

Team design from the individual points of view
a humanistic approach

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ABSTRACT

This paper deals with design in teams from the individual points of view of all the parties involved in the process: principals, investors, owners, specialists, experts, advisors, officials, builders, users and residents. Taken together, these different points of view enable us to describe decentralised design in its pure form. Discussion of the individual points of view is possible only if one assumes that the parties involved have their own standpoints in the form of a collection of definable goals (all their wishes, efforts, principles, standards etc.), that they will endeavour to achieve those goals and that they will adjust their actions and decisions during the design process to serve those goals. For the elaboration of this individual point of view (of team design in a matrix structure) I shall take as a basis two concepts from decision theory: 'methodological individualism' and 'the actor's viewpoint'.

1 THE INDIVIDUAL POINT OF VIEW

From the individual point of view the design process takes place between all the individuals involved and can therefore be described as an inter-individual process. However, as individuals are usually part of an organisation (the body commissioning the project, the design firm, the structural engineering firm, the owners of a building, the users' organisation etc.) and as they usually participate in the design process in that capacity, it is more appropriate to speak of an interorganisational process.

Assessment of team design from an individual point of view is uncommon in the field of design methodology.

In the 1970s team design was usually assessed, by those working on the development of design methods and design methodology, from the point of view of the leading professional designers, usually the architects, but also from the point of view of the official principals. It was assumed that the other members of the design team were specialists and advisors who, in harmony, executed their part of the design commission within the framework set by the architect or principal. This assumed harmony was possible because consensus was expected on how the design commission was to be carried out. Furthermore, it was assumed that the design

process would proceed according to a specified schedule and allocation of tasks which had been derived from the commission. The views of the users, as the fourth important party involved, would be considered only when the design was ready and had been approved by the principal. At that stage they could do no more than accept or reject the design (Jones, 1970; Broadbent, 1973).

This view of team design reflects a hierarchic ‘linear’ structure with respect to the cooperative relationships between principals (P), designers (D), specialists (S) and users (U) (Figure 1).

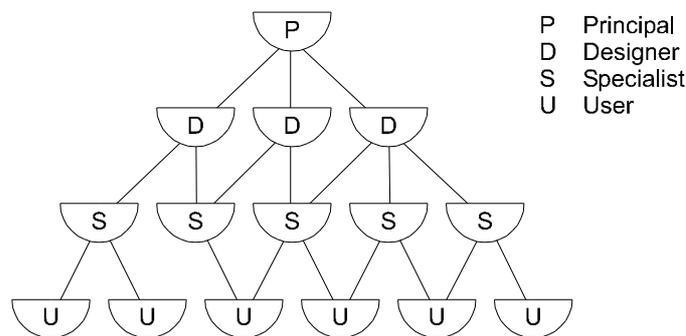


Figure 1: **The hierarchic linear structure for team design**

Later, in the 1980s, team design was seen from the point of view of collaboration. The framework for a design team was set up from within the project organisation. The design process was structured in advance and the design task was first split up so that separate sub-groups of designers and specialists could implement it. A core group of generalist designers ensured that there was cohesion (Maver, 1970; Bax, 1979; Behesti, 1985; Lawson, 1991).

This view of team design reflects a concentric ‘circular’ structure with respect to the cooperative relationships between the team members (Figure 2).

