The slide has a dark blue background with a light blue cloud pattern. The hySafe logo is in the top right corner. The text on the slide is as follows:

Safety and Risk

Safety is a societal construct and, thus, cannot be calculated. It varies as per societal needs.

Safety can only be measured through risk, which is a technical construct and can be calculated: if risk is within an acceptable / tolerable limit within a given society, the condition is deemed to be “safe”.

Tolerance, however, varies globally!

AVT logo in the bottom left corner.

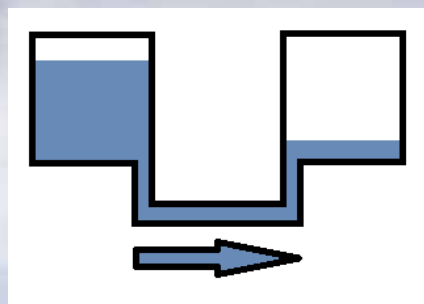
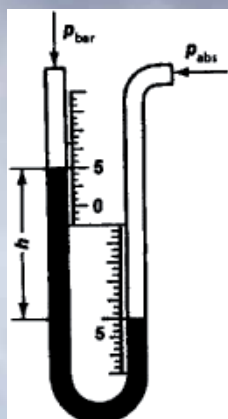
Safety and Risk



Yanus Bifrons,
Vatican Museum

**Safety is a societal side of risk!
... Or risk is a technical side of safety!**

Safety and Risk



Communicating vessels

**Higher established level of safety means
lower acceptable level of risk.**

Essential Definitions

- ❑ It starts with a hazard:
 - ✓ No Hazard, No Risk
- ❑ Definitions / explanations:
 - ✓ **Hazard** – potential source of harm (ISO/IEC Guide 51)
 - ✓ **Risk (unofficial)** – probability of realization of a hazard
 - ✓ **Risk (official)** – combination of the probability of occurrence of harm and the severity of that harm (ISO/IEC Guide 51)
 - ✓ **Risk (origin)** – *risicare* (Italian) “to dare”
 - ✓ **Risk** is a *technical* construct – it can be calculated
 - ✓ **Risk** is a measure of *safety*, which is a *social* construct and cannot be calculated other than through risk
 - ✓ **Safety** is freedom from unacceptable risk (ISO/IEC Guide 51)
 - ✓ **Risk criteria** – terms of reference by which the significance of risk is assessed (ISO/IEC Guide 73)



“This is a hazard, but risk is very low risk”, says Thomas Jordan

Exposures or Parties

- ❑ **First party:**
 - ✓ Workers / employees – most trained and have most knowledge about hazards and related risks – *highest acceptable risk*
- ❑ **Second party:**
 - ✓ Customers – *knowingly* take risk
 - ✓ Note: customer becomes 1st party when self-servicing
- ❑ **Third party:**
 - ✓ Public – may not be aware of hazards and risks, i.e. *unknowingly* takes risk – *lowest acceptable risk*

Attendant – 1st Party
Customer watching – 2nd Party



Customer becomes 1st Party when self-refueling



Third Party – Public

Understanding Hydrogen Properties



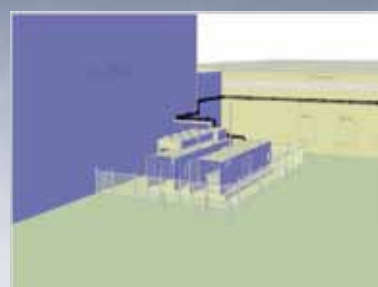
- Bonfire test (above)**
- 350 bar H₂ composite tank
 - Propane fire

- Bullet penetration test (below):**
- 350 bar H₂ composite tank
 - 9 mm rifle



CTC Powered by Hydrogen Pilot Project

- ❑ **Canadian Tire Corporation Ltd:**
 - ✓ Founded in 1922
 - ✓ 2013 Sales Revenue - \$13.2 B
 - ✓ Market Cap - \$11.42 B (est.)
 - ✓ 1,700 retail and gasoline outlets in Canada
- ❑ **Core Competencies:**
 - ✓ A world leader in applying technology to efficient supply chain operations – revolutionized material handling in mid-1970s
 - ✓ A leader in sustainability (social, environmental and financial performance)
 - ✓ Expert knowledge of retail sector including vehicle fueling
- ❑ **Incentive:**
 - ✓ By substituting batteries with fuel cells Canadian Tire can save the need to recycle or dispose of 22,400 pounds of lead and 180 gallons of sulfuric acid over the expected life of a fuel cell pack



Q & A

THANK YOU FOR YOUR ATTENTION!