



**33<sup>rd</sup>** Annual **INCOSE**

international symposium

hybrid event

Honolulu, HI, USA

July 15 - 20, 2023

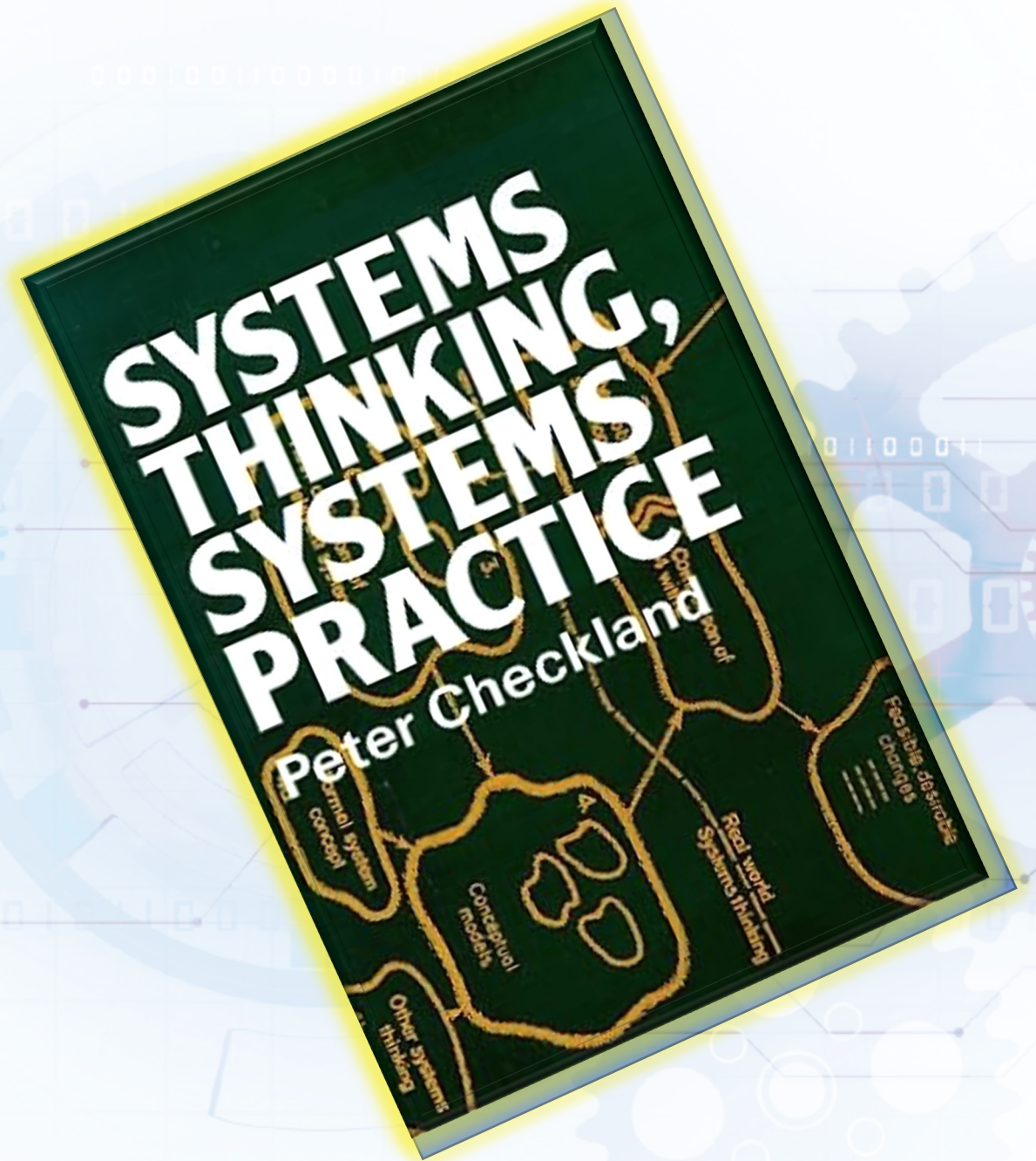


# Inspiring Systems Engineers: the Wonder Woman & Superman methodology ...different actions first

Sir Julian Young

@chf\_eng\_air









**Me & why I think the way I do**

**Reflections from a Chief Engineer**

**Why I'm a convert to systems engineering**

**Engineering landscape**

**Wonder Woman & Superman Methodology  
...different actions first**

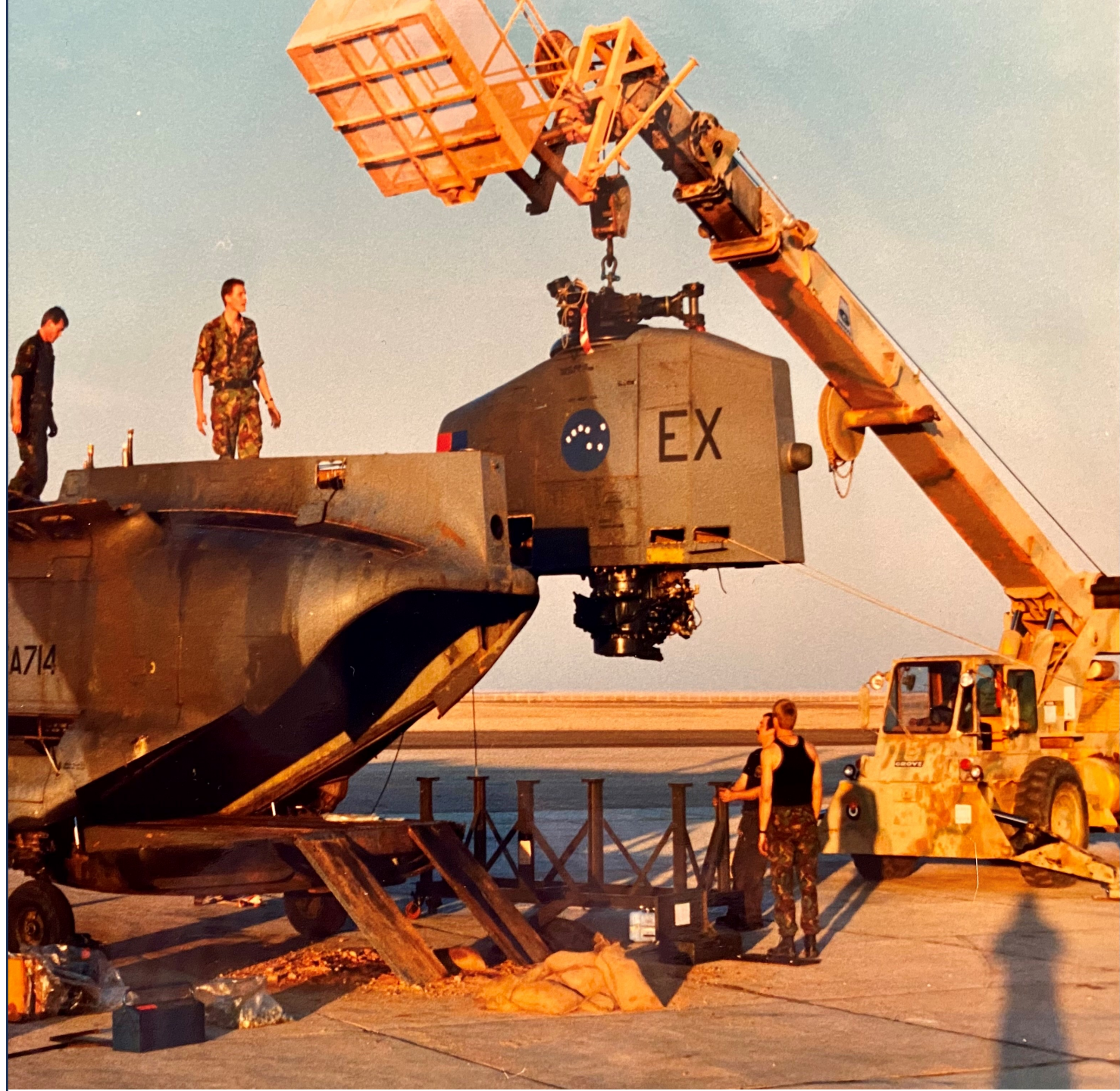


IET

The Institution of  
Engineers and Technicians











Defence Equipment & Support, UK Ministry of Defence  
*“To equip and support our Armed Forces  
for operations now and in the future”*













# Reflections of a Chief Engineer



- Comprises 3 roles:
  - Professional Engineer
  - Project Manager
  - Leader
- ...within a heavily regulated safety environment





# Reflections of a Chief Engineer



- Comprises 3 roles:
  - Professional Engineer
  - Project Manager
  - Leader
- ...within a heavily regulated safety environment
- What worked for me & what would I have done differently?





