

Joint optimization of sociotechnical systems is no more

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The genotypical design principles were discovered by Fred Emery and published in 1967 for the first time (Emery F, 1967). They have profoundly affected both the theory and practice of what is generally known as sociotechnical systems (STS) ever since.

I document some of the ways below but it is clear from the literature that these powerful design principles have been ignored by many, particularly in the USA where they represent a huge challenge to the widespread belief in the superiority of dominant hierarchies over any cooperative, collective or 'communist' way of organizing people (see for example, Emery M, 2024).

They cling to old methods and old language to the detriment of themselves and their work. This note is also for them in the hope that some of them may crawl out of the last century where they are entombed and start to enlighten themselves and their colleagues.

The discovery of the design principles revolutionized the whole field, its various conceptualizations, its methods and language as in Table 1.

The language underwent a radical shift as practitioners automatically started talking about the PDW and the DP2 structures that came out of it. The old language had always been ungainly and was quickly left behind as practitioners discovered more and more about the effects and power of the design principles.

The old language to describe the groups resulting from the old process had been semi-autonomous groups as it was clear they were not autonomous because they were operating in the name of the organization, under its legal auspices, using its resources and operating under the state for laws such OH &S. As work with the PDW proceeded it became clearer that 'self managing' was a much more accurate descriptor than semi-autonomous so that term was official adopted (Emery F, 1982).

Table 1. Summary of Language Evolution and Position of Responsibility for Coordination and Control			
Organization	Autocratic	Participative Democratic	Laissez-faire (None)
Old language: Process: sociotechnical systems design (STS or STSD)	Non jointly optimized sociotechnical* Basic modules are sections of individuals + supervisor	Jointly optimized. Basic modules are semi-autonomous groups	Neither
New language: Process: PDW for democratization	DP1 structures Basic modules are sections of individuals + supervisor	DP2 structures Basic modules are self managing groups	No structural relationships
Location of responsibility for coordination and control	Not with actors	With actors	No such responsibility

* Where sociotechnical includes sociopsychological and socioecological

Method. We no longer required the long spelling out of the principle of jointly optimizing the social and technical systems in any enterprise and the Norwegian ID program itself proved that the long, detailed and expert dependent method with STS was unnecessary. Emery & Thorsrud knew during the Norwegian Industrial Democracy Program (1962-67)

that the old method called sociotechnical systems, the 9 step method, was obsolete and neither ever used it again (Emery & Thorsrud, 1976).

Work began on the new method to democratize organizational structures immediately resulting in the new method called the Participative Design Workshop (PDW) (Emery & Emery, 1974) and countless other papers since then (www.socialsciencethatactuallyworks.com).

The PDW has now been used innumerable times around the world and its success in democratization can be seen in a multitude of reports (Emery M, 2008; Emery M, 2025). All that is clear enough.

Purpose. As Table 1 shows, with the advent of the design principles, there can be no misunderstandings about the conceptualization of 'sociotech' or its intent. The purpose of the PDW is simply and *only*, to change the design principle from DP1 to DP2, i.e. effect democratization.

Nor can be there be any mistake about when democratization has occurred – one has only to take a quick look at the org. chart to determine where responsibility for coordination and control is located. Individual positions or position names with the exception of perhaps right at the top of the hierarchy of functions, where there is one, are a dead giveaway that the structure is still actually DP1. In some organizations, the group(s) at the strategic level are highly specialized using the alternative model where responsibility is split between coordination and control (Emery & Emery, 1974). Similarly, some modern organizations have highly specialized groups at various levels. However, it is not difficult to determine whether the organizational design is genuinely DP2 or some sort of hybrid or a scam drawing.

The focus is now organization not work.

Again, one of the basic changes attendant on the discovery of the design principles was the shift from an emphasis on work to organizations more generally. The design principles apply to every organizational structure. This allowed us to explore what the design principles and their resulting structures looked like in all other types of orgs whether it be voluntary organizations (Emery M, 1977) or boards of directors or governance structures (Emery F, 1974, 1976a & b). That elaboration also opened the way to the two stage model of active adaptation (Emery M, 1999).

