The Ingenesist Project: An AI/ML Model for Addressing Global Systemic Risk

Daniel R. Robles, PE, MBA
Dr. Tuyet-Trang (Snow) Lam

Abstract:

The Next Economic Paradigm. Abstract: Nobel Laureate Dr. Robert Solow calculated that 80% of economic growth can be attributed to the contributions of engineers, scientists, and technologists. But GDP measures products, not people. Unfortunately, intangible assets are treated as expenses to be minimized, not investments to be maximized. This tiny accounting error may be responsible for a vast majority of the systemic risk that is strangling the world. The Ingenesist Project is developing a novel application of Game Theory, Blockchain, and Artificial Intelligence with the goal of directly measuring the contribution of Engineers, Scientists and technologists in an economy as a tangible asset. The implications of this project would change the nature of money itself without disrupting the institutions upon which civilization depends.

Value of Engineering is Invisible

A fireman has very little value until there is a fire. Then, the fireman is worth a million dollars per hour.
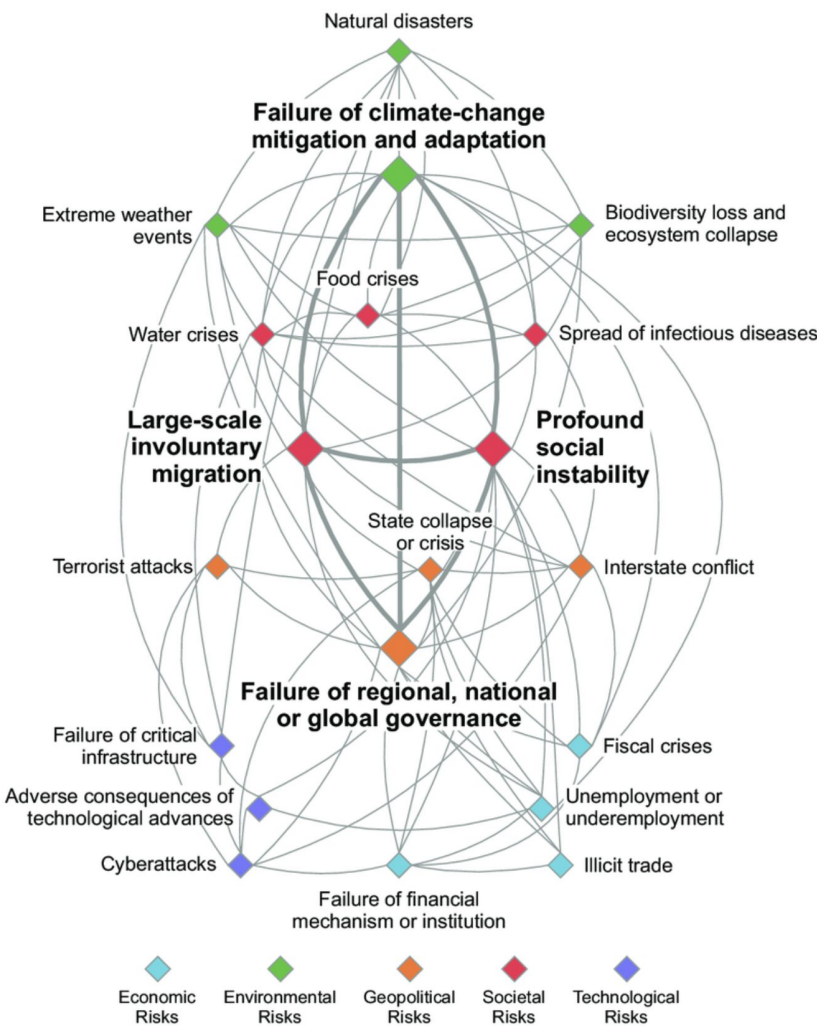
The Fire measures the value of the fireman into existence

If the fire never happens, the value of engineer is invisible

Engineers removes risk from systems

Global Systemic Risk

Three Components of Risk Management

1. Identify Risk Exposure [s]
2. Determine probability peril will happen [p]
3. Determine the consequences if the peril does happen [c]

