ARK GROUP

KMASIA

THE KM TRANSFORMATION OUTLOOK

HOW KM, BIG DATA, AND ANALYTICS CAN SUPPORT INNOVATION AND DIGITAL TRANSFORMATION

• MOVING BEYOND THE HYPE • FROM EMPTY PROMISES TO AN EVIDENCE-BASED APPROACH

BRUCE BOYES, EDITOR AND LEAD WRITER, REALKM MAGAZINE

KMASIA

About the Speaker

Bruce Boyes, Editor and Lead Writer, RealKM Magazine

Bruce Boyes (www.bruceboyes.info) is editor and lead writer of the award-winning RealKM Magazine (www.realkm.com) and currently also teaches Academic English as part of the University of NSW (UNSW) Foundation Studies program in China, which is the largest source of undergraduate students from China for the Australian Group of 8 (G8) top-ranked universities. He has expertise and experience in a wide range of areas including knowledge management (KM), environmental management, program and project management, writing and editing, stakeholder engagement, communications, and research. Bruce holds a Master of Environmental Management with Distinction and a Certificate of Technology (Electronics).

With a demonstrated ability to identify and implement innovative solutions to social and ecological complexity, Bruce's many career highlights include establishing RealKM Magazine as an award-winning resource for knowledge managers, using agile approaches to oversee the implementation of an award-winning $77.4 million river recovery program in western Sydney on time and under budget, leading a knowledge strategy process for Australia's 56 natural resource management (NRM) regional organisations, pioneering collaborative learning and governance approaches to empower communities to sustainably manage landscapes and catchments, and initiating and teaching two new knowledge management subjects at Shanxi University in China.

REAL KM Evidence based. Practical results.

#KMAsia

KMASIA

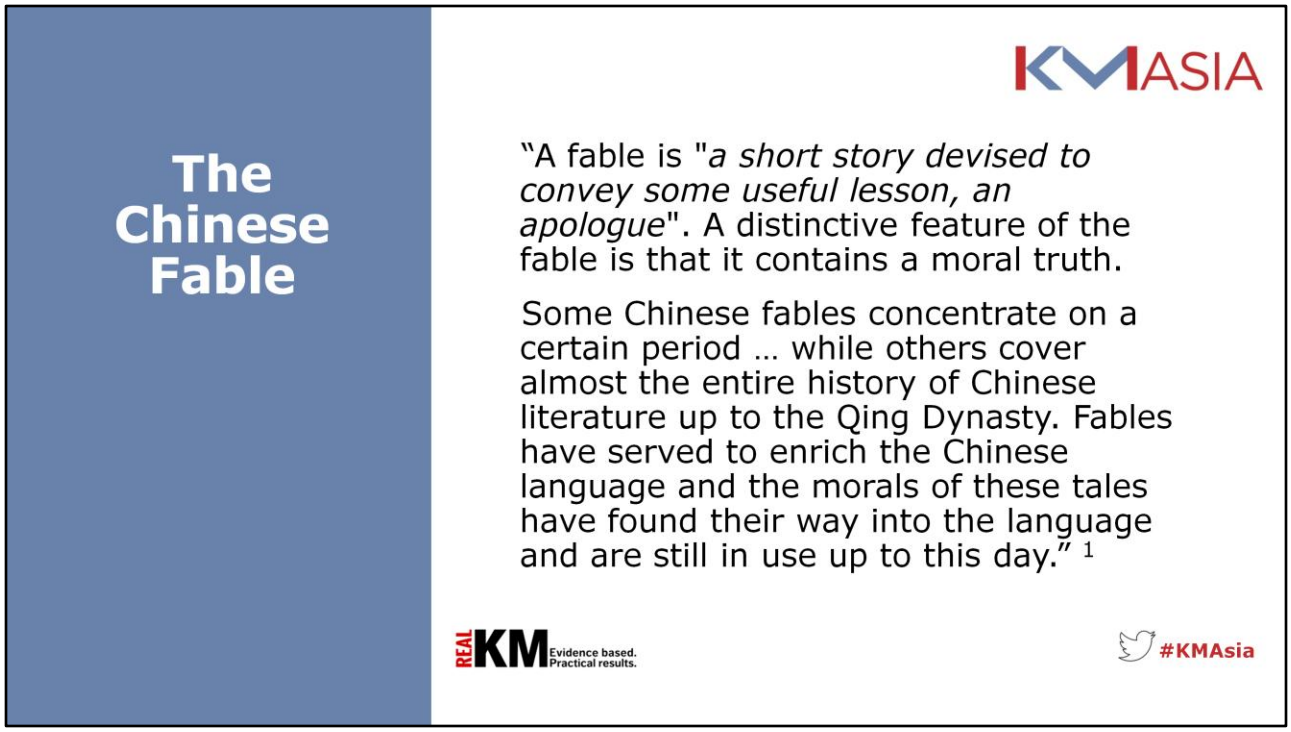
Content warning

This presentation includes potentially distressing references to air disasters, including the recent Indonesian and Ethiopian Boeing 737 MAX air disasters.

REAL KM Evidence based. Practical results.

#KMAsia

Over the past two years, I've been assisting a friend who has been facing serious mental health challenges (as discussed in the RealKM Magazine article series at https://realkm.com/2017/05/12/the-worst-mental-health-killer-you-probably-know-nothing-about/). I've learnt from this experience that discussion of certain events or hearing particular words or phrases said can be a trigger for people who are experiencing mental illnesses such as post-traumatic stress disorder (PTSD). Like all members of society, knowledge managers have a responsibility to ensure that we don't inadvertently cause such triggers, so content warnings such as this need to become part of all knowledge management communications (for some advice in regard to content and trigger warnings, see https://sites.lsa.umich.edu/inclusive-teaching/2017/12/12/an-introduction-to-content-warnings-and-trigger-warnings/).



Storytelling is a well-known and widely used practice in knowledge management, so I'm going to deliver my presentation as a series of three Chinese fables. I've been living in mainland China since 2012, following on from regular travels to the country beginning in 2006. My Chinese friends have told me numerous Chinese fables in that time. Each fable discusses a historical event or series of events, and, very importantly, uses those events to convey a moral truth that is beneficial to maintaining a harmonious society.

The Fable of the Fishing Village

Wikimedia Commons[2]

REAL KM Evidence based. Practical results.

KMASIA

#KMAsia

The first fable I'm going to tell is "The Fable of the Fishing Village". Just a short distance away from us here in Hong Kong is the mainland Chinese megacity of Shenzhen, where I lived for my first two years in China. The United Nations defines "megacities" as urban agglomerations with over 10 million people (see https://population.un.org/wup/Publications/Files/WUP2018-KeyFacts.pdf). You can see the scale of Shenzhen's urban development in this picture. The current population is estimated to be 12 million and the megacity is continuing to grow.

KMASIA

"A mere 35 years ago, Shenzhen was little more than a fishing village clinging to the coast, peering enviously at wealthy Hong Kong across the water. But then it was chosen to become the first of China's special economic zones under Deng Xiaoping — an area where foreign investment and entrepreneurialism was encouraged.

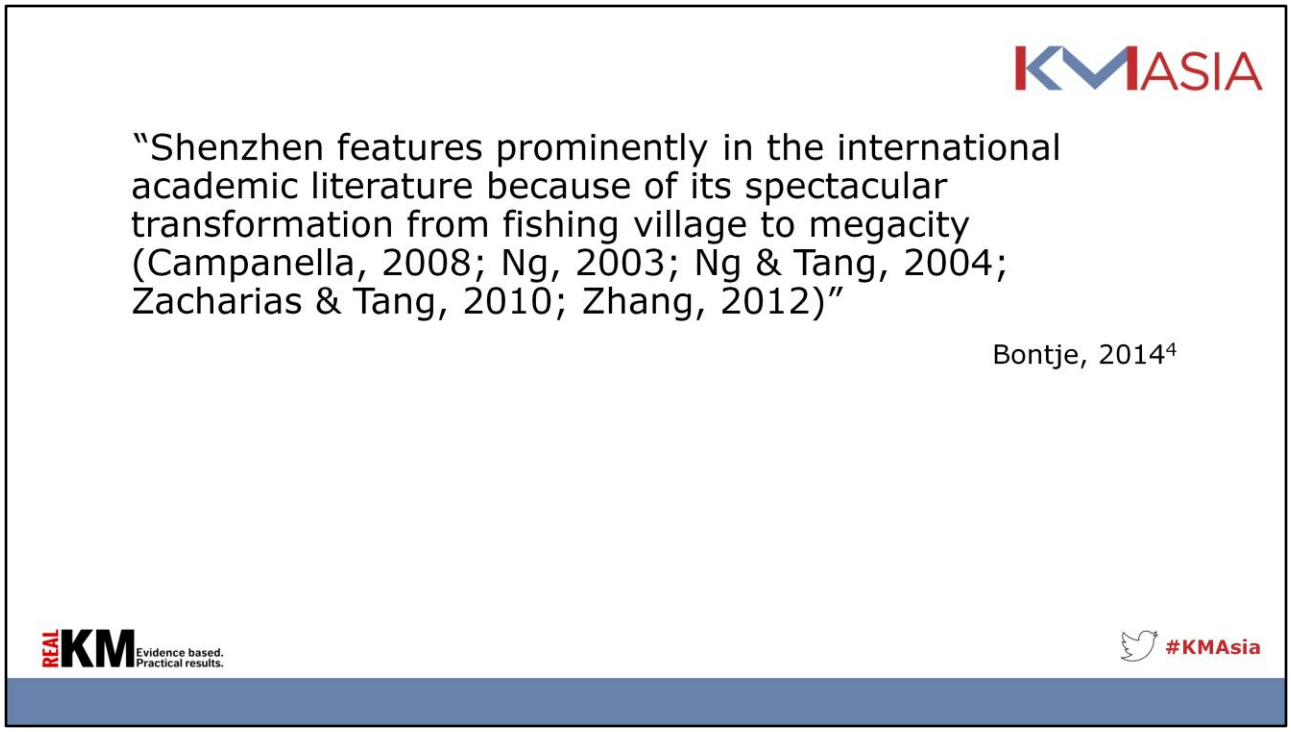
Since then it has rapidly grown into a massive metropolis — one of the largest cities on the planet — and along the way it has also become the manufacturing heart of the global tech industry."

Steve Ranger, *TechRepublic*, 2014[3]

REAL KM Evidence based. Practical results.