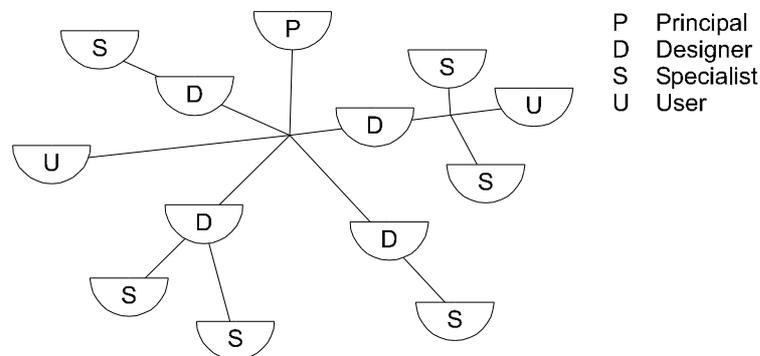


Figure 2: **The concentric circular structure for team design**

However, from the purely individual points of view, team design takes place less in a hierarchic or circular structure than in a flat ‘matrix’ structure. This is based on the idea that it is not only the professional designers who are responsible for the setting up of the framework of the design team and for the design itself, but that all the parties involved contribute. Thus, principals, professional designers, specialists, experts and users together form the design team. Each team member makes his own contribution to the work and the design, often at his own moment in the process. It is therefore not possible to say in advance how the team process will take shape and proceed (Blake, 1978; Hamel, 1990; Van Gunsteren, 1992; Berkhout, Van Loon and Micheels, 1982; Van Loon, 1986).

Naturally, the individual members of the team can operate in sub-groups within the process: e.g. a users’ interest group, a team of experts from a particular department, a consortium of investors etc. All this means is that a number of individuals have grouped their goals to form one set of common goals and that they will attempt to achieve these goals as a subset within the whole.

The individual view leads to a matrix structure without fixed relationships, because it is based on a multi-interpretable design commission and multi-dimensional solution space (Figure 3).

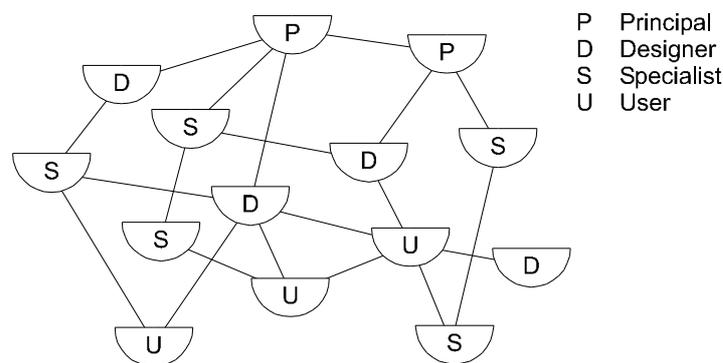


Figure 3: **The flat matrix structure for team design**

For the elaboration of this individual point of view (of team design in a matrix structure) I shall take as a basis two concepts from decision theory: ‘methodological individualism’ and ‘the actor’s viewpoint’.

1.1 Methodological individualism

Methodological individualism was developed in economics and, more specifically, in the economic theory of political decision-making (Van den Doel, 1978). The simple view that a group of people working together form one independent entity is replaced by the view of the group as a collection of individuals (or sub-groups) producing

something for another collection of individuals (or sub-groups), who may or may not be working together.

The idea that the group, which produces something together, has its own responsibility for taking (paternalistic) decisions for others, is incompatible with methodological individualism. Individuals and sub-groups of individuals working together have special authority which enables them to take decisions for others and renders them accountable (Van den Doel, 1978 p. 20-21).

Methodological individualism is becoming increasingly relevant to team design. The growing complexity of design commissions has made it impossible for professional designers to decide alone what is relevant to achieving the (individual) goals of all the parties involved.

1.2 The actor's viewpoint

The actor's viewpoint is developed in the rational choice theory which has drawn up decision-making models for describing the progress of individual choice processes (Pellikaan, 1994). Initially, these models were based on the image of the individual as homo economicus who ranks his preferences rationally in an (economic) order before making the best decision. Later, they came to be based on the image of the individual as homo sociologicus who has different types of considerations for his preferences and decisions: not only individual (economic) interests but also altruism, solidarity, social norms and so on.

The actor's viewpoint is based on the latter image. Moreover, according to this perspective each individual shapes his order of preferences directly, i.e. while acting. This implies that where individuals have to take a decision together, something which on paper could be considered a dilemma between them will not necessarily turn out to be so. Conversely, what appears to be a problem-free issue may well prove to be a dilemma in practice (Pellikaan, 1994 pp. 31-33).

The actor's viewpoint is significant in team design because preferences and a preferential order is formed mainly during the design process. During the design process new solutions can be devised which can be combined in new ways. This means that designers and users can voice their preferences for these solutions only during the design process.

