Experimentus
excellence in software quality management

The Ultimate Human Challenge

Presented on
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by

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Listen | Challenge | Understand | Interpret | Create

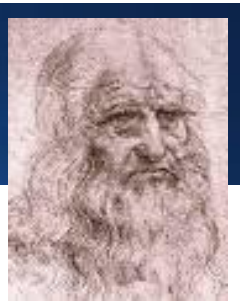
Some of our great past testers

- Leonardo da Vinci
- Isambard Kingdom Brunel
- Chuck Yeager
- Yuri Gagarin
- Andy Green

Leonardo da Vinci

- 1452 – 1519 (aged 67)
- Well known for his paintings, sculptures, inventions
- Substantially ahead of his time in both his thinking and ideas
- Many of his original ideas exist with us today in updated format.....

Leonardo da Vinci inventions include..



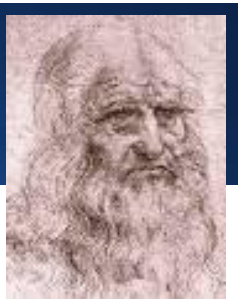
Military machines

- the armoured tank
- battleships and submersibles
- catapults and crossbows
- cannons and machine guns
- scythed chariots

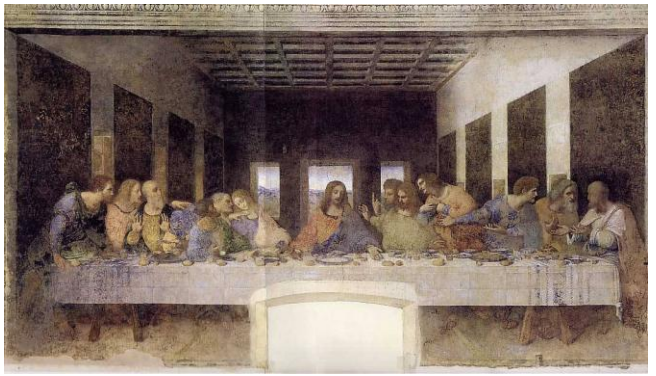
Civil machines

- clocks and cranes
- diving gear
- flying machines
- land vehicles
- parachute
- water pumps
- printing press
- *and others…….*

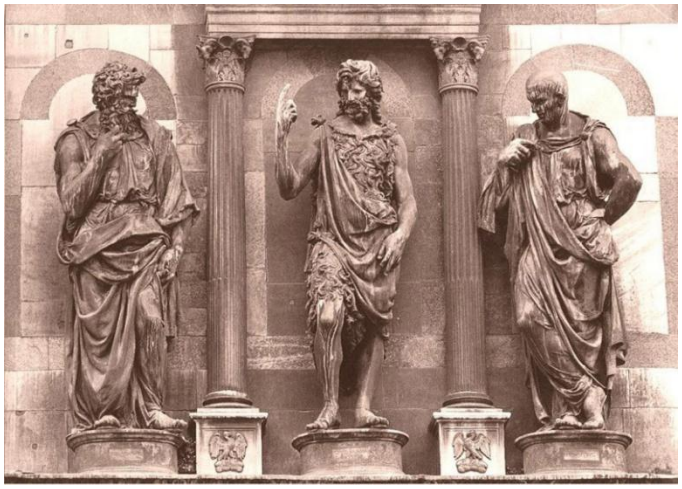
Leonardo da Vinci



- Artworks
  - Mona Lisa
  - Last supper
  - Baptism of Christ etc…
    - A total of 27 works of art

