Academic year 2023 – 2024

Research, Innovation and Global Trends

RGIT:
next techs

(Session 4, Mar 11, 2024)

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Masters in Innovation and Research for Sustainability

Our conversation today

Starting a learning cycle

1. Antecipating change

   key issues and the scope for strategy?

2. Emerging tech

   several trends under analysis

Critical insight:

How to study emergente tech in practice.

- 1. What do we (think we) know …

Eye of Next Tech

topic acquisition for piloting the future

Section A: **Overarching Aspects**

Do you think it is possible to anticipate future developments in strategic innovation? (short answer)

Researching innovation?!

Motivations

- Possible to anticipate future developments, but with caution and flexibility
- Applying to the future studies like scenario planning or weak signal/wild card analysis
- Considering market trends, technological developments and competitive dynamics. . .
- . . .

Eye of Next Tech

Section B: **Among the topics listed below what do you think are the more relevant aspects to be addressed by policy makers in shaping policy (3 choices)?**

Among the topics listed below what do you think are the priority aspects to be addressed by policy makers in shaping policy (3 choices)? (select the answers by turning 3 of the options into bold)

Researching innovation?!

Motivations

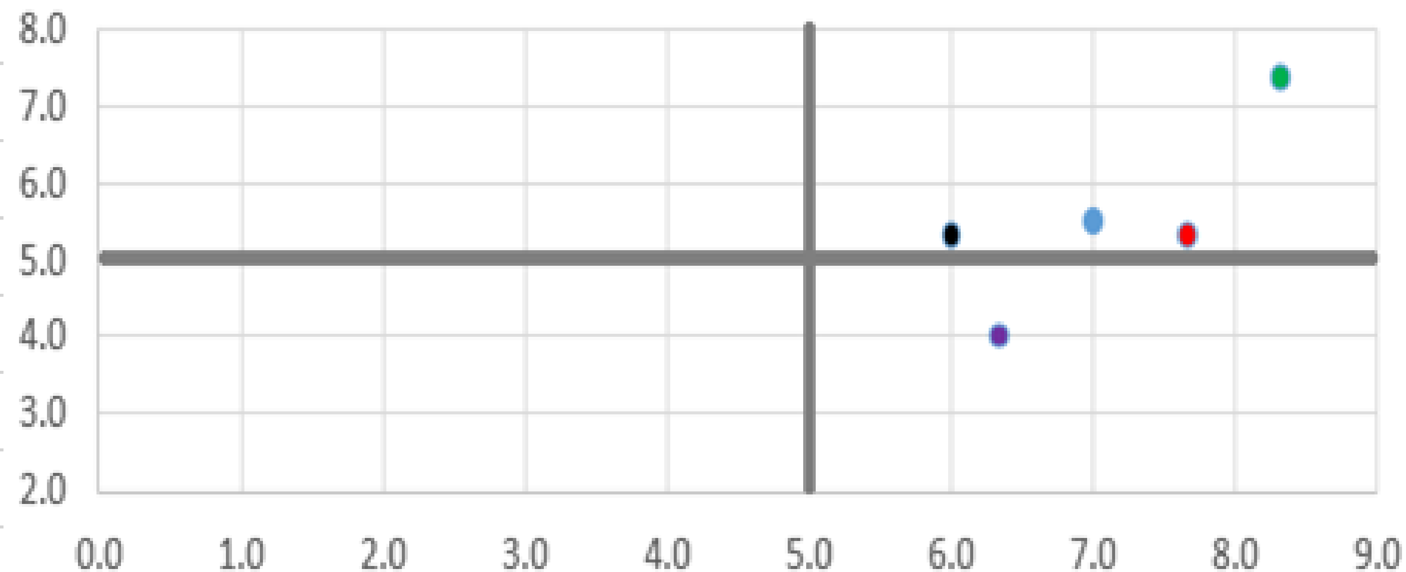
- Environmental protection
- Secure sustainable energy supply
- Societal wellbeing

Eye of Next Tech

Section C: Key challenges

Rate these examples?

	Importance	Uncertainty
6G	6.0	5.3
Batteries	7.7	5.3
Green H2	8.3	7.3
GNSS	6.3	4.0
Chips	7.0	5.5



but, …

do You see a problem?!