The individual approach cannot be applied to all design teams and design commissions. The view of the various conflicting interests is less relevant to teams designing products for individual consumption, where it is assumed that their use will have no effect on non-users, so that they do not have to be taken into account in the design process. However, if a team is designing a public utility (with one or more users and affecting non-users too) then the idea of individual interests provides a great deal of insight not only into the actual design process, but also in the outcome of this process, specially the collective value of this outcome.

2 THE OPTIMUM TEAM DESIGN

This section focuses on the outcome, the result of the team design process. In his process, each designer individually and constantly strives to improve his part of the design, and thus to achieve his individual optimum. Each designer acts as a rational actor who, as soon as he sees opportunities to improve his proposals and therefore also his contribution to the overall design, will no longer be satisfied with his existing proposals. As a result, the design team as a whole will continually strive to achieve the best result possible. This result is referred to as the optimum team design, a definition of which will be build up in this section.

The section is structured as follows. First, the collective optimum is described, reasoned on the basis of two concepts from decision-making theory: methodological individualism and the actor's viewpoint. The rational choice theory is used for this purpose. Then the difference between the optimum in an individual's own situation and that of the collective situation is described. This is based on the economic welfare theory.

2.1 The collective optimum from methodological individualism viewpoint

The methodological individualism view of the collective optimum states that the micro-economic position whereby an individual will always maximise his own utility also applies at macro-economic level: only individuals participate in joint decision and actions within a national economy, within a society, and these individuals are focused on maximising their own utility and, in cooperation with each other, on maximising the group result. At this macro level, methodological individualism has no independent leading unit, no independent economic ('superhuman') subject above these individuals with its own goals and preferences. This is replaced by a pluralist conception in which the leadership (government or management) is also seen as a collection of individuals (the suppliers) that prepares and makes collective decisions for another collection of individuals (the demanders) who assess the results on their individual merits (Van den Doel, 1978 p. 20).

Methodological individualism is above all an ethical humanist standpoint in the sense that it assumes that all human activities are based solely on the unique individual (Elias, 1982; Achterhuis, 1985; De Swaan, 1989).

Methodological individualism originally assumed in the seventies (Davis and Olsen, 1987 p. 231; Van den Doel, 1978 p. 40; Pellikaan, 1994) that, in order to achieve the individual optimum and thus also the collective optimum, during the decision-making process each individual acted as a homo economicus who:

is fully informed about the various economic options;

- operates completely rationally;
- aims to optimise the expected economic value;
- and is influenced only by measurable results.

These assumptions came under heavy criticism. Complete information is never available, no one behaves in a completely rational way, decision-makers do not always strive to achieve the best result, and results which cannot be measured also

play an important role. As more insight was gained into the actual state of affairs, it was concluded that the decision-maker is not always consistent and focused. Decision-making also involves intuition, tradition, trust and impulse. Goals are often determined after choices have been made. Decisions are therefore often made in an unpredictable order (Boersma, 1989 p. 28; Pellikaan, 1994).

This is not to say, however, that every method which assumes that an individual tackles his problems in a targeted and focused way is doomed to failure (Van den Doel, 1978 p. 39). I regard many, if not most activities as focused. I am, nevertheless, aware that there are in reality situations in which designs come about without explicit goals having been formulated. In these cases appropriate goals are set out both during and after the design process. In such situations, I assume that it is still possible to reconstruct the relationship between goal and solution.

In decision-making theory, such situations are said to involve 'limited rationality', which indicates the limitations of people as decision-makers (Boersma, 1989 p. 23). These limitations are connected with: the image of a decision-making problem (a lack of knowledge means that the problem is not always a 'given fact' and is therefore difficult to define and the image is limited and subjective); the availability of solutions (alternative solutions are not usually provided, but have to be sought or devised); the awareness of the effects of solutions (It is often not known what can be achieved with a particular solution).