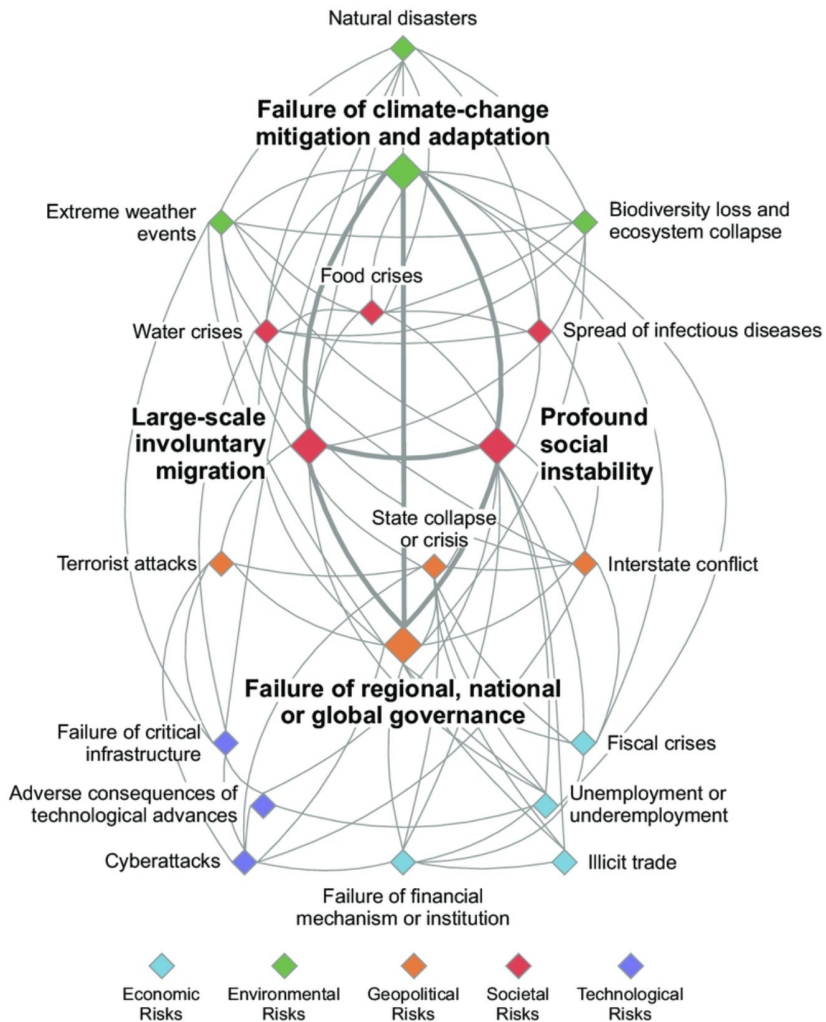$$R=f(s,p,c)$$

$$R=f(s,p,c)$$

How do we …
…Know what we know?
…Know what we don't know?
