A reading of science's crisis in terms of maturing contradictions. Adapted from: Ravetz, J. R., 2011. "Postnormal Science and the maturing of the structural contradictions of modern European science", Futures 43: 142–148.

Knowledge and power. A contradiction plagues the official image of truth- and good-oriented disinterested science against the corruption of the knowledge creation process by entanglement with institutional power. The dominant industrialisation and militarisation of research are compounded by the involvement of science in what many see as the global exploitation of the world's vulnerable peoples and species.

Knowledge and ignorance. Education in science is now far more dogmatic than in theology, and a key aspect of this dogmatism is the 'ignorance of ignorance', which result in a widespread incompetence in the management of uncertainty. Now ignorance has come back with a vengeance. The contradiction between unreflective knowledge and ignored ignorance harms the search for knowledge itself, and its applications to policy.

The True, the Good, and the morale. There is a glaring contradiction between the old absolutist vision of science and the new realities of this human institution. The loss of conviction that science is essentially involved with the True and the Good cannot but affect morale, on which recruitment and quality-assurance critically depend.

Consequences. Under what conditions could there be an effective official reassurance that a proposed new technology is 'safe' or 'safe enough'? If the prospect of a successful reassurance is doubtful, then the traditional positive claims for the benefits of science are now in contradiction with its unintended, and perhaps uncontrollable, negative consequences.

Quality. Quality assurance in research science has always depended on the high quality (technical and moral) of its leadership. Quality assurance of science, developed over generations of 'little science', has now come into contradiction with the contemporary social processes of the industrialised production and utilisation of knowledge.

Innovation and property. The needs of scientific innovation and those of personal intellectual property are now in open contradiction. The increasing commodification of knowledge blurs the boundary between discovery and invention. In the research factories of mega-science, researchers lose the intellectual property of their discoveries, and their status is less that of scholar and more that of proletarian.

Elitism and democracy. In spite of professions of democratic sentiment, science is part of elite culture. The very language of science requires a style of thinking that is almost totally restricted to those with a lengthy and expensive education. The contrast and contradiction between the required integrity and impartiality of the research community, and its involvement with vested interests of the State and commerce, threatens to destroy public trust.

Corruption in research. The prospects and rewards of instant success, combined with the hype, uncertainty and even fantasy of so many technoscience projects, create new stresses on the ethical standards of scientists. The widespread manipulation of research and of published results can no longer be ignored or denied. The integrity that had previously been assumed to define the scientific endeavour is now in contradiction with the new harsh realities.

Image and audience. Maintaining a sympathetic audience, for securing resources, recruits and protection, has depended on a sincerely projected image of Science as the unique provider of the means to human happiness in this world. Science is now caught in the contradiction between the need for an accepted positive image, and the reactions of an increasingly skeptical and informed public that is all too aware of its negative aspects.

Historical context. Historically, the context of the growth of European science was the successive phases of the expansion of the European empires. Science experiences senescence, exemplified by the ebbing of local recruitment and the increasing dependence on Asia, and lives the contradiction between inherited imperial power and its imminent decline.

Cosmology. The world-view of contemporary physics is quite other than the billiard-ball universe of its predecessors. A contradiction has arisen between the inherited metaphysical frameworks of modern Science, its 'flat cosmology', and the rapidly changing common-sense of its publics.

Safety. Governments are caught in a policy contradiction: they need to demonstrate a commitment to safety for their electorate, while economic progress, or indeed national economic survival, demands high-tech innovation, which is inescapably dangerous.