2.2 The 'satisficing' principle

Herbert Simon has postulated that it is not always possible to strive constantly towards the best situation, and has introduced the idea of the 'satisficing' principle (Simon, 1957, 1969; Boersma, 1989 pp. 20-22). This holds that individuals strive only to achieve a limited, usually concrete level of aspiration because their image of a problem is limited by their incomplete knowledge, and because solutions still have to be devised and the effects of the solutions are not entirely known. The criterion is not then 'the house must be as big as possible' but 'the house must have 200 m² of floor space'.

Describing decision criteria as specific levels of aspiration offers important practical and theoretical advantages, even if those involved have only a vague notion of how their situation could be improved. It is an unambiguous means of measuring whether the goal has been achieved.

Van den Doel (1978 p. 40) states that the fact that formulating decision criteria as levels of aspiration offers advantages must not automatically lead to the conclusion that individuals do not seek to achieve a maximum. The inaccuracy of this conclusion can be demonstrated by distinguishing between subjective and objective rationality. A decision is subjectively rational if a decision-maker attempts to maximise his goal function. It is objectively rational if this maximum is actually achieved. The gap between subjective and objective rationality arises partly because of a lack of information about alternatives and their implications, and partly because of the impossibility of taking all information into account. The decision-maker optimises: he looks for the best solution from given, offered or known solutions.

In terms of design this means that the individual designer attempts to achieve a satisfactory level of design result. Achieving this does not necessarily mean that he will always be entirely content. For instance, as soon as he receives more information, his level of aspiration will rise and he will attempt to reach that level.

These ideas about optimisation on the part of the individual decision-maker are often also applied to whole teams. The reasoning is as follows: in a team, all the members' ideas and proposals are collected, arranged in order of preference and combined with alternative solutions. The team then chooses the best. This represents the basis of the majority of what we might call the 'classic' (or 'systematic') design methods, which are most frequently used in practice. These methods developed from a succession of techniques which allow teams to combine and select more effectively, more efficiently and more rapidly. However, once design commissions became more complex and teams became more interdisciplinary and grew bigger, the design process began to run aground more frequently. The enormous number of sub-solutions which were produced in these large teams and the complexity of combining these alternatives meant that it became impossible to find solutions which were satisfactory for everyone. The technical refinement of the classic methods, refinements in terms of the calculation procedures for combination and selection, did not solve the problem. On the contrary: they allowed so many possibilities that they caused a combinational 'explosion'. In other words, the calculation time needed to find the best combinations from all these possibilities had become so excessive that the process had become virtually unmanageable (see Van Loon, 1998).

In practice, many professional designers therefore rejected the systematic design methods they had been taught, in order simply 'to make good plans', which they then tried to sell using their charisma and powers of persuasion. In so doing, they turned their backs to a large extent on team design. In this publication I hope to offer them an alternative to the classic design methods, one that is tailored to designing in large teams.

2.3 Rationality

In the shift from the classic design methods based on the individual situation to the group situation, design methodology had overlooked the fact that these methods were based on an excessively narrow definition of rationality: the rationality of homo economicus of the 1970s. The idea that a decision-maker, or designer, in the process of optimising, rationally compares his conflicting preferences and arranges them in a fixed order before choosing the best one and that the designers in a team, in the process of optimising, then also make a rational comparison and determine a fixed order, but then for all preferences together, before choosing, is too limited for team design.

Later, in the 1980s, the rational choice theory showed that rational decision-making in groups could also be structured using a broader definition of rationality. The image of homo economicus was replaced by homo sociologicus, thus replacing economic rationality with sociological rationality.

Pellikaan and Aarts (1996) summarised this by distinguishing between the thick theory of rationality and the thin theory of rationality. The thick theory assumes maximisation of the outcome and specifies the goals, objectives and preference orderings of actors. The thin theory assumes some sort of maximisation and specifies conditions for the preference orderings of actors, but does not specify any particular goal, objective or preference ordering.

This difference can be clearly illustrated using the well-known Prisoner's Dilemma from decision-making theory (a theoretical formulation of a human dilemma that had already been described by philosophers like Hobbes and Hume).