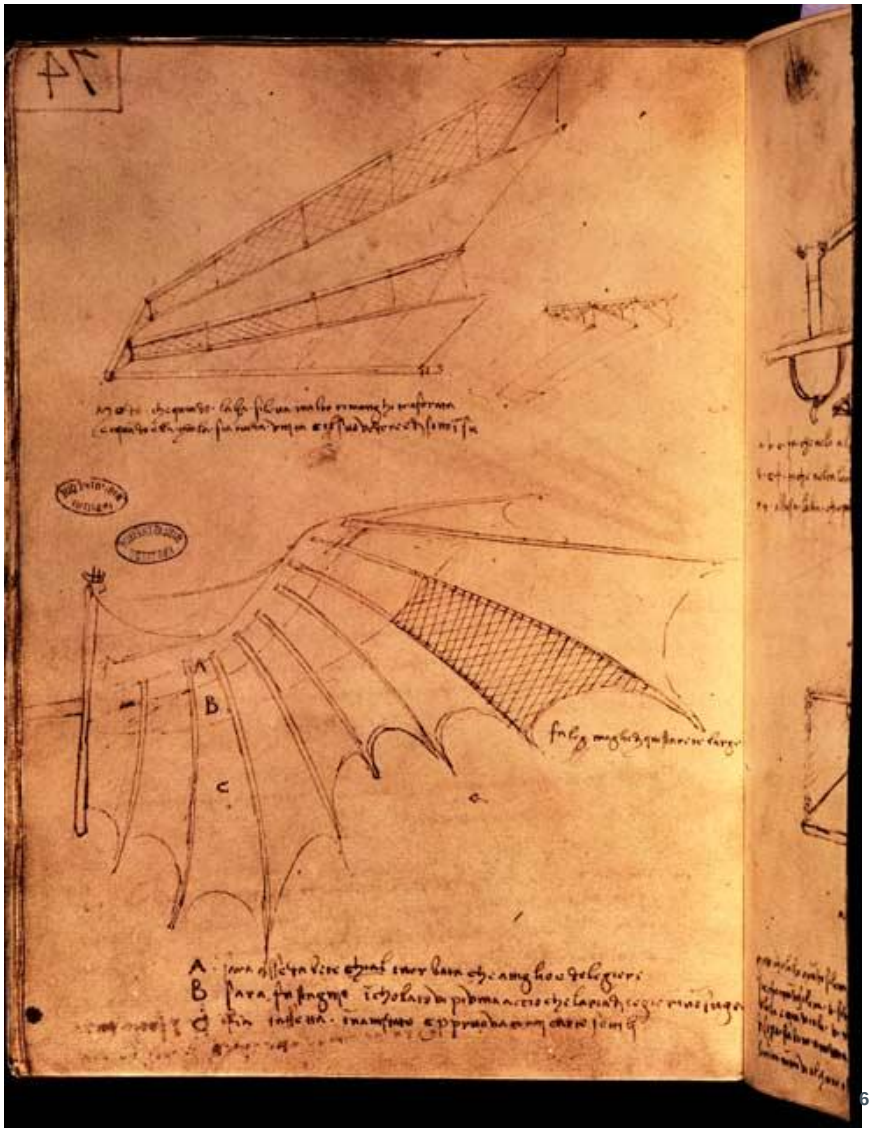


- Sculptures
  - Triad sculpture
  - Equestrian statue



Leonardo da Vinci - Wing

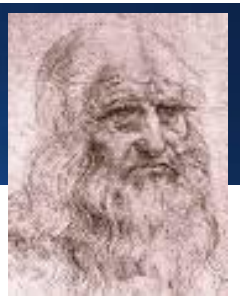
- A major flaw in his thinking was to assume man had enough power and co-ordination to copy birds
- There was a misunderstanding how a bird's wing works and he clearly did not understand theory of lift
- Test rig had 1 wing – big flaw!
- The tester was an apprentice who broke his leg!



Leonardo da Vinci - Helicopter

- Created an inefficient helical screw
- His concepts played an important role in future helicopter design by Igor Sikorsky
- Mirror writing was early form of encryption

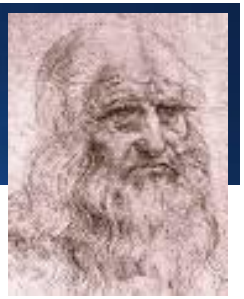
What made him great



What can we learn?

