

1 **Transforming global food systems requires integration of global networks and new**
2 **knowledge hubs**

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51 Sustainable food systems supporting healthy foods for all are key to achieving the Sustainable
52 Development Goals (SDG). But food systems fall short everywhere as they place pressure on
53 local natural capital and ecosystem services while generating significant greenhouse gas
54 emissions. Recent demands to address these issues and future-proof food-systems, the UN Food
55 Systems Summit called for a transformation of food systems that must guarantee equitable
56 access to affordable, healthy, and safe food, produced in fair and environment-friendly ways.
57 Such a transformation will be challenging. (1, 2). Therefore, the urgent need for efficient SPSIs
58 has been proposed (3) that can effectively bridge the local to global span of food systems in a
59 coordinated way will be key to future transformation and it was proposed that effective SPSIs
60 need to support six key functions: forecasting and monitoring, capacity building, data
61 collection, independent assessment, engagement, and diplomacy (4). A recent report written
62 by a European Commission High-Level Expert Group (HLEG) suggests three potential
63 pathways to achieve this: (1) strengthening and adapting existing SPSIs with additional
64 resources and a broader mandate to engage across the food sector and across scales and engage
65 with society, (2) enhancing the multilateral institutions' capacity to cooperate with member
66 states and fund a series of taskforces to fill priority knowledge and data gaps, and (3) creating
67 a global coordination hub comprised of multilateral institutions through collective investment
68 in a "network of networks" (5). It is proposed that achieving a sustainable food system
69 transformation requires an inter-linked ecosystem of "science-policy-society" interfaces
70 (SPSIs) that embody participation, legitimacy, accountability, transparency, rigor, capacity,
71 and empowerment. A future SPSI landscape must place key principles at the heart of any
72 undertaking. These are: (1) political legitimacy; (2) participation of traditionally excluded and
73 equity deserving groups; (3) transparency and democratic decision-making; (4) integration of
74 a variety of concerns emerging at different scales and across different sectors of the food
75 system; (4) independence and rigor; (5) permanent attention to clearly defined and measurable
76 impacts.

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78 Much of the literature agrees with these principles and functions of SPSIs. Yet, concrete
79 pathways forward remain debated. Given the time and resource constraints as well as overlap
80 with existing panels (e.g., the HLPE) establishing new institution would encounter a range of
81 political and practical challenges (7,11). There is an urgency for food systems transformation
82 to meet the deadlines set by the SDGs, there is a growing realisation that this option is unlikely
83 to have an impact soon enough. Therefore, one of the best ways forward would be to start by
84 strengthening existing institutional and human capacities such that the current landscape of
85 SPSIs is better empowered to work more collaboratively. Acting now to enhance the current
86 landscape does not exclude the ambition to have an intergovernmental Food Systems SPSI
87 beyond 2030. Indeed, the next eight years could provide evidence whether the modified SPSI
88 landscape proposed below could deliver transformation and whether a new specific SPSI is
89 needed.

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91 Numerous research institutions, development agencies and time-bound projects have made (or
92 are making) significant contributions that could be harnessed to create a more sustainable,
93 equitable and nutritious food system. Harnessing this existing resource can address some of the
94 gaps in understanding constraints to action, e.g. local variability in food system drivers and
95 outcomes and social justice dimensions, such as fair wages and work safety conditions.
96 Similarly, the effectiveness of SPSIs can be improved by addressing the challenge of linking
97 multiple food system concerns/topics. These include, a better understanding of time constraints
98 and convenience as drivers of household food choices, and finding gaps in how science-based
99 policy dialogue processes engage with relevant stakeholders. Overall, a multi-sectorial
100 interdisciplinary approach is needed to connect different actors, drivers, stakeholders, and

101 dimensions of food systems. However, Enhanced resources, expertise and mandate will be
102 required to foster collaboration, capacity, and networking and deliver policy outcomes.
103 Harnessing interdisciplinary global capability in assessing, forecasting, exploring plausible
104 futures and recommending options can provide effective options to deliver led by reformed
105 SPIs. However, this will require a central coordination to invite, assemble, assess, and produce
106 reports and recommendations.