…Learn what we need to know?
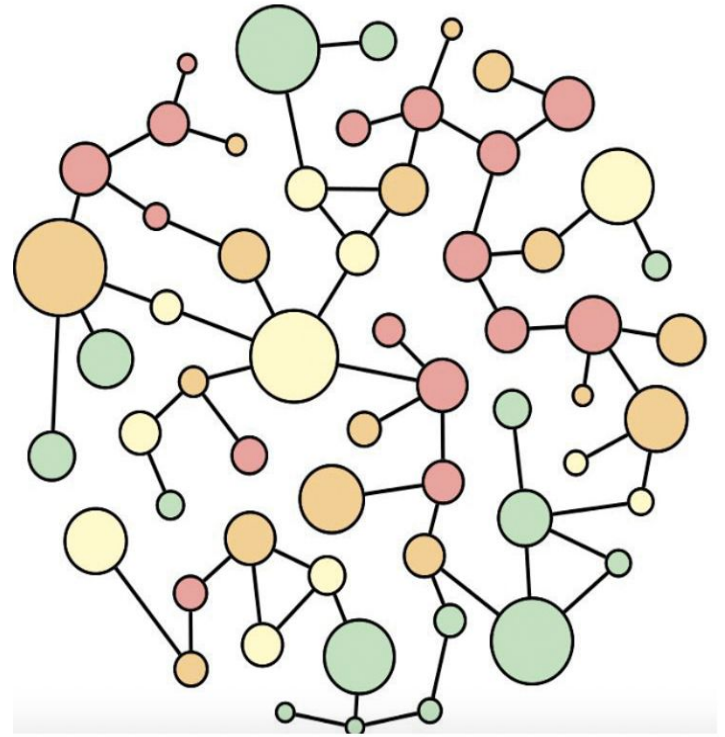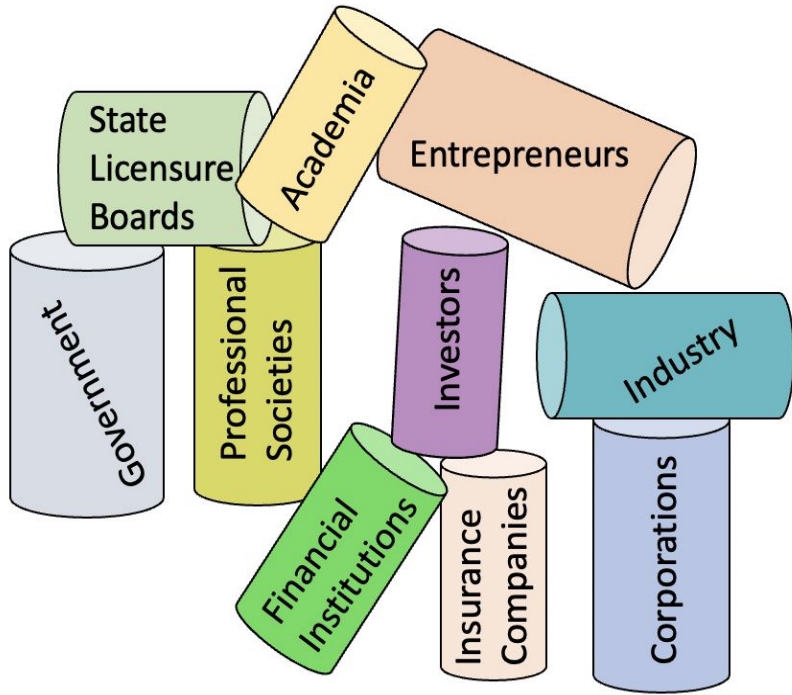…Produce these facts in human economy?