Fundado em 1864, o seu Arquivo é Tesouro Nacional

Diário de Notícias

www.dn.pt / Sábado 9.3.2024 / Diário / Ano 160.º / N.º 56 570 / €2,00 / Diretor José Júdice Diretor adjunto Leonídio Paulo Ferreira Subdiretores Ana Cáceres Monteiro e Filipe Garcia

SUSTENTABILIDADE

MOBILIDADE ELÉTRICA: PROBLEMAS COMEÇAM A SURGIR

ALANÇO Avarias frequentes
s autocarros elétricos,
peras de meses nas oficinas
roibição de veículos
micos nos centros urbanos
io a criar limitações à vida
noruegueses. Mas
ratégia *zero emissões* é
manter no país pioneiro
ansição energética:
ndas de elétricos já
nham para os 90% e
ndomínios são obrigados
alar carregadores. É uma
isão do que poderá
ecer em Portugal
década. PÁGS. 4-5

ONTEIRAS: SEF PERDEU FINANCIAMENTO EUROPEU E OBRIGA A AJUSTE DIRETO DE 25 MILHÕES PÁG. 10

EUA Um combativo Joe Biden abriu uma campanha eleitoral de oito meses PÁG. 17

ONDE ESTAVA HÁ 50 ANOS? VICENTE BATALHA ATOR, ENCENADOR, PROGRAMADOR CULTURAL PÁG. 3

BRASIL Fugas de prisões de alta segurança afetam imagem de Lula PÁG. 19

ANTÓNIO CARLOS CORTEZ *Um Fernando Pessoa, um Agostinho da Silva* PÁGS. 26-27

RECORDE *"Bitcoin é muitas vezes considerada o ouro 2.0"*, diz Nuno Lima da Luz DINHEIRO VIVO

SCANNER DA ÍRIS PROCESSO "NÃO É NADA CLARO" E PRIVACIDADE PODE ESTAR EM CAUSA PÁG. 12

Issues: Norway's

~50% vehicle fleet is electric

Electric buses may colapse at -13C

Or they make less trips

The buses have design problems

They can emit a burnt smell

Maintainence services (queus)

Problems with firefighting

Only EVs can circulate in city centre, so plumers do not go to the centre

Communes oblige house car plugs, even for those bus-obly users

That is: we see classic issues, such as technical and design gliches, complementary services, new infrastructure requirements, redistributional effects

- 2.

cases …

The scramble for semiconductors is our era's industrial Great Game

TECHNOLOGY

John Thornhill

The table stakes to play in the global semiconductor market keep spiralling upwards. This month, Taiwan Semiconductor Manufacturing Company, one of the world's leading chipmakers, said it would hike capital expenditure to as much as $44bn this year, almost three times more than 2019. South Korea's Samsung Electronics had previously signalled a hefty increase in semiconductor spending; the US manufacturer Intel this week announced it would invest $20bn in building two chip factories in Ohio.

One industry leader has likened the competition to gladiatorial combat in ancient Rome. "If you win, all that you have accomplished is the right to go to the Colosseum one more time," Cristiano Amon, chief executive of the US chip designer Qualcomm, told the FT.

But the semiconductor battles are not just being fought between gladiatorial companies desperate to supply booming demand for microchips but by strategically-minded governments intent on asserting technological superiority, too. Semiconductors, which run everything from smartphones to medical devices to F-35 fighter jets, have become the battleground for ferocious geopolitical rivalry as the US attempts to strengthen its technological hegemony and slow China's rise.

The fight to dominate the semiconductor industry is rapidly turning into today's industrial equivalent of the 19th-century Great Game, when rival powers clashed over Central Asia. Now, as then, the strategy is to secure resources and supply chains, pin down allies and deprive rivals of strategic assets. But the modern game is mostly about boosting intellectual capital, strengthening industrial capacity and pioneering the latest technology.

To that end, Gina Raimondo, the US commerce secretary, this week urged Congress to pass the Chips Act, which would unlock $52bn in subsidies to domestic chip manufacturing. In the EU, Ursula von der Leyen, the commission president, has also been pushing a similar Chips Act, aiming to double the bloc's production of semiconductors to 20 per cent of the global total by the end of the decade. The British government is also scrutinising the sale of the chip designer Arm Holdings to the US giant Nvidia on national security grounds.