- Keen observer
  - watch the world around us to gain ideas and experience of tests you should consider performing
- Lateral thinker
  - think outside the box. Don’t always go for the obvious. One of the traits of a great tester.
- Skilful
  - ongoing development of your craft through practise and learning

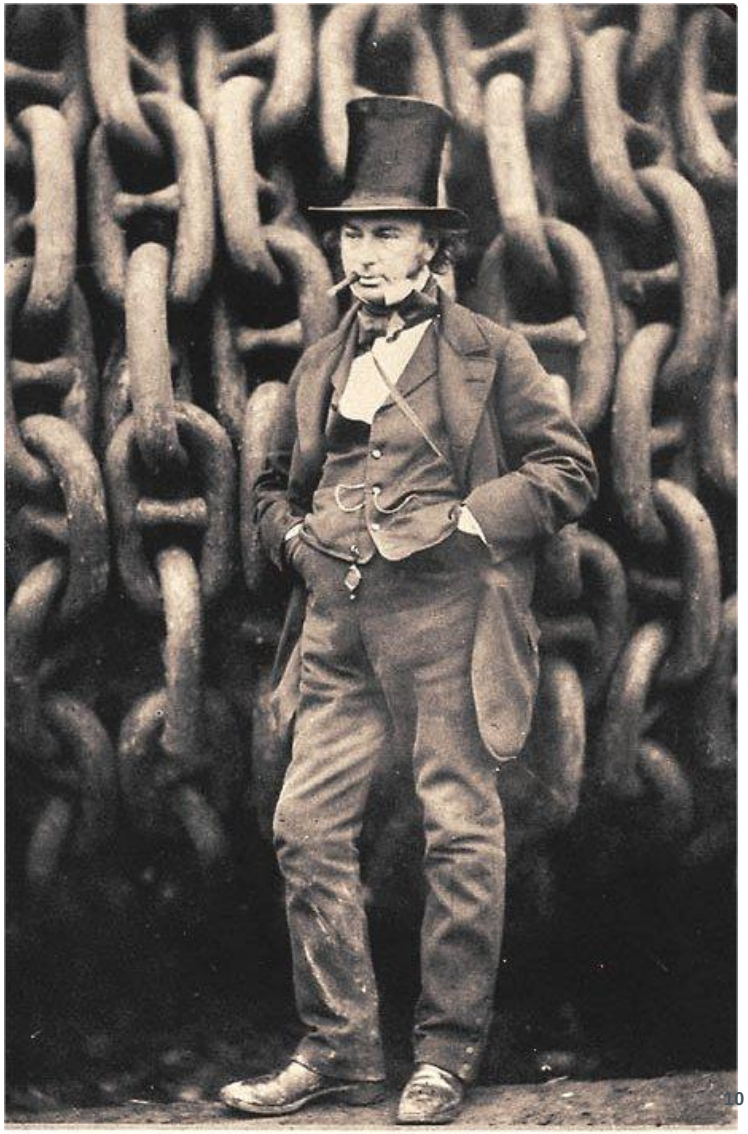
What made him great



- Thinking ahead of his time
  - innovative ideas on testing. Awareness of where **our** industry is going?
- Delegated the testing
  - accept you can't do it all yourself maybe due to lack of time and knowledge
- Dreamer
  - Reflect on what you have done and what could you possibly have done better?

Isambard Kingdom Brunel 1806 - 1859

- Brunel was one of the most versatile engineers of the 19th century, responsible for the design of tunnels, bridges, railway lines and ships.
- Redesigned and constructed major docks



Suspension Bridge Avon Gorge - Bristol

- Started work in 1831
- 700 ft long
- 245 ft above the ground
- Brunel presented 4 designs and went beyond technicalities to consider aesthetics
- Completed 5 years after his death
- Part way into the project it was clear that funding was insufficient

In response to lack of budget he said "to compete on price will ultimately lead to unsafe, unscrupulous and hence unprofessional practice"

Atmospheric railway

- Brunel embraced modern new ideas
- Trains set new speed record of 60 mph (97 kph) twice as fast as anything else at the time
- It coped better with steep gradients
- Materials were not up to the rigors of use, which meant
  - the maintenance was too high so he instructed the investors to stop the ongoing development and funding
- Brunel took no fee and was seen to set a good professional standard

