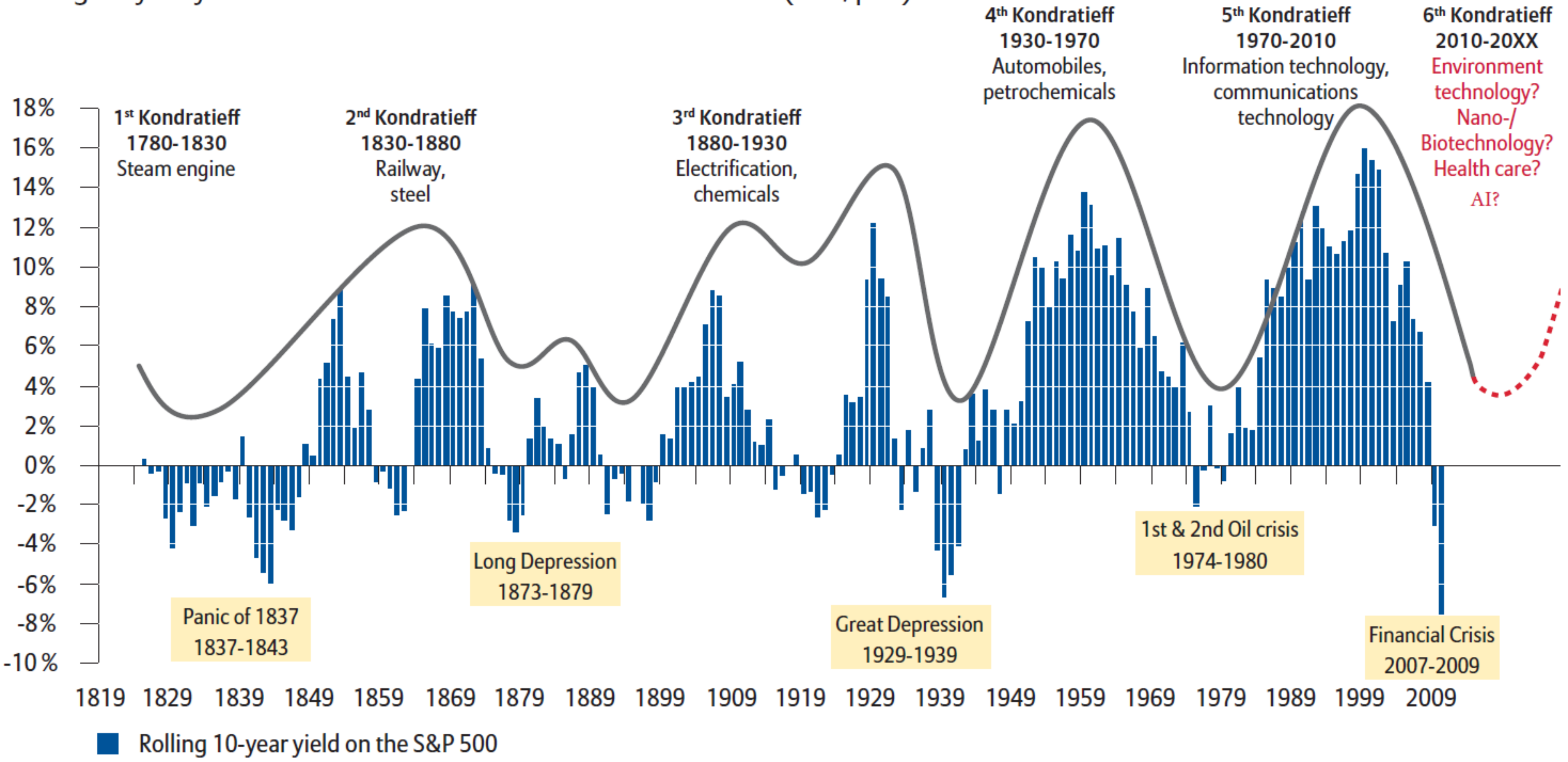
REGIONAL CONFERENCE

INCLUSIVE ENERGY TRANSITION IN SOUTH ASIA AND BEYOND

7–9 MAY 2024 • Galle, Sri Lanka

Technology Innovation and Economic Cycles

Figure 1: Kondratieff cycles – long waves of prosperity.
Rolling 10-year yield on the S&P 500 since 1814 till March 2009 (in %, p. a.)