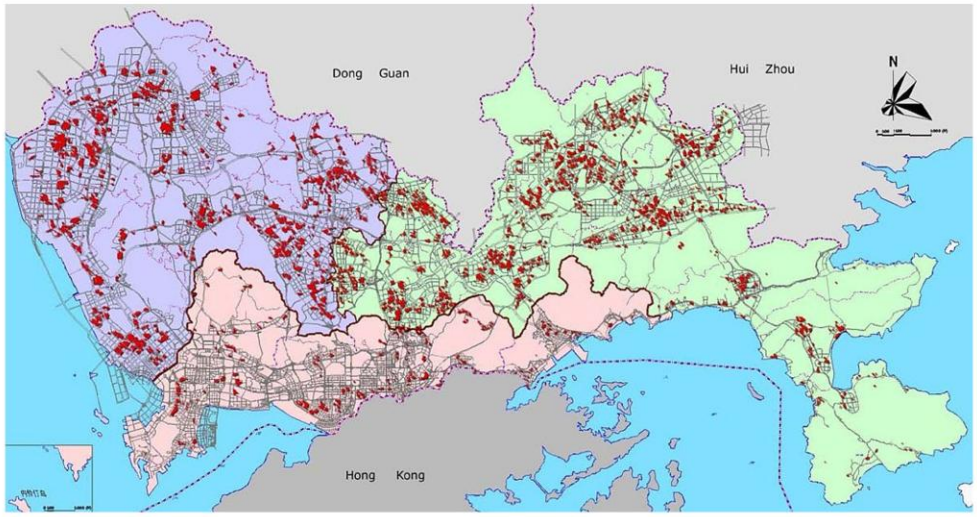
#KMAsia

A commonly and widely told story about Shenzhen is this one, which talks about the city having grown from just a small fishing village 35 years ago to the megacity it is today. This remarkable story of growth has been told time and time again in newspaper articles, tourism publications, and other media.



I've seen this fishing-village-to-megacity story told in the *South China Morning Post*, which is the main newspaper published here in Hong Kong. The story also appears in numerous peer-reviewed academic journal papers.

But this remarkable story isn't true! While it's true to say that Shenzhen has over the past 35 years grown from a fishing village into the megacity it is today, it's not true to say that Shenzhen was "35 years ago … little more than a fishing village clinging to the coast." These seemingly similar expressions actually have very different meanings. As Shenzhen has grown from one small fishing village, which was located in the current Shenzhen district of Luohu, it has encompassed a large number of other villages. Rather than Shenzhen being "little more than a fishing village" 35 years ago, it was actually 304 villages with a combined population of around 300,000 people.

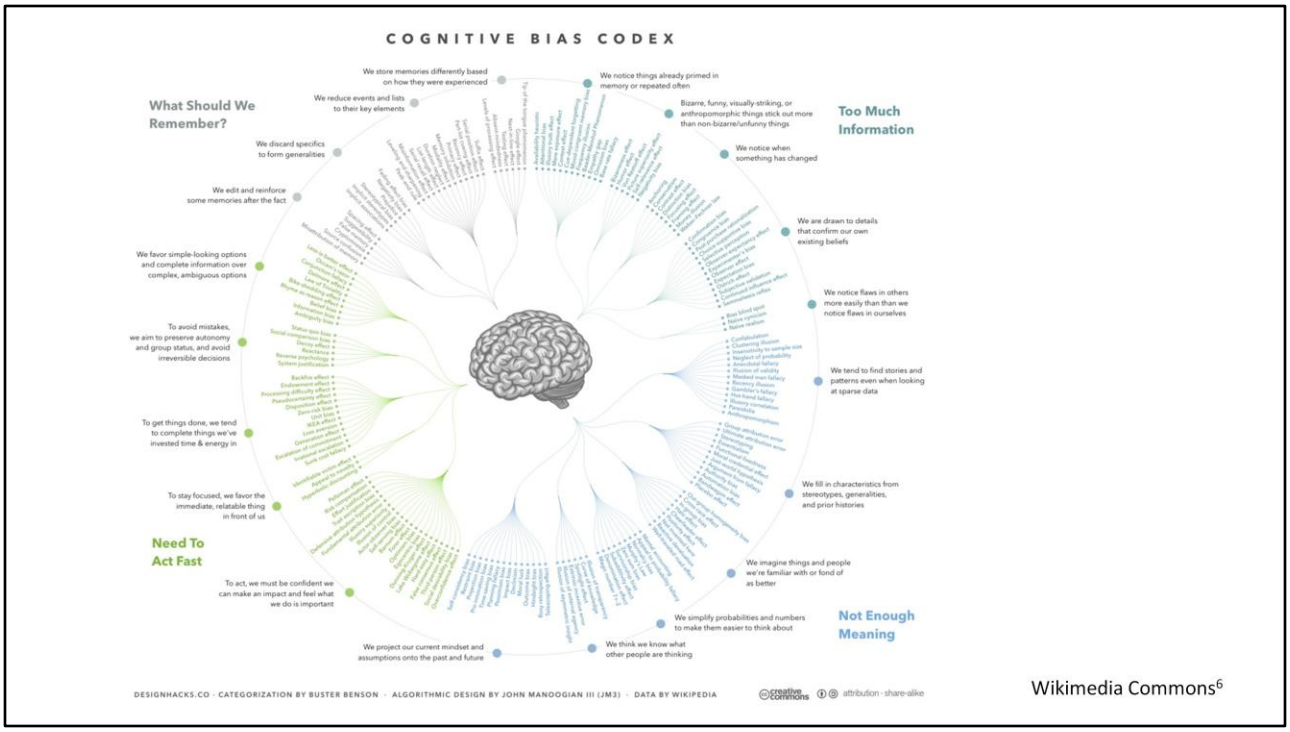


Ma, 2006[5]

What is truly remarkable is that many of these villages still persist. Rather than just being bulldozed as the megacity of Shenzhen was established and has continued to expand, many of Shenzhen's villages continue to persist as "urban villages" scattered throughout the modern city. Anywhere in Shenzhen, people can step from wide tree-lined streets of glittering modern skyscrapers into another world: the bustling narrow alleyways of villages. Not only do the urban villages persist, but so do a range of historic buildings central to village life, for example temples and ancestral halls, as well as many cultural traditions. The urban villages are now home to around half of Shenzhen's population of 12 million people, many of them "migrant workers" who have come to Shenzhen from other parts of China. The fascinating true story of Shenzhen's development is told in two doctoral dissertations investigating Shenzhen's villages: *"Villages" in Shenzhen—Persistence and Transformation of an Old Social System in an Emerging Mega City* and *Shenzhen's Urban Villages: Surviving Three Decades of Economic Reform and Urban Expansion*. This map comes from the first of these dissertations, with the village locations shown in red. Since the publication of that dissertation, new districts have been added to Shenzhen, encompassing many more villages.

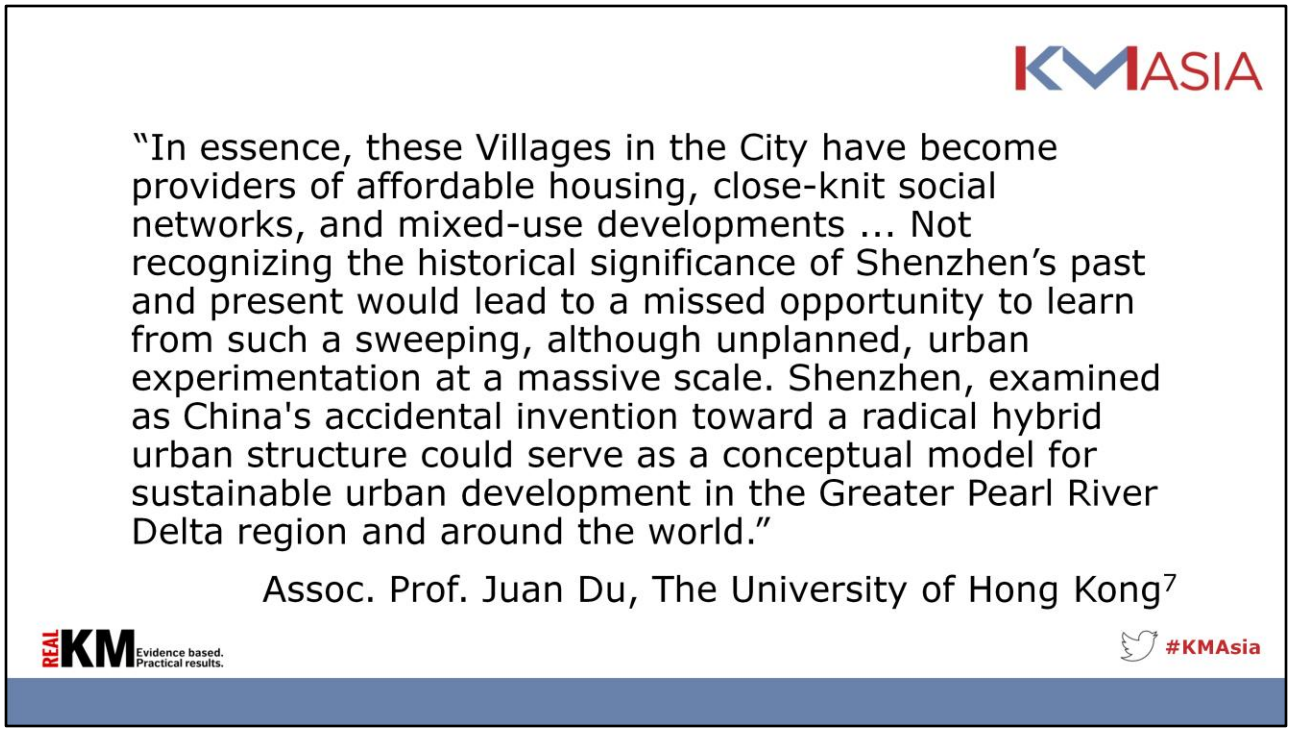
Ma, 2006[5]

It's actually quite naïve to think that the land area now covered by the megacity of Shenzhen could have been the location for just one tiny village 35 years ago. An awareness of China's historically large population combined with a knowledge of historic landscape settlement patterns in coastal China should have alerted authors, particularly academic authors, that it would be extremely unlikely for a landscape like that of Shenzhen to have had just one small village. This image, which also comes from the dissertation *"Villages" in Shenzhen—Persistence and Transformation of an Old Social System in an Emerging Mega City* shows just one of the villages, Huanggang village, in the 1970s. It probably better fits the definition of town, as it is a substantial built-up area with numerous multi-level buildings. Huanggang is located close to the Hong Kong border, and persists today as one of Shenzhen's largest urban villages. Also evident in the image is the extent of landscape modification that had already occurred at that time, including the construction of canals which are a common feature in coastal China, having been constructed for over a thousand years.