# 1 - Being good at your job

What  
worked



- Sad, but true: you can simulate the outcome of smart working by working harder
- Read the rules and understand them ...no, really understand them; then you can exploit them to your advantage
- Always drive for success; take responsibility; life is competitive, and so is teams' delivery of projects



## 2 - Making change stick

What  
worked



- Be an Engineer - be 'restless' - and never be content with the situation ...continually improve
- Use proven models, eg John Kotter's 8 steps to successful change - DO CX RITE<sup>©</sup>
- Always change the highest set of rules possible to embed into policy your great new idea





# 3 - Continually refresh your education

What  
worked

- Undergraduate education and professional training will not easily support a successful full, long-term career
- Technology refreshes required - regularly
- Over time, serious business acumen and programme management play a greater role in outputs and career progression







# 1 - Make more of fun opportunities

What to do  
differently

- People said I worked too hard
- Never been to 'RAF Ski Champs'; never good enough to play regular Station sport
- However, have always encouraged others to participate ...remember, engineering is a team sport







## 2 - Consider non-mainstream role

What to do  
differently



- I've always been an engineer - happy, but too narrow use of my engineering skills?
- Broaden career opportunities by utilizing good engineering skills in another branch or field
- However, remember your professional career anchor, and return/protect



### 3 - Don't pretend to be someone else

What to do differently



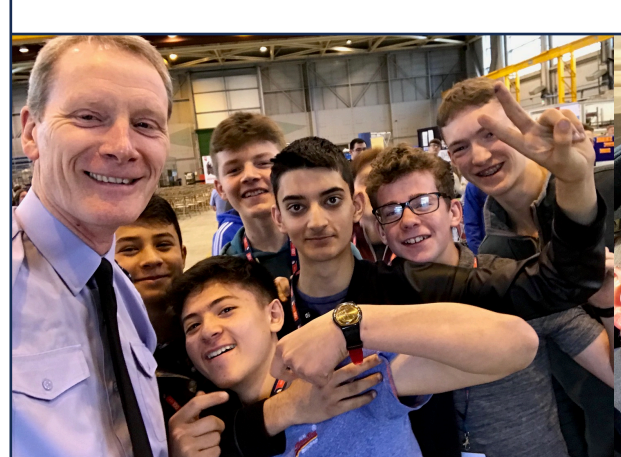
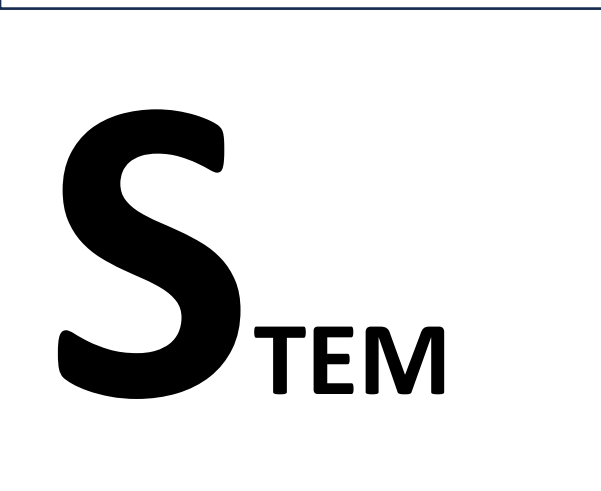
- Either stick to what you do best or consciously push yourself to adapt, openly
- Seek to use your softer skills to influence outcomes - mentoring & performance coaching versus straight transactional/transformational leadership
- Be comfortable in your own skin; today, the enlightened world encourages Diversity & Inclusion like never before