Source: Datastream; Illustration: Allianz Global Investors Capital Market Analysis

Co-Evolution, lessons from the previous energy transition

World energy experts examining the historical evolution of the 'grand' energy transition of the last century – electricity and the grid -- draw some important lessons.

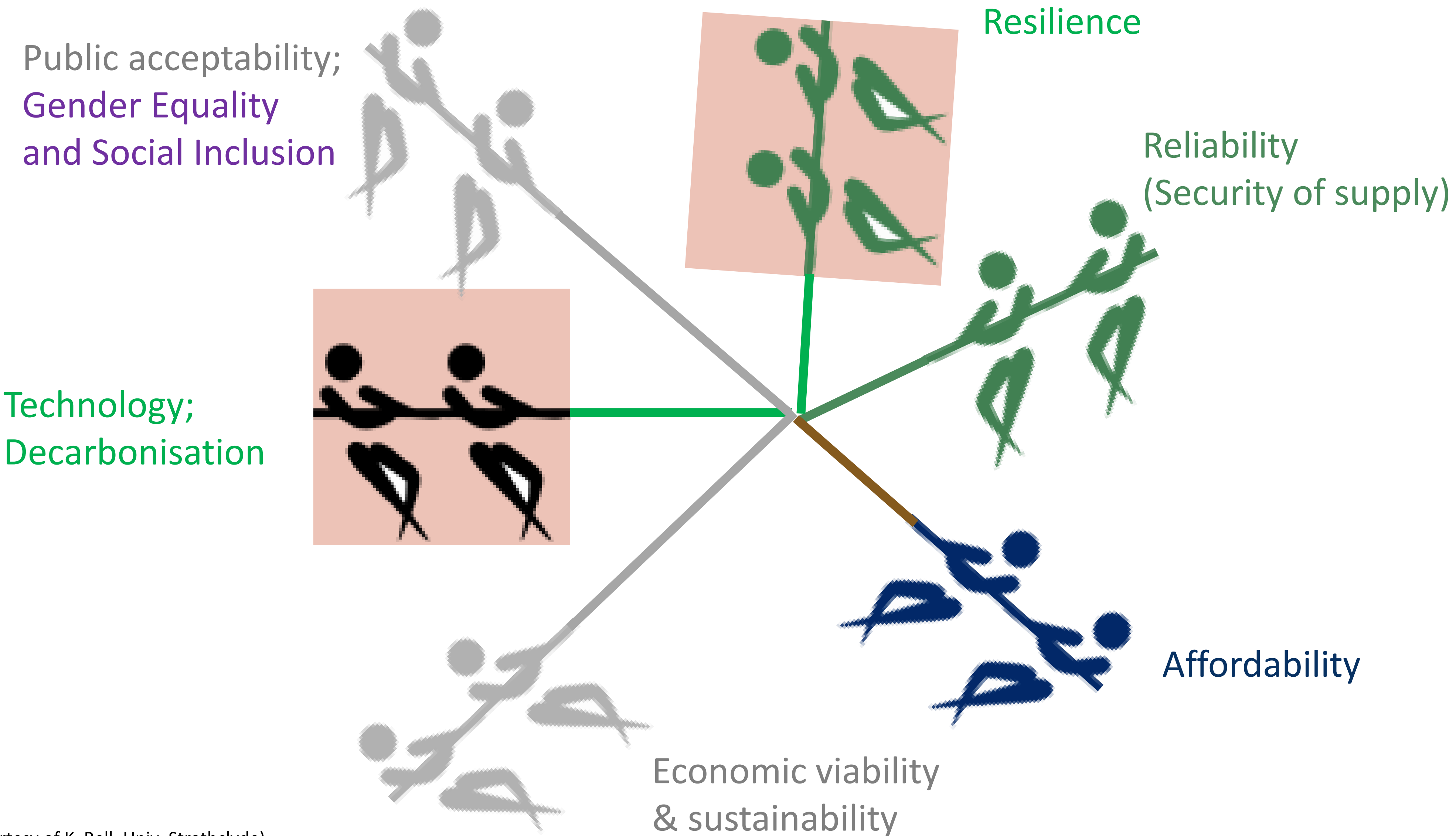
- Technology, institutional and social settings **'co-evolve, mutually depending on, mutually cross-enhancing each other'**

