salinesi, Stefan Sturm	Making new and integrated sense of heterogeneous preclampsia <u>Author:</u> Gary Smith
14:00	14:35	Executable system of systems architecture using OPM in conjunction with colored Petri net: A module for flexible intelligent and learning architectures for system of systems <u>Authors:</u> Renzhong Wang, Sid-dhartha Agarwal, Cihan Dagli	Lean reliability engineering <u>Author:</u> Albertyn Barnard	The overall systems engineering value stream <u>Presenters:</u> Dieter Scheithauer, Kevin Forsberg
14:40	15:05	Coffee/Tea		



SESSION 8A: TRACKS AND TUTORIALS				
15:10	15:45	Concept definition for the SKA and MeerKAT projects Author: Thomas Kusel	TRACK D2-2B <b>SUSTAINABLE DEVELOPMENT AND CLIMATE CHANGE</b> Can systems engineering support innovation in sustainable development? Author: Cecilia Haskins	The impact of technological innovation on cloud computing as an emerging phenomenon within the South African healthcare environment Authors: Thembayena Mgozi, Richard Weeks
		A report on the MeerKAT project: Lessons learned Author: Justin Jonas	System architecture in the Dutch (rail) infrastructure Author: Paul Schreinemakers	Factors influencing diffusion of health technology Authors: Riaan van der Watt, Tinus Pretorius, Leon Pretorius
15:50	16:25			The overall systems engineering value stream (cont.) TRACK D2-4B <b>PANEL DISCUSSION</b> Complexity and the energy water nexus: Implications for systems engineering and regional policy Panel: William Good, Diana Mann, David Mason, Larry Millikan, Neil Snyder, Scott Workinger
SESSION 8B: PLENARY				
16:30	17:30	Back to basics: "San solutions"; if you're not hunting you're being hunted! Quinton Coetzee		
Start Time	End Time	CONFERENCE FUNCTION		
18:30	22:00	Traditional South African Braai		

# **WATER/ENERGY NEXUS PANEL**

## **Complexity and the Energy Water Nexus Implications for Systems Engineering and Regional Policy**

William Good (INCOSE Colorado Front Range Chapter President)

Diana Mann (INCOSE Colorado Front Range Member)

David Mason (INCOSE Silicon Valley Member)

Larry Millikan (INCOSE Colorado Front Range Member)

Neil Snyder (INCOSE Colorado Front Range Member)

Scott Worker (INCOSE Silicon Valley Member)

[www.incoseco.org](http://www.incoseco.org)

### **Abstract**

As a complex systems engineering problem, the Energy Water Nexus (EWN) is all about the efficient use of both resources – energy and water. Classical systems engineering methods can, at best, get us part way to a solution. A transformational approach is required to solve this wicked problem. We start with a careful data-driven root cause analysis to thoroughly understand the locus of the problem, identify all-important causal factors, and uncover crosslinks between each. By scoping the problem initially to a smallscale, we define the measures of effectiveness (MOEs) for the processes and develop a model to rank potential solutions.

## PLENARY

**Back to basics: “San solutions”; If you’re not hunting you’re being hunted!**

**Speaker: Quinton Coetzee**

Born in the Namib Desert, Quinton spent most of his childhood in the African bush. He began his working career as a hunter and then later attained a degree in the natural sciences. Today, he is considered one of Southern Africa’s leading bushcraft specialists.



**Quinton Coetzee**

His passion for adventure has taken him from bitter sub-Antarctic regions to the scorching deserts of the Middle-East. He has summited the highest ice-peak in Russia and has lived with ‘vanishing’ tribes in Africa, the frozen wastelands of Outer Mongolia and the sweltering jungles of the Amazon basin. As a conservationist, he has managed the animal collection for one of the largest Zoological Gardens in Africa where he was committed to the breeding of endangered species around the world. He is a frequent resource in print and on radio programs, speaking on a variety of nature topics. He is well known as a television presenter of popular wildlife programs such as “Aardwolf” and 50/50 “Veldfocus”.

He has also trained as a classical pianist. Quinton’s business message has universal appeal - he has addressed audiences in more than 30 countries worldwide. His talks assist people to tap into their natural potential... to improve their business skills and performance... and to gain a better understanding of themselves and others.