> Battles are not just between gladiatorial companies but also strategically-minded governments

China, which spent more money importing semiconductors than oil in 2020, is being squeezed hard by US export constraints on advanced chips and has declared it a "whole-of-society" priority to achieve technological self-sufficiency. Lavish national and local funds have enabled China to vie with Taiwan and South Korea as the biggest buyers of semiconductor manufacturing equipment.

As intended, US export restrictions are hurting China and have significantly weakened the industrial giant Huawei. But, as Dan Wang, a Shanghai-based tech analyst at Gavekal Research, argues, they have also served to realign Chinese tech company's commercial interests with Beijing's national security imperatives and "make semiconductors sexy again". With a vast domestic market, daring entrepreneurs, a vibrant venture capital industry, a host of US-trained technologists and a flood of funding, China is switching its focus, brains and capital from the consumer internet to more strategic technologies. "The US government has turbocharged China's most dynamic firms to pursue economic self-sufficiency and technological greatness," says Wang.

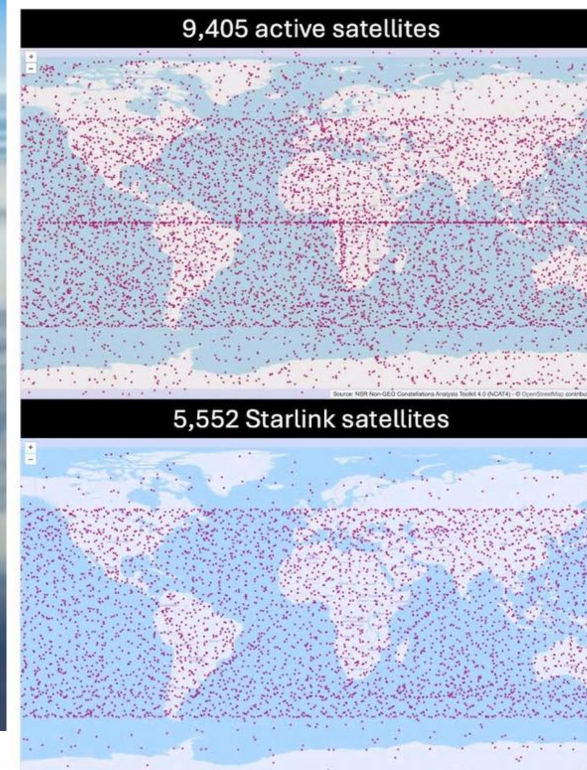
Still, Beijing's growing authoritarianism and a broadening crackdown on parts of the technology industry may sap China's entrepreneurial vigour. In her book *US-China Tech War*, the writer Nina Xiang describes how earlier state-directed, technological campaigns have not always ended well. It remains a formidable challenge for China to design and manufacture 3-nanometer chips like those the world's most advanced plants are planning. One of the most complex industrial processes ever invented, it requires the interplay of decades of technological experience and expertise. But, Xiang tells me, China does not necessarily need to reach the cutting edge of semiconductor technology to derive most of its benefits.

Strategic advantage can derive from deploying existing technologies effectively, not just developing the latest inventions. Basic state capacity will determine the outcome of the industrial Great Game as much as technological capability. And on that front, the US has reason to worry: it cannot even roll out 5G telecoms networks without messing up air travel. In the end, fixing core infrastructure at home may count for more than pursuing strategic technological advantage abroad.