Four 'grand' patterns characterised the energy transition last century:

- 'no individual technology, as important as it may be, is able to transform whole energy systems that are large and complex';
- 'any new technology introduced is initially crude, imperfect, and very expensive';
- 'the history of past energy transitions highlights the critical importance of end-use', that is consumers and energy demand; and
- 'the process of technological change, from innovation to widespread diffusion, takes considerable time'. (Grubler)
- An additional consideration*: Certain choices were made based on socio-economic-technological contexts of those times and these decisions locked the world into certain pathways of technological development.*

ADB THE UNIVERSITY OF MELBOURNE Nossal Institute for Global Health IEEE SA STANDARDS ASSOCIATION IEEE SSIT SOCIETY ON SOCIAL IMPLICATIONS OF TECHNOLOGY

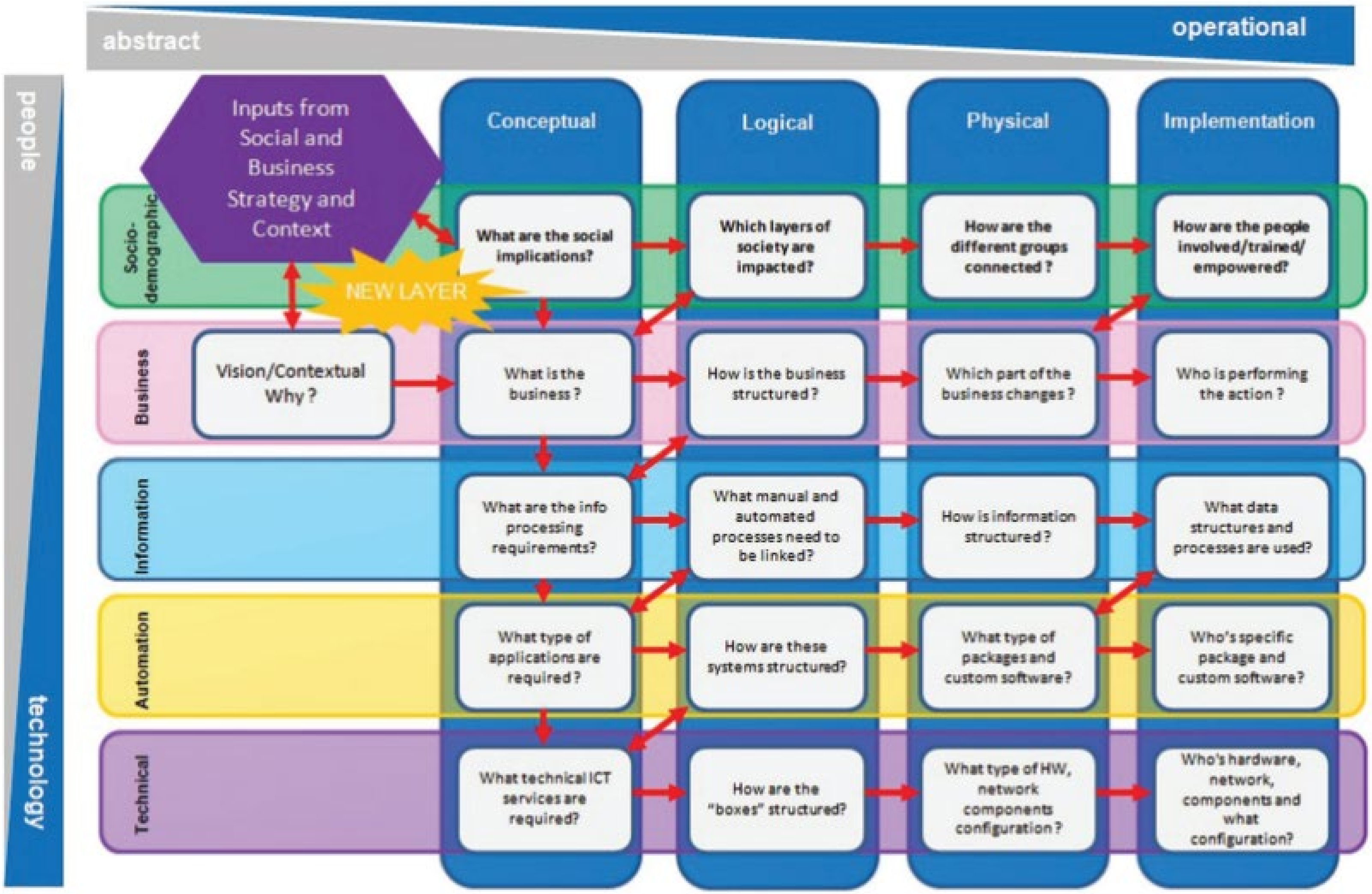
Socio-technical approaches in Power System Design