$$R=f(s,p,c,k)$$

$k =$ *Engineering Knowledge*

Global Systemic Risk: A Networked Adversary

"It Takes a Network to Defeat a Network."
With that, we [take] the first step toward an entirely new conversation."
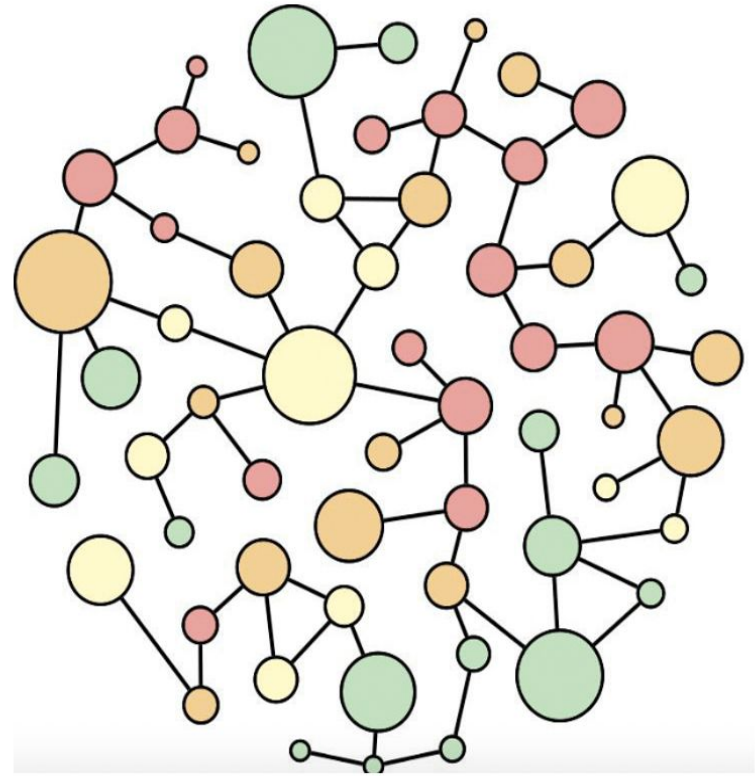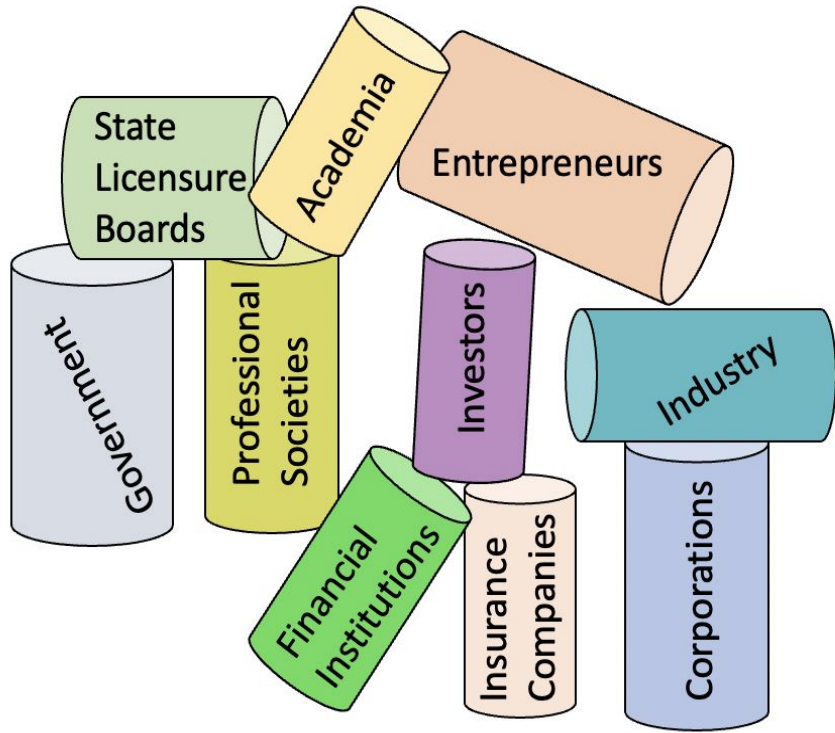
— Stanley McChrystal

Missing Piece: Must convert from one social structure to another social structure.

The Innovation Bank; An Economic Game

$$R=f(s,p,c)$$

1. Player 1 makes a claim about *{s,p,c}*
2. Player 2 validates Player 1's claim about *{s,p,c}*
3. A single node with 2 edges is memorialized on Blockchain
4. Players each receive tokens for creating nodes
5. Network graph aggregates all nodes and edges
6. Tokens used to access network for $$$

Converts from hierarchical knowledge system to a network knowledge system

Must convert from one social structure to another social structure.

Enter AI/ML: R=f(s,p,c,k)

