"Standard real number based topology prevents going fro N to N+1 in a

continuous manner.

Your conjecture is intuitively obvious. From N-dimensional structure no N+1 -dimensional structure can emerge \*continuously\*. "Continuous\* is the key word. "Emergence" would mean continuous map from N-D to N+1 D mapping N-D subset to N+1-D subset. Continuous map preserves metric dimension: the image of n-D set is n-D set in N+1-D space for a continuous map.

Consider as a simple example 1-D segment of real line mapped to 2-D plane. The image image is union of images f(x) labelled by single coordinate x so that image is 1-D too. This curve cannot fill the entire 2-D space although it could form a dense subset in the sense that for any point of 2-D space it would contain at point arbitrary near to it. Continuous map is like putting the real line to plane and deforming it in  continuous manner. Dimension is preserved. This intuition generalizes.

Formal induction proof could go roughly as follows.

a) Consider first the map of 0-D space - just point - to 1-D space. If there were a continuous map mapping 0-D space to 1-D subspace it would be many-valued: map property does not allow this.

b) Assume that this holds true for D=n: meaning that n-D subset of n-D space has at most n-D image in map to n+1-D space. (Here one could of course consider any dimension n+k-D).

c) Consider the image of n+1-D set in n+2-D space. This set can be though of as union of n-D sets labelled by a continuous parameter t. For instance, sphere decomposes to parallel disks in this kind of slicing.

By induction assumption the images of these n-D slices are n-D at most. The images of n+1-D set

consisting of these slices is union of at most n-D images labelled by the same continuous parameter t so that it is n+1-D at most."

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