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108 The challenges that food system SPSIs must help address are enormous, and given resource
109 and time constraints, it would be wise to establish a network of SPISs and integrate some of
110 their activities with SPIs from many other sectors. For example, IPCC and IPBES periodically
111 assess food/agriculture impacts of climate change and biodiversity. Collaboration with these
112 institutions will leverage their resources, data, models, and societal engagement platforms.
113 Food SPSIs can also benefit from their expertise and tools in developing scenarios of
114 unexpected events (e.g., pandemics, climate extreme events, wars, and social conflicts). For
115 example, One CGIAR (in partnership with FAO and others) could host a data repository for
116 assessment and forecasting, in coordination with IPCC and IPBES. Similarly, expanded
117 resources, mandate, and accountability will allow the HLPE (with support from FAO and other
118 UN agencies) to coordinate periodic assessment, forecasting, foresight, and recommendations
119 for policy actions in partnership with other SPSIs and the global research community. But
120 structural issues within the current system demand that SPSIs for food systems must integrate
121 knowledge and policy advice from local, regional, and global scales (**Figure 1**) to promote
122 sustainable production, trade, healthy diets, and waste management while explicitly
123 considering the complexity and diversity of socio-cultural norms. In developing actionable
124 advice, food system SPSIs must also consider planetary boundaries, societal feedback, and
125 political buy-in for effective policy development and implementation. This is not a trivial task.
126 It will require prioritization of actions (e.g. no hunger, nutrition) and legislative actions (to
127 increase mandate, accountability, resource) and hence international political negotiations. The
128 COVID pandemic and war-linked fragility in the global economy raise challenges in terms of
129 securing additional funds, and it is likely that developed economies will need to bear the initial
130 cost until circumstances improve globally. However, a concerted effort now at United Nation
131 can set the ball rolling towards meeting some of key food related SDGs, and when geopolitical
132 situations stabilise, this can be further build upon for ambitious changes needed to deliver food-
133 systems transformation.

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135 Effecting a transformation of global food systems is one of humanity’s highest priorities and
136 will drive food security and nutrition outcomes while at the same time contributing to multiple
137 SDGs. With only eight years remaining, the challenges of reaching the SDGs demand the best
138 possible knowledge to support decision-makers at all scales. This means policymakers around
139 the world must commit to the creation of a better-resourced landscape of food system SPSIs as
140 a vital means to supporting the urgently needed transformation of the world’s food systems.