[illegible]



# EMEASEC 2014

27 - 30 October 2014

Cape Town, South Africa

## PROGRAMME

### DAY 3: WEDNESDAY 29 OCTOBER 2014



# PLENARY

## South Africa's water and river systems

### Speaker: Dr Ronnie McKenzie

He is a civil engineer specialising in water resource management, Director and Chairperson of WRP. He holds a PhD (University of Strathclyde, Scotland, UK), BSc (Hons) (University of Strathclyde, Scotland, UK) and a Diploma (Computer Science) from UNISA. He is a Professional Engineer (ECSA), a Chartered Engineer (UK) and holds further professional memberships of MICE, FSAICE, FIWA, WISA, and IMESA.



**Dr Ronnie McKenzie**

### Experience

Experience in Hydrology, Water Resource Planning, Management and Operation. He has considerable experience with various hydrological and water resources models including the Stanford Watershed Model (forerunner to the HSPF Model), Sacramento Model, HSPF, ARSP, WRYM, WRPM, Pitman Model, WRSM2000 Model. He also developed various new modules for the Pitman Model which were eventually either incorporated into the model or modified and then incorporated into the model including AFFDEM and IRRDEM etc.

Dr McKenzie is a key member of the Vaal River System Analysis team that developed the various water resource analyses models used by DWAF for all major Water Resource studies in South Africa. Responsible for many developments and software utilities in the field of Hydrology and provision of specialist hydrological services to DWAF for various projects including the establishment of the Royalty Hydrology in Lesotho which involved over 15 years of negotiation. He was heavily involved with the development of the Water Resource Yield Model and has developed similar models for use outside South Africa based on the same concepts but using non-proprietary components.

He was responsible for the hydrology and System Analyses components of many major water resource projects (listed below) and developed the original training material for the Water Resources Yield Model.

### **The presentation will touch on:**

- South Africa is technically an arid country that experiences long and often severe drought events
- The water resources are unevenly distributed
- Demands in the main demand centres have already outstripped the local supplies and large scale inter-basin transfers are used to address shortfalls
- South Africa has one of the most integrated and complicated water resource infrastructure anywhere in the world
- Managing the water resource infrastructure is undertaken by the Department of Water and Sanitation using highly sophisticated computer models
- The models were first introduced in 1985 and have been refined and further developed over the past 25 years – a combination of expertise from the USA, Canada, UK and South Africa
- The models are essentially network models based on the “out-of-kilter” modelling approach which as a form of Linear Programming
- Through the use of the system models, South Africa has managed its water resources effectively and efficiently for almost 30 years without having to introduce serious water restrictions – unlike most other countries in the world

The presentation will introduce the complexity of the water resource network in South Africa and explain how the complicated systems have been modelled using the South African models. The models will be discussed in general terms highlighting some of the most important features which place them at the forefront of system modelling worldwide.

The use of stochastically generated hydrological sequences will be mentioned to highlight the need for such sequences in the overall modelling approach in order to cover potential impacts of global warming and climate change.

# DAY 3: WEDNESDAY 29 OCTOBER 2014

In case of any problem with the arrangements speak to Wessel Joubert (cell: 082 459-6814)  
A 5 minute change-over time is provided for between tracks

SESSION 9A: PLENARY			
End Time	08:30	Registration & Coffee	
08:30	09:30	System Modelling to Manage South Africa's Water Resources Dr Ronnie McKenzie	
09:30	09:35	Introduction to the programme for the day Jörg Lalk (Technical Chair)	
SESSION 9B: TRACKS AND TUTORIALS			
Start Time	End Time	TRACK D3-1 SUSTAINABLE DEVELOPMENT AND CLIMATE CHANGE (CONT)	TRACK D3-2 SYSTEMS ENGINEERING EDUCATION
09:40	10:15	A systematic method for the development of a functional safety concept Authors: Ruediger Kaffenberger, Karl-Ernst Neitzel	The BKCASE™ project and the Graduate Reference Curriculum (GRCSE) Author: Richard Adcock
10:20	11:05	Applying systems thinking in shaping South Africa's electricity system Authors: Pieter Stoker, Johan Fick	
		Design of human services and public health interventions using systems engineering principles Presenters: Tak Igusa	
Coffee/Tea			