(courtesy of K. Bell, Univ. Strathclyde)

Smartgrid: Extended Architecture to Include Socio-Demographic Layer

Based on NIST, IEEE Smartgrid Architecture Layers and Iteration Level



Mohideen and Demazy. Inclusive community energy resilience in Bangladesh. 2022

Gender Equality and Social Inclusion (GESI)

This workstream seeks to propose technical standards to integrate GESI in system design, policy and planning.

IEEE SA STANDARDS ASSOCIATION

DIITA DIGNITY, INCLUSION, IDENTITY, TRUST & AGENCY

IEEE Dignity, Inclusion, Identity, Trust and Agency Industry Connections Activity (DIITA): Gender Equality and Social Inclusion (GESI) Workstream

STATEMENT OF PURPOSE

"Gender equality and social inclusion to foster and advance technology to benefit humanity"

Just Energy Transition Integrated Domains Framework

<table>
<tr><th>POLICY</th><th>ACCESS</th><th>ECONOMY</th><th>EMPLOYMENT</th><th>SOCIAL PROTECTION</th><th>LOCAL GOVERNANCE</th><th>TECHNOLOGY</th><th>FINANCING</th></tr>
<tr><td colspan="8">GESI policies, coherent across economic, environmental, social, education, training, labor</td></tr>
<tr><td colspan="8">To utilities, energy services, appropriate technologies by excluded and vulnerable groups</td></tr>
<tr><td colspan="8">Growth of green industries and green jobs</td></tr>
<tr><td colspan="8">Reskilling and Upskilling</td></tr>
<tr><td colspan="8">Adequate social protection systems providing income security and social services</td></tr>
<tr><td colspan="8">Vulnerable communities in the decision making and leadership of their transition.</td></tr>
<tr><td colspan="8">Smart grid with demand side participation in the power system and energy markets</td></tr>
<tr><td colspan="8">Funding to support GESI outcomes</td></tr>
</table>