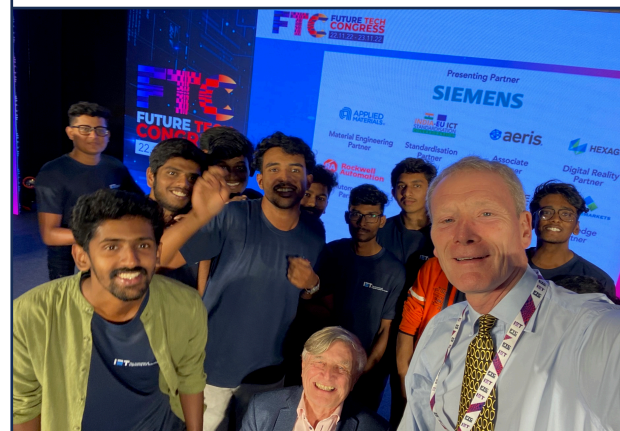
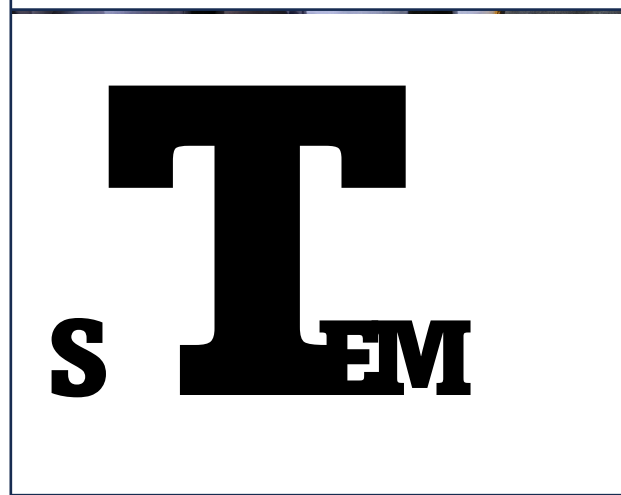


**Early responsibility for any  
Chief Engineer on appointment is to  
ensure a succession route to replace  
themselves...**





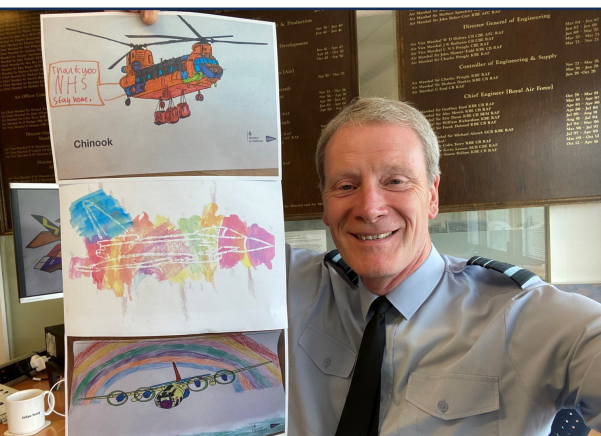
















# STEM & Inspiring ...a crowded activity

Institute of Engineering and Technology: **Inspiring the next generation** [of engineers]

Cranfield University: **Inspiring the next generation** - welcoming school children to engineering

UK Government: Year of Engineering - landmark campaign to **inspire the next generation** of engineers

Make UK, UK Manufacturing: **Inspiring the next generation** of women in engineering

University of Sunderland: Hosts engineering challenge to **inspire the next generation**

British Compressed Air Society: Award for **inspiring the next generation** of engineers

'New Scientist' magazine: How to **inspire the next generation** of engineers

STEM Learning: **Inspiring the next generation**. Engaging young people in engineering and technology

University of Portsmouth: Graduate features in book to **inspire the next generation** of engineers

IEEE Women: 'TryEngineering' - initiative to foster the **next generation** of technology innovators





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IEEE Women: 'TryEngineering' - initiative to foster the **next generation** of technology innovators

INCOSE: Fellows Awards - developing the **next generation** of successful systems engineers





# Scope for collaboration on STEM?



- **Collaboration** on shared values needs underpinning with a mix of **curiosity** and **creative** ideas with **courageous commitment**
- I think that working together could make a significant difference?