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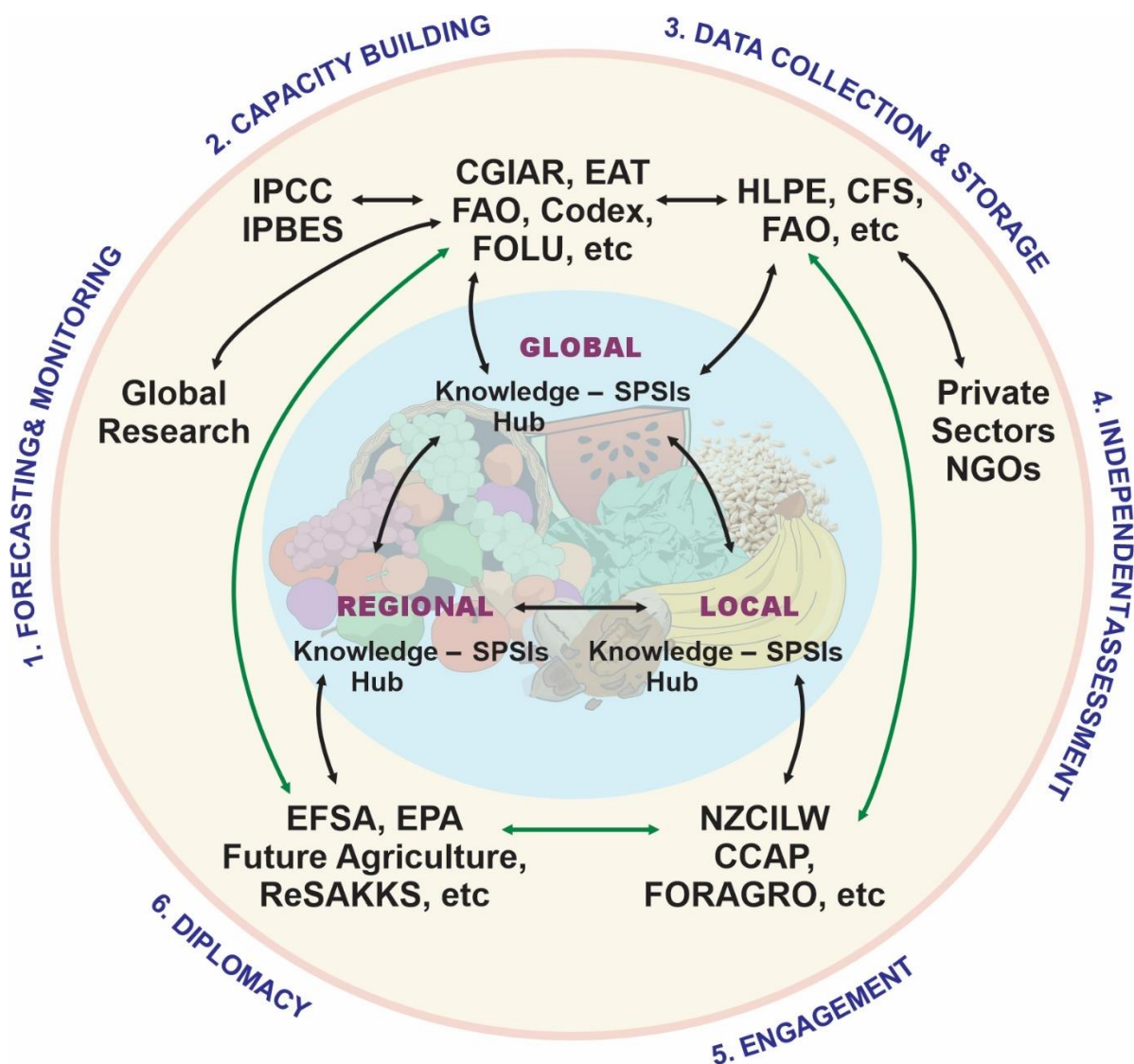
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172 Commission's (EC) Directorate-General for Research and Innovation to advise on the need,
173 potential, feasibility, options and appropriate approaches for SPIs to support food systems
174 transformation. The views expressed in this article represent those of authors. This manuscript
175 is an independent exercise which addresses the implication of the HLEG-report in light of
176 ongoing debates around these issues.

177 **FIGURE.**

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182 **Figure 1.** A simplified example of a potential network of existing knowledge hubs and SPIs at
183 local, regional and global scales (inner ring) can collaborate to provide six key functions
184 identified (outer ring) for food systems transformation. This network could coordinate
185 activities to promote sustainable production, trade, healthy diets and waste management while
186 explicitly considering the needs of local culture and communities. For example, at the global
187 scale One CGIAR, FAO along others could host a data repository for assessment and
188 forecasting in coordination with IPCC, IPBES and others. Similarly, the HLPE (with support
189 from FAO and other UN agencies) with an expanded mandate and additional resources can
190 coordinate periodic assessment, forecasting, foresight and recommendations for policy actions
191 in partnership with other SPSIs and the global research community (middle ring). The global
192 scale information can be fed by similar approaches at local and regional levels that will promote

193 collaboration across all stakeholders to deliver functions for food transformation across all
194 scales.

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196 **Abbreviations.** **SPSIs:** Science-Policy -Society Interfaces; **CGIAR-** Consultative Group on
197 International Agricultural Research; **FAO-** Food and Agriculture Organisation of the United
198 Nations; **IPCC-** Intergovernmental Panel on Climate Change; **IPBES-** Intergovernmental
199 Science-Policy Platform on Biodiversity and Ecosystem Services; **HLPE-** High-Level Panel
200 of Experts of the Committee on World Food Security. **FOLU-** Food and Land-use Coalition;
201 **ReSAKSS-** Regional Strategic Analysis and Knowledge Support System; **CFS-** Committee on
202 World Food Security; **NGOs-** Non-governmental organisations; **CCAP-** China Centre for
203 Agricultural Policy; **EFSA-** European Food Safety Authority; **EPA-** European Environmental
204 Agency; **FORAGRO-**Americas on Agricultural Research and Technology Development;
205 **NSCILW-** The National Science Challenge Initiative on Land and Water of New Zealand.

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