

Group	Sub-group	Function	Examples
Move or stay put	Attach	Permanently	[1]
		Temporarily	[2,3]
	Move	In/on solids	[4]
		In/on liquids	[4]
		In/throught gases	[2,4–8]
Protect from physical harm	Protect from living threats	Animals	[9–11]
		Plants	[9–12]
		Fungi	[10–12]
		Microbes	[10–12]
	Protect from non-living threats	Excess liquids	[10,11,13–15]
		Loss of liquids	[10,11,13–15]
		Loss of gases	[10,11,13,14]
		Light	[10,11,13,14]
		Temperature	[10,11,13,14,16]
		Wind	[10,11,13,14]
		Gases	[10,11,13,14]
		Dirt/solids	[10,11,13,14,17]
		Chemicals	[10,11,13,14]
		Fire	[10,11,13,14]
		Ice	[10,11,13,14]
		Nuclear radiation	[10,11,13,14]
	Manage structural forces	Shear	[10,11,13–15,18,19]
		Compression	[10,11,13–15,18,19]
		Thermal shock	[10,11,13–15,18,19]
		Impact	[10,11,13–15,18,19]
		Tension	[10,11,13–15,18,19]
		Turbulance	[10,11,13–15,18,19]
		Mechanical wear	[10,11,13–15,18,19]
		Chemical wear	[10,11,13–15,18,19]
		Creep	[10,11,13–15,18,19]
	Regulate physiol. Processes	Cellular processes	[20]
		Maintain homeostasis	-
		Reproduction or growth	-
	Prevent structural failure	Buckling	[10,11,14,16,19]
		Deformation	[10,11,14,16,19]
		Fatigue	[10,11,14,16,19]
		Melting	[10,11,14,16,19]
		Fractue/rupture	[10,11,14,16,19]
	Coordinate	Coordinate by self-organization	[9,21]
		Activities	[9,21]
		Systems	[9,21]
Maintain community	Cooperate	Within the same species	[21,22]
		Cooperate/compete between different species	[21,22]
		Within a (eco)system	[21,22]
		Cooperate/compete between (eco)systems	[21,22]
	Provide ecosystem services	Manage disturbance in a community	-
		Regulate hydrological flows	[15]
		Polinate	-

		Generate soil/renew fertility	-
		Detoxification/purification of air/water/waste	[17,20]
		Control erosion and sediment	[15]
		Regulate water storage	[15]
		Cycle nutrients	[20]
		Regulate atmospheric composition	-
		Regulate climate	[20]
		Disperse seeds	
		Maintain biodiversity	[20]
		Biological control of populations, pests, diseases	[17,23]
Modify	Modify physical state	Size/shape/mass/volume	[24]
		Pressure	[24]
		Density	[24]
		Phase	[24]
		Buoyancy	[24]
		Light/color	[13,24,25]
		Material characteristics	[13,24,25]
		Speed	[24]
		Position	[24]
	Modify chemical/electrical state	Energy state	[4]
		Free radical reactivity	[26]
		Concentration	-
		Chemical potential	[26]
		Reactivity with water	-
		Oxidation state	[26]
		Electric charge	-
		Conductivity	[13,26]
		Surface tension	[13]
		Ph	[135]
		Solubility	-
		Electron transport	-
		Chemically generate flow of electrons	[135]
	Adapt/optimize	Adapt genotype	[27,51]
		Adapt phenotype	[27,51]
		Coevolve	[51]
		Adapt behaviors	[51]
		Optimize space/materials	[27,37,51,127,181]
	Transform/convert energy	Electrical energy	[28]
		Magnetic energy	-
		Chemical energy	[28]
		Mechanical energy	-
		Thermal energy	[28]
		Radiant energy (light)	[28]
Make	Reproduce	Self-replicate	-
	Physically assemble	Structure	[37,135,140]
	Chemically assemble	Polymers	[20,135,140,186]
		Metal-based compounds	[20,135,140]
		Molecular devices	[20,135,140]
		Specific stereoisomers	[20,135,140]
		Mineral crystals	[20,135,140]
		Inorganic compounds	[20,135,140,186]
		Organic compounds	[20,135,140,186]
		Attach a functional group	[20,135,140,186]
		Detach a functional group	[20,135,140,186]
		Catalyze making of bonds	[20,135,140]

		On demand	[20,135,140]
Process information	Navigate	Through air	[128]
		Through liquid	[128]
		Over land	[128]
		Through solids	[128]
	Send signals	Light (visible spectrum)	[28]
		Light (non-visible spectrum)	[28]
		Sound	-
		Tactile	-
		Chemical (odor, taste, etc)	-
		Vibratory	-
		Electrical/magnetic	-
	Process signals	Differentiate signal from noise	[33,115,119]
		Transduce/convert signals	[33,115,119]
		Respond to signals	[27,33,115,119]
	Sense signals/environmental cues	Light (visible spectrum)	[28]
		Light (non-visible spectrum)	[28]
		Electricity/magnetism	-
		Disease	-
		Touch and mechanical forces	-
		Chemicals (odor, taste, etc.)	[20]
		Atmospheric conditions	-
		Sound and other vibrations	-
		Temperature	-
		Motion	[92]
		Pain	-
		Body awareness	-
		Balance/orientation	-
		Shape and pattern	[27]
		Time and day length	-
	Compute/learn/[en/de]code		-
Break down	Chemically break down	Cleave heavy metals from organic compounds	[20,135]
		Cleave halogens from organic compounds	[20,135]
		Inorganic compounds	[20,135]
		Polymers	[20,135]
		Organic compounds	[20,135]
		Catalyze making of bonds	[20,135]
	Physically break down	Non-living materials	[135]
		Living materials	[135]
Get, store or distribute resources	Capture, absorb, or filter	Organisms	[20,140]
		Solids	[20,140,181]
		Liquids	[20,140]
		Gasses	[20,140]
		Energy	[20,28,51,140]
		Chemical entities	[140]
	Store	Solids	[140,181]
		Liquids	[140,181]
		Gases	[140]
		Energy	[51,140]
		Chemical entities	[20,140]
	Distribute	Solids	[140]
		Liquids	[140]
		Gases	[140]
		Energy	[51,140]
	Expel	Solids	-

		Liquids	-
		Gases	

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