Great Western Railway

- Developed the first rail link between Bristol and London (118 miles, 190 kms)
- Built as broad gauge (7ft) but in the end had to follow standards of 4ft 8 ½ ins
- Took a personal interest in identifying the route to follow and decided on best route not cheapest
- Important the railway made money so it was opened in stages

Great Western Railway

- He always paid close attention to detail and always carried notepad of squared paper, pencil and sandpaper
- Never got discouraged by obstacles and he used humour to great effect to break down tensions (not sarcasm)
- At 118 miles long, directors complained about the length of the train line and that it would fail, so Brunel's response was "make it longer!"

Duke of Wellington said:
..train travel will only encourage the lower classes to move about….

Ships

- Developed the steamship SS Great Western
  - sail and paddle steamer
  - made out of wood
- Made 74 crossings to New York (16 days of travel)
- Then the SS Great Britain
  - first steamship made of iron
  - designed a sideways launch
  - first propeller driven ship to cross Atlantic
  - now restored and resting in Bristol

The admiralty had previously rejected the idea of propellers as it would be impossible to steer ships from the stern!!

Ships

SS Great Western

SS Great Britain

SS Great Britain when she was found!

What made him great?

What can we learn?

- Not only smart but also had nerve
  - be prepared to take calculated risks
- As the railway opened in stages to make money
  - We should consider staged deliveries when appropriate
- Honest and ethical
  - be professional in the way work is conducted
- Great skill in presenting his views
  - be clear in thought and word
- Used mathematical models for prediction
  - prepare expected results
- Described as “master of the prototype”
  - use storyboards and models. Talk through scenarios

Chuck Yeager (b1923)

- First man to break the sound barrier in 1947
- Set the 1952 air speed record 1650 mph – twice speed of sound
- Known as the best of the elite test pilots
- Age 20 he was a flight officer flying P-51 mustangs

Chuck Yeager

- Started in maintenance but spent more time flying than pilots. A skill that proved useful in his flying career
- Resulting in him being offered a role as test pilot and proved himself to become the prime pilot for the X-1 project in 1947
- No-one believed planes could go beyond speed of sound – they would break up. Broke sound barrier on Oct 14th 1947
- One of a very few people to rise from the ranks to a General
- Last military flight Oct 14th 1997
  - to mark 50th anniversary of breaking speed of sound did it again in an F-15 fighter

What made him great?

What can we learn?

- Be brave
  - have the courage of your convictions and push the boundaries that inhibit you. Don't feel constrained, any testing should be considered of value.
- Work as part of a team
  - build the team relationships (the test team and outside) and achieve goals as a team
- Passion about his craft
  - have passion about what you do. Infect others with the same passion. Not really a job, more a way of life.

What made him great?

- Great breadth of knowledge
  - acquire knowledge about as many aspects of testing you can – conferences, books, journals, websites, LinkedIn, focus groups, discussion boards etc... always more to discover
- Saw obstacles as insignificant – broken ribs
  - face challenges, don't put them off – our job is to get over problems

Yuri Gagarin 1934 - 1968

- Trained as metalworker but interested in flying and showed a talent for it
- After graduation joined Soviet air force in 1955
- Displayed above average abilities and was taken on as a test pilot
- Volunteered to be cosmonaut – no procedures in place
- Went through series of tests including 13G's!!!!!
- First man into space – 1961 April 12th (recent 50 year celebrations)
  - 89.34 minutes in orbit
  - total flight time 108 minutes

What made him great?

What can we learn?

