Section 3. Definitions: Establishing a Common Language Before Mathematics

3.1 Information (I): quantity + structure + predictability

In QIA, the term information is defined more broadly than in classical communication theory. It is not treated as mere numerical entropy nor as a subjective observer-dependent quantity. Instead, QIA defines information as a combined entity consisting of three inseparable components: (i) quantity, referring to how much distinguishable content is encoded; (ii) structure, referring to the organized pattern of the encoding; and (iii) predictability, referring to the capacity of the encoded pattern to constrain or forecast future relational states under given network dynamics. This three-part definition is essential because quantum phenomena are not explained solely by the amount of information, but by the structural form of correlations and by the predictive power that wave-patterns exert on routing stability.

3.2 Wave-pattern code

QIA describes quantum information as being encoded in wave-pattern codewords. A codeword is not a symbolic string; it is a physical configuration of the wave state. Formally, a wave-pattern codeword is represented as a triple: codeword = (phase profile, amplitude profile, correlation tensor). The phase profile determines interference relationships and timing structure; the amplitude profile determines intensity distribution and weighting; and the correlation tensor captures multi-partite dependencies, including entanglement. This definition allows QIA to treat information as a genuine geometric object in state space rather than as an abstract label.

3.3 Node / Channel / Link in the Entropic Network

To discuss information flow, QIA models the universe as an entropic network. In this network, a node is defined as a domain or region characterized by a coherent entropic boundary. A node therefore does not need to correspond to spatial locality alone; it may correspond to any subsystem whose degrees of freedom share a stable entropic description. A channel is the effective pathway through which a wave-pattern can propagate between nodes. A link is the operational coupling between nodes, represented by a coupling operator that determines what kinds of wave-pattern transformations are permitted across the boundary. In short, nodes define informational domains, channels define propagation pathways, and links define the permissible coupling operations.

3.4 Entropic distance d_E and compatibility metric **K**

Because the network is entropic rather than purely geometric, QIA introduces an entropic distance, d_E, to represent how “far apart” two nodes or two states are in terms of entropic separation. Unlike ordinary spatial distance, d_E measures informational and thermodynamic separation—how difficult it is for a wave-pattern to maintain structured coherence across two domains. Complementary to this is the compatibility metric **K**, which quantifies how well a given wave-pattern codeword matches the constraints of a node, channel, or measurement boundary. High compatibility implies low entropic cost and stable routing; low compatibility implies instability and pressure toward re-routing.

3.5 Collapse event: trigger, boundary update, routing update

Within QIA, a collapse event is defined as a structured network transition rather than a mysterious axiom. It can be decomposed into three stages. First is the trigger, which may be caused by measurement coupling, environmental interaction, or an entropic instability threshold. Second is the boundary update, in which constraints at a node or interface are modified, effectively reshaping the entropic compatibility landscape. Third is the routing update, in which wave-pattern information reorganizes and stabilizes into new routing attractors. This decomposition allows collapse to be modeled mechanistically as constrained reconfiguration of information flow.

3.6 Observer / measurement apparatus as routing constraint injector

In QIA, the observer and the measurement apparatus are not treated as metaphysical agents. Their functional role is physical: they act as routing constraint injectors. A measurement device introduces specific constraints into the entropic network, such as selecting a basis, enforcing pointer stability, or restricting accessible channels. By injecting such constraints, the apparatus changes the compatibility structure **K** and therefore drives a collapse transition as information re-routing. In this way, the measurement problem is reframed as a problem of network constraints and routing stability, rather than one of subjective observation.