

# WORKING PAPER

*Architecture of an Economy with Social Enterprises:  
the Relational Capacity Approach*

Pieter H.M. RUYS

**CIRIEC N° 2014/13**



**CIRIEC activities, publications and researches are realised  
with the support of the Belgian Federal Government - Scientific Policy  
and with the support of the Belgian French Speaking Community - Scientific Research.**

**Les activités, publications et recherches du CIRIEC sont réalisées  
avec le soutien du Gouvernement fédéral belge - Politique scientifique  
et avec celui de la Communauté française de Belgique - Recherche scientifique.**

**This working paper is indexed and available  
in SSRN and RePEC**

**Ce working paper est indexé et disponible  
dans SSRN et RePEC**

**ISSN 2070-8289**

**© CIRIEC**

**No part of this publication may be reproduced.**

**Toute reproduction même partielle de cette publication est strictement interdite.**

# Architecture of an Economy with Social Enterprises

---

*The Relational Capacity Approach*

Pieter H.M. Ruys<sup>1</sup>, Tilburg University

Preliminary Version<sup>2</sup> 2014-12-10

## Abstract

*One of the main unresolved issues is the way on which a social enterprise can be embedded in a market economy. That problem is approached here by offering a sound foundation for social-economic modeling with private, non-profit and public sectors.*

*An enterprise, being a nexus of relations, is described and analyzed as an operator, an Actor, which governs the interaction between its relational production factors. Each factor consists of characteristic relational capacities that together determine the identity of an enterprise. By going to the limit of these capacities, and by treating behavioral and positional concepts on an equal footing, one arrives at a generic perspectives structure that orients an enterprise, or any other actor, towards its future. The operator's generic goal is to enhance its relational capacity, based on improvements of the realizations of the perspectives in terms of values and resources. By endowing this structure with institutional characteristics, an Institutional Design Map is constructed. By ordering institutional factors with in layers with increasing sophistication, market behavior by 'Econ's can be distinguished from relational behavior by 'Human's, using the terminology introduced by Kahneman. Combining the two, private, social, and public enterprises are identified and conditions for their performance are derived. These enterprises are embedded in an institutional framework, the social economy. A blueprint is presented in which questions as: who owns, who supervises, and who finances social enterprises, are discussed.*

*The introduction of an actor as the basic building stone for the social sciences is based on the mathematical tools, such as projective and convex geometry; it offers as a magnifier glass many opportunities for analysis and can be applied to a great variety of concepts, from micro entrepreneurial behavior to properties macro-economic systems.*

**Keywords:** Institutional Design, Ordering Values, Multilayered Rule rationality, Cooperatives; Sector Policy.

**JEL codes:** H75, L31, L51, I18, K12, L33.

---

<sup>1</sup> This research has been partially financed by the Tilburg School of Economics and Management and the Tias Centre for Governance of the Private Public-Sector Enterprise (CBMO). I gratefully acknowledge the hospitality I receive from the Econometrics Department. I benefitted from discussions with participants of various seminars, congresses, the CIRIEC Committees, and Tias executive-classes. I am deeply indebted to my friends Rob Gilles, René van den Brink, Dolf Talman, and the late Claus Weddepohl, as well as to Gerard van der Laan, Jacques Drèze, Emiliya Lazarova, Jack Vromen, Frans van Doorne, Shou Jilin, Gleb Koshevoy, and Eric van Damme, for commenting on some of the many preliminary versions.

<sup>2</sup> An earlier version has been presented at the 2013 CIRIEC-Conference at the University of Antwerp.

## Table of Contents

1	Introduction.....	4
1.1	The Relational Approach and Institutions.....	4
1.2	Some Literature on Social-Economic and Organizational Modeling.....	5
1.3	The historical context and definitions of Social Enterprises .....	7
1.4	Organization of the Paper .....	9
2	Actors: Disentangling their nexus of positions and relations.....	10
2.1	The Fano Projective Structure: Generic Capacity Perspectives and Rules of Motion .....	10
2.2	The Structure of the Generic Behavioral Regimes .....	11
2.3	The Endowed Perspective Structure; Domain.....	13
2.4	The Richness Ordering of the Mindset: Layers of Complexity.....	14
2.5	The Refinement Ordering of the Means-factor; Evolution .....	15
2.6	An Actor: Balancing Richness and Refinement.....	17
3	An Institution Composed of Actors; Institutionally Induced Behavior .....	17
3.1	Institution Design.....	17
3.2	Micro-behavior induced by Institutional Governance; Rationality and Trust.....	26
4	Social Enterprises: developing appropriate layers in Factors and Regimes .....	29
4.1	Adapting Enterprises to a Market economy .....	29
4.2	Hybrids: Temporarily Mixing Regimes .....	32
4.3	Design of an Architecture for a Social Economy .....	34
5	Conclusion .....	37
6	The Modeling of the Relational Capacity Approach .....	37
6.1	Social Epistemology.....	37
6.2	An Actor as Operator on its Factor-Perspective Space.....	38
6.3	The Fano-Matroid and the Perspective-Structure .....	43
	References .....	49