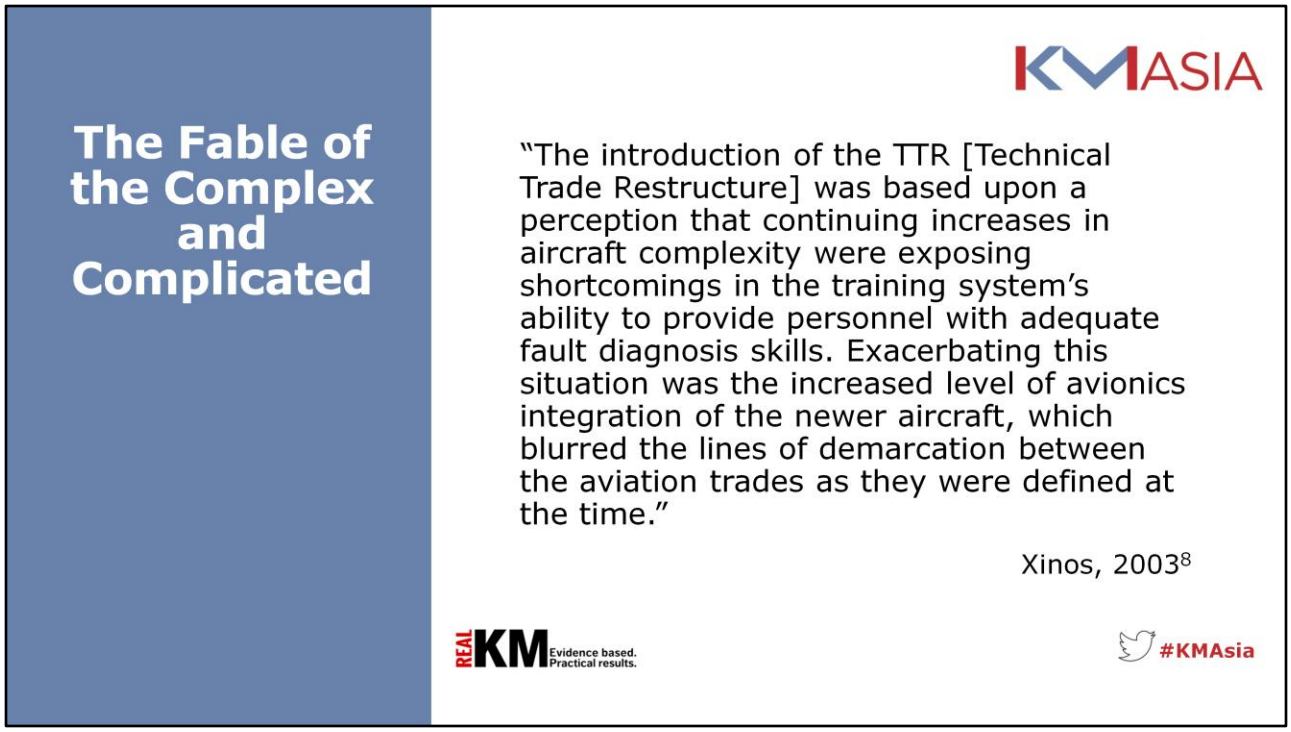
Wikimedia Commons[6]

So why have so many journalists, tourism writers, and even academics believed and circulated the fantastical one-line fishing-village-to-megacity story of Shenzhen's development, instead of researching and then reporting on the far more complex true story? The answer lies in our cognitive biases. These biases are the result of the way that our brains have evolved to deal with the problems that humans face, and we have a large number of them, as shown in this diagram. They include that we favour options that appear simple or that have more complete information over more complex and ambiguous options, we discard specifics to form generalities, and bizarre or visually-striking things stick out more than non-bizarre things (for further information see https://realkm.com/2016/10/28/just-how-rational-is-our-thinking-time-for-a-reality-check/).



But in believing and promoting the false one-line fishing-village-to-megacity story, we're losing the opportunity to learn from the true story. The much more complex true story offers us a potential model for urban development worldwide, as I discuss in the RealKM Magazine article "Planning for the fascinating social complexity of Chinese cities, and what it can teach the west" (https://realkm.com/2017/08/04/planning-for-the-fascinating-social-complexity-of-chinese-cities-and-what-it-can-teach-the-west/).

What should we learn from The Fable of the Fishing Village? There's not just one moral truth, but three. These moral truths suggest a way in which knowledge management can transform to support innovation. Are we dealing adequately and effectively with complex realities, and do we base our decisions on evidence, or illusions?



Let's now move to the next of our three fables, "The Fable of Complex and Complicated". Let's travel back 37 years, to 1982, when I commenced my first work after completing senior high school. I joined the Royal Australian Air Force (RAAF) and became part of the very first intake of Technologist Apprentices (TECHAPPs). The TECHAPP scheme and associated Systems Technician (SYSTECH) trade group were introduced as part of a Technical Trade Restructure (TTR) initiated in response to increasing complexity and integration in aircraft systems.

No 1 Technologist Appy Course

These blokes were from Qld, NSW and ACT and arrived at Laverton on the 12 January 1982 aboard a modern, complex, high-technology aircraft, all bright eyed and bushy tailed ready to start their studies.

Back Row: ***Bruce Boyes***, from Gladstone Qld; ***David Smith***, from Canberra ACT; ***Stephen Creese***, from Mackay Qld; ***Gavin Healy***, from Cairns Qld; ***Cpl Tregilgas***, Radschool Staff; ***Greg Fuller***, from Cootamundra, NSW; ***Gary Wickham***, from Gladstone NSW; ***Warren Downing***, from Innisfail Qld; ***Darryl Platz***, from Gold Coast Qld;
Front Row: ***Justin Baldwin***, from Cairns Qld; ***Brian Barrow***, from Mt Druit NSW; ***David Jensen***, from Cairns Qld; ***Craig Thomas-Schumacher***, from Penrith NSW; ***Michael Cummings***, from Lemon Tree Passage NSW; ***Ted Lander***, from Ipswich Qld.

KMASIA

Radschool Association Magazine[9]

REAL KM Evidence based. Practical results.

#KMAsia

Here we are arriving at RAAF Laverton (now named RAAF Williams Laverton Base). The comment about us arriving "aboard a modern, complex, high-technology aircraft" is classic Australian irony, with this particular type of aircraft, the de Havilland Caribou, being a very basic transport aircraft that had been in service with the RAAF since 1964 (https://en.wikipedia.org/wiki/No._38_Squadron_RAAF).

KMASIA

Wikimedia Commons[10]

REAL KM Evidence based. Practical results.

#KMAsia

The aircraft that I would go on to work on after my three-year RAAF TECHAPP training was this one – the high-technology swing-wing General Dynamics F-111C, initially with 1 Squadron (https://en.wikipedia.org/wiki/No._1_Squadron_RAAF) and later with 482 Squadron (https://en.wikipedia.org/wiki/No._482_Squadron_RAAF). But the F-111C isn't actually complex either. Dave Snowden's Cynefin framework (https://en.wikipedia.org/wiki/Cynefin_framework) tells us that high-technology aircraft systems such as this are complicated rather than complex.

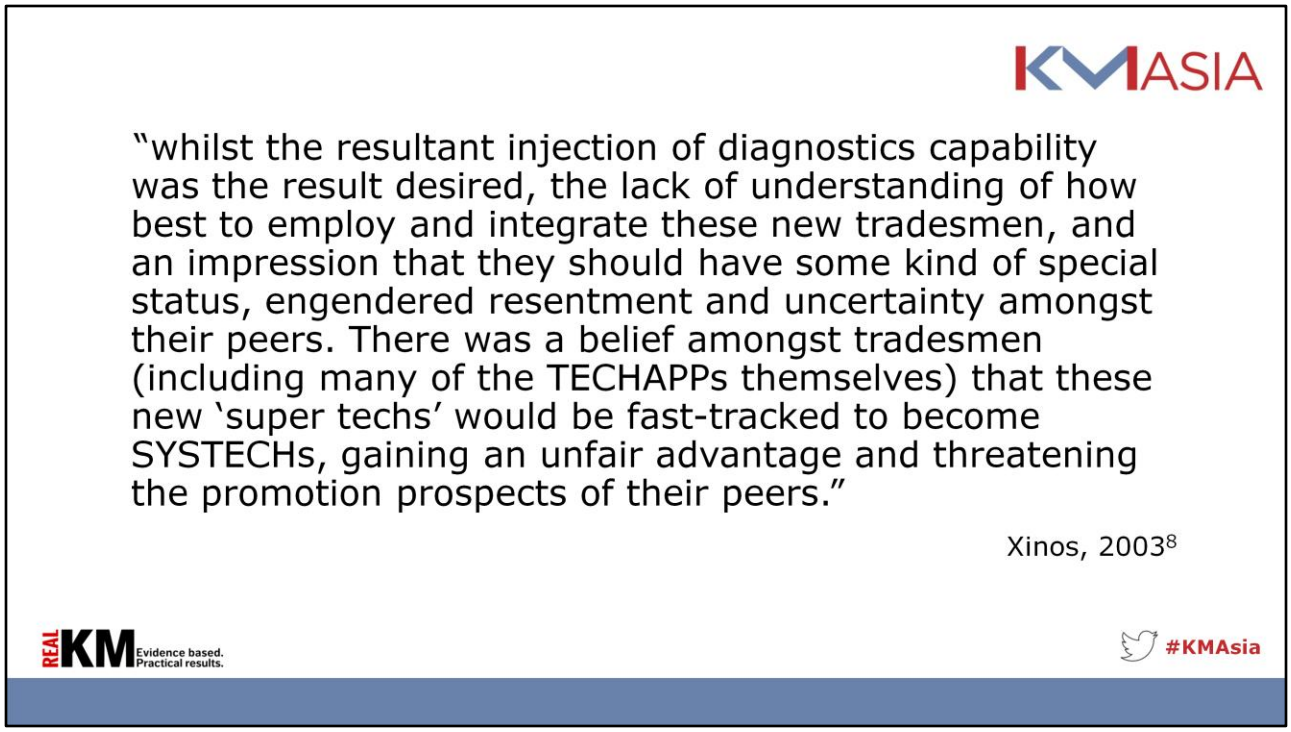
KMASIA

1 Squadron RAAF photography section[11]

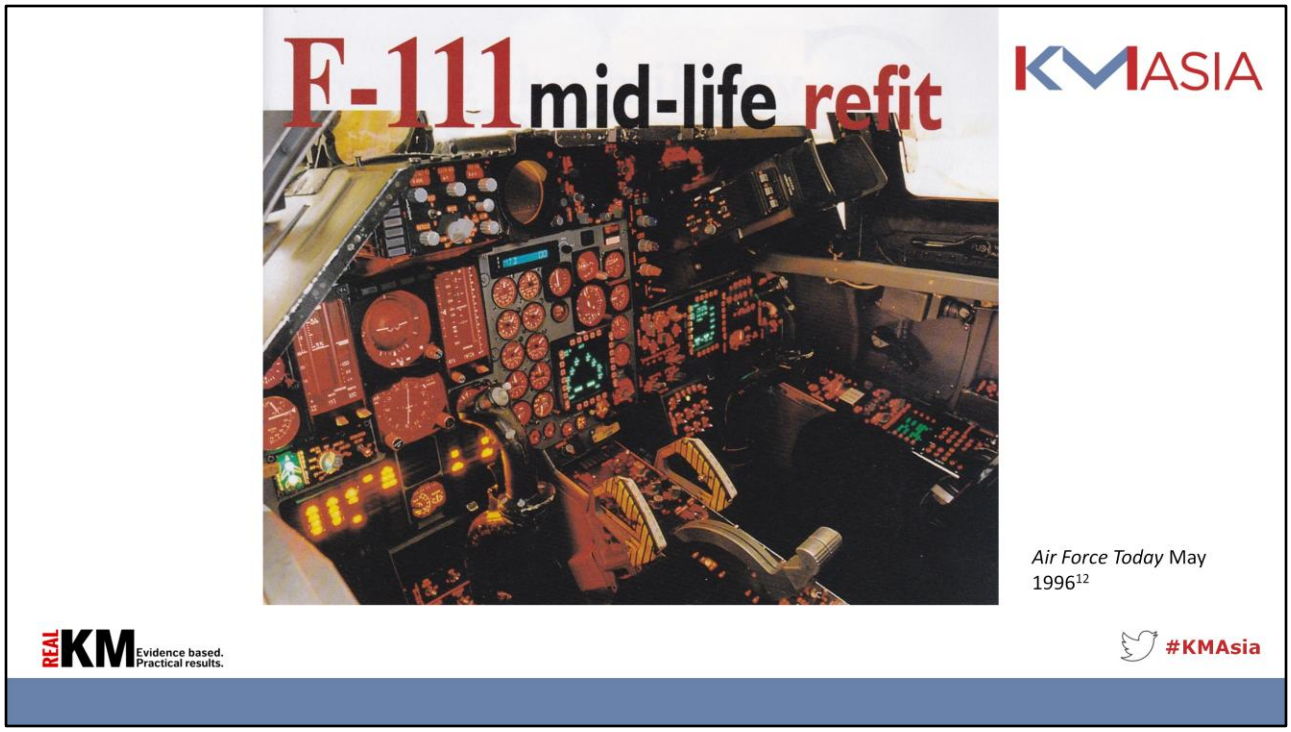
REAL KM Evidence based. Practical results.

