

Widening Systems Engineering Borders

WiSEB Special Track

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ICONS 2020

WiSEB - why do we need systems engineering?

High-level documentation

« piecewise curve defined by linear and quadratic curves and the use of the Heaviside step function »

Low-level documentation

$$f(x) = (h-l)H(x+1) + (r-h)H(x-1) + (l-w)H(x+3) + (w-r)H(x-3) + w$$

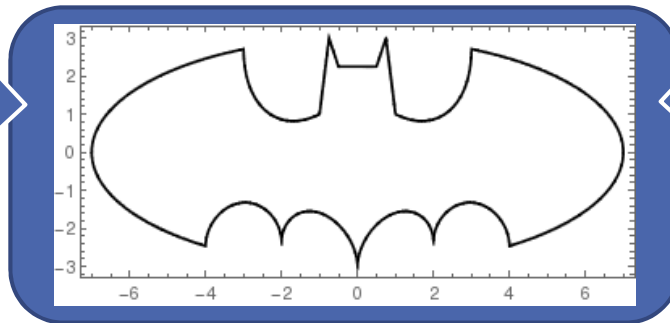
$$g(x) = \frac{1}{2} \left[\frac{1}{2}|x| + \sqrt{1 - (|x|-2|-1)^2} - \frac{1}{112} (3\sqrt{33} - 7)x^2 + 3\sqrt{1 - (\frac{1}{7}x)^2} - 3 \right] \times [\text{sgn}(x+4) - \text{sgn}(x-4)] - 3\sqrt{1 - (\frac{1}{7}x)^2}$$

$$w = 3\sqrt{1 - (\frac{x}{7})^2}$$

$$l = \frac{1}{2} (x+3) - \frac{3}{7}\sqrt{10}\sqrt{4 - (x+1)^2} + \frac{6}{7}\sqrt{10}$$

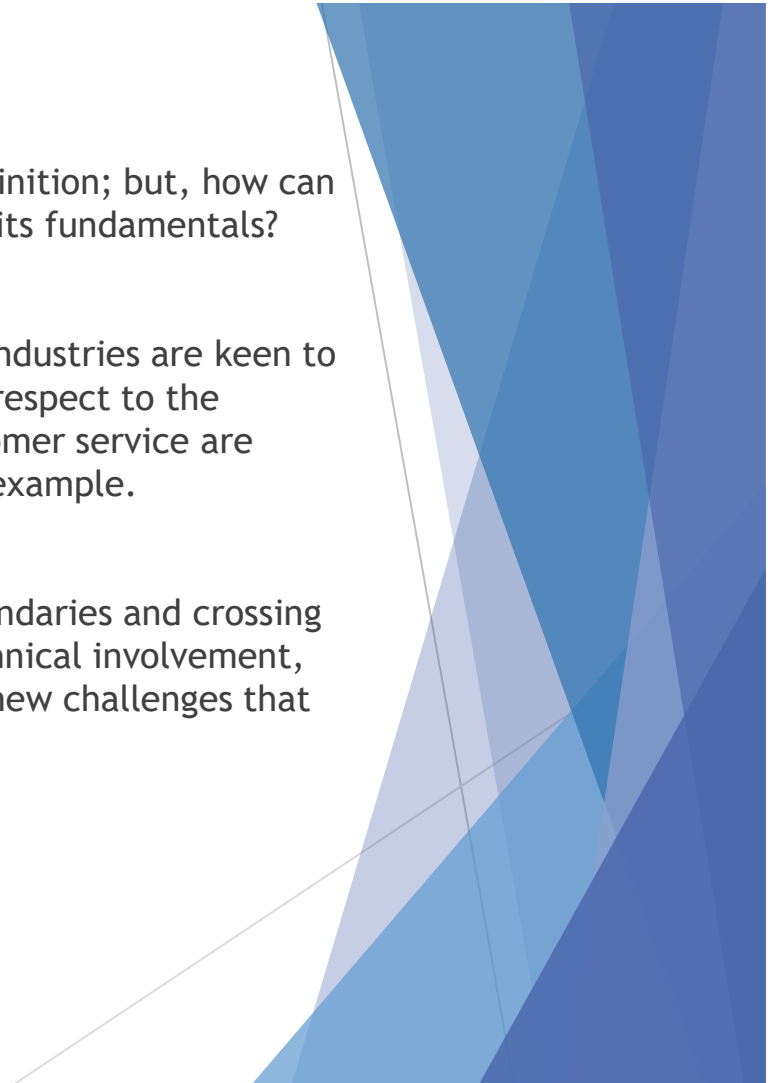
$$h = \frac{1}{2} [f(|x + \frac{1}{2}| + |x - \frac{1}{2}| + 6) - 11(x + \frac{3}{4}) + |x - \frac{3}{4}|]$$

$$r = \frac{1}{2} (3-x) - \frac{3}{7}\sqrt{10}\sqrt{4 - (x-1)^2} + \frac{6}{7}\sqrt{10}$$



WiSEB - the topics we're addressing

- ▶ Systems engineering is promoting a holistic approach by definition; but, how can we push forward its concepts and have a wider adoption of its fundamentals?
- ▶ Defense, automotive, Internet of Things (IoT) and medical industries are keen to systems engineering practices but with limited access with respect to the company population; business development, sales and customer service are usually not involved in systems engineering practice, as an example.
- ▶ Moreover, complex systems have no-longer strict sector boundaries and crossing those boundaries (e.g., openness to civil society, social-technical involvement, etc.) opens the doors to a wide range of opportunities and new challenges that we'd like to address.



WiSEB - contributions



Strategic Engineering as closed loop approach to address Complex Systems

Agostino G. Bruzzone, Marina Massei, Kirill Sinelshchikov

University of Genoa



An Innovative Memristor-based Near Field Communication Topology Adopted as Security Key

Colin Sokol Kuka, Mohammed Alkahtani, Gor Poliposyan, Muflah Alahammad

University of Liverpool



Transdisciplinary Approach to Enhance Customer Engagement in the Design of Complex Defence Systems

Giulio Telleschi, Andrea Caroni

MBDA Italy

WiSEB - contributions



Digital Twins
Saverio Romano
MBDA Italy



Requirements Based Testing and MBSE in Defence
Mark Williamson
Synthesys