# Scope for collaboration on STEM?

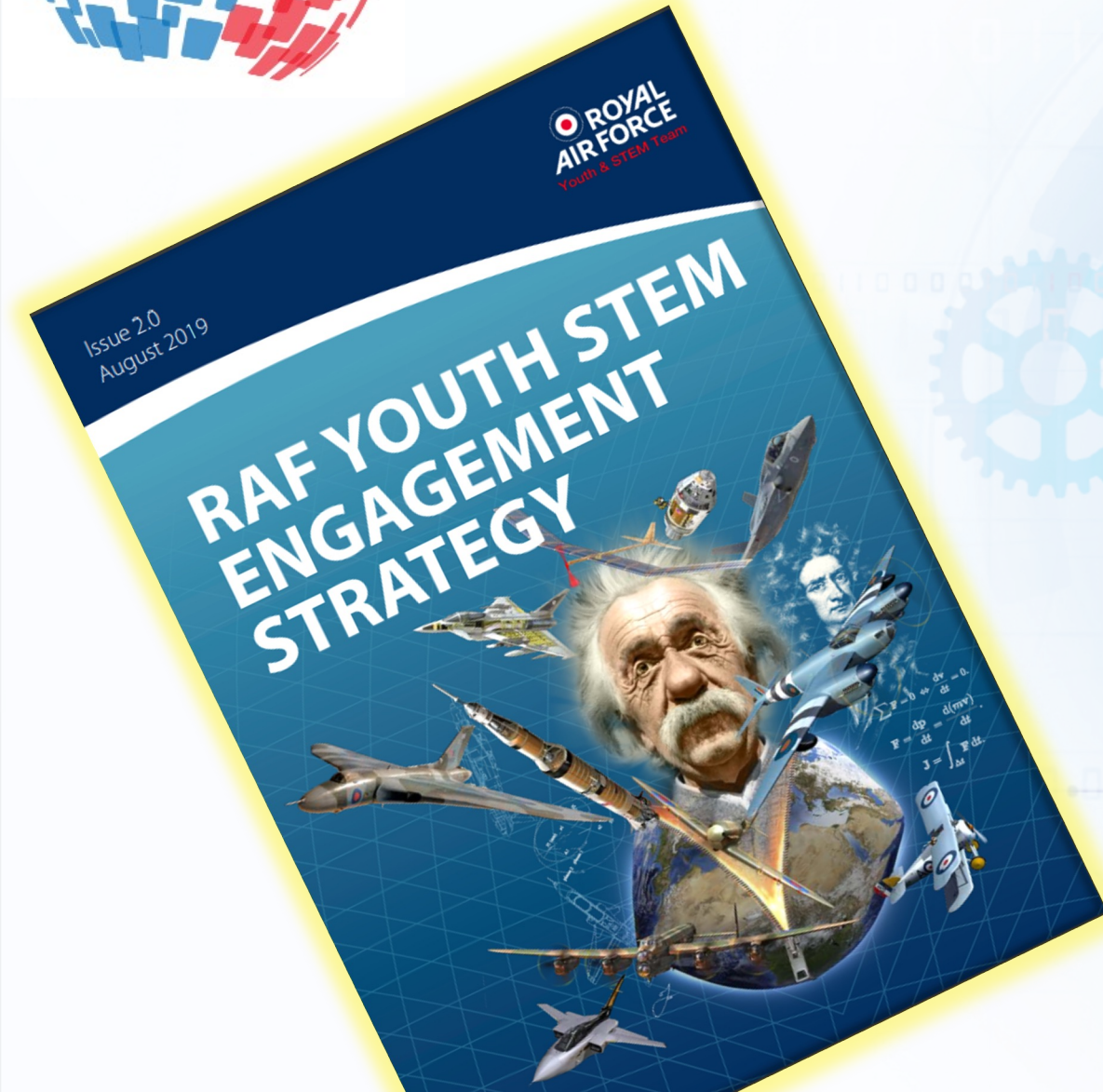


- **Collaboration** on shared values needs underpinning with a mix of **curiosity** and **creative** ideas with **courageous commitment**
- I think that working together could make a significant difference?
- “SE Vision 2035 can ... support **collaborative efforts** to advance the discipline and grow the skill base to meet current and future challenges related to systems development.”





# STEM & youth outreach



- If you are a young engineer, then inspire the next generation directly
- And if you are an old(er) engineer, then give permission to younger engineers to inspire the next generation indirectly
- Time and resource required...





**Complexity has converted me to  
Systems Engineering thinking...**







# Complexity has converted me to Systems Engineering thinking...

- Project CENTURION: rapid integration of 4 new weapons onto Typhoon to maintain national capability and allow ground attack specialist Tornado GR4 to retire and generate savings
- 4-nation programme for agile Eurofighter jet, including 4 nations' industry partners - focus on national workshare
- 42x interconnected computer systems, old design, with no delineation between flight safety and mission enabling software































# Engineering landscape (1) - shortfall in Engineers & influence

**“The US would need to increase its yearly production of undergraduate STEM degrees by 34% over current rates to match the demand forecast for STEM professionals.” - US President’s Council of Advisors on Science & Technology**

**“Between 2016 and 2026 there has been and will be a shortfall of 6 million engineers, or more.” US Bureau of Labor Statistics**

- UK shortfall of between 37,000 and 59,000 in meeting the annual core demand for engineering level 3+ skills
- 17% of UK job vacancies are in engineering, with almost 10% of these from expansion demand
- Fewer than 5% of UK FTSE250 company directors are engineers
- Engineers needed to enable global opportunities and solve the world’s most significant threat...