#KMAsia

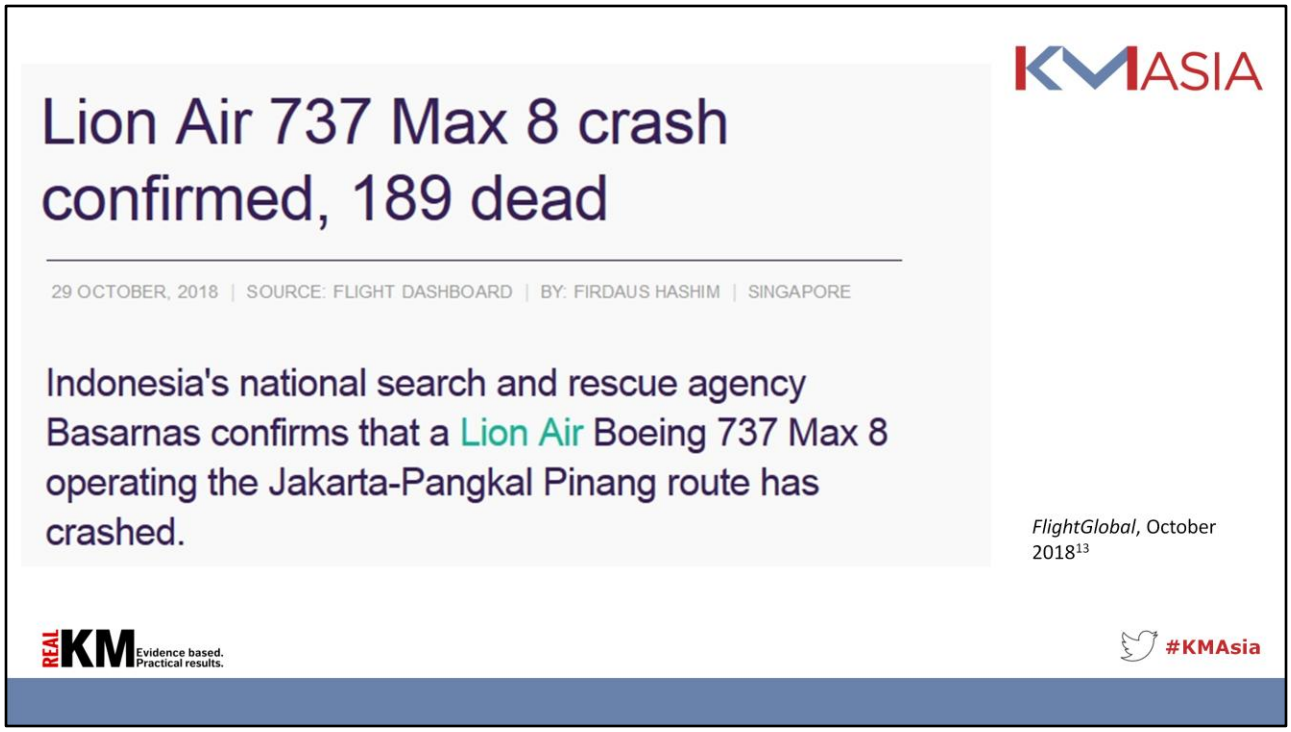
It's when we add the human factor – aircrew and ground crew – that aircraft systems become complex. The aircrew and ground crew have a complex array of interactions with the aircraft, with each other, and with the wider world.



Indeed, while it effectively addressed a complicated technical systems issue, the introduction of the TECHAPP scheme caused unintended consequences, thrusting us into this complex social situation that we then had to try to navigate. The TECHAPP scheme had been proposed and championed by a senior RAAF officer who hadn't realised that an apparently simple change in a complex social context can bring about unexpected consequences. As Dave Snowden and Mary E. Boone advise in their highly-cited Harvard Business Review article "A Leader's Framework for Decision Making" (https://realkm.com/go/a-leaders-framework-for-decision-making/), "in a complex system … we cannot forecast or predict what will happen." The Australian Defence Force (ADF) would later stop training technicians to the depth and breadth of TECHAPPs, and instead shift the emphasis to on-the-job competency development. However, this approach also brought its own array of complex problems.

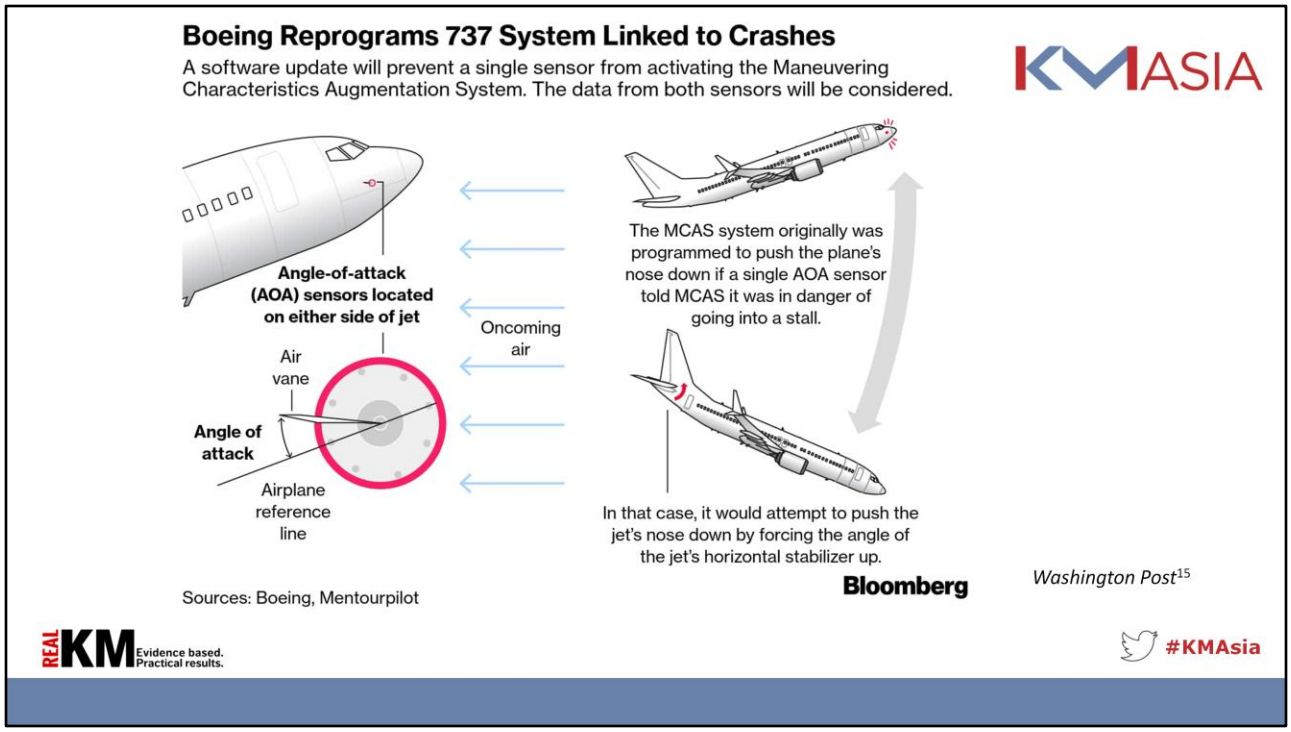


The moral truths of the Fable of the Fishing Village suggest that a way in knowledge management can transform to support innovation is through helping organisations to cut through cognitive biases and more effectively recognise and deal with complex realities. I'm now going to expand my focus to talk about how KM can support both innovation and digital transformation. Although already a high-technology aircraft when I first started working on it in 1985, the F-111C had only a small degree of digitalisation at that time. For example, the very complicated analogue navigation computer unit (NCU) operated through tiny electric servos and gear wheels. The F-111C's aging analogue avionics systems were then given a major digital update in the 1990's. Over time, military and civilian passenger aircraft avionics systems have become increasingly digitalized, and electronic fly-by-wire flight control systems have replaced manual systems.