## 1 Introduction

### 1.1 The Relational Approach and Institutions

In the law-and-economics literature, Jensen and Meckling (1976) first formulated the idea that a corporation is a nexus of contracts (Eisenberg, 1998). It is firmly rooted on the theory of the firm and transaction cost theory, as developed by Coase, Williamson, e.a. Transactions are specific forms of interactions, which are described by relational networks. Similarly, interaction structures generating utility and welfare can be described by relational networks. An institution is conceived in this paper as an operator on potential welfare generating networks transforming these fluid networks into a system of hard transactions. A market, for example, transforms – by instituting market behavior and the price mechanism – profiles of chaotic interac-

tions potentially generating utility into predictable actual transactions realizing utility. This paper aims at investigating the types of institutions that can transform characteristic virtual interaction networks of a social economy into robust transaction networks, leaving the relevant social characteristics invariant. A political mechanism, for example, transforms – by instituting a voting mechanism – profiles of chaotic, virtual collective interactions into parties that are empowered to make social choices and transactions.

By adopting the relational approach, this paper firstly disentangles the myriad of relations into ternary relations between near-independent functional factors in a projective space. The near-independent property of factors in a ternary relation means that every factor can be identified as such, but is dependent on all other factors in the society. By requiring that relations (generating behavior) may evolve into factors (generating positional functions), and vice-versa, a unique generic interaction structure is obtained that is spanned by three generic perspectives. The relational approach implies a strong correspondence (a duality) between capacities and behavior. The analysis can therefore be transposed to the behavioral domain, giving a sound foundation to, for example, the connection between legal institutions and economics. Economic acts that are deemed illegal should be precisely defined before being prohibited by the law of a country.

Such an analysis requires a common analytical framework, which not readily available in standard economic theory. In the next sections I introduce the concept of an *Actor*, endowed with generic relational capacities on which transient relational structures as organizations are built. In standard economics a firm is modeled as a production function that assigns a set of feasible outputs to some production-factor configuration. The technology of a firm is given. In the relational approach an Actor is modeled as an operator on a structure of factor-endowments, which are oriented to the three generic perspectives in the unique (tripolar) interaction structure: the internal perspective, the external perspective, and the common resource perspective. That results in a genuine dynamic model in which change of factors and organizations can be described and predicted.

The relational perspective holds that social entities evolve through the dynamic interplay between meanings and structures. Relational structures emerge out of the meanings the individuals assign to them, while in turn shaping the meanings connected to the structures in which the individuals are embedded. As individuals switch between the various social, cultural, and economic domains in which they are active, opportunities arise for constructing new meanings and relational structures.

An institution is formalized as an Actor that transforms some interaction structure in society into a transaction structure with its values determined by the society's members. The central question is: what kind of societal institutions can satisfactorily cope with the increasingly social and complex interaction structures that are generated by its members.

## 1.2 Some Literature on Social-Economic and Organizational Modeling

Standard neoclassical economics is in principle restricted to exchange transactions between self-interested and opportunistic individuals. The standard economic approach views competitive markets as the most efficient solution to the problem of coordinating economic exchange. The "invisible hand" of the price mechanism is thought to ensure that exchange is swift and equitable in the sense that the most efficient actors are conceded additional resources at the cost of less efficient actors, who are weeded out of the market. That model is apt for defining and improving efficiency in a society of people endowed exogenously with instrumental rationality to attain their profit and utility maximizing goals. The standard neoclassical model treats both producers and consumers as individuals with exogenously given characteristics; their internal, endogenous motives are empty: these are 'black boxes', and give no clues for differing a for-profit firm from a non-profit enterprise.

Coase (1937) opened in a sense the black box of a firm by asking why there exist firms at all, if markets are the most efficient way to manage exchange. He explained the existence by assuming that the internal allocation mechanism of a firm is - to a certain extent -- cheaper than the external market mechanism. The extent determines the boundary of the firm and is based on the difference between internal and external institutional rules. This phenomenon explains the 'nature of the firm'.