Business Intelligence:
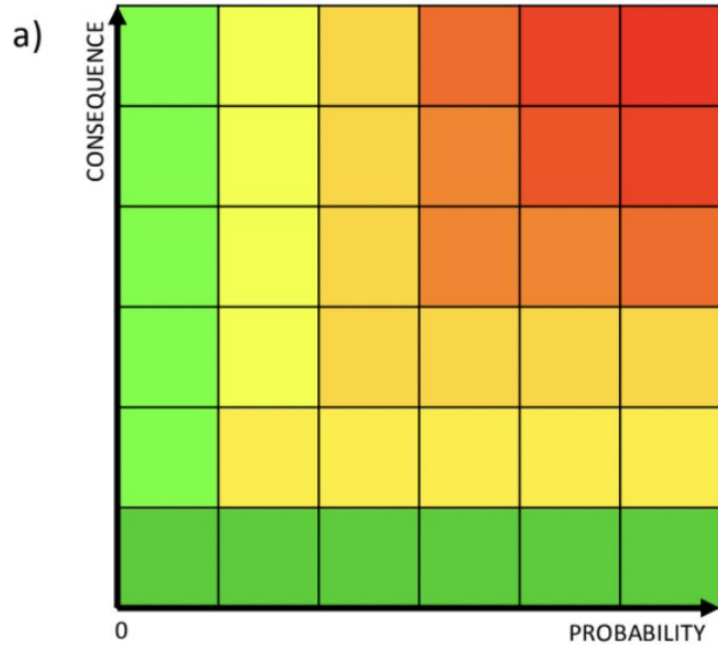"This is the information that is missing"

Business Intelligence
"This is where the information can be found"

New Economy = connect the dots

Prioritization of risk mitigation strategies

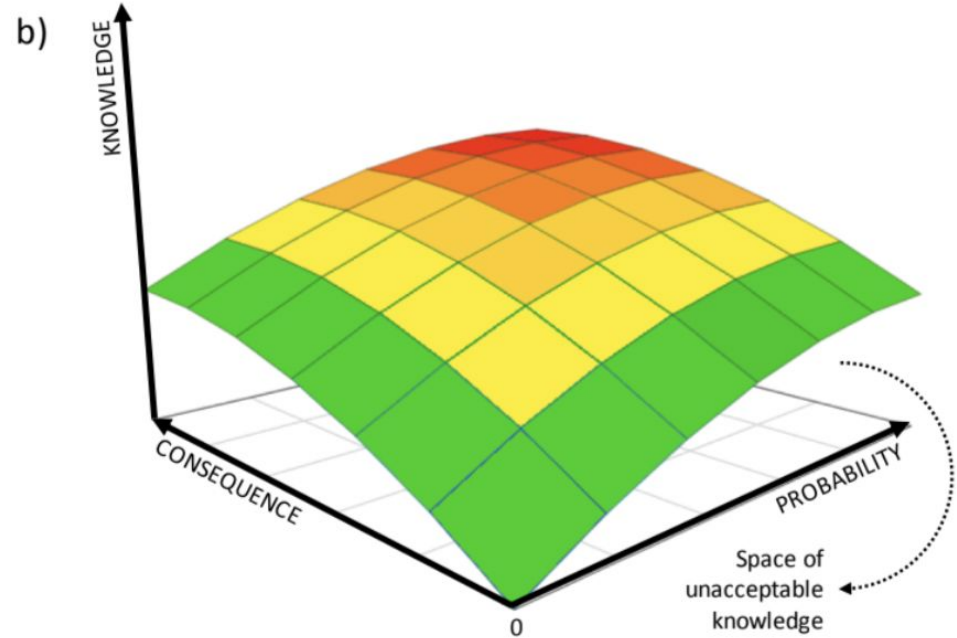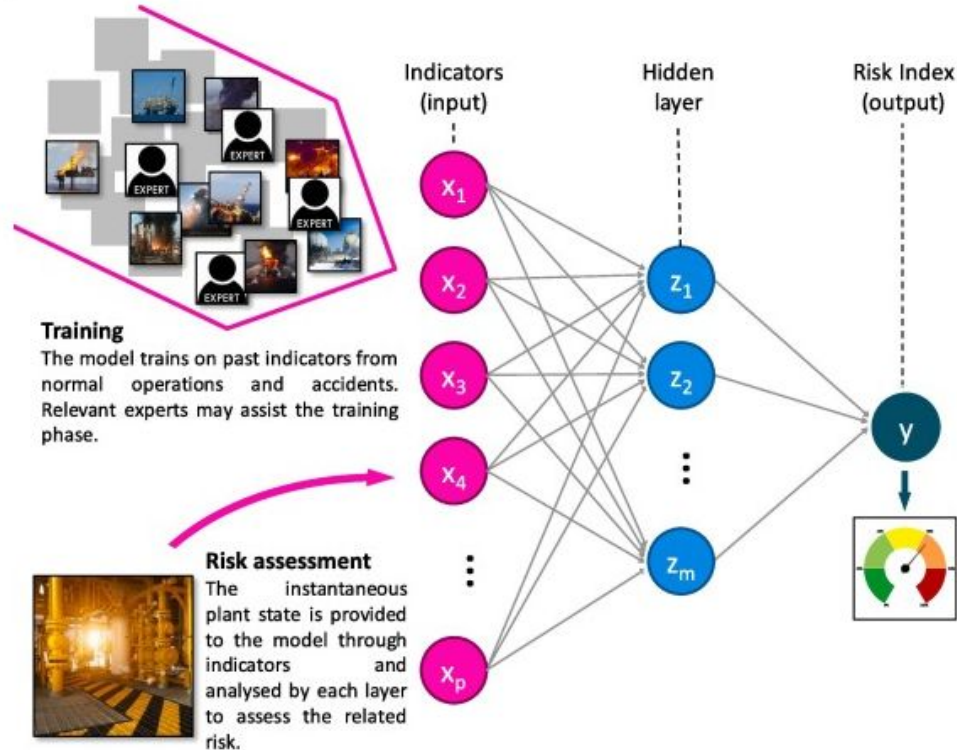$$R = f(s, p, c, k) \qquad (2)$$

