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IoT and AI Applications and Services: Key Regulatory Aspects from an Information Security Perspective

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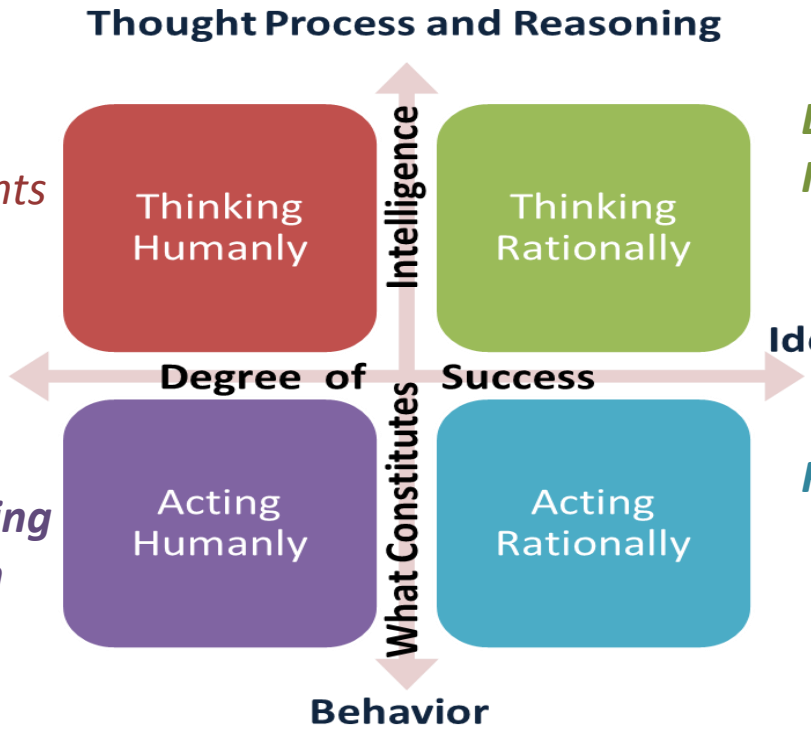
Artificial Intelligence – Features/Apps/Services



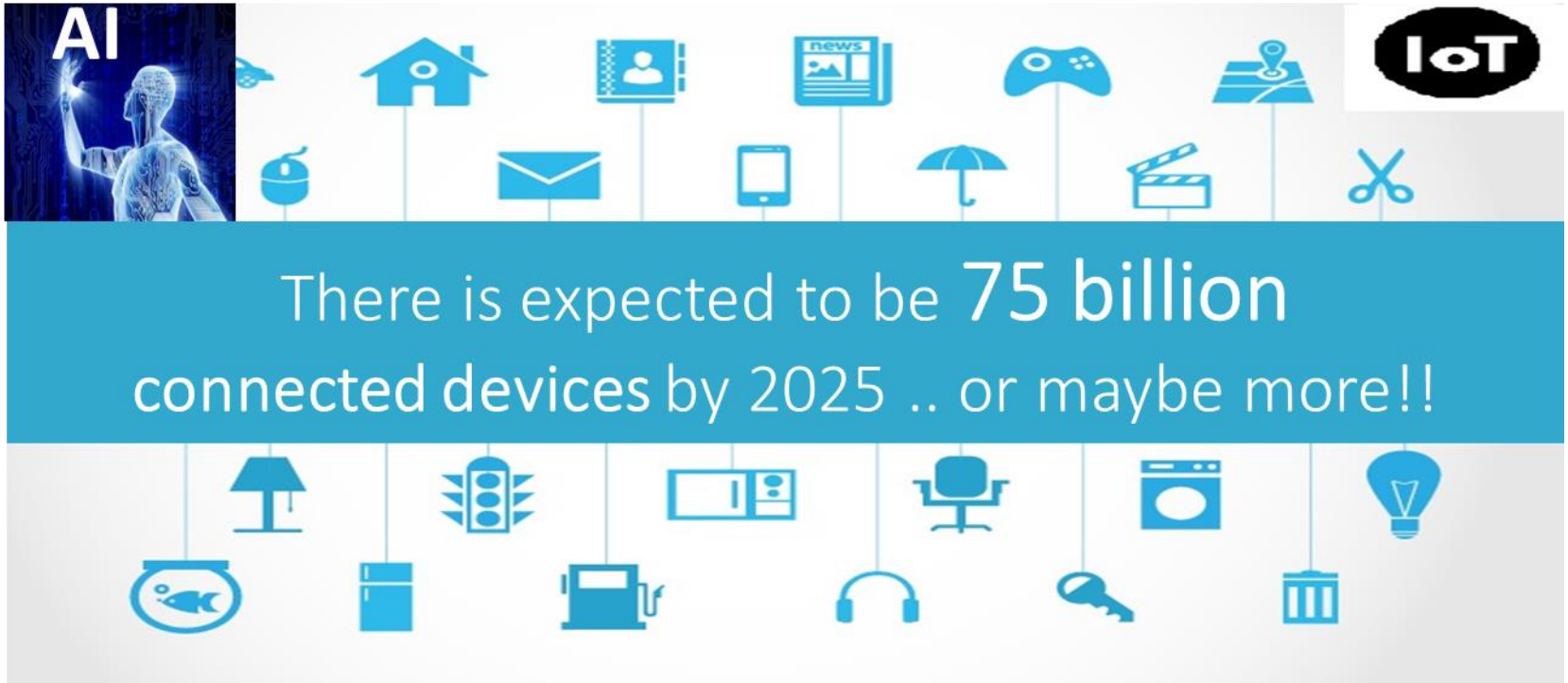
Cognitive Neuroscience
Introspection
- *Psychological Experiments*
- *Brain Imaging*