The cooperative and capacity approaches have precursors in Sen's Capability approach (Sen, 1985, 2009)<sup>3</sup>, made operational by, a.o., Nussbaum's capability theory of justice. Although Sen's ideas have inspired many, his concept lacks a formal foundation. By giving that formal relational foundation in Section the concept of capacity deviates from Sen's view. Among others, Bouchard (2010) and Guala (2013) have contributed to the concept of a cooperative; contributions by various authors can be found in CIRIEC publications and in its series on Social Economy & Public Economy (2000, 2005, 2013).

Organizational economics emerged. Concepts as property rights, principal-agent relations, and transaction cost economics: they all made significant contributions to the understanding of organizations. According to Granovetter (1985), however, any economic approach to organizations is limited if the individual and organizational actors are abstracted out of their social and institutional context. Etzioni (1996, 2014:87) introduced the communitarian thinking pointing to "the idea that all those involved in the corporation are potentially members of one community. While they have clearly significant divergent interests, needs, and values, they also have some significant shared goals and bonds." The relational approach takes not an actor, but interaction in the form of a ternary relation as primitive.

Starting with the institutional context, Staber (2013) defines institutions as "relatively persistent rule systems, allowing people to act collectively on the basis of common understandings." Distinct rule systems can be found in areas like government, business, family, education, health, and religion. Each of these areas consists of a web of meanings and values which specify how its participants should act and relate to one another. The fundamental assumption of this approach is that the meaning of an action is not given in itself, but arises only from its relation to other actions, both temporally and structurally. The view that preferences and other mental states capture real phenomena, which I position in a near-independent module, the Mind Regime, is also held by Dietrich and List (2012).

The conventional, popular approach to organizations and organizational design emphasizes that structure follows strategy (Chandler, 1962): the structural architecture of relationships between actors, which differs in relevant attributes (e.g., age, education) follows from corporate strategy. This strategy shapes individual and collective action (e.g., who in a group occupies what position, who has what kinds of decision-making rights) in predictable ways. The relational approach attends to the mutual constitution of structural relations and the meanings of relations, with a view to what people do when they discover contradictions or obstacles, renegotiate the content of ties, or change partners (White, 1992). From a relational perspective,

---

<sup>3</sup> Amartya Sen (2009, p. 19 and 244) considers the term capability as the power people have to do something, both individuals and groups. For Sen, the concept of capability serves primarily as a social indicator against which governments should be measured. For example, human rights may be fairly empty as long as they cannot be activated. In order for citizens to have a capacity to [vote](#), they first must have "functionings". These "functionings" can range from the very broad, such as the availability of [education](#), to the very specific, such as transportation to the [polls](#). Only when such barriers are removed can the citizen truly be said to act out of personal choice. It is up to the individual society to make the list of minimum capabilities guaranteed by that society. For an example of the "capabilities approach" in practice, see [Martha Nussbaum's](#) Women and Human Development. (Wikipedia 2011). The term capacity that I introduce, however, is a ternary relation describing a productive operation on pairs of factor-endowments. This concept also differs from the mathematical concept of a capacity, which is a kind of measure for coalitions with the purpose to order these coalitions (see Section ..).

the structure of relations affects their meaning, while at the same time being shaped by the meanings that the actors ascribe to relations. Structure and meaning are co-constitutive of one another.

Firstly, organizations are *complex, evolving systems* (CES). System theory is characterized by emergence, connectivity, interdependence and feedback. Adaptive or evolving systems are, in addition, characterized by self-organization, complexity, space of possibilities, co-evolution, chaos, and self-similarity. The structure is complex in that they are dynamic networks of interactions, and their relationships are not aggregations of the individual static entities. They are adaptive; in that the individual and collective behavior mutates and self-organizes corresponding to the change-initiating micro-event or collection of events.

Secondly, since the meanings and values mentioned in the definition develop and evolve, *organizational evolution* is therefore an essential ingredient for our purpose. Staber (2013) observes that Darwinian evolution is essentially about replicating populations of slightly different combinations of units in changing resource environments, rather than changes of singular self-organizing systems. Evolutionary processes, thus conceived, are generic and applicable to any unit and environment. The Darwinian paradigm characterizes evolution as a movement away from a previous state of a system towards a new and different state. Evolution in a social system, like an organization, work group, or business cluster, is possible if there is sufficient variation in the population of units constituting the system, if selection can operate because there is competitive pressure, and if the selected units can be passed on to subsequent generations (Aldrich and Ruef, 2006).