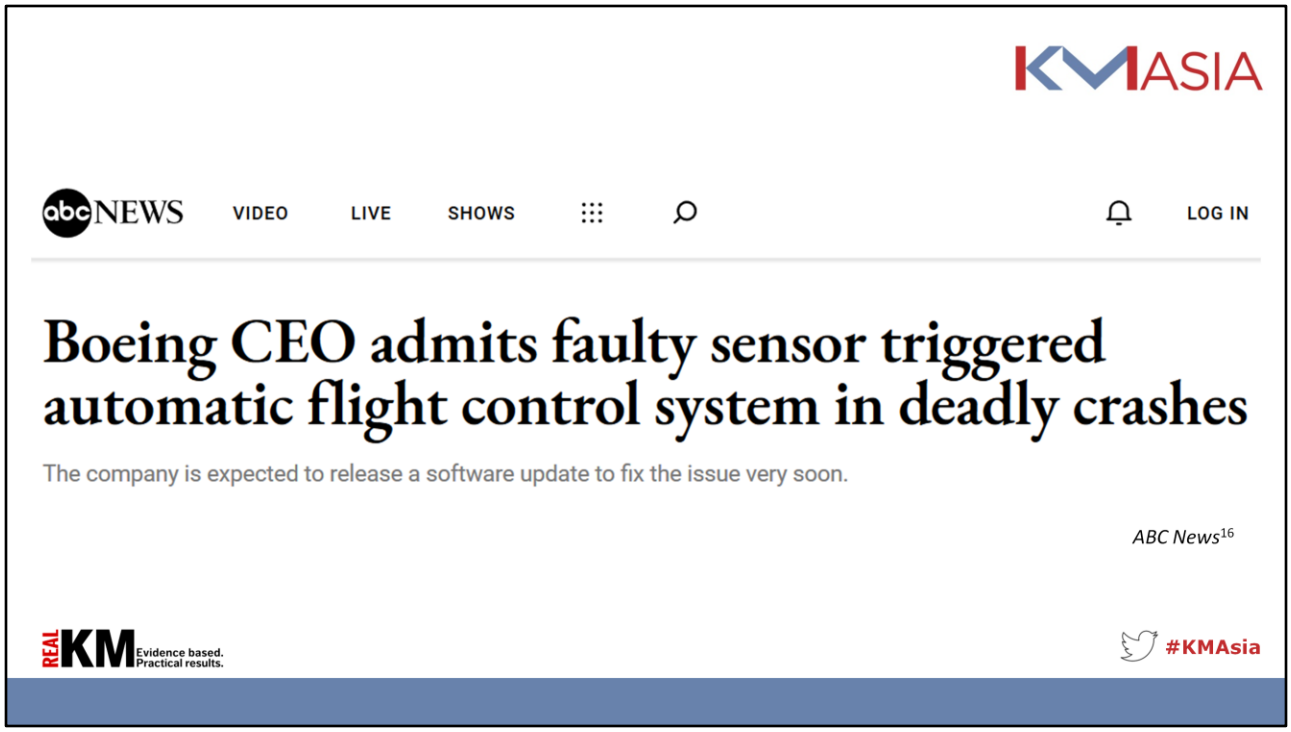


Let's now past forward to the present time. In October last year came the tragic news that a Boeing 737 MAX aircraft owned by Indonesia's Lion Air had crashed, killing all 189 people on board. Lion Air had taken delivery of this new aircraft just two weeks prior to the crash. The 737 MAX is the latest generation in Boeing's long-running and very successful 737 series, with technologically advanced digital avionics and flight control systems.

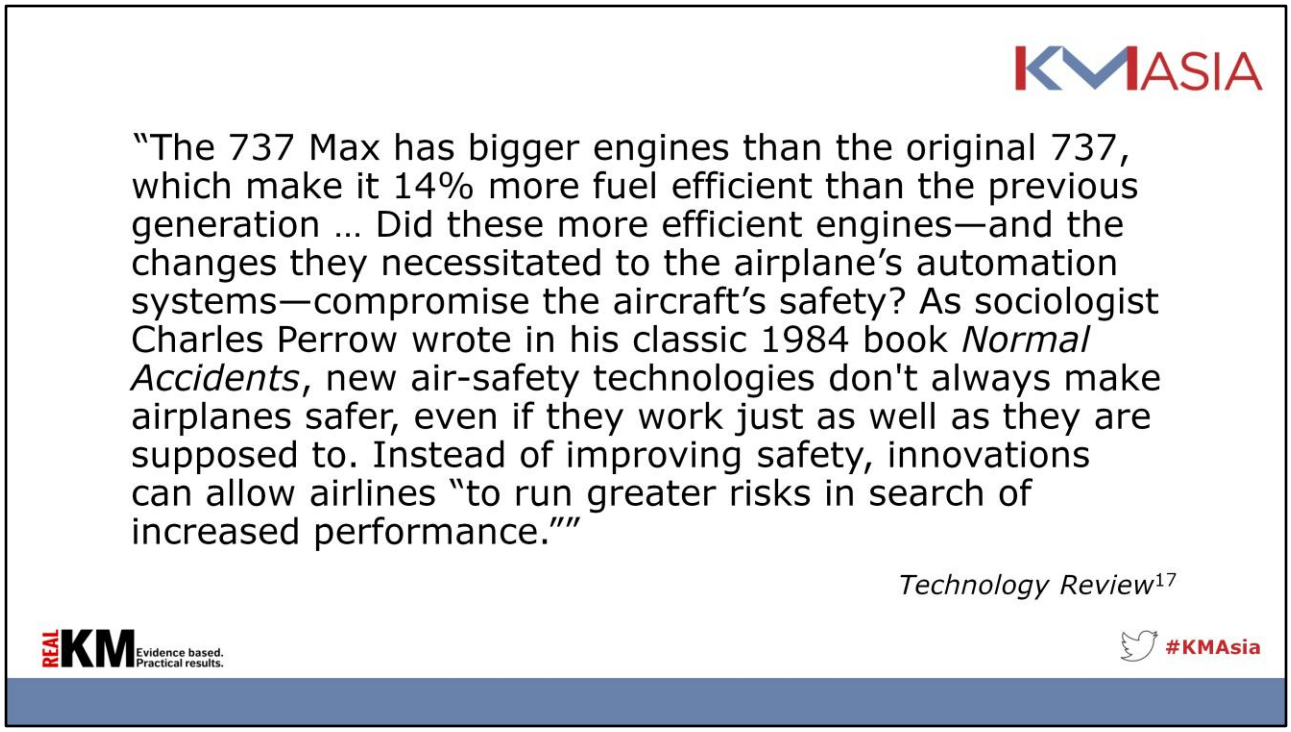
Then, just last month, another Boeing 737 MAX aircraft operated by Ethiopian airlines crashed in apparently similar circumstances to the Lion Air crash, also tragically killing all those on board.



While the final reports from both disasters are yet to be released, the 737 MAX's Maneuvering Characteristics Augmentation System (MCAS) has been identified as the cause in both cases. The MCAS "was deployed on the 737 MAX to mitigate its tendency to pitch skywards due to the aircraft's engines being mounted further forward and upwards compared to previous models. The MCAS uses airspeed, altitude and angle of attack (AOA) sensor data to make an attempt at computing when a dangerous condition has developed and then trims the aircraft nose down" (https://en.wikipedia.org/wiki/Boeing_737_MAX).



Just last week, Boeing admitted responsibility for both crashes, with CEO Dennis Muilenburg stating that “with the release of the preliminary report of the Ethiopian Airlines Flight 302 accident investigation, it's apparent that in both flights the Maneuvering Characteristics Augmentation System, known as MCAS, activated in response to erroneous angle of attack information." Despite following the emergency checklist, the pilots of both flights were unable to regain control of the aircraft. Amid chaotic scenes in the cockpit, they didn’t realise that disabling the MCAS would have solved the problem.



How could this have happened? In the wake of the two disasters, some very disturbing issues in regard to aircraft technology and the Boeing 737 MAX have been raised in the media, as shown in this and the following slides.

KMASIA

"because it's so complex, some pilots may have problems with it, especially if it's the case that they're not given all the training and information necessary to maneuver. That appears to have been part of the problem with the Lion Air flight. It's not yet clear if that's what happened with the Ethiopian Airlines flight."

Vox[18]

"Pilots repeatedly voiced safety concerns about the Boeing 737 Max 8 to federal authorities, with one captain calling the flight manual "inadequate and almost criminally insufficient" several months before Sunday's Ethiopian Air crash that killed 157 people, an investigation by *The Dallas Morning News* found.

The News found five complaints about the Boeing model in a federal database where pilots can voluntarily report about aviation incidents without fear of repercussions."

Dallas News[19]

Boeing's over 1,600-page flight manual for the 737 Max 8 aircraft mentions the MCAS only once – in the glossary of abbreviated terms (https://www.cbc.ca/news/business/boeing-737-manual-mcas-system-plane-crash-1.5065842).

"As Boeing hustled in 2015 to catch up to Airbus and certify its new 737 MAX, Federal Aviation Administration (FAA) managers pushed the agency's safety engineers to delegate safety assessments to Boeing itself, and to speedily approve the resulting analysis.

But the original safety analysis that Boeing delivered to the FAA for a new flight control system on the MAX — a report used to certify the plane as safe to fly — had several crucial flaws."

Seattle Times[20]

KMASIA

DOT's watchdog says FAA to improve air safety oversight procedures by this summer

- A Senate subcommittee is set to grill the FAA and the NTSB over the Boeing 737 Max.
- Questions will likely center around how the plane came to market with an automated stall-prevention system that has been linked to crashes.
- Lawmakers are also likely to raise questions about a plan for a software fix to the jets that Boeing said it gave the FAA in January.

CNBC[21]

REAL KM Evidence based. Practical results.

#KMAsia

"Boeing's latest airliners lack a common override feature that, in some dangerous circumstances, allows pilots to reliably pull planes out of nosedives and avert crashes such as last month's fatal plunge by Lion Air Flight 610, aeronautics experts and pilot groups say.

The state-of-the-art 737 MAX 8 airplanes do not have this feature, yet the company failed to prominently warn pilots of the change even as airlines worldwide began taking delivery of the new jets last year, pilots say.

"We were completely in the dark," said Dennis Tajer, a 737 pilot and spokesman for the Allied Pilots Association, representing American Airlines pilots."

Washington Post[22]

As well as highlighting very serious questions in regard to aircraft safety certification, the issues raised in these media articles point to inadequate knowledge management by Boeing. Insufficient information was provided to pilots in regard to the MCAS, and Boeing failed to respond to, or even be aware of, concerns raised by pilots in regard to problems that they were experiencing with the 737 MAX. The reputations of both Boeing and the once highly-respected US Federal Aviation Administration (FAA) are now in tatters, with the 737 MAX grounded worldwide, orders being cancelled, and Canada, the European Union, and China no longer considering the FAA to be a trustworthy body. But how could this be, when Boeing has a substantial knowledge management program, as shown in this cover story from a 2007 issue of the company's *Frontiers* magazine?

Voice Assistant[24]

navel-gazing

Noun

noun: **navel-gazing**
self-indulgent or excessive contemplation of oneself or a single issue, at the expense of a wider view.

Google Dictionary[25]

I suggest that this is because while Boeing's knowledge management program is apparently effective, it's internally focused to the neglect of the complex external environment and Boeing's interface with that environment.

"The FAA's latest statement, released Tuesday, doubled down hard on its stubborn position, saying they have found no reason to ground the Boeing 737 Max 8. Is the FAA then – between the lines – tacitly floating a not-so-subtle theory of blame the pilots, not the plane?

Case in point, the Boeing Dreamliner 787. Not long after its initial launch, the entire 787 fleet in 2013 was grounded by the FAA due to overheating lithium-ion batteries. …

What's the difference between grounding the Dreamliner 787, and not grounding the 737 Max 8? Pilot error. A widespread belief exists that U.S. pilots undergo superior training, and come to the cockpit with more flight hours and rigorous experience, compared to third-world pilots such as those flying for Ethiopian Airlines, or Indonesia's Lion Air."

Fox News[26]

Further, media articles are providing disturbing insights into the cognitive biases that have apparently contributed to Boeing and the FAA's failure to effectively engage with the pilots around the world that fly Boeing's aircraft.