Logic
Inference

Natural Language Processing
knowledge Representation
Automated Reasoning
Machine Learning

Rational Agents :
- ***operate autonomously,***
- ***perceive environment,***
- ***persist over long time,***
- ***adapt to change, and***
- ***create and pursue goal***

Global economic impact of IoT exceeds 10 trillion USD per year in 10 years while AI promises around 13 trillion USD (that's 1.2% additional GDP growth per year).

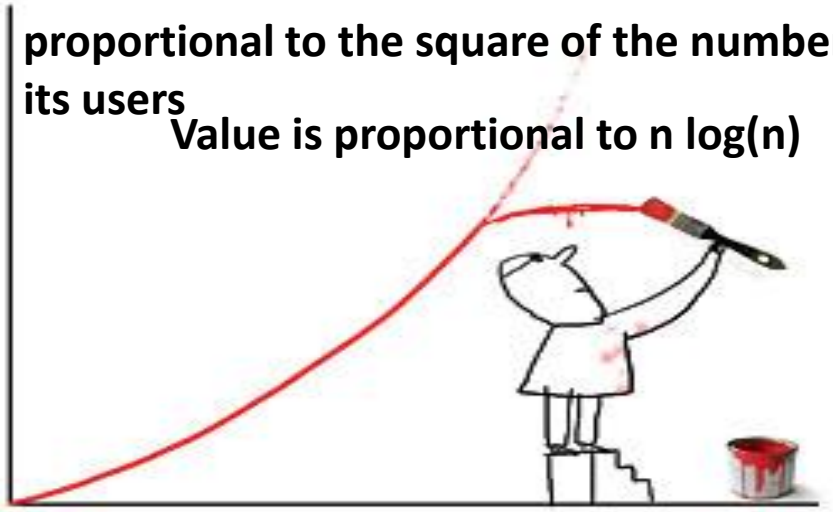


IoT applications and services have positive effects on cost savings, revenues, and operational efficiencies.. True.. Opportunites gets better by adding AI .. True.. But not without disclaimers!

IoT + AI Promises	Only IFs
New revenue streams for businesses	Policies Support It
Cost savings in a wide no. of industries (operational efficiencies)	Regulations Allow it
Prediction capabilities (for businesses, individuals, and gov.)	Standards are in Place
Very good Sci-Fi movies ☺	Good Movie Producers ☺

Metcalfe's Law is Wrong!

The value of a communications network is proportional to the square of the number of its users



"We are in great haste to construct a magnetic telegraph from Maine to Texas; but Maine and Texas, it may be, have nothing important to communicate."
Henry David Thoreau in *Walden* (1854).