- Contributed to ongoing development
  - speak up with constructive comments, add value
- Very difficult to upset – calm composure
  - keep calm but not laid back
- Paid close attention to detail
  - also important for testers
- Focused on the tasks
  - concentrate on job in hand, careful not to do too much
- Set own challenging goals and objectives
  - have your own personal goals in life

Andy Green - 1962

- land speed record holder
  - September 25th 1997 714.144 mph
  - October 15th 1997 763.035 mph (Mach 1.016)
    - new projects underway from the US North American Eagle team to take a car to 800 mph
    - New thrust car for 1000 mph

- August 23rd 2006 achieved 350.092 mph in the JCB Dieselmax car

Thrust SSC

- 7 tonnes in weight
- Used scale models to verify analytical test data. 2D data model converted to 3D solid model
- Stability was tested out on all areas of the car
  - aluminium, carbon fibre and titanium
    - 15 tonnes of pressure on body panels

Learning to drive Thrust SSC

Car tests in Jordan

- Accelerate slowly to 120 mph using a maximum of 90% engine RPM, note the engine RPM needed for the Car to start moving
- Test the steering as the car accelerates by weaving left and right, then hold it on the line for the rest of the run
- Select idle and note the deceleration at 100 mph
- Accelerate to 220 mph using a maximum of 95% RPM
- Select idle and note the deceleration at 200 mph
- Apply the brakes to try and achieve an extra 0.2g deceleration and note the maximum brake temperature
- Accelerate to 320 mph using Mil power (maximum dry power)
- Select idle and note the deceleration at 300 mph
- Apply the brakes to try and achieve an extra 0.2g deceleration, note the deceleration and maximum temperature; do not exceed 700 degrees C
- Deploy the chute
- Shut down the engines at around 100 mph
- Stop the car using the brakes

What made him great

What can we learn?

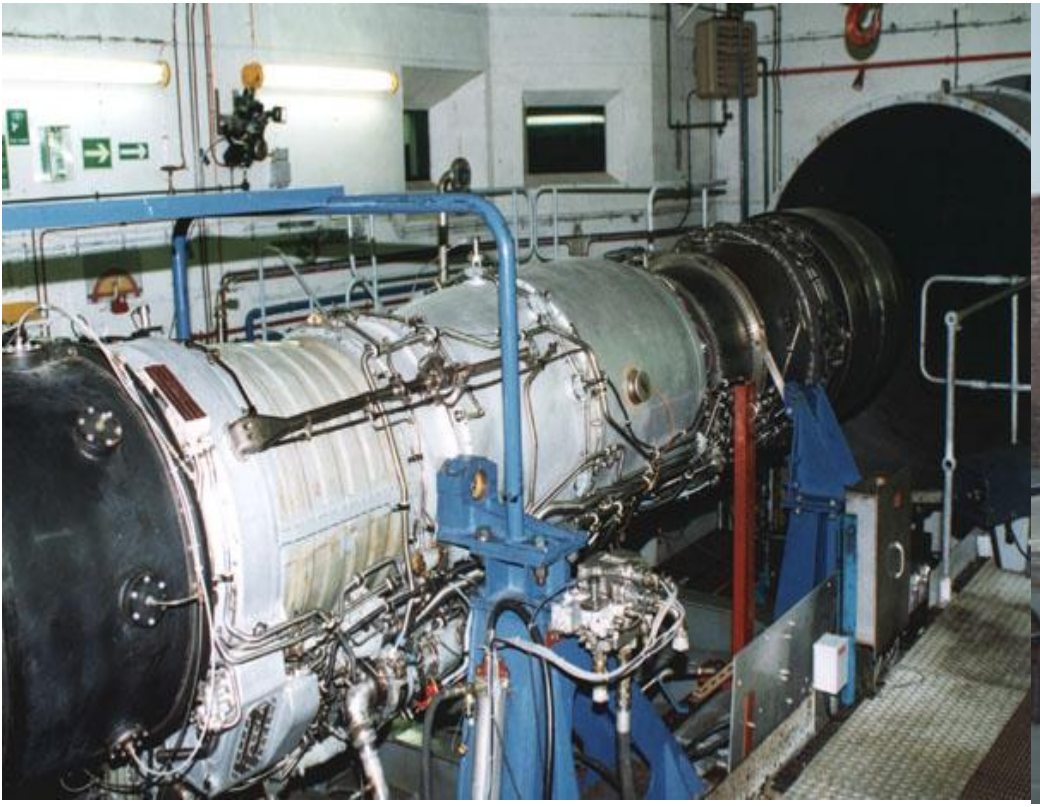
- Be focused
  - have very clear objectives on what needs to be achieved
- Identify and respect the risks
  - trust in the rest of the team but leave nothing to chance
- Physical fitness (robustness)
  - keep fit and healthy, breaks, working hours, food etc
- Capacity to keep a clear head
  - remain calm and see the bigger picture
- Fast response to situations
  - past experience helps you know how to deal with changing circumstances