SESSION 10: TRACKS AND TUTORIALS					
Start Time	End Time	A systems engineering approach for the deployment of an atmospheric monitoring station Authors: AD Venter, PW Stoker, PG van Zyl, JP Beukes, V Vakkari, L Laakso	SE journeyman years-Learning project success by doing Author: Asmus Pandikow	The case for nuclear electricity in South Africa - An economic view Authors: Pieter Stoker, Johan Fick, Lukhanyo Ndube, Ntsoaki Tlape, Michael Vuba	
11:10	11:45			Design of human services and public health interventions using systems engineering principles (cont.)	
11:50	12:25	Case description and initial analysis of systems engineering principles application to the design of integrated solutions for megacities – Urban intervention in São Paulo: Tietê Arc Authors: Carlos Zink, Eduardo Werneck	Feedback from training SE at universities and companies Author: Alain Faisandier		The case for nuclear electricity in South Africa - A political alignment framework Authors: Pieter Stoker, Johan Fick, Mandisi Stwayi, Justice Gumede
12:30	13:15	Lunch			
SESSION 11: TRACKS AND TUTORIALS					
Start Time	End Time	Using systems thinking to inform natural resource governance Author: Suzi Malan, John Innes	Presenting systems engineering concepts to undergraduate mechanical engineering students Author: Wim Fuls	Ontology-driven semantic search for requirement engineering Authors: Luca Picciaccia, Roberto Basili, Danilo Croce, Valerio Storch	
13:20	13:55			The principles of evolutionary acquisition <u>Presenters:</u> Ad Sparrius	

14:00	14:35	SE in rural transport - Applying SE in a non-traditional domain <u>Author:</u> Tom Strandberg	Systems engineering career analysis in the Helix project <u>Authors:</u> Nicole Hutchison, Devanandham Henry, Arthur Pyster, Peter Dominick	A risk based view on building a sustainable nuclear electricity industry in South Africa <u>Authors:</u> Johan Fick, Pieter Stoker, Johann Austin, Yerishca Mudaly	
14:40	15:05	Coffee/Tea			
		SESSION 12A: TRACKS AND TUTORIALS			
15:10	15:45	Support for sustainable development projects based on real options <u>Author:</u> Krzysztof Targiel	Engineering education - A systems dynamics view <u>Authors:</u> Alwyn Smit, Alan Brent, Josephine Musango	Subsea oil production: The design basis <u>Author:</u> Luca Piciaccia	The principles of evolutionary acquisition (cont.)
		SESSION 12B: CONFERENCE CLOSING PLENARY			
15:50	16:15	Announcing the winner of the Ad Sparrius Best Paper Award!			
16:15	17:15	Conference Closing Keynote: “The cost of technical debt on a program” John Thomas			

# CONFERENCE CLOSING KEYNOTE

## The cost of technical debt on a program

**Speaker: John Thomas**

John A. Thomas is the Founder of John A Thomas & Associates LLC, a retired Senior Vice President/Chief Systems Engineer of Booz Allen Hamilton, and Past President of the 9000 member International Council on Systems Engineering (INCOSE). John is a leader, whether his role is as engineer, program manager, mentor, multi-disciplinary team member, or business man. He has delivered both IT and Hardware intensive systems and is recognized as a developer of people. As a senior consultant, John provides systems engineering and integration services to clients across Defense, Security, and Transportation communities.



**John Thomas**

In a career spanning more than 40 years, Mr. Thomas has worked with the application of technology to mission problems. First, he served as a technician, and then officer in the US Air Force, retiring from the USAF Reserves in 1998. John was also an engineer at the National Reconnaissance Office and engineer/program manager at ESystems Corporation prior to his 20 years with Booz Allen Hamilton, rising to the position of senior vice president. Mr. Thomas also is an executive coach and mentor to senior technical and management professionals and a sought-after spokesperson to both professional, lay groups, and media for systems engineering. He raises community awareness of the positive leadership impact of the systems engineer and the relevance of the discipline of systems engineering for addressing stakeholders complex and challenging problems. John has been an INCOSE member since 1998 and has received INCOSE's ESEP (Expert System Engineering Professional) certification. He also is a member of the Institute of Electrical and Electronics Engineers (IEEE), the National Defense Industrial Association (NDIA), the Program

Management Institute (PMI), the Armed Forces Communications and Electronics Association (AFCEA), and the International Test and Evaluation Association (ITEA). He holds a M.S. degree from the Air Force Institute of Technology and a B.S. from Michigan State University. Both degrees are in Electrical Engineering.

### **Abstract**

Cost growth is reframed as the inevitable interest payment paid on the technical debt of a program. The term “technical debt” – reflects missing content expected in system design, requirement, and interface artifacts called for during risk reviews. These interest payments on technical debt are shown to be much higher than anyone of us would willingly pay when seeking a loan to buy a house, car, or maintain a credit card balance.