# Engineering landscape (2) - lack of understanding about engineers



Google image of an engineer

Common myths about engineers:

1. No social skills
2. Not creative
3. Love mathematics
4. Poor communication skills
5. Work in a predominantly male field
6. Don't start work until their 30s





# Focus on Strengths & Opportunities

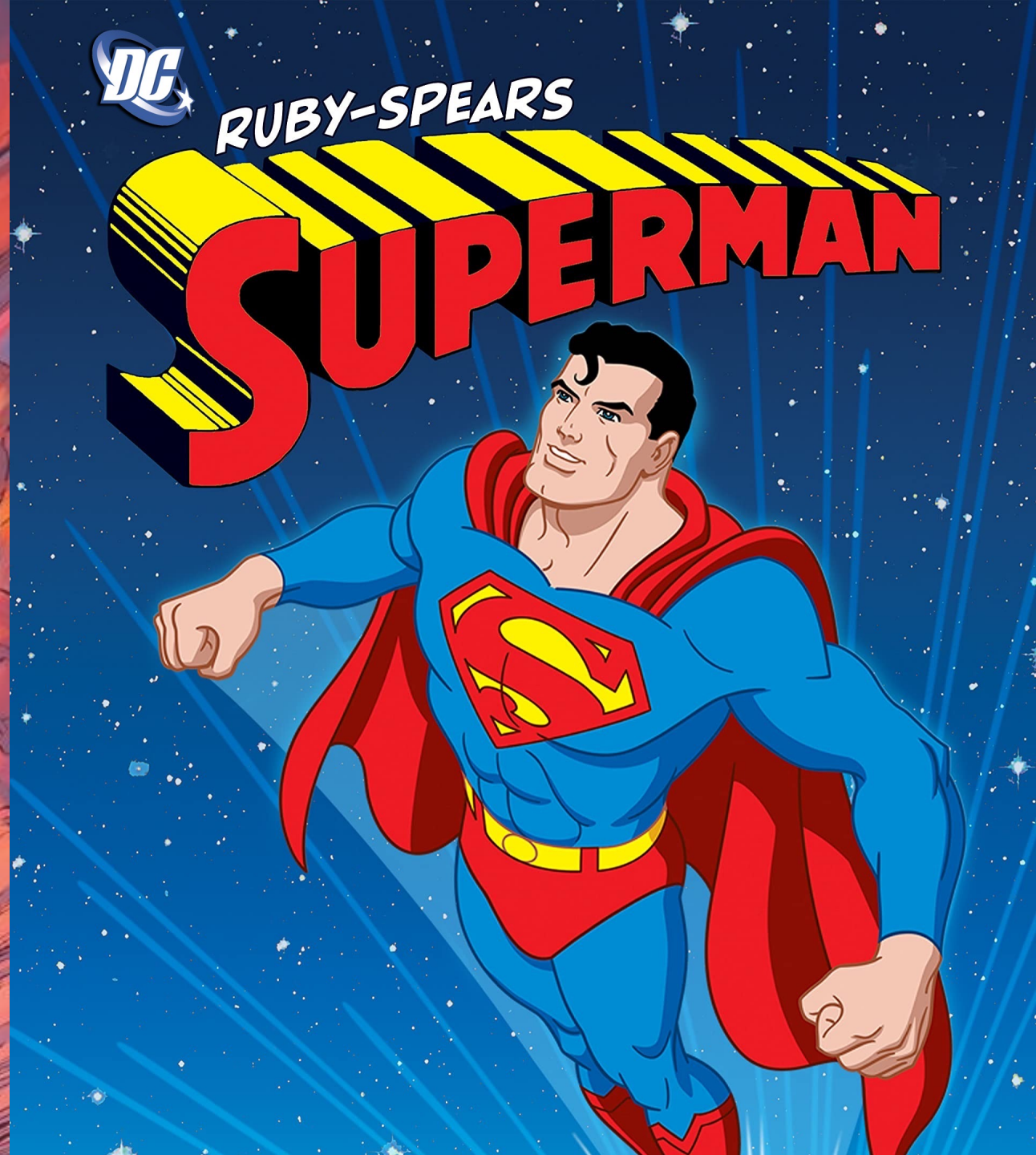
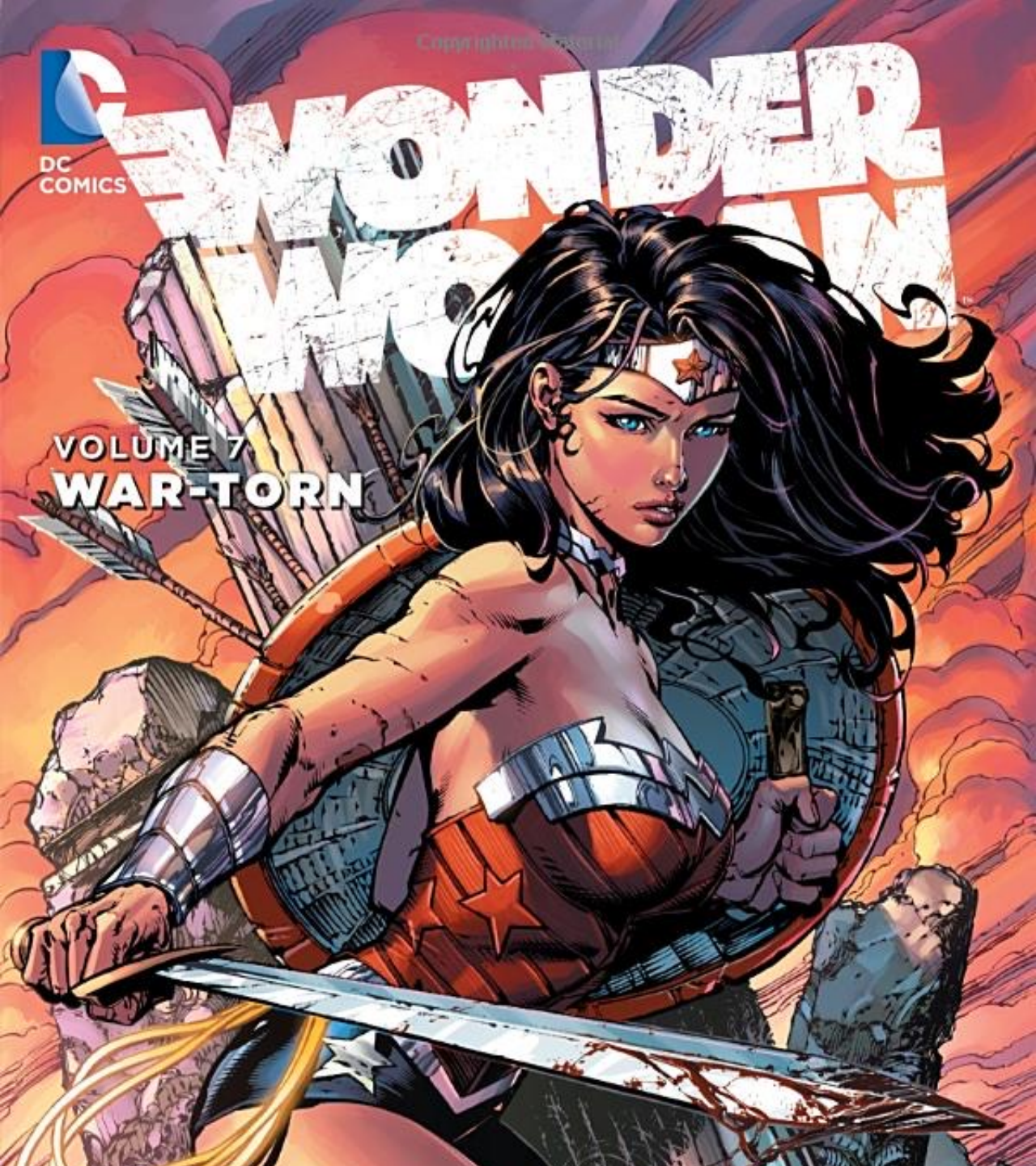
**SE Vision 2035: “Engineering solutions for a better world”**