Thrust SSC – showing shockwave

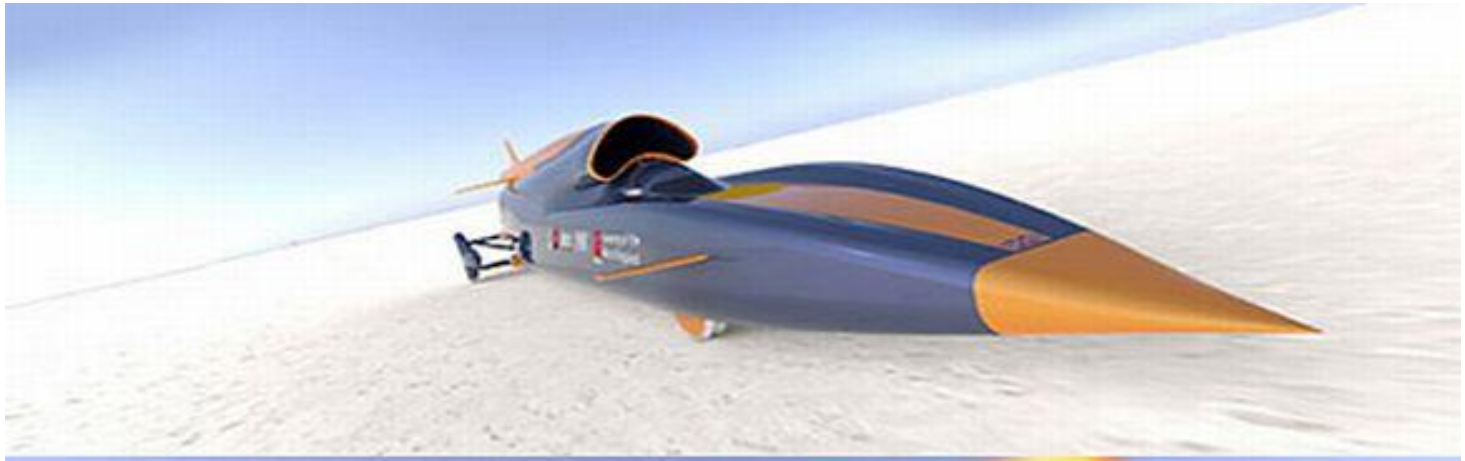
Car dashboard

Testbed control room

Test beds!!



What next – 1000 mph (1610 kph)



Summary: What we can learn

- Have clear goals and objectives - planning
- Be focused on what you need to achieve
- Plan for the worst and act accordingly
- Keep a good sense of humour
- Build bridges with others – work as a team (within the project)
- Challenge the challengers (respectfully)
- Think beyond what you are doing
- Have courage of your convictions
- Think before speaking – prepare countermeasures

Summary: What we can learn

- Learn lessons from what you have done
- Enjoy what you do – life is what you make it
- Be honest, ethical and professional
- Be willing to stand up and be noticed
- Take responsibility to get things done
- Take calculated risks

Acknowledgements:

- Richard Noble - Land speed record holder
- Professor G R Peters – Retired lecturer and authority on Brunel
- Martyn Whittock – Historian and author
- John Pudney – Writer and poet
- various articles taken from internet

Some of our great past testers

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- Isambard Kingdom Brunel
- Chuck Yeager
- Yuri Gagarin
- Andy Green
- **Who else ?? – you decide**

Thank you

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