Thirdly, this complexity can only be tackled by appropriate system decomposition in wholes, boundaries, and parts: the discipline called "Mereology". Informal part-whole reasoning was consciously invoked by Plato (in particular, in the second half of the *Parmenides*). The *modular functional perspectives* view has been developed by, a.o., Varzi, 2006; DiMaggio & Owell, 1983; Enjolras, 1996; Santos & Eisenhart, 2005; Fodor, 1983; Kirman & Teschl, 2006; North, 1990. Simon's (1962) seminal work on complex systems emphasized the *modular and hierarchical structure* of most complex systems, both natural and artificial. A modular system cannot be partitioned into completely independent subsystems, but rather contains nearly independent subsystems (modules) which are connected via interfaces. These interfaces are elements of a system that connect subsystems. This definition generalizes the concept of near-decomposability, introduced by Simon (2002), as well the more recent notion of modularity in complex networks (Newman 2006, Frenken and Mendritzky 2011).

The modular nature of complex systems refers to the nearly decomposable architecture of the interaction between elements. Modular architectures offer evolutionary advantages because, in most instances, the effect of a change in a given module is confined to that module. Their components, *nearly independent subsystems*, are connected by 'interfaces'. The concepts "actor", "factor" and "regime" in this paper refer to such nearly independent subsystems or to modules in a modular system. The interfaces ruling their interaction are their *regimes*.

### 1.3 The historical context and definitions of Social Enterprises

As for their mission, social enterprises are from all ages and are present in all cultures. Their form, however, shows a great variety. The social enterprise developed in the European culture has been promoted and protected by the ruling classes of the time: church, nobility and commerce. This happened also in the medieval Netherlands. The French revolution and Napoleon sought to bring the governing boards of charitable institutions under political control to better express the will of the people, resulting in public institutions providing social services.

The organization of non-profits, on the other hand, has survived Napoleon in the Netherlands and established a strong tradition in the Dutch society. The reason is the difference in the societal mental model between the two countries. The Netherlands had freed itself from the feudal social ordering in the 17<sup>th</sup> century,

and allowed private social groups (the 'pillars' of Protestants, Catholics, Liberals, Labour) to take responsibility for their own social goals and services. Each group owned a mental social model with their own rules and rituals. This motivated the behaviour of the organizations' boards, managers and collaborators. Boards with these mental models could be trusted by appropriate financiers and stakeholders. In the Netherlands, almost one third of the social-economic order was based on the autonomy of private organizations providing social services, each regulated by mental model and philosophy of life characteristic for that social group. An example of the public involvement is the Education Law (1917), which marked the end of the educational contest (*'schoolstrijd'*) between public (*openbaar*) and private (*bijzonder*) education. Each private group (pillar) received the right to establish a school (at any level), which would be is financed by the state; each public community (at an appropriate level) has the obligation to establish a school on a non-denomination (secular) basis.

The peculiarity of the Dutch system is that the State was a partner in this undertaking, although on 'arm length distance': the state did not interfere with their philosophies and their governance. As far as these private institutions provided social services that were acknowledged to be partly the responsibility of the state, such as education, these institutions were even subsidized by the state. Remains of this pillar-system still exist, but the pillars have lost their popular base today.

From the 1960s, different European models emerged. Defourny & Nyssens (2014:14) distinguish the Bismarckian countries, with a strong corporatist tradition; the Nordic countries with a tradition of co-operatives; in the UK was a lower level of government spending, but a large voluntary sector, relying mostly on private resources, increasingly from the market sector. In the Southern countries, families are key actors in welfare provision, together with the co-operative tradition. In the US, social entrepreneurship and social enterprises refer to the use of commercial activities by non-profit organizations in support of their mission, as well as to social initiatives by commercial firms. There also exists a widespread social users' co-operatives form in rural areas.

Social enterprises used to be defined in legal and institutional terms, such as a 'non-profit enterprise'. This is unsatisfactory as institutional definitions are context-dependent and make comparison of public policies between countries impossible. In the 1996, a European Research Network (EMES) was started to identify and clarify indicators over a concise and elegant definition. Rather than constituting prescriptive criteria, they describe an "ideal type" in Weber's terms, which allows also for identifying new social enterprises being reshaped by internal dynamics. The EMES approach distinguishes three dimensions of a social enterprise: (i) the economic and entrepreneurial dimension, (ii) the social dimension, and (iii) the participatory governance dimension.

This approach gives a good intuition about the factors that made social enterprises emerge in different societies, and identifies their common characteristics. However, the broad picture makes it hard to draw precise boundaries of the relevant concepts and to identify interdependencies between them. This paper aims, just as the EMES project and other initiatives do, at developing "a tool, somewhat analogous to a compass, which helps analysts locate the position of the observed entities relative to one another and eventually identify subsets of social enterprises they want to study more deeply" (Defourny e.a., 2014:19).