Demise of joint optimization

My discussion today, however, is of an aspect of the era of sociotechnical systems which has been even more systematically ignored than the above.

You don't even have to get into a PDW to see people's eyes light up when the design principles are explained to them for the first time – ripples go round the room, "Can this be for real?" Then when you get into the PDW itself you see the employees immediately get to work on phase 3 of the PDW, the Practicalities which will ensure the design works in practice, to realize that they have already assumed responsibility for their section of the organization. They do not hesitate to start redesigning their technical system and other areas to make those changes required for better functioning.

(Task no 4 listed under Practicalities is "What else is required to make sure the design works in practice, e.g. changes in technology, layout, mechanisms for coordination e.g. weekly meetings etc). This is after 1-3 have been done, namely setting the comprehensive set of measurable goals for the group, essential training requirements for start up and a first go at setting out a suitable career path for this new formation.)

Often these changes may have discussed between themselves but not mentioned to management or initiated by themselves. The latter of course is common because it has not

been seen as their responsibility or they may have been previously punished for making unauthorized changes. Management may have been requested to make the change but it never happened. There are a variety of reasons as to why change is slow in DP1 structures but once in the PDW, we see those potential changes immediately brought to the surface.

Once the designs are implemented and DP2 has swung into action, the extent and intensity of this change behaviour, the orientation of employees is even more unmistakable. Employees no longer hesitate in any way when making changes to their section and are not shy about getting onto others about improvements they can see in other places which would effect improvements for the whole organization. I can remember Don deGuerre saying that after the first round of PDWs went through at Syncrude that it became impossible to draw up a current org chart as things were moving so fast the new charts were obsolete before they hit the paper.

If these changes seriously affect other sections or functions, they must of course be discussed more widely and perhaps with the strategic level if they are of a nature to affect organizational goals and functions.

But the point is made, the relationship between the social and tech/psych/eco systems is *no longer one of optimization*, it is one of the people, the social system, *purposefully changing* the adjoining system to benefit the whole. This is particularly marked with the technology because it is so ubiquitous, whether it be the primary interface system or just another major variable in the functioning of the whole whether that be sociopsych or socioeco – people are deliberately improving the technology and other systems all the time.

The notion of joint optimization has become obsolete.

The whole purpose of the shift to DP2 is to put control for coordination and control in the hands of the people making the action and they do not flinch – they jump at the chance and do not want to let it go.

Open purposeful systems

There is no secret as to why it is the case that they jump at the opportunity to take responsibility and make change. This is what most of them have been missing all their lives. As Ackoff & Emery (1972) spelt out, humans are decision making creatures and make their decisions on the basis of four parameters.

In DP1 structures, where they are deprived of decision making, they are being deprived of an essential human function, one which gives shape and meaning to their activities and to their lives. This is why inevitably in DP1 structures, it is impossible to constantly get high score on the 6 psychological requirements for purposeful activity. They are being treated as less than adult human and it always shows up in both the basic assumption, negative group dynamic, behaviour first documented by Bion (1952; 1961) and a seriously, if not predominantly negative profile of affects. Over time, this profile can deteriorate into a mental illness.

So when people are introduced to DP2, they grab it with both hands: now they are being treated as the responsible decision making people they are in all other dimensions of their life. The only real meaning of the word '*empowerment*' is the locating of responsibility for coordination and control in the hands of the people who are making the action. Now they can behave like human beings in *all* aspects of their lives.

So this is the real promise that the design principles have delivered, a process in which humans are restored to their full potential which they are free to exercise. No longer is sociotech some relatively static arrangement where both sides of the equation are optimized. In its DP2 form, it is now a dynamic living, ever changing system where purposeful systems alert to their various environments, are constantly thinking, adjusting and adapting to meet agreed shared purposes.

Nor does the real meaning stop there: it is only in DP2 structures that people can genuinely become ideal seeking (Emery F, 1977; Emery M, 2021) which is what we desperately need in this poor old world suffering from the ravages of DP1 structures.

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