Fig. 1. (a) Two-dimensional risk matrix according to formula (1); (b) three-dimensional risk matrix according to formula (2).

# NN architecture for integrating non linear knowledge in risk estimation

[SafetyScience_2019] proposed a risk assessment approach based on machine learning. In particular, a deep neural network (DNN) model is developed and tested for a drive-off scenario involving an Oil & Gas drilling rig. Results show reasonable accuracy for DNN predictions and general suitability to (partially) overcome risk assessment challenges.

Indicators (input) — Hidden layer — Risk Index (output)

Training
The model trains on past indicators from normal operations and accidents. Relevant experts may assist the training phase.

Risk assessment
The instantaneous plant state is provided to the model through indicators and analysed by each layer to assess the related risk.

The Innovation Bank Vision

- What are the economic risks if a bridge becomes impassable?
- What expertise is needed to correct the problem?
- Who can help close the knowledge gap ?
- Can you send them notification ?
- What are the risks / cost trade off ?

User

Data   Information   Knowledge   Innovation   Wisdom
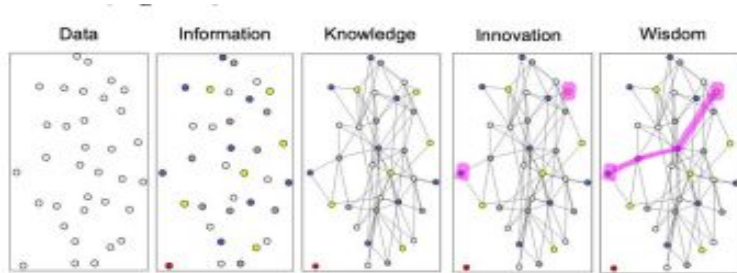
- Here are the knowledge needed to perform the project
- Here are the estimated risks and cost
- Would you like me to send notification to the proposed expert ?

Robles, DR, & Layton, BE. "The Innovation Bank: Blockchain Technology and the Decentralization of the Engineering Professions." *Proceedings of the ASME 2020* https://doi.org/10.1115/IMECE2020-23015

Conclusion

The economic contribution of engineers is invisible in the pre AI/ML world

Engineers remove risk from complex systems - risk is invisible

Systemic risk is by far the biggest problem in the world

Engineers and scientists need to reorganize away from silos and toward networks

This allows us to be more visible to AI/ML applications

Engineering Professionals and AI/ML can have a symbiotic relationship

The Only Piece Missing is The Innovation Bank.