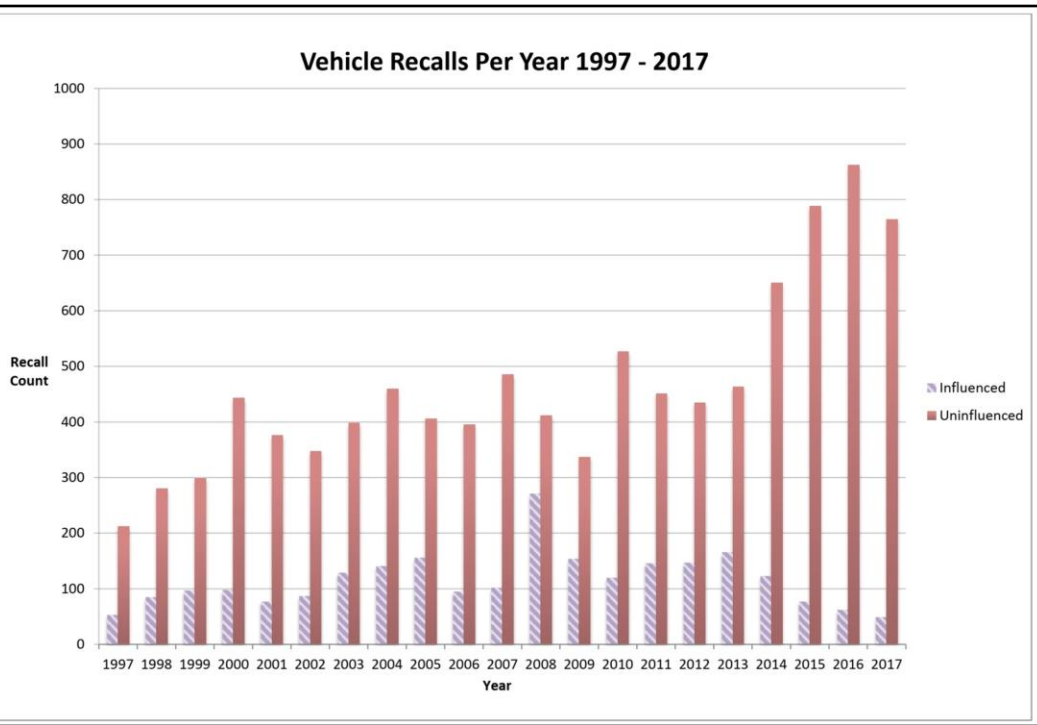
So what are the moral truths from the Fable of the Complex and Complicated? Well, they're exactly the same as the moral truths from the Fable of the Fishing Village. What Boeing and the FAA have believed to be the reality is in fact an illusion, divorced from the evidence that pilots were documenting in regard to problems with the 737 MAX. Boeing also favoured a simple explanation – that pilot error was the cause – rather than seeking to understand the realities of the complex external environment and their interface with that environment. In doing so, they lost an opportunity to understand the problem and address it before it killed 346 people.

Serial	Date	Type	Tail N°	Fatal	Time	Environment	Segment	Current	Likely Cause
1	28 Apr 77	F-111C	A8-136	No	Day	Land	Cruise	Yes	Material (fire)
2	29 Sep 77	F-111C	A8-133	Yes	Day	Land	Target	Yes (pilot limited experience)	Environment (birdstrike)
3	25 Oct 78	F-111C	A8-141	No	Day	Maritime	Target	Yes	Material (fire)
4	24 Aug 79	F-111C	A8-137	No	Day	Land	Take-off	Yes (pilot limited experience)	Human (late abort)
5	28 Jan 86	F-111C	A8-139	Yes	Night	Maritime	Target	No	Human (CFIT)
6	02 Apr 87	F-111C	A8-128	Yes	Night	Land	Target	Yes (limited experience)	Human (CFIT)
7	13 Sep 93	F-111C	A8-127	Yes	Night	Land	Target	No	Human (CFIT)
8	18 Apr 99	F-111G	A8-291	Yes	Night	Maritime	Target	Yes	Human (CFIT)
9	18 Nov 87	AF/A-18	A21-104	Yes	Night	Land	Target	No (limited experience)	Human (CFIT)
10	02 Aug 90	AF/A-18	A21-42	Yes	Day	Land	Target (air-to-air)	Yes (AVMED uncurrent)	Human (collision)
11	05 Jun 91	AF/A-18	A21-41	Yes	Day	Land	Cruise	Yes (AVMED uncurrent)	Human (aeromedical)
12	19 May 92	AF/A-18	A21-106	Yes	Day	Land	Target	Yes (limited experience)	Human (CFIT)

Sifting Through the Evidence[27]

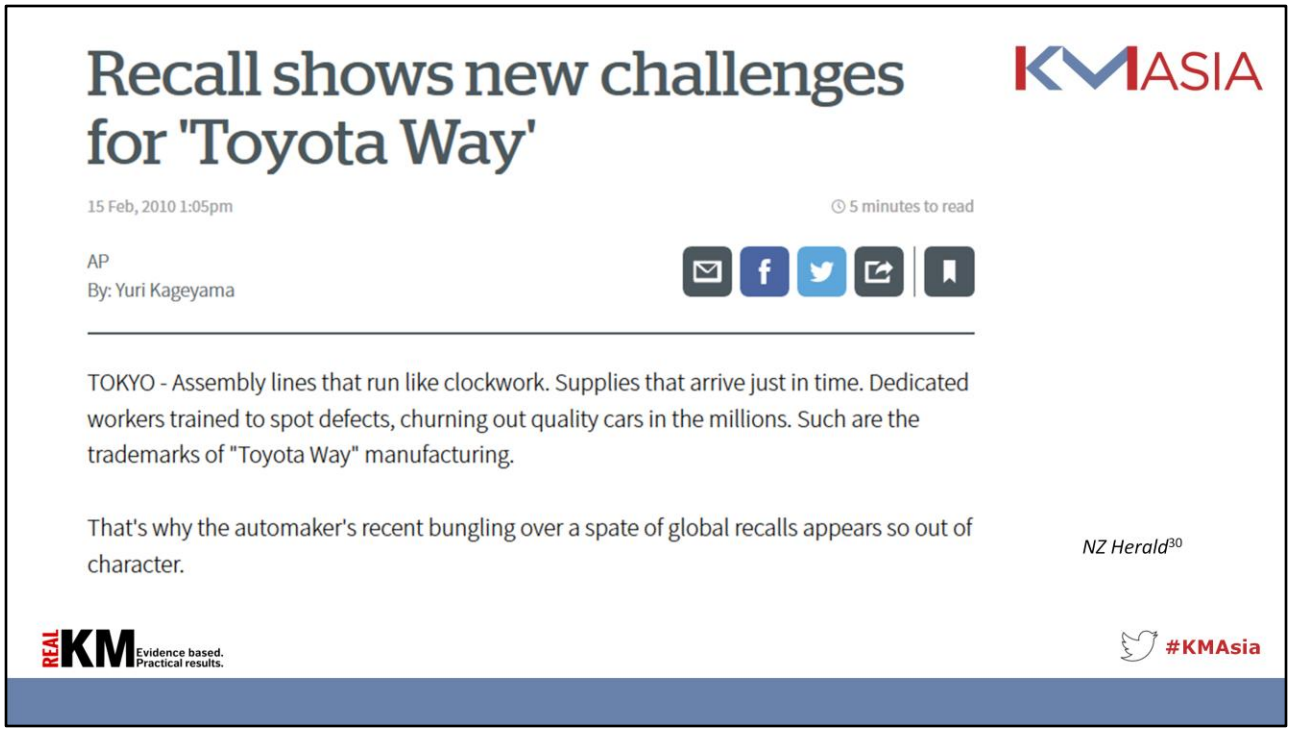
And, disturbingly, it appears that the aviation industry has long failed to effectively address the complex external environment in which aircrew interact with increasingly complicated aircraft systems. The findings of a report analysing the causes of crashes of RAAF F-111C and AF/A-18 aircraft dating back to 1977 bear a striking similarity to the Boeing 737 MAX situation. The RAAF F-111C was the aircraft that I worked on in the late 1980s. The report states that: “Nearly all of the RAAF F-111 and AF/A-18 fatal accidents that have occurred to date can be attributed to some extent to crews not being fully aware of the situation or the environment around them. Four of the five F-111 and two of the four AF/A-18 fatal accidents could be classified as CFIT — these CFIT accidents (apart from one of the AF/A-18 accidents) were at night. Additionally, all of these accidents have been in the target area (or area of engagement). This is where crew workload is at its highest level, and in the case of multi-crewed aircraft, where crew communication and co-ordination tends to break down. Any distraction, or the planned events not going as expected, can have dire consequences, particularly when operating close to the ground where there is little margin for error.” The risk of future crashes is likely to progressively increase over time as a result of ongoing exponential increases in the amount of air travel worldwide (https://data.worldbank.org/indicator/IS.AIR.PSGR), which has implications for the experience level of pilots (https://www.express.co.uk/travel/articles/924762/future-of-travel-flight-safety-pilots).

Let's now turn to the final of the three fables, the Fable of the Quality Paradigm. In this fable, we move from aircraft to another fundamental form of human transport – the car. Just like aircraft, cars have been becoming progressively more and more technologically advanced, to the point where we are now experimenting with autonomous and self-driving cars (https://www.techpats.com/self-driving-autonomous-difference/). Automotive drive systems are becoming simpler with the emergence of electric vehicles which have far fewer moving parts than internal combustion engines. However, autonomous and self-driving cars have a highly complex relationship with the external environment, and depending on the level of automation of a particular car, also with the driver. For example, cars operating in self-driving mode have been involved in fatal accidents as a result of inadequate care and attention by the driver (see https://www.theguardian.com/technology/2018/mar/31/tesla-car-crash-autopilot-mountain-view and https://www.theguardian.com/technology/2018/mar/29/uber-settles-with-family-of-woman-killed-by-self-driving-car).



US National Highway Traffic Safety Administration[29]

Further, as cars have become more technologically advanced, the number of vehicle recalls has also grown over time. Recalls are where the maker of a vehicle issues a notice for the vehicle to be returned to the maker's service agent to have a defect repaired.



Looking at a high-profile example of these recall incidents, we find a strikingly disturbing similarity to the Boeing 737 MAX situation. Between 2009 and 2011, Toyota carried out three recalls related to unintended vehicle acceleration that had caused accidents, with millions of vehicles recalled (https://en.wikipedia.org/wiki/2009%E2%80%9311_Toyota_vehicle_recalls).

Toyota CEO apologizes for recall, accidents

KMASIA

Toyoda, the automaker's 53-year-old chief executive, says the company grew too fast to keep up with safety controls. ***Toyota Etios*** | ***Toyota recall: Full Coverage***

Agencies | Feb 24, 2010, 07.33 PM IST

Save

0 Comments

A+

WASHINGTON: Akio Toyoda, scion of the beleaguered Toyota empire, is apologizing Wednesday before a House committee investigating deadly flaws that sparked the recall of 8.5 million cars.

Toyoda, the automaker's 53-year-old chief executive, says the company grew too fast to keep up with safety controls.

The Economic Times[31]

REAL KM Evidence based. Practical results.