In 2011 the European Commission, in its communication on Social Business Initiative<sup>4</sup>, defined a social enterprise as:

---

<sup>4</sup> Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Social Business Initiative - Creating a favourable climate for social enterprises, key stakeholders in the social economy and innovation; COM(2011) 682; Brussels, 25.10.2011.

*A social enterprise is an operator in the social economy whose main objective is to have a social impact rather than make a profit for their owners or shareholders. It operates by providing goods and services for the market in an entrepreneurial and innovative fashion and uses its profits primarily to achieve social objectives. It is managed in an open and responsible manner and, in particular, involve employees, consumers and stakeholders affected by its commercial activities.*

As for recent definition of a public enterprise, Massimo Florio (2014)<sup>5</sup> suggest that “Public enterprises can be defined as economic organizations: (a) ultimately owned or co-owned by national or local government, (b) internalizing a public mission among their objectives, (c) enjoying full or partial budgetary autonomy, (d) exhibiting a certain extent of managerial discretion, (e) operating mainly in a market environment, and (f) for which (full) privatization would in principle or de facto be possible, but for some reasons it is not a policy option. Despite this evidence, economists and policy-makers no longer seem to have a firm understanding of why PE exist, what explains their performance, and the role of the State as owner.”

The increasing importance of social aspects, and the simultaneous fragmentation of social services in society, requires an approach that integrates the goals belonging to the social economy, the public economy, and the market economy. It must accept the primacy of the social objectives: money is necessary but not sufficient for a happy, respectful social life. The weights between the two are to be determined by the individual agents, and by a cooperation of agents, such as in an enterprise.

When defining a new legal concept, we first need to redefine the idea that constitutes the base of that concept. This idea to be redefined for today concerns the enhancement and ordering of social relations and capacities that create welfare, rather than just the welfare creation by private goods and services through the market mechanism. The appropriate instrument is a social enterprise, which I describe for the time being as:

- (i) An undertaking by a social membership community with the objective to realize social value.
- (ii) Incorporated under private law and embedded in a social forum determining the social sector's governance code and legitimizing the social community's activities.
- (iii) Supported for its financial viability by public means, commercial activities developed from its social services, and/or other financial resources that are incorporated in an ancillary corporation working in the appropriate regimes.

## 1.4 Organization of the Paper

The paper is organized as follows. Section 2 lays the groundwork for the analysis. The concept of an Actor is introduced, as well as the ordering of the composing factors in layers of sophistication. Institutional Design is introduced in Section 3, together with the relation between macro rules and micro behavior. Section 4 focuses on the Social Enterprise, whereas Section 5 concludes.

The reader who is not comfortable with mathematical symbols may well choose to skip Section 2 and start with Section 3. Or perhaps even browse through this section and look to the verbal descriptions in Section 4. I apologize for the potpourri in Section 6, but an elegant description of novel concepts asks for much more time than I can dispose of at the moment.

---

<sup>5</sup> See also: GHK, Johnson and Spear (2006) “Social Enterprise: An International Literature Review”, A Report to Small Business Service/Social Enterprise Unit. Monzón, J.L. and Chaves, R. (2012) The Social Economy in the European Union, Presentation, 3 October, Brussels.

## 2 Actors: Disentangling their nexus of positions and relations

### 2.1 The Fano Projective Structure: Generic Capacity Perspectives and Rules of Motion

The purpose of this section is to disentangle the many functions of relations and to arrive at a generic structure of relational capacities, necessarily valid for any actor, and on which her transient developments are based and developed.

The *first step* concerns the decomposition or disentanglement of the set of transitory capacity factors and behavioral relations identifying a phenomenon into *generic* factors and relations, common to all phenomena. For that purpose a behavioral relation is described as a **ternary relation** between capacity-factors. That is, it expresses an interaction – a creative force – between capacity-factors that is caused by an opposed capacity in some dimension of the two capacity-factors. This interaction generates a third capacity-factor, which contains the capacity that is present in only one factor of the pair and neglects the capacity that is common or absent in both factors. This integration is represented by an operation on the factor space, indicated by  $\otimes$  and called *component-wise addition modulo two* (see Figure 2.1). Next, assume that a ternary relation is emerging as a capacity-factor, which defines the capacity space of ternary relations (or hyperplanes: see Section 6.2). When those two spaces are equal, that is, the number of factors is equal to the number of behavioral relations, then a unique, closed and symmetric structure results, called the *Fano Projective Structure*,  $(P_2, \otimes)$ .