### **Notes**

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# EMEASEC 2014

27 - 30 October 2014

Cape Town, South Africa

## PROGRAMME

### DAY 4: THURSDAY 30 OCTOBER 2014



# DAY 4: THURSDAY 30 OCTOBER 2014

In case of any problem with the arrangements speak to Wessel Joubert 082 459-6814

		EDUCATIONAL TOURS AND EXAM PLEASE CONSULT BROCHURES FOR EXACT DETAILS - INFORMATION HERE IS FOR GUIDANCE ONLY			
		SKA TOUR	TOWNSHIP TOUR	DISTELL TOUR	CSEP EXAM
Start Time	End Time	Depart from Hotel Foyer Tour as per brochure			
05:30					
07:30					Report to venue
08:00	10:30				Trial Exam
09:00	15:00		Depart from Hotel Foyer Tour as per brochure	Depart from Hotel Foyer Tour as per brochure	
	13:00		Return to Hotel		
	15:00			Return to Hotel	
	17:30	Return to Hotel			

# EDUCATIONAL TOURS

## **SKA Facility, Carnarvon**

The Square Kilometre Array (SKA) will be the world's largest and most sensitive radio telescope, about 50 times more sensitive, and up to 10 000 faster (in terms of its survey speed) than the best radio telescopes of today. It will be powerful enough to sense radio waves from objects millions or even billions of light years away from Earth. The SKA will focus on addressing questions that can only be answered using a radio telescope. Scientists will use it to help us understand how the Universe evolved, how stars and galaxies form and change, and what "dark matter" really is. Scientists expect that the SKA will make new discoveries that we can't even imagine now. They may even find life elsewhere in the Universe!

The collecting areas of all the receivers that make up the SKA add up to one square kilometre - that is why the instrument is called the "Square Kilometre Array". Many different countries are working together to build - and pay for - the SKA. At least 13 countries and close to 100 organisations are already involved, and more are joining the project. Thousands of SKA antenna dishes will be built in South Africa (in the Karoo, not far from Carnarvon), with outstations in other parts of South Africa and in eight African partner countries, namely Botswana, Ghana, Kenya, Madagascar, Mauritius, Mozambique, Namibia and Zambia. Another part of the telescope, the low-frequency array, plus more dishes, will be built in Western Australia.

## **The Bergkelder and the Van Ryn Distillery**

The South African wine industry has a rich history that reaches back in excess of 300 years. This tour offers an opportunity for a small insight into two of its well-known stalwarts. The Bergkelder ("Cellar in the Mountain") is tucked under the steep slopes of the historic Papegaaiberg. The name refers to clay pigeons ('papegaai' in Dutch), which were shot in commemoration of the birthday of Governor Simon van der Stel, in the late 1700s. A short walk along the banks of the Plankenburg River and across a footbridge flanked by lush gardens, takes you to the entrance of this unique underground bottle-maturation cellar – the first of its kind in

the Southern Hemisphere. Here, thousands of bottles of wine mature under the serene guard of old French Oak maturation casks bearing carvings of famous Cape wine landmarks and events.

Van Ryn's began in 1845 in Cape Town. The current distillery where the brandies are made was established in 1905, built from rocks from the nearby Eerste ('First') River. The distillery tour includes a guided walk through the working brandy distillery, a demonstration of the age-old art of coopering and a whiff of the Angel's Share in the Van Ryn maturation cellar. Van Ryn brandies have won many accolades and awards, including several International Gold Awards.

## **Enkanini Township Upgrading Projects**

A group of postgraduate students from the University of Stellenbosch have concerned themselves with the practical implications of the Upgrading of Informal Settlements Programme (UISP), specifically *in situ* upgrading from the shack dweller's perspective. In 2011 A trans-disciplinary research team was created based in an illegal informal settlement known as Enkanini (which means 'Take by Force') where about 2400 households reside. Enkanini has very few amenities and services and virtually no infrastructure. The +- 8000 residents are serviced by 70 toilets, 28 taps, 7 rubbish skips and no formal electricity grid. With the aid of a research grant from the National Research Foundation and donations from the Bill and Melinda Gates Foundation and the Green Fund, initial infrastructure research was conducted and a participatory model derived for scaling the results and impacts of the co-produced interventions.

Three infrastructure projects were piloted in Enkanini with close involvement of the residents. These are related to Waste Management, Sanitation and Energy (iShack). The Enkanini Research Centre of the University of Stellenbosch was established and under its auspices these and other initiatives and projects are run to improve and uplift the living standards of the Enkanini community. The Enkanini Educational Tour will offer delegates an opportunity to experience first-hand the successes and difficulties of trans-disciplinary research and an insight into an innovative way in which systems engineering principles, although not formally applied, plays a role in the success of this initiative.