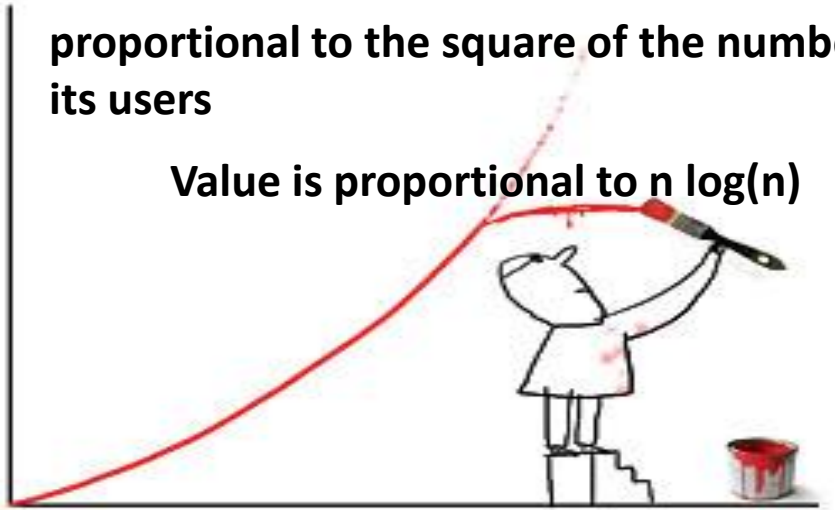
The fundamental flaw underlying Metcalfe's (and similar laws like Reed's is in the assignment of equal value to all connections or all groups.

Source: https://spectrum.ieee.org/computing/networks/metcalfes-law-is-wrong
Jul. 2006

Metcalfe’s Law is Wrong!

The value of a communications network is proportional to the square of the number of its users

Value is proportional to n log(n)



Connectivity might not be the one and only value driver!

Many ingredients like expected performance, expected effort exerted (ease of use), **trust** ,..etc.

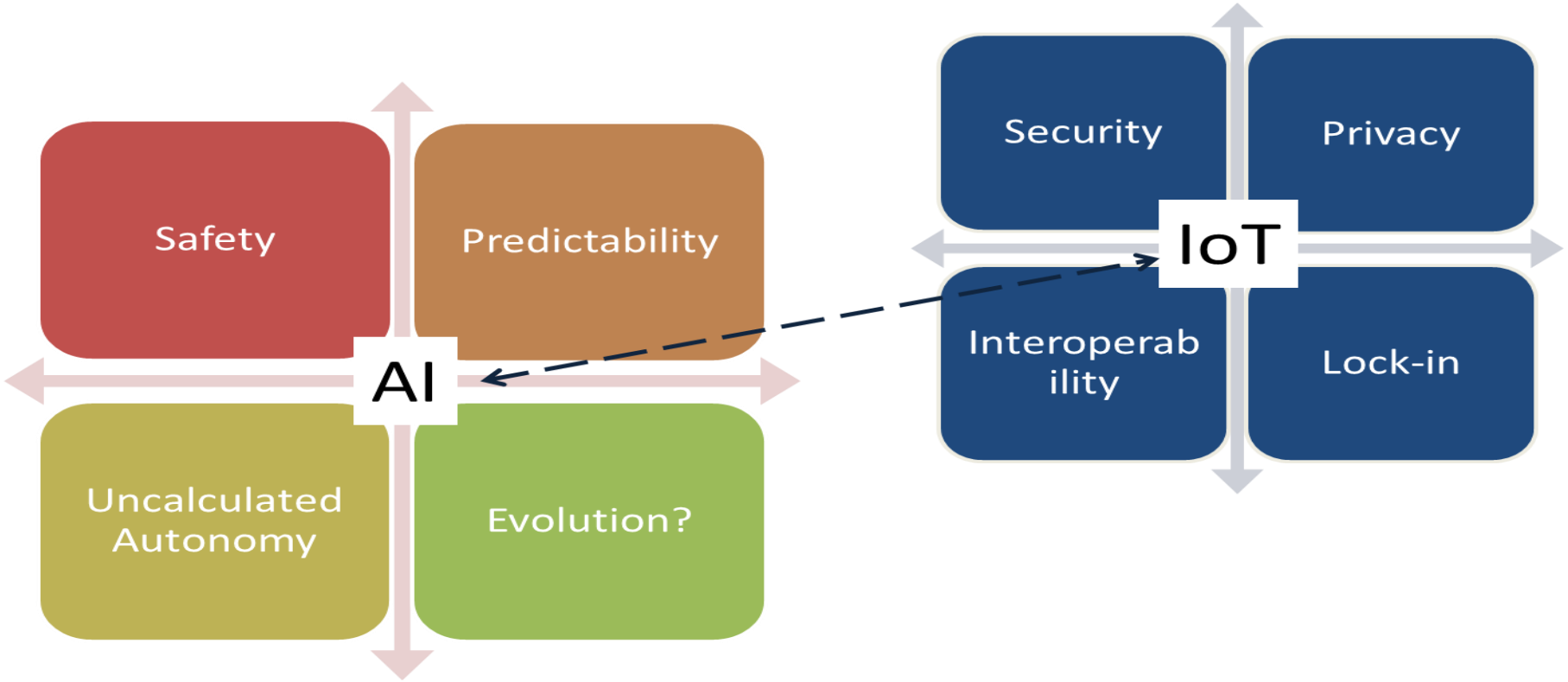
Issues Coming Up!