This structure defines **the rules of motion** between the positional factors and between its ternary relations. It defines relative positions, but is otherwise void of any empirical interpretation. This structure, derived in Section 5.2, is a special projective geometry, in which some of its elements are points at “infinity”. It contains seven positions and relations, any three of which span or determine the whole structure: see Figure 2.1. Each position is connected with all other positions by three characteristic relations and each relation contains three positions. In Figure 5.1 all relations are depicted as circles.

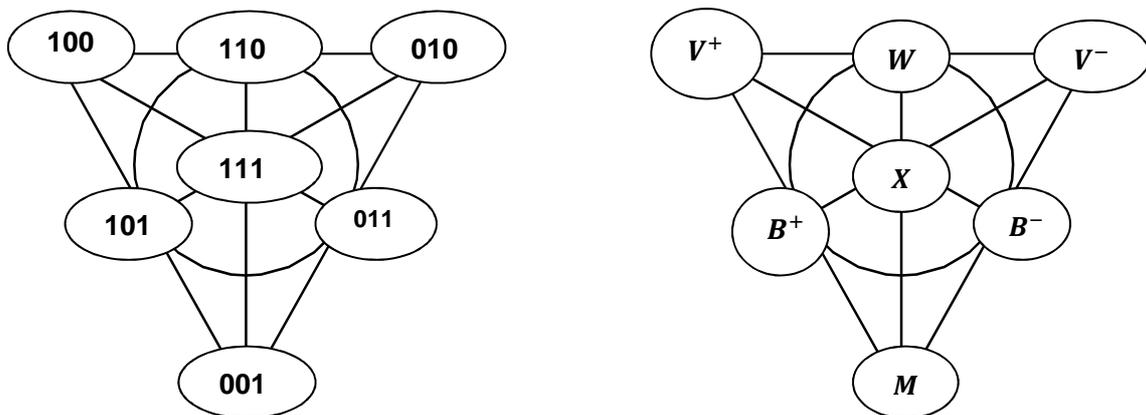


Figure 2.1: The Fano Projective Structure  $(P_2, \otimes)$ , and the Factor-Perspective Structure  $(F_2, \otimes)$

The *second step* is to give interpretations to the positions and relations in the projective structure. In Table 2.1, two of the three spanning positions in Figure 2.1 are *defined* to be *opposite*, meaning that any interpretation of the second characteristic in the position (010) should be opposite to the interpretation of the first characteristic in the position (100). The third characteristic in the position (001) is interpreted as a *medium* between the first two. This makes the symmetric structure asymmetric, its positions *factor-perspectives*, and its relations *regimes*. The duality property between positions and relations in the Fano-projective structure

carries over to the Factor-Perspective Structure. Regimes define the behavioral component between a pair of factors or roles that span a regime. In Table 2.2 interpretations of regimes for a generic enterprise are presented.

These interpretations define the asymmetric *Factor Perspective Structure* in Figure 2.1, where the positions are indicated by letters that correspond with the definitional rules set above. There are three spanning capacity-factors: two opposite: the Internal Mind perspective ( $V^+$ ) and the External Mind perspective ( $V^-$ ), and one medium spanning factor: the Means-perspective ( $M$ ). The other four factors result from the interaction rule: the Common Mind perspective ( $W$ ), the Internal Body perspective ( $B^+$ ), the External Body perspective ( $B^-$ ), and finally the Nexus of Perspectives ( $X$ ).

Sym.	Factor- <i>Perspective</i> Positions	Asym.	Factor- <i>Endowments</i> for a <i>Market Economy</i>	
100	Producers (micro)	$V^+$	Production Technologies and Capabilities	$V^+(t)$
010	Consumers (micro)	$V^-$	Consumer Preferences and Expectations	$V^-(t)$
001	Common resources	$M$	Market Institutions and Resource Allocations	$M(t)$
101	Supply (macro)	$B^+$	Commodities actually supplied	$B^+(t)$
011	Demand (macro)	$B^-$	Commodities actually demanded	$B^-(t)$
110	Common market price	$W$	Exchange values and prices	$W(t)$
111	Nexus of Perspectives	$X$	Allocation: Nexus of Factor-Endowments	$X(t)$
$P_2, \otimes$	Factor Perspective Structure	$F_2, \otimes$	The Factor-Endowments Structure	$F_2(t), \otimes(t)$

Table 2.1. The Factor-Perspectives and Factor-Endowments Structure for a Market System

The crucial feature of this structure is that the rules of motion for positions – assigning a unique, well defined position to each pair of positions – is isomorphic to the rules of motion for ternary relations – assigning a unique third ternary relation to each pair of ternary relations. This property carries over to all further specifications of the factor-capacities. The interpretations of the Factor-Endowment given in Table 2.1 correspond with the interpretation of the actor as a firm in a market economy.