2.4 The prisoner's dilemma

In the original Prisoner's Dilemma two players have a choice between two strategies: cooperate (do not confess) or defect (confess). The combination of two players with two possible strategies yields a matrix with four possible cells. Matrix 1 is the outcome matrix of this game, which describes the physical consequences for every possible combination of choice by both players. The outcomes in Matrix 1, however, do not imply the dilemma. The dilemma only arises after the players have established their utilities or payoffs for the four outcomes.

	Column - Player	
	Cooperate / Don't Confess	Defect / Confess
Cooperate/ don't confess	Outcome Q (1 year, 1 year) Neither player confesses the major crime; they are tried for minor crimes and get one year each.	Outcome S (20 years, 0 year) The column player turns state's evidence and is freed. The row player is convicted and gets twenty years.
Row- Player	Outcome P (0 years, 20 years) The row player turns state's evidence and is freed. The column player is convicted and gets twenty years.	Outcome R (10 years, 10 years) Both players confess, are tried for the major crime and get ten years each.
Defect/ confess		

Matrix 1: The outcome matrix of the original Prisoner's Dilemma (after: Pellikaan and Aarts, 1996)

The problem in Matrix 1 is one-dimensional because the players are assumed to consider only the self-regarding motive indicated by the number of years they personally will spend in jail. The self-regarding motive 'prefer a shorter term for yourself to a longer term' leads to the following preference ordering: 0 years > 1 year > 10 years > 20 years. This preference ordering corresponds with $P > Q > R > S$ or, for short, PQRS. The preference ordering PQRS is the so-called Prisoner's Dilemma or PD-ordering. The PD-ordering is a plausible ordering for every individual who is placed as a (row-)player in the outcome matrix of Matrix 1. If both

players have a PD-ordering the game becomes a Prisoner's Dilemma. The payoffs in Matrix 2 define the Prisoner's Dilemma game. Both players have a dominant strategy (Defect), and the result of the game is mutual defection.

		Column - Player	
		Cooperate	Defect
Row- Player	Cooperate	Outcome Q (3,3)	Outcome S (4,1)
	Defect	Outcome P (4,1)	Outcome R (2,2)

Matrix 2: The payoff matrix of the original Prisoner's Dilemma (after: Pellikaan and Aarts, 1996)

The Prisoner's Dilemma has often been used to show that methodological individualism and, consequently, the individual pursuit of maximisation of utility, leads to a less-than-optimum collective outcome. This justifies the enforcement, from outside the group, of cooperative behaviour that would be beneficial for both players - enforcement by the government or management. These bodies do not decide what the best outcome is, they have no goals or preferences of their own, but enforce cooperation so that the individuals achieve a group optimum.

The PD model is often extrapolated to the N-individuals situation. The number of combinations of strategies then grows exponentially. Without cooperation enforced by some central authority, the collective optimum could never be achieved in an N-individuals group.

However, enforcement of mutual cooperation in groups has led to many drawbacks. Not everyone can always be forced to cooperate. Power to enforce the optimum will be limited in an open, democratic community. There will be no consensus that people must be forced to cooperate on all collective dilemmas. An alternative for central enforcement was then sought in cooperation on the basis of commitment to others and social norms. But because people did not always choose to contribute to collective matters, it was not possible to achieve the group optimum in some cases. The search then turned to cooperation based on the notion that iterated choices can generate cooperative behaviour. The rational actor will choose a conditional voluntary cooperative strategy. But in a large group of actors a common knowledge of each other's behaviour was not feasible. Individual actors still preferred unilateral defection to mutual cooperation (Pellikaan and Aarts, 1996 pp. 3-4).

One common feature of these three types of "enforced" cooperation is the assumption that each individual is selfish and that this can only be held in check by central authority, commitment to others and social norms. Pellikaan introduced an alternative to this assumption: the actor's viewpoint (based on the thin theory of rationality).

The actor's viewpoint assumes that even given force, commitment to others and social norms, actors can adopt a cooperative attitude. This possibility arises because the individual's efforts to maximise utility do not mean that he seeks to achieve selfish aims. People are not selfish by definition (Pelikaan, 1994 p. 265). This implies that individuals have their own subjective preferences, their own view of the best outcome and that in a group there will always be several preference orderings for one and the same group dilemma. Only in practice will it become clear whether a specific collective issue that is a dilemma on paper will actually appear so in reality. And, conversely, an issue that on paper seems uncontroversial might turn out to be a dilemma in practice.