# INCOSE INITIATIVES

In addition to the technical programme, the event also includes a programme on INCOSE initiatives hosted by the Systems Engineering Training Working Group (SETWG) of the INCOSE SA Chapter. This is offered concurrently with the technical programme and is specifically aimed at those involved in engineering education.

The programme commences on Monday morning after the opening plenary with a Roundtable discussion between INCOSE leaders visiting South Africa and invited guests from South African academia and industry with the aim to facilitate discourse on the INCOSE value proposition to SE Education at tertiary level in South Africa. After lunch continues with a half-day tutorial by Rick Adcock on the Graduate Reference Curriculum for Systems engineering (GRCSE), one of the products of the Body of Knowledge and Curriculum to Advance Systems Engineering (BKCASE) project (<http://www.bkcase.org>).

The programme continues on Tuesday at 11:50 with a tutorial by Dave Walden on the soon-to-be-released INCOSE SE Handbook version 4. The tutorial runs for the rest of Tuesday.

The programme concludes on Wednesday at 11:50 with feedback from the Monday Roundtable discussion, and another half-day tutorial starting after lunch on the second product of the BKCASE project, namely the System Engineering Body of Knowledge (SEBoK) also presented by Rick Adcock.

In the few open slots that remain, be on the lookout for presentations by the tools vendors exhibiting at the event.

Monday – 27 Oct 2014			Tuesday – 28 Oct 2014			Wednesday – 29 Oct 2014		
Start Time	End Time	Session 1B	Start Time	End Time	Session 5B	Start Time	End Time	Session 9B
10:10	10:45	SE Training Round Table (Invited)	9:40	10:15	Anylogic, a Multithreaded Simulation Modelling Tool Presenter: Clemens Dempers	9:40	10:15	INCOSE SE Student Division: A Smit
10:50	11:20	Coffee/Tea	10:20	11:05	Coffee/Tea	10:20	11:05	Coffee/Tea
Start Time	End Time	Session 2	Start Time	End Time	Session 6	Start Time	End Time	Session 10
11:20	11:55	SE Training Round Table (Invited)	11:10	11:45	Letter 27	11:10	11:45	ESTEQ
12:00	12:35		11:50	12:25	SEHBv4 Tutorial Presenter: Dave Walden	11:50	12:25	SE Training Round Table Feedback
12:40	13:25	Lunch	12:30	13:15	Lunch	12:30	13:15	Lunch
Start Time	End Time	Session 3	Start Time	End Time	Session 7	Start Time	End Time	Session 11
13:30	14:05	BKCASE/GRCSE tutorial Presenter: Rick Adcock	13:20	13:55	SEHBv4 Tutorial Presenter: Dave Walden	13:20	13:55	SEBOK Tutorial Presenter: Rick Adcock
14:10	14:45		14:00	14:35		14:00	14:35	
14:50	15:15	Coffee/Tea	14:40	15:05	Coffee/Tea	14:40	15:05	Coffee/Tea
Start Time	End Time	Session 4A	Start Time	End Time	Session 8A	Start Time	End Time	Session 12A
15:20	15:55	BKCASE/GRCSE tutorial Presenter: Rick Adcock	15:10	15:45	SEHBv4 Tutorial Presenter: Dave Walden	15:10	15:45	SEBOK Tutorial Presenter: Rick Adcock
16:00	16:35		15:50	16:25		15:50	16:25	

# EMEASEC LEADERSHIP

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**Seattle, WA**  
**July 13-16, 2015**

**Submission  
date for papers,  
tutorials and  
panels:  
09 November  
2014**

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**5<sup>th</sup> Conference on Complex Systems Design & Management (CSD&M)**  
12-14 November 2014 – Paris, France

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**Annual SE Conference 2014 (TdSE2014)**  
12-14 November 2014 - Bremen, Germany

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**20<sup>th</sup> Annual INCOSE UK Conference**  
18-19 November 2014 – RAF Museum, Cosford, United Kingdom

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**Conferenza INCOSE Italia su Systems Engineering (CIISE14)**  
24-25 November 2014, Roma, Italia

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**INCOSE 2015 International Workshop**  
24-27 January 2015, Los Angeles, USA

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**11<sup>th</sup> Annual INCOSE SA SE Conference**  
15-17 September 2015 – Pretoria, South Africa

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