- IoT: Notions of security, privacy (data), cloud security, interoperability, lock-in, identification were all coming in.

- Blockchain: Notions of anonymity, accountability, decentralized platform, smart contracts, permissioned vs. permission-less ledgers + money laundry issues (bitcoin and similar digital currencies)

- AI: Notions of autonomy, accountability, unknown behavior, & unpredictability will pop up + which AI paradigm are we trying to adopt? → mistrust.
  - New regulatory tools are needed for security, and safety checks are needed

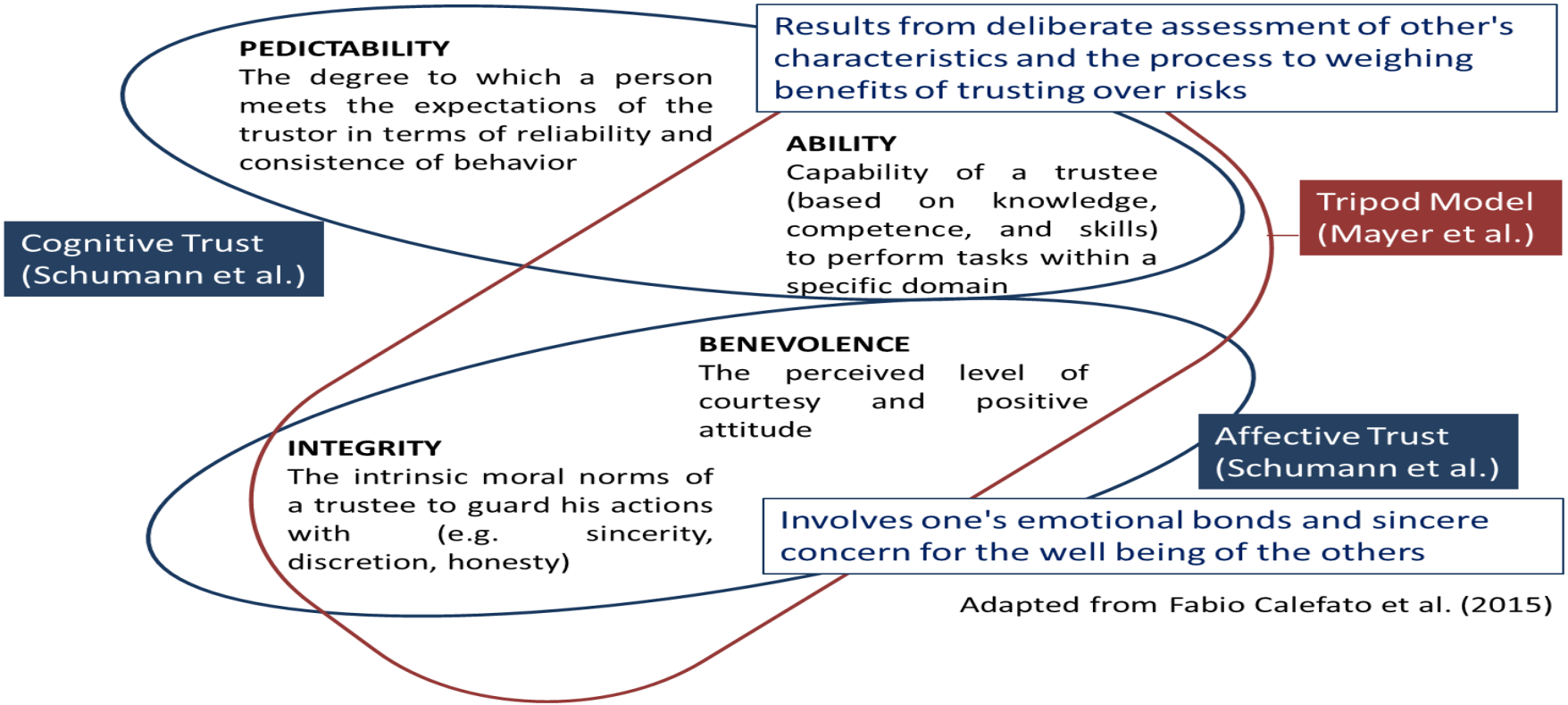
There are eight major domains of risk associated with AIIoT!



