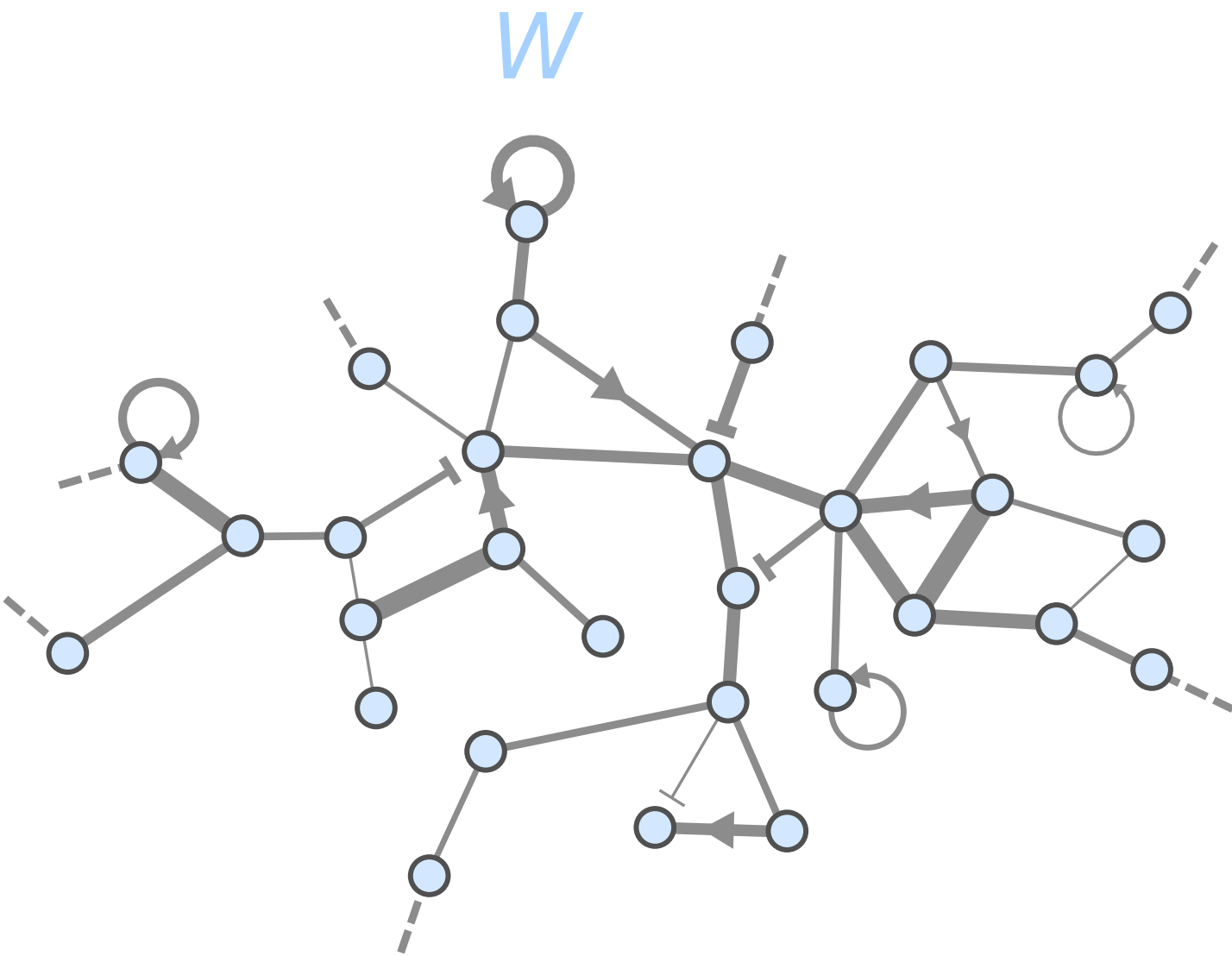


Complex network

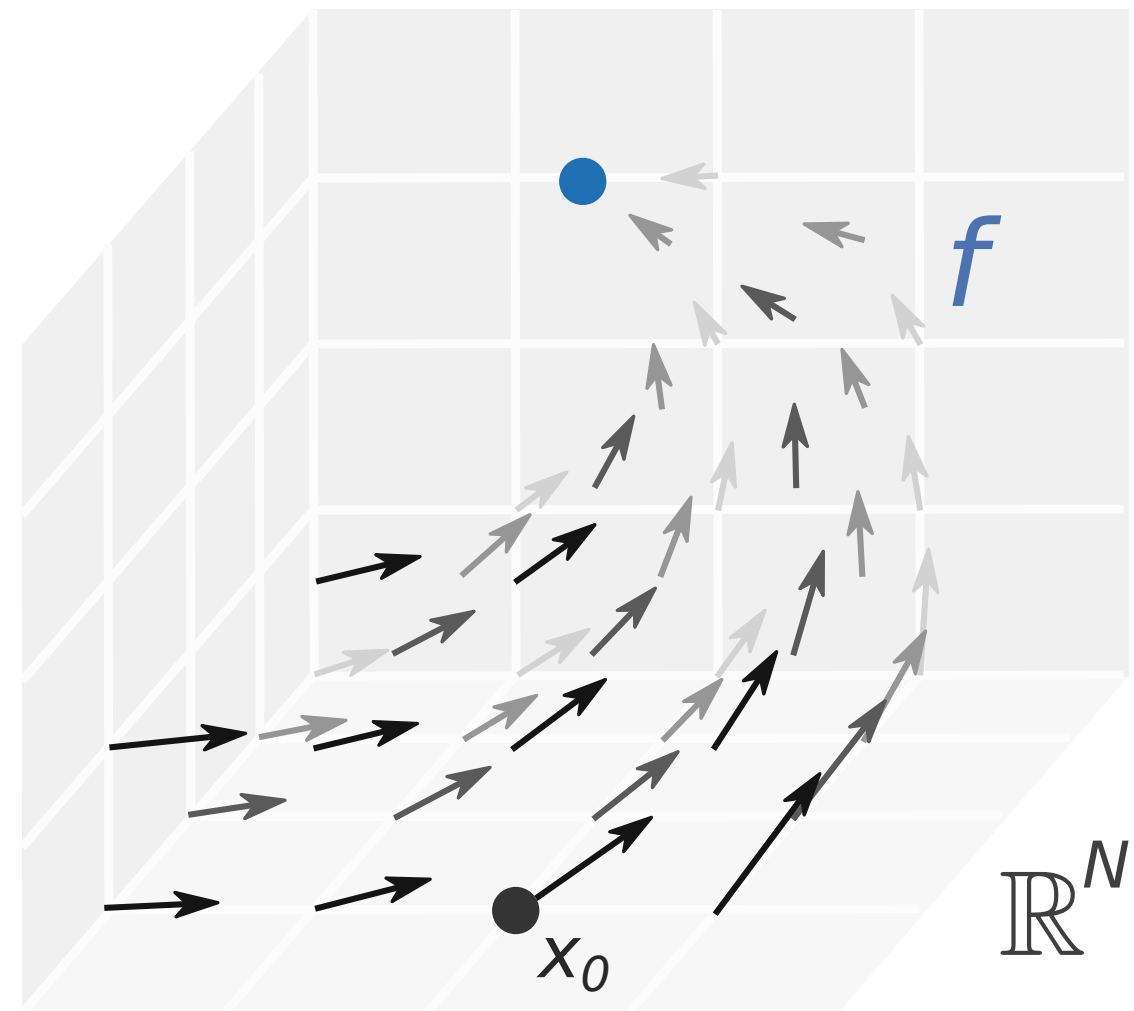


Vector field



High-dimensional dynamics

$$\dot{x} = f(x; W)$$



Modeling the dynamics of complex systems

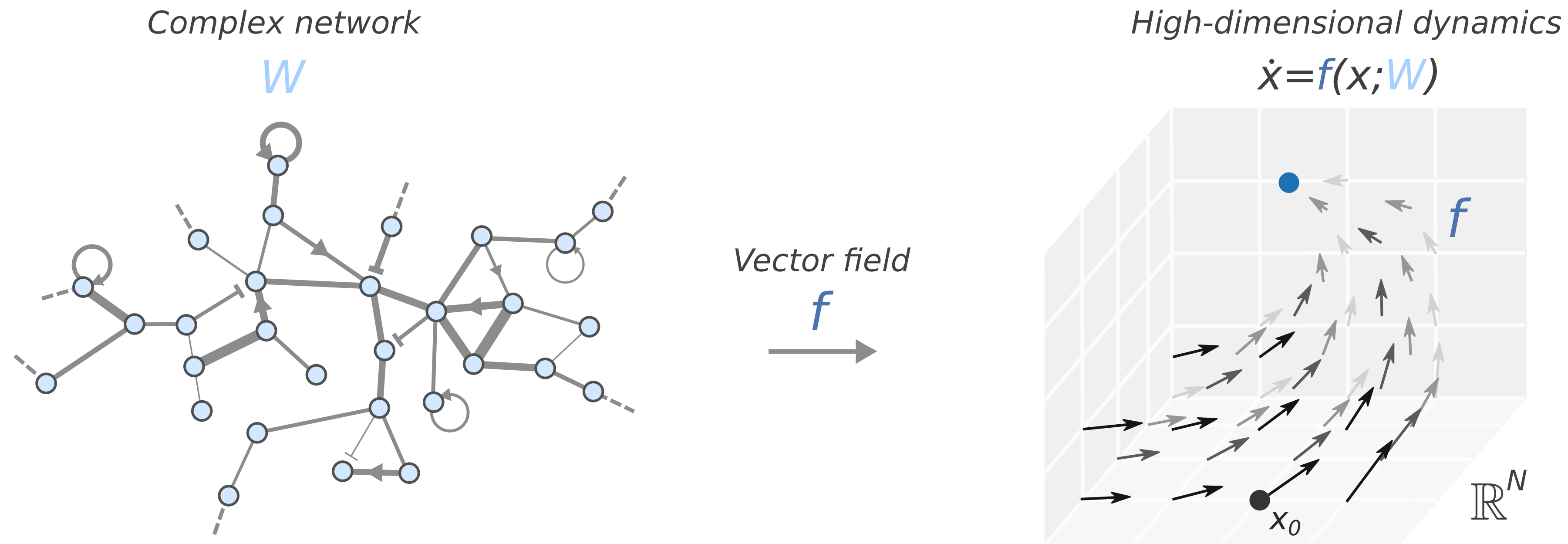
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Most mathematical models involve low-dimensional representations of the networks and/or dynamical observables.



Can we justify such a low-dimensional approach beyond mathematical and/or conceptual convenience?

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The rank of adjacency matrices

Rank r of a matrix

- ▷ number of linearly independent rows/columns
- ▷ **dimension** of the vector space generated by its rows/columns
- ▷ number of **nonzero singular values**