## 2.2 The Structure of the Generic Behavioral Regimes

The *third* step is to identify the behavioral components associated with the functional factors and to derive their structure. Factors are relational capacities that induce a force, weak if it concerns an unstable actor, strong if it concerns a stable (institutional) actor. Each of these forces, acting between relational capacities within a ternary relation, generates a factor-endowment that combines the characteristic of the two spanning factors. When the spanning factors are elements of the generic factor-perspective structure, the force is called a *Generic Behavioral Regime*, or – if it is spanned by factor-endowments – an *Endowed Behavioral Regime*. The generic behavioral regimes derived from the Factor-Perspective Structure are represented in Figure 2.2. The diagram on the right specifies the ternary relations, whereas the diagram on the left represents these regimes in a single variable. Table 2.2 presents intuitive descriptions of these variables: regimes that correspond with the Factor-Perspectives Structure of Table 2.1.

There are three spanning regimes: the internal embodying regime,  $\beta^+$ , the external embodying regime,  $\beta^-$ , and the mindset regime,  $\psi$ .

The consumer's *embodying regime*, for example, indicated by  $\beta^- = (V^-, B^-, M)$  in Figure 2.2, specifies a set of preferences (the  $V^-(t)$ -factor) and a set of allocated resource vectors in the commodity space (the  $M(t)$ -factor), which results in an action or choice (the  $B^-(t)$ -factor). This regime is called external in Table 2.2, as

the actor's reference is the producer in the context of a market. The producer's embodying regime, indicated by  $\beta^+ = (V^+, B^+, M)$  in Figure 2.2, is called internal. It represents the producer's behavior resulting from the profit-maximizing force imposed on him by the market institution, ( $M$ ). A well-known specification of embodying regimes is the model called Action Theory<sup>6</sup>. As for growth theory, economists point to so-called fundamentals, such as better schooling – more human capital – and better institutions, represented here in the factors  $W$  and  $M$ .

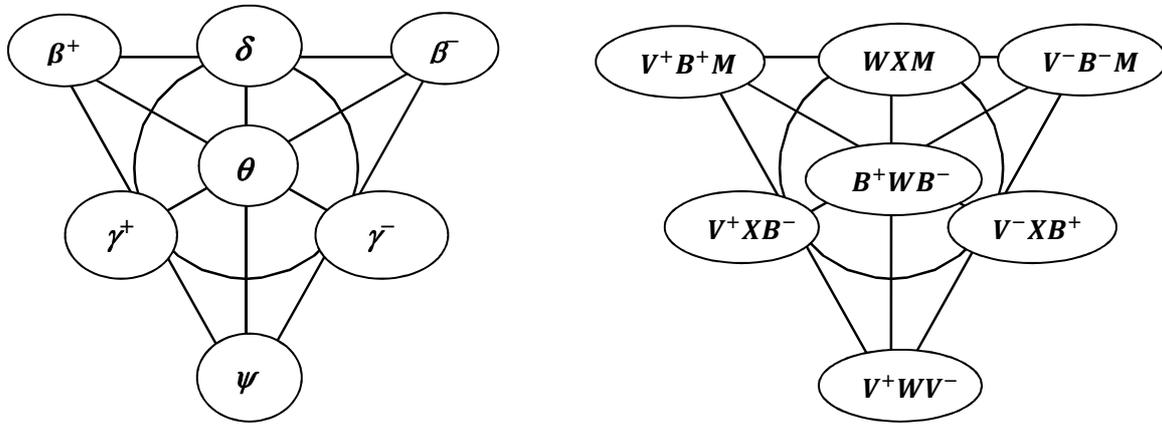


Figure 2.2: The Structure of the Generic (Near-independent) Behavioral Regimes

The Mindset Regime  $\psi = (V^+, W, V^-)$  is the third behavioral regime spanning the regime structure. It represents the arbitrary interactions between the mind-factors, caused by value-specifications as attraction, curiosity, or need, possibly leading to the common mind-factor,  $W$ . From these three spanning regimes, all other regimes can be derived from regime interaction equations. The central equation is the Institutionalization or domain-equation, derived as follows.