Can Security help?

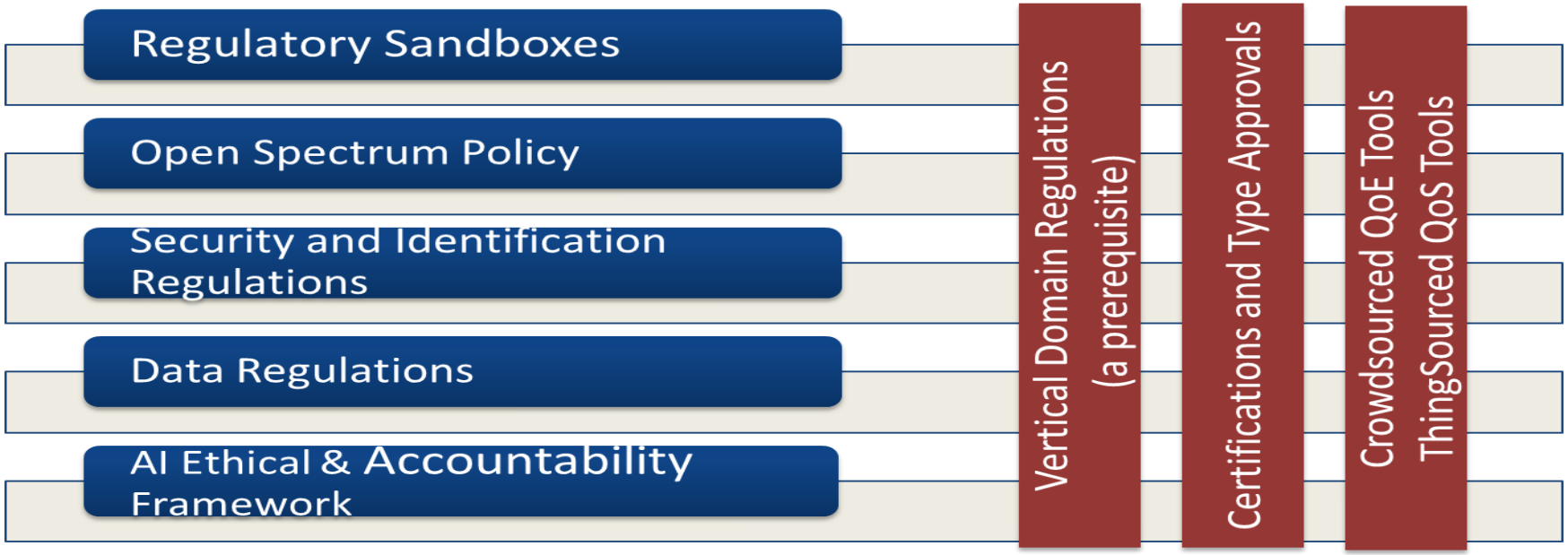
- Confidentiality
- Fidelity
- Availability
- Trust
- Non Repudiation
- Authentication
- Authorization

Reasons for Trust



Adapted from Fabio Calefato et al. (2015)

What type of measures could the industry do to reap the value of AIIoT and avoid the risks?



Thingsourced QoS Tools: things collaborating together and reporting back on QoS of IoT connectivity.

Examples of Key Questions/Possible Regulatory Measures..

- Is the device capable of receiving security related updates? if yes, is it automatically?
- Are PII stored, processed, and transferred securely? How?
- Authentication by default, including unique system generated one time passwords.
- Implement measures to help prevent physical tampering of devices.
- Systems and solutions deployed should be standardized to ensure security, interoperability, and standard interfaces and protocols adoption (Industry specific).
- Do AI communities/industry groups have an ethical framework to govern their work? published? audited? How?

Thank you

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