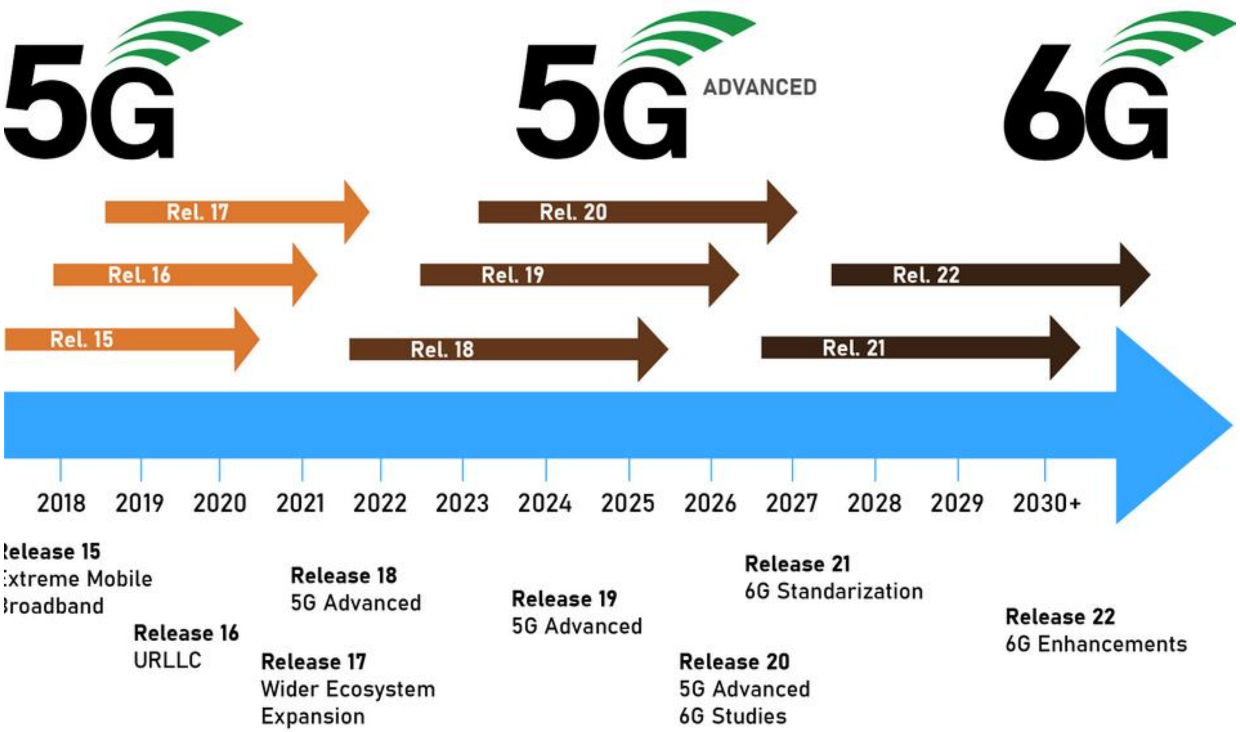
The writer is founder of Sifted, an FT-backed media site for European start-ups

Source: FT, 28 Jan 2022, p. 15

Starlink approaching 60% of all active satellites
As of March 10, 2024 and based on Celestrak data processed through the NCAT4 analysis toolkit, 59% of all active satellites belong to SpaceX:
- Active satellites include all satellites in LEO, MEO and GEO orbits used for communications, navigation, earth observation, weather and science.
- Starlink includes all orbiting SpaceX satellites, regardless if satellites have reached their destination altitude.



- 4. overviews…



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▶️Whilst early #5G adopters include #mobile operators in APAC & the US, India was the last of the jurisdictions surveyed to launch 5G services.

▶️5 out of the 16 jurisdictions surveyed are already preparing for #6G.