In short, one cannot say in advance how preferences and goals will be weighted. This can only be established on the basis of concrete actions. The actor's viewpoint means that actors (designers) must above all have the opportunity, as they work together, to weigh up their preferences and goals during the design process. The design method they use must cater for this (Van Loon 1998)

3 THE INDIVIDUAL OPTIMUM VERSUS THE COLLECTIVE OPTIMUM

When describing matters on which decisions are made in a society (an economic system, a company) economists distinguish between: the individual optimum and the collective optimum; and between individual (consumer) goods and collective (consumer) goods.

Individual consumer goods can be consumed by one individual in 'separate' units, after which they are no longer available to other individuals. They might be apples, jackets, or private homes. In contrast, collective goods can be consumed by several individuals at the same time. Examples include bridges and parks. The individual optimum is the optimum for one individual, while the collective optimum is the optimum for a number of individuals together. The four terms give four different situations:

	Individual Goods	Collective Goods
Individual optimum	a individual optimum for individual goods	D individual optimum for collective goods
Collective optimum	b collective optimum for individual goods	C collective optimum for collective goods

Table 1: **Four situations for the optimum (after: Van den Doel, 1978 pp. 51-55.)**

Van den Doel (1978 pp. 63-64) concludes, in summary, that the welfare optimum for individual goods differs in at least two respects from that for collective goods: firstly, "in an optimum situation, different consumers consume different amounts of purely

individual goods at the same price. However, in the same situation, different consumers will consume the same amount of purely collective goods at different prices.”; secondly, “the optimum for individual goods means that their marginal benefits for each individual consumer will be the same as the marginal costs of the good as a whole. However, the optimum for collective goods means that their marginal benefits totalled up for all consumers is equal to the marginal costs of the goods as a whole.”

Economists have worked these four situations (a, b, c and d) in much greater detail. They have addressed the difficulties of representing the actual demand curve of consumers - in reality this will seldom be straight - and establishing how consumers will value several individual or collective goods in relation to each other in terms of benefits and sacrifices. However, the above descriptions are enough to indicate the essential difference between decision-making methods geared to an individual result, and decision-making methods geared to a group result. The difference between these two methods lies in the ‘aggregation of the marginal benefits of the individuals’. As indicated in situation c (collective optimum for collective goods), this aggregation must now be possible if the optimum group result is to be achieved.

The classical design methods, geared to systematic design, have never incorporated this step. They are focused on situation a: the individual optimum for individual goods. For a design commission there has to be a principal who decides, as an ‘individual consumer’, what the optimum is. The designer (this might also be a ‘homogeneous’ group of designers) designs goods at a particular price that have a certain value for the principal. The principal chooses on the basis of price and value. If there are several principals for the same good then, on the basis of the classic design method, this good will first have to be divided into individual parts, after which each principal will be given a say over his own part. Altogether they determine the optimum combination of these individual parts. This is situation b: the collective optimum for individual goods

4 CONCLUSION

The shift from the economic approach to the optimum - with which this paper began - now presents a problem. This approach is actually only concerned with numbers, with the quantity of the goods, ignoring their composition and form. However, these are also highly relevant in the design approach.

When situation c occurs - a group of principals want a number of goods, which they regard as collective goods - then the classic design method will attempt to keep the optimisation of this situation ‘outside’ the design process. Designers and design teams only need to draw up designs, plans and proposals for collective goods (bridges, parks). It is left to the principal(s) to decide on the number, price and users of these collective goods. In practice this is no longer possible. The need to design in a decentralised, open manner - principals (organisations) negotiate via their representative, their own designers, during the design process - means that ‘collective

action' to 'aggregate individual marginal benefits' can no longer be placed outside the design process.

In welfare theory, the government is usually the institution most suitable for performing this aggregation. In my book I examined whether, and how, a design team can do this.

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