#KMAsia

As has happened in regard to the Boeing crashes, Toyota had released vehicles into the market that weren't safe, then failed to appropriately respond to the issues drivers of its vehicles were raising, leading to the company being the subject of a US Government investigation, and the CEO publicly apologising for the faults and the accidents they had caused. Just like Boeing, Toyota's reality was an illusion. But what makes matters arguably worse is that Toyota pioneered "The Toyota Way", which is "a system designed to provide the tools for people to continually improve their work" (https://en.wikipedia.org/wiki/The_Toyota_Way). The Toyota Way is often lauded by knowledge managers, but as is the case with Boeing's processes, The Toyota Way is internally focused to the neglect of the complex external environment and Toyota's interface with that environment.

Another example is the current and ongoing Takata airbag recall. The Takata recall is one of the largest consumer product recalls ever, affecting tens of millions of vehicles worldwide.

"Takata should refine its process for identifying quality-related problems … and make better use of the information that it collects … The roles and duties of those employees responsible for responding to externally raised quality issues should be formalized and specific processes should be put in place governing how those teams manage (and elevate, if necessary) potential quality problems when identified. Those processes should put a premium on timely and accurate reporting. Takata should also explore the possibility of engaging in some form of independent in-fleet monitoring and put a system in place that allows the data it collects on product performance to be systematically studied."

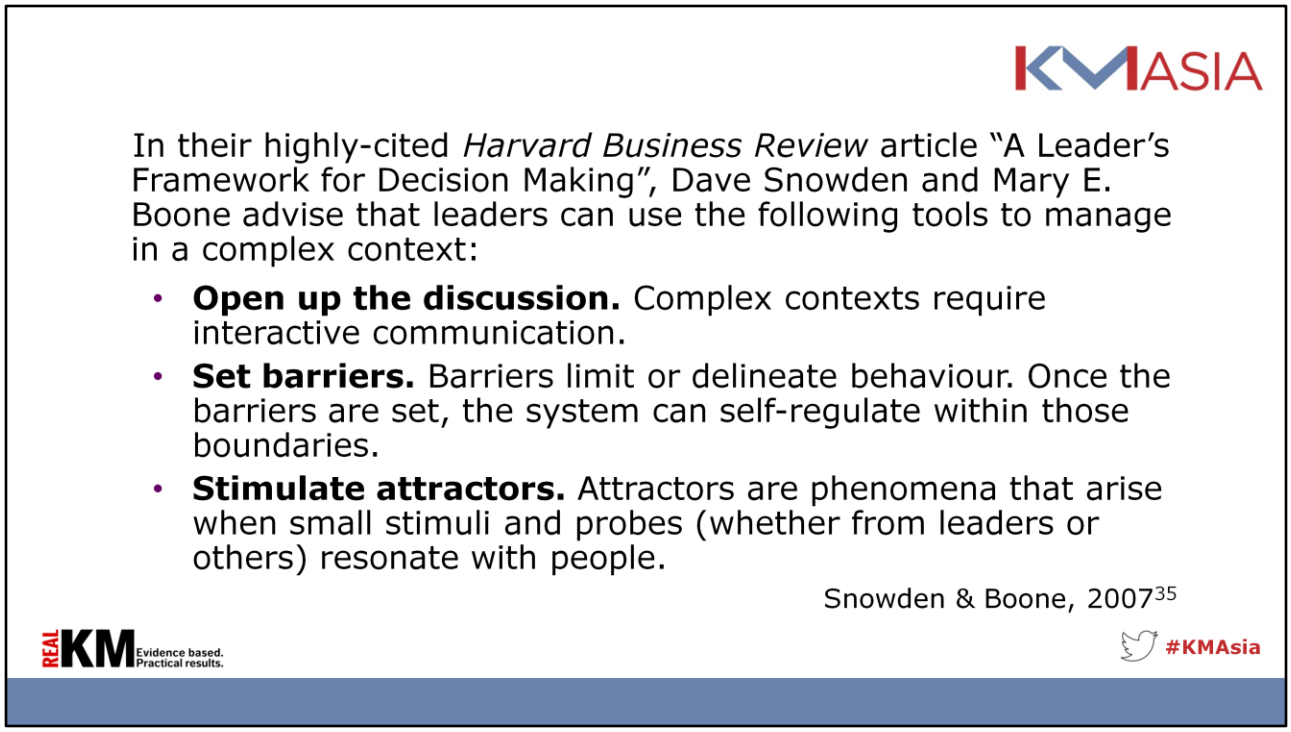
Independent Takata Corporation Quality Assurance Panel, 2016[33]

This 2016 recommendation from the Independent Takata Corporation Quality Assurance Panel highlights the complexity of Takata's external environment and the company's interface with that environment.

"Many of Takata's competitors decided not to use ammonium nitrate because of the risks it involved. However, Takata was confident about its engineering and manufacturing expertise and in being able to tackle any quality problems that arose and make improvements. Therein lies the genesis of Takata's problems, including possibly leading it to manipulating test data. You have the challenge to that engineering culture and confidence as well as the risk of embarrassment and criminal prosecution when the problems begin to emerge. It's not surprising that companies want to block out any evidence that these deeply held beliefs in the rightness of what they were doing were wrong, as well as wanting to hide wrongdoing."

Knowledge@Wharton[34]

And Wharton University management professor John Paul MacDuffie alerts that, just as has been the case with Boeing and Toyota, cognitive biases created the situation where Takata's reality has in fact been an illusion.



So, how do we appropriately respond to the complex external environment in which people interact with increasingly complicated technological systems? In their highly-cited *Harvard Business Review* article "A Leader's Framework for Decision Making", Dave Snowden and Mary E. Boone provide guidance in regard to understanding and responding to complexity. Dave Snowden is the creator of the Cynefin framework, a very well-known and highly-regarded decision and analytical framework that I referenced earlier in this presentation. As well as having become an institution in knowledge management, Cynefin has been widely applied, for example in project management and IT design.

KMASIA

- **Encourage dissent and diversity.** Dissent and formal debate are valuable communication assets in complex contexts because they encourage the emergence of well-forged patterns and ideas.
- **Manage starting conditions and monitor for emergence.** Because outcomes are unpredictable in a complex context, leaders need to focus on creating an environment from which good things can emerge, rather than trying to bring about predetermined results and possibly missing opportunities that arise unexpectedly.

Snowden & Boone, 2007[35]

REAL KM Evidence based. Practical results.

#KMAsia

ls project co-ordi

e off
com-
ordi-

pro-
down
ilical

lidon
atton
and

been
n for

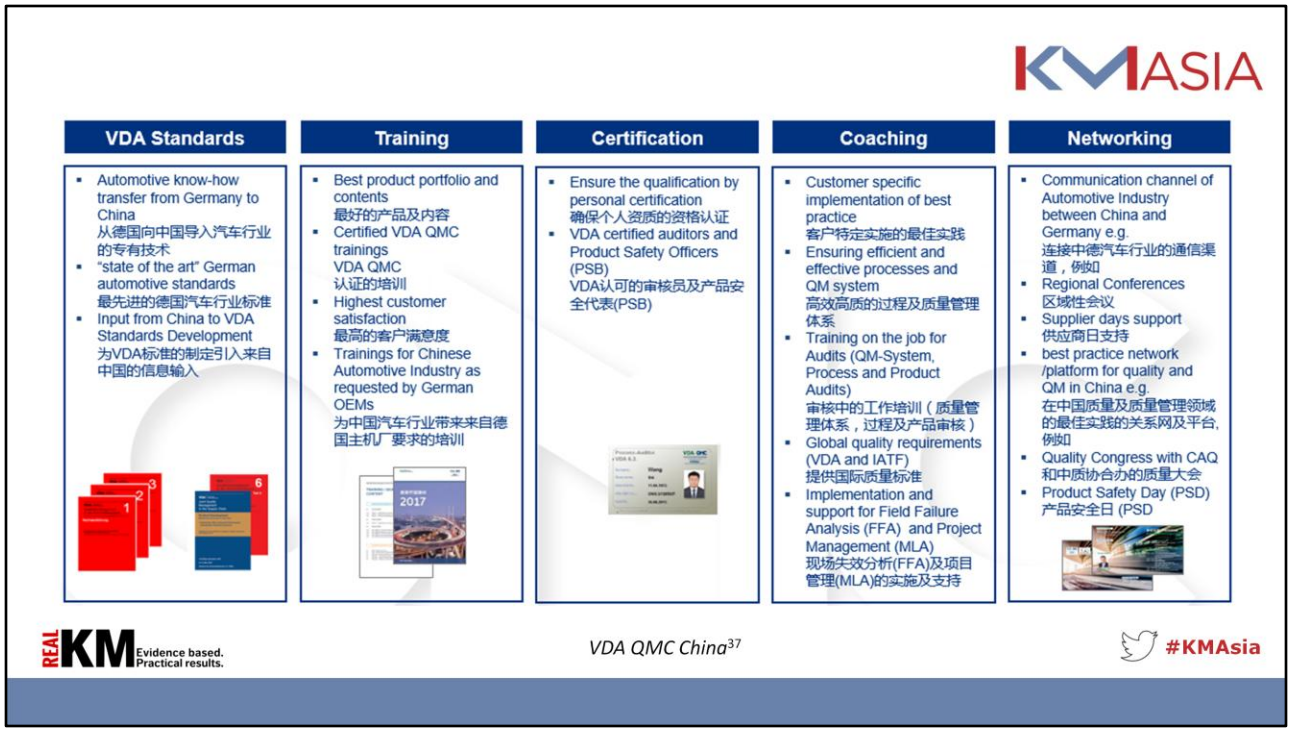
Chairman of council's planning and development committee, Cr Dave Mayo, described Mr Boyes' effort as project co-ordinator as a "wonderful job", highlighting his commitment to a high degree of consultation and involvement from all parties.

"The manner in which he has undertaken the Helidon Hills project is as important as what he has done," Cr Mayo said.

The project has incorporated the whole spectrum of issues relevant to sustainable management, including landholders' rights, nature conservation, cultural heritage, timber harvesting, farming, environmental tourism, sandstone, extractive and explosive industries, fire, water and property management as well as infrastructure and planning

Gatton Star[36]

A very effective way of using Snowden & Boone's tools is through the facilitation of multi-stakeholder engagement processes that allow organisations to (1) simultaneously and in real-time open up discussion, experiment and stimulate attractors, encourage dissent and diversity, and monitor for emergence; and (2) set barriers to delineate appropriate behaviour and establish boundaries for the system. I've had extensive experience in facilitating such processes to successfully address socio-ecological complexity, for example as this media article shows. Chinese mobile phone maker Xiaomi is also demonstrating the power of these processes in the context of digital transformation and innovation (https://blog.btrax.com/xiaomi-the-fan-economy-and-word-of-mouth-marketing/). It's appropriate at this point to talk about another aspect of the focus of this presentation – big data and analytics. I've included them because they are constantly referenced in discussions in regard to KM transformation, digital transformation, and innovation. But while big data and analytics can provide very useful insights to assist with the use of Snowden & Boone's tools, they should not be the primary focus. So please don't be captured by the vague hype and empty promises in regard to big data and analytics.