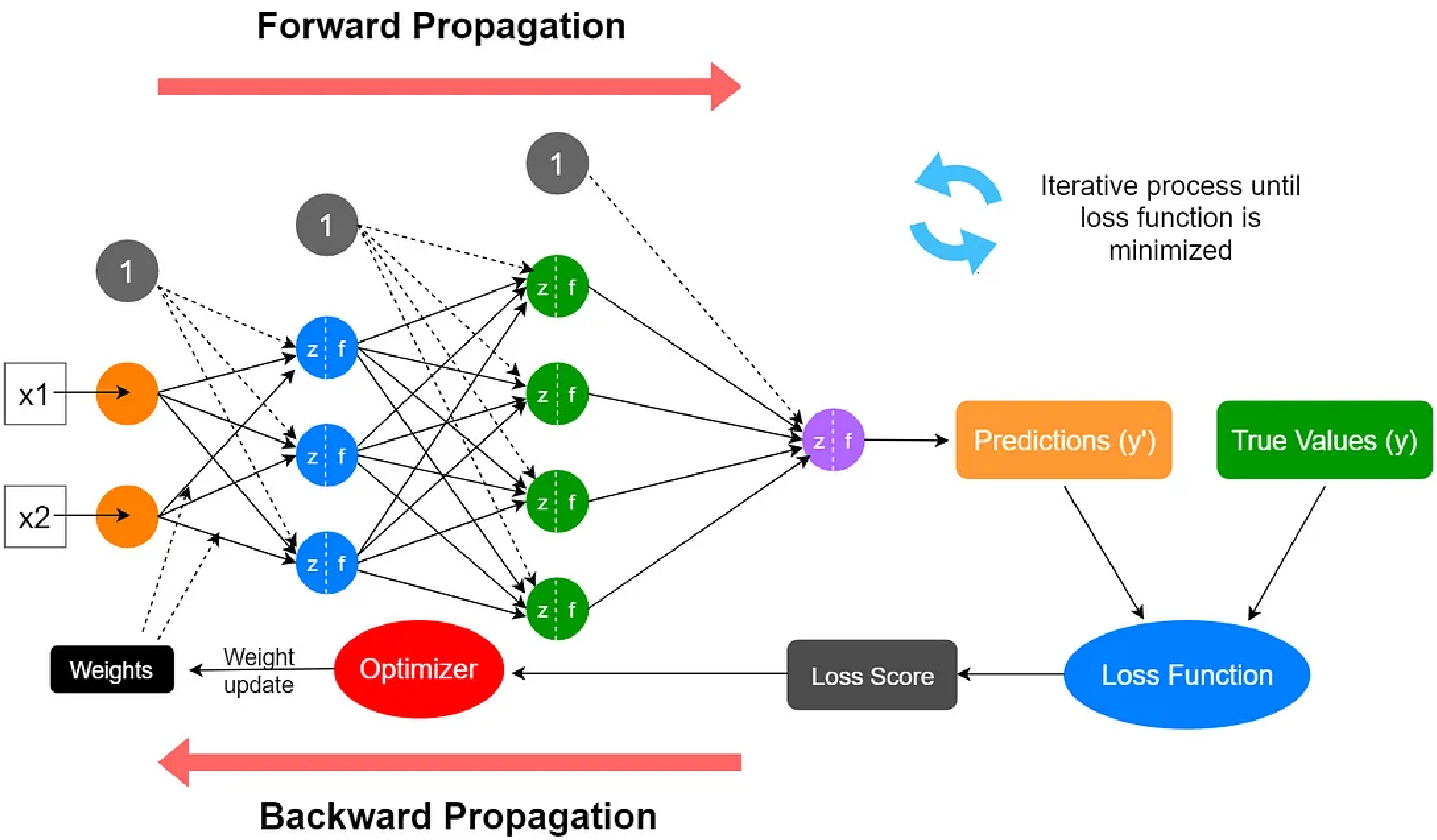
Concluding Question

Question Consideration:
Forward thinking systems design: If we are at the beginning of a new Kondratieff cycle, technology advancement may outpace policy and regulation (even if designed fairly), which could have a negative effect on social inclusion by policy being too quickly outdated and outpaced.

Social inclusive policy design principles at the grassroots level are key, so that all policy design procedures begin with GESI criteria as inputs.

Thank You!!!

Exploring AI: Learning Models in Machine Learning Networks



Data Set: 80% Training / 20% Validation

1. **Forward Propagation**: Inputs pass through the neural network, weighted and summed layer by layer, then passed through an activation function
2. **Loss Calculation**: The loss function compares the expected value to the predicted value.
3. **Backpropagation**: Gradients of the loss function for each weight are back propagated to the input layer.
4. **Update Weights**: Weights are updated through an optimisation function which minimally decreases the loss.
5. **Iterate until loss is minimised!**

https://medium.com/data-science-365/overview-of-a-neural-networks-learning-process-61690a502fa

Exploring AI: Applications in Energy Transitions

AI for the energy transition principles

Governing
- Risk management
- Standards
- Responsibility

Designing
- Automation
- Sustainability
- Design

Enabling
- Data
- Incentives
- Education

AI could be a good tool for assessing complex social inclusion scenarios and criteria.

Need to design AI systems with GESI criteria included from the beginning!

AI for the energy transition principles, 'Harnessing Artificial Intelligence to Accelerate the Energy Transition', BloombergNEF and Deutsche Energie-Agentur (dena), September 2020."