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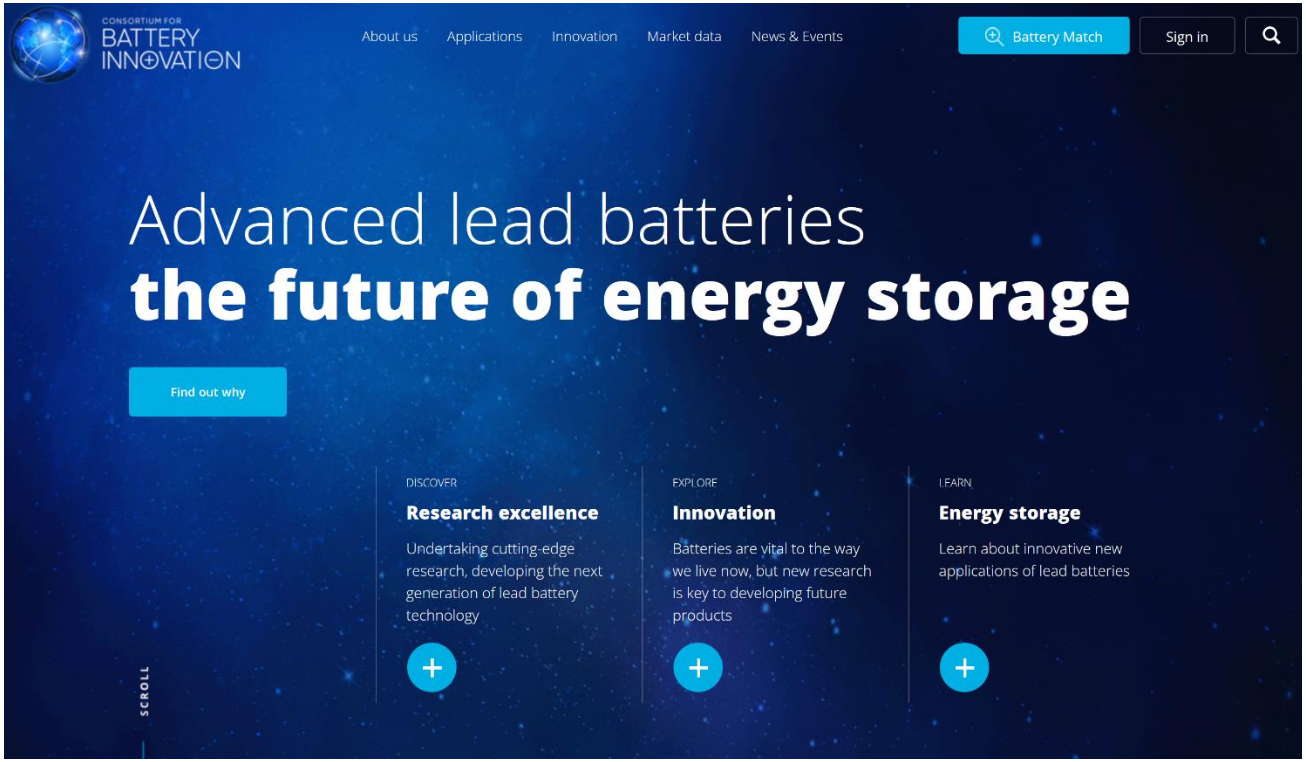

Dr. Stefan Wolf · Seguindo
Senior Innovation Consultant | R&D&I Strategy | ...
39 min ·

#Drones push lithium-ion batteries to their limits. The application is very challenging for batteries for several reasons:

#Energydensity: The weight must be as low and the gravimetric energy density as high as possible.
#Power: A lot of energy must be provided in a short time during take-off.
#Safety: The battery must be safe and must not fail in flight.
#ThermalStability: The battery must be able to provide the specified flight performance in all weather conditions and ambient temperatures.

Researchers at the Oak Ridge National Laboratory have now investigated how lithium-ion batteries react to short, intensive discharge pulses at 15 C.

The results show that the battery recovers after the intensive discharge pulse. However, the capacity for high discharge rates degrades quickly.

Although the batteries can then still be used in less challenging applications, they are no longer suitable for further flight operations. New battery technologies are needed.

Drones and other electric vertical take-off and landing vehicles (eVTOL) are an interesting field of application for future #solidstatebatteries, as high energy density is absolutely essential here. Hybrid solutions with #ultracapacitors could also be a solution.

Find the paper here: https://lnkd.in/eizktbyU

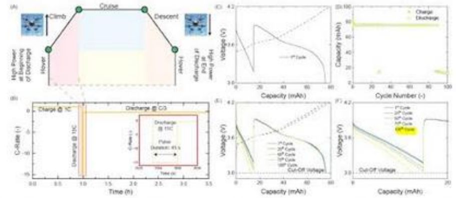

Figure 1. High power requirements in eVTOL load profiles and electrochemical behavior of lithium-ion batteries under simulated takeoff step. (A) Schematic diagram showing major segments of an eVTOL mission profile and the corresponding power requirements. We are interested in evaluating the behavior of lithium-ion batteries within the initial high-power segment of takeoff. (B) Current profile for the testing carried out in this study. Cells are charged at a nominal 1C rate until a full state-of-charge is achieved (4.2 V cutoff). At the beginning of discharge, a current pulse equivalent to 15C is applied for 45 s. Subsequent discharge is carried out at a nominal C/3 current. For the batteries investigated here, 1C corresponds to ~0.08 A, and 15C corresponds to roughly 1.2 A. (C) First charge–discharge cycle polarization curve with the dotted line showing the charge cycle and solid line depicting the discharge cycle. (D) Capacity retention of the cell over extended cycling under the simulated climb step discharge protocol. (E) Complete polarization curves and (F) zoomed in plot of the polarizations within the 15C discharge pulse segment for the 1st, 25th, 50th, 75th, and 100th cycles. The cut-off voltage of 3 V is identified by a dashed line in (E) and (F).