How to move forward on effectively addressing the external and external interface complexities faced by the aircraft and automotive industries? The automotive industry is shining a bright light ahead in this regard by embracing a strong quality paradigm. As this image from the German Automotive Association - VDA Quality Management Center (QMC) in China shows, standards and certification are key aspects of this quality paradigm. There's now the potential for the knowledge management community to align with this quality paradigm, with the new knowledge management standard ISO 30401 being recently published and the linked CILIP KM Chartership professional certification scheme about to be launched. There's also an increasing focus in knowledge management research on viewing knowledge management from a knowledge risks perspective. Through ISO 30401 linked to ISO 9001, there's the potential to be able to put in place knowledge management systems that can give effect to all of Snowden & Boone's tools for managing in a complex context.

So what are the moral truths of the Fable of the Quality Paradigm? As has happened with Boeing and the FAA, Toyota and Takata's realities were illusions divorced from the evidence. Cognitive biases and behaviours linked to those biases shrouded the complex external reality, so Toyota and Takata lost opportunities for understanding and effective action.

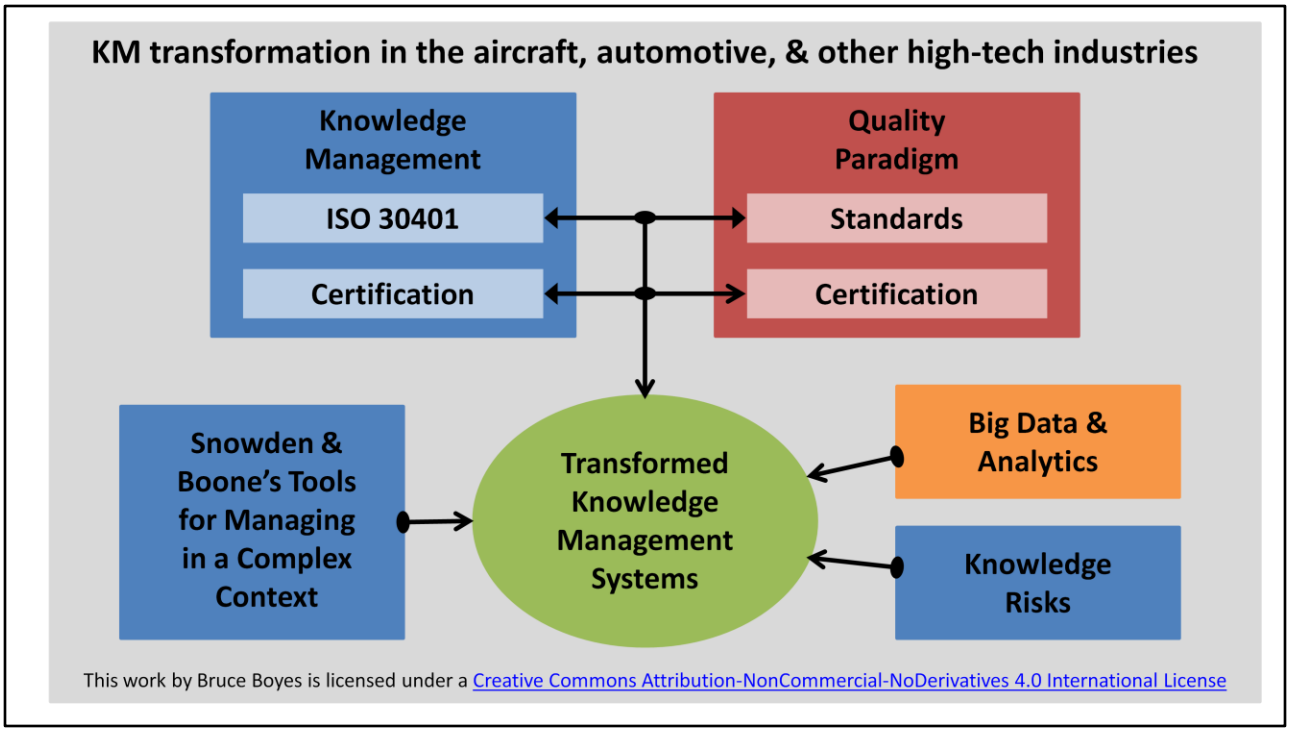
The Moral Truths

KMASIA

But, as we've seen, there's a way forward...

REAL KM Evidence based. Practical results.

#KMAsia


KM transformation in the aircraft, automotive, & other high-tech industries
Knowledge Management
ISO 30401
Certification
Quality Paradigm
Standards
Certification
Snowden & Boone's Tools for Managing in a Complex Context
Transformed Knowledge Management Systems
Big Data & Analytics
Knowledge Risks
This work by Bruce Boyes is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License

For more information in regard to complexity, ISO 30401, and professional certification for knowledge managers, please visit the RealKM Magazine website. RealKM Magazine articles relevant to this presentation include:

1. Exploring the science of complexity series https://realkm.com/exploring-the-science-of-complexity-series/
2. Case studies in complexity series https://realkm.com/case-studies-in-complexity-series/

I've made my own digital transformation to no longer using business cards, so feel free to connect with me on LinkedIn (left-hand QR code) or WeChat (right-hand QR code).

References:

1. http://chinavista.com/experience/fable/fable.html
2. https://commons.wikimedia.org/wiki/File:Shenzhen-centreville.jpg, CC BY-SA 3.0
3. https://www.techrepublic.com/article/shenzhens-transformation-from-chinese-fishing-village-to-global-gadget-factory/
4. Bontje, M. (2014). Creative Shenzhen? A Critical View on Shenzhen's Transformation from a Low-Cost Manufacturing Hub to a Creative Megacity. *International Journal of Cultural and Creative Industries*, *1*(2), 52-67. https://www.researchgate.net/profile/Marco_Bontje/publication/261771561_Creative_Shenzhen_A_critical_view_on_Shenzhen%27s_transformation_from_a_low-cost_manufacturing_hub_to_a_creative_megacity/links/5992f962458515c0ce61e9f5/Creative-Shenzhen-A-critical-view-on-Shenzhens-transformation-from-a-low-cost-manufacturing-hub-to-a-creative-megacity.pdf
5. Ma, H. (2006). *"Villages" in Shenzhen—Persistence and Transformation of an Old Social System in an Emerging Mega City* (Doctoral dissertation, Bauhaus University, Weimar, Germany). https://d-nb.info/1115337211/34
6. https://commons.wikimedia.org/wiki/File:Cognitive_bias_codex_en.svg. CC BY-SA 4.0
7. Du, J. (2010). Shenzhen: Urban myth of a new Chinese city: Op arch i. *Journal of Architectural Education*. https://core.ac.uk/download/pdf/37949973.pdf
8. Xinos, J. (2003). *What Makes Techo's Tick? The Human Factor in ADF Aviation Maintenance Capability*. Chief of Air Force Aerospace Fellowship 2001, Royal Australian Air Force (RAAF) Aerospace Centre. http://airpower.airforce.gov.au/APDC/media/PDF-Files/Fellowship%20Papers/FELL23-What-Makes-Techo%E2%80%99s-Tick_-The-Human-Factor-in-ADF-Aviation-Maintenance-Capability.pdf
9. http://www.radschool.org.au/magazines/Vol39/Page5.htm
10. https://commons.wikimedia.org/wiki/File:F_111s_DF-ST-85-06905.jpg, Public Domain.
11. 1SQN photography unit, Bruce Boyes collection.
12. F-111 mid-life refit, *Air Force Today*, May 1996.
13. https://www.flightglobal.com/news/articles/lion-air-737-max-8-crash-confirmed-189-dead-453061/
14. https://www.thenational.ae/world/africa/ethiopian-airlines-flight-et302-crashes-en-route-to-kenya-killing-157-1.835173
15. https://www.washingtonpost.com/business/boeings-grounded-737-max-the-story-so-far/2019/04/02/059ab02a-5513-11e9-aa83-504f086bf5d6_story.html?noredirect=on&utm_term=.a25661613aa4
16. https://abcnews.go.com/International/boeing-ceo-admits-faulty-sensor-triggered-automatic-flight/story?id=62191006
17. https://www.technologyreview.com/s/613106/a-second-737-max-crash-raises-questions-about-airplane-automation

18. https://www.vox.com/2019/3/12/18262359/boeing-737-max-controversy-faa-trump
19. https://www.dallasnews.com/business/airlines/2019/03/12/boeing-737-max-8-pilots-complained-feds-months-suspected-safety-flaw
20. https://www.seattletimes.com/business/boeing-aerospace/failed-certification-faa-missed-safety-issues-in-the-737-max-system-implicated-in-the-lion-air-crash/
21. https://www.cnbc.com/2019/03/27/faa-boeings-737-max-to-face-heat-in-congress.html
22. https://www.washingtonpost.com/business/economy/pilots-say-they-were-in-the-dark-about-boeings-737-max-safety-update/2018/11/28/10b2da14-f339-11e8-aeea-b85fd44449f5_story.html?utm_term=.a39ed12ee069
23. http://www.boeing.com/news/frontiers/archive/2007/october/cover.pdf
24. https://voiceoverassistant.com/wp-content/uploads/2014/09/bellybutton.jpg
25. https://www.google.com/search?q=navel+gazing&client=firefox-b-d&tbas=0&source=lnms&sa=X&ved=0ahUKEwiswu2qwMHhAhWZyYsBHWK7CKMQ_AUICSgA&biw=1536&bih=710&dpr=1.25
26. https://www.foxnews.com/opinion/faa-vs-the-rest-of-the-world-boeings-737-max-8s-are-under-suspicion-but-is-the-pilot-or-plane-to-blame
27. http://www.pigzbum.com/accidents/sifting-through-the-evidenc.pdf
28. https://slate.com/technology/2019/03/boeing-737-max-crashes-automation-self-driving-cars-surprise.html
29. https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/2017_recall_annual_report_updated011818_0.pdf
30. https://www.nzherald.co.nz/motoring/news/article.cfm?c_id=9&objectid=10626326
31. https://economictimes.indiatimes.com/news/international/toyota-ceo-apologizes-for-recall-accidents/articleshow/5612494.cms
32. https://www.nhtsa.gov/equipment/takata-recall-spotlight
33. http://cdn.gonorthwebsites.com/849924ae5f53e170e674a17a200c467e5f1f0dae/panel_report.pdf
34. https://knowledge.wharton.upenn.edu/article/dasher-macduffie-takata-airbags/
35. Snowden, D. J., & Boone, M. E. (2007). A leader's framework for decision making. *Harvard Business Review*, 85(11), 68. https://pdfs.semanticscholar.org/5e47/59be42661b101efab48e40ccd96e604c6450.pdf?_ga=2.67248977.1545413454.1553778859-804519981.1553167234
36. https://bruceboyes.info/wp-content/uploads/2010/11/Sustainable_Management_of_the_Helidon_Hills_Project_-_Media_article_at_completion.pdf
37. http://www.vdachina.com.cn/about.php