The common mind-factor,  $W$ , is the mindset regime,  $\psi$ , also performs in the transaction domain-regime  $\theta = (B^+, W, B^-)$ , and the common embodying or domain-design map  $\delta = (W, X, M)$ . It follows that these three regimes are dependent, which dependence is expressed by the Domain's **Institutionalization Equation**:

$$(2.1) \quad \theta = \delta(\psi), \quad \text{or its inverse} \quad \psi = \delta^{-1}(\theta).$$

This equation expresses the generic idea that – under feasibility conditions to be specified – an incorporation or (institutional) design map ( $\delta$ ) can transform a relational mindset regime ( $\psi$ ) into a predictable transaction-domain structure ( $\theta$ ). Or, inversely, such an institutionalization regime can reveal the mindset regime from its transaction regime. That generalizes the revealed preference property in consumer theory.

<sup>6</sup> In Action Theory, an *action* is modeled as a *consequence of a choice*, decided upon by some economic *agent*. This agent may be an individual or a group of individuals. In [sociology](#), action theory refers to the **theory of social action** presented by [Talcott Parsons](#) (Parsons and Shills, 1951). Human action must be understood in conjunction with the motivational component of the human act. In this way social science must consider the question of ends, purposes and ideals in its analysis of human action. So modeling behavior requires a specification of a value to be realized (the motivation), together with a specification of the competence to incorporate that value (the powerful resource); and their interaction resulting in an act realizing the value. An action characteristic is thus a composition of a value characteristic and a power characteristic.

	Generic Behavioral Regimes		Endowed Market-Behavioral Regimes
$\beta^+$	Producers' behavior (acting)	$\beta^+(t)$	Incorporating micro Supply ( $V^+B^+M$ )
$\beta^-$	Consumers' behavior	$\beta^-(t)$	Incorporating micro Demand ( $V^-B^-M$ )
$\psi$	P & C micro Interactions	$\psi(t)$	Sounding Market Expectations, ( $V^+, V^-, W$ )
$\gamma^+$	Producers' appropriations	$\gamma^+(t)$	Producing Demand ( $V^+B^-X$ )
$\gamma^-$	Consumers' appropriations	$\gamma^-(t)$	Consuming Supply ( $V^-B^+X$ )
$\delta$	Market Design map	$\delta(t)$	Transforming Expectations into real Allocations
$\theta$	P&C macro Transactions	$\theta(t)$	Price formation: Balancing Supply and Demand
$(F^{2*}, \otimes)$	Regime Structure	$(F^{2*}(t), \otimes)$	Regime-Endowments Structure

Table 2.2. Generic and Endowed Behavioral Regimes in a Market System

Regimes are, just as Factors, near-independent modules. They can be analyzed in isolation (*ceteris paribus*). However, since their factors also belong to other regimes, they are interdependent (not independent) within an actor. Since the factors and regimes are modules, containing parts with the same function, the Mindset regime can also be denoted by:  $\psi = (\{V^i\}_{i \in N^+}, \{V^j\}_{j \in N^-}, W)$ , or:  $\psi = (\{V^i\}_{i \in N}, W)$ . The set  $\{V^i\}_{i \in N}$  is a separable utility profile in social choice theory.

The duality property between positions and relations in the Fano-projective structure – in which only positions are relevant and not their content – carries also over to the Factor-Endowments Structure. This means that a pair of empirical capacity-factors determines unambiguously some empirical regime. This regime constitutes the behavioral component associated with the factors. An example is given in the right part of Table 2.2.

### 2.3 The Endowed Perspective Structure; Domain

The *fourth step* is to endow each of these generic perspective-factors with attributes, a string of relational capacity realizations indicated by the variable  $t$ . That results in the *Factor-Endowments Structure*,  $(F_2(t), \otimes(t))$ . A general attribute are networks in which certain properties can be defined.

This concept is represented by a projective geometry. Figure 2.3 gives an intuition about the way a projective geometry introduces (ideal) perspective points in an ordinary space, such as a Euclidean space. This figure is a copy of Figure 13.7 in Henle (1997: 142). The ideal points in the Henle figure are all situated on a circle as the 'ideal line'. That is not the correct representation for the Perspective Structure in which the ideal lines are represented by seven ternary relations. The correct presentation is given in Section 5, Figure 5.1.

An Actor consists of transitory strings of endowments, each oriented at a perspective in the generic structure of factor-perspectives. Since these perspectives interact on a generic way, so do the strings of factor-perspective endowments.

An actor is identified in Section 2.6 by the amalgamation at some time and place of these factor-perspective endowments. This is modeled by the Factor-Endowment structure  $(F_2(t), \otimes(t))$ , a geometric structure worked out in Section 5.