**IET Vision: “Engineering a better world”**

**IMechE: “Improving the world through engineering”**

- Through collaboration we could change the common view of engineering
- Focus on key universal challenges
- Develop opportunities together to influence policy of Governments
- Beyond the Accords, seek common recognition of standards and enable international career mobility









# **‘Wonder Woman & Superman methodology’**



- Continue to be restless and continually improve something, everyday
- Deliver, deliver, deliver great solutions
- Don't be downhearted about missed or misplaced recognition
- Be confident that Engineers will realize the benefits of a digital future, and Engineers will deliver a sustainable future and fix the planet





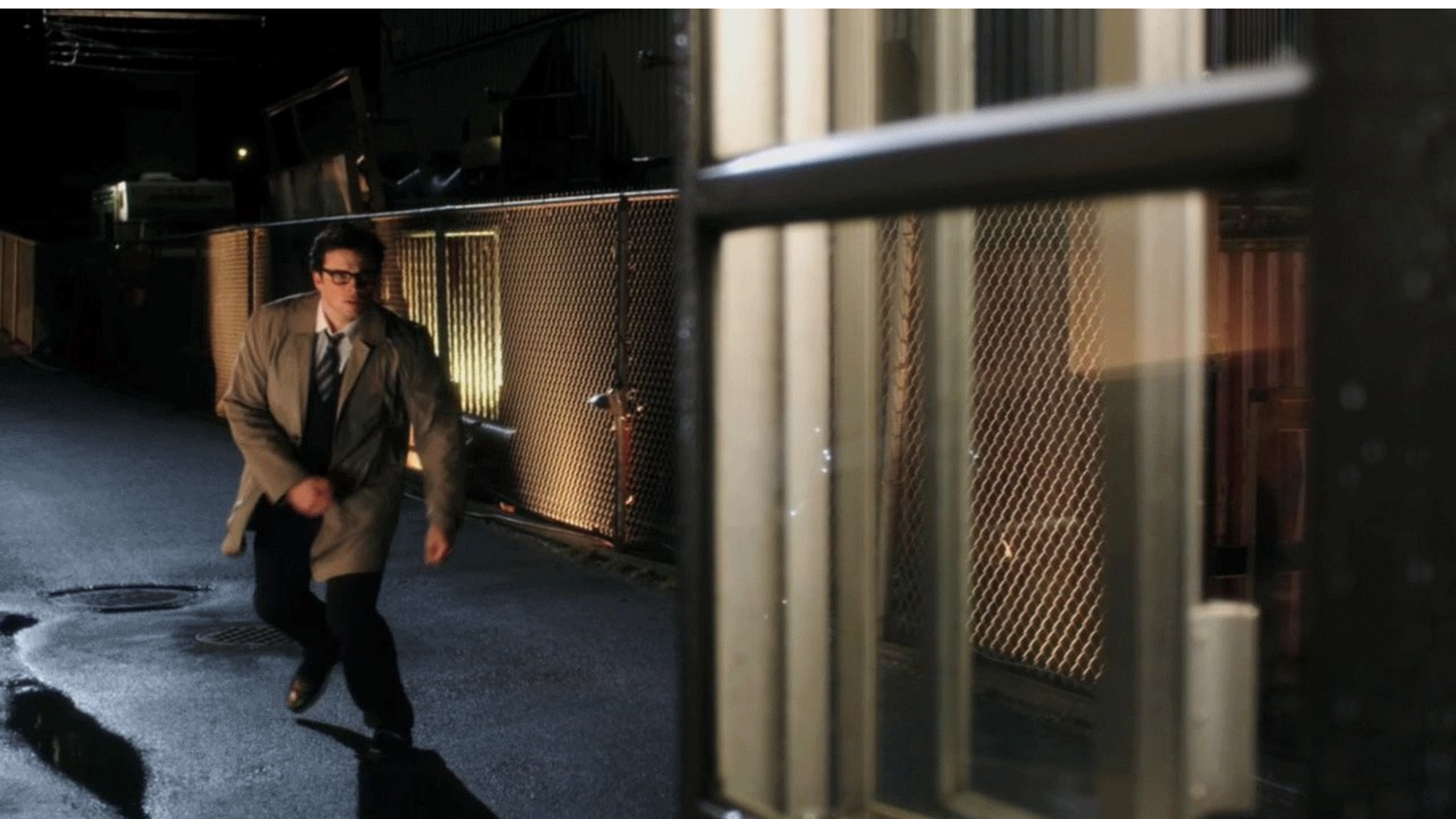
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- **Be overtly modest and inwardly proud:  
Engineers can be super-heroes when required!**















A row of red Royal Air Force jets, likely Red Bull Air Race planes, is parked on a wet tarmac. The wet surface reflects the sky and the aircraft. The sky is filled with large, white, fluffy clouds, and the sun is visible, creating a bright glow. In the background, there are dark, silhouetted mountains. The text "Any reflections from you?" is overlaid in the bottom left corner in a blue, serif font. Below it, the text "Any reflections from you?" is repeated in a lighter blue, serif font, but it is upside down and partially obscured by the first line of text.

Any reflections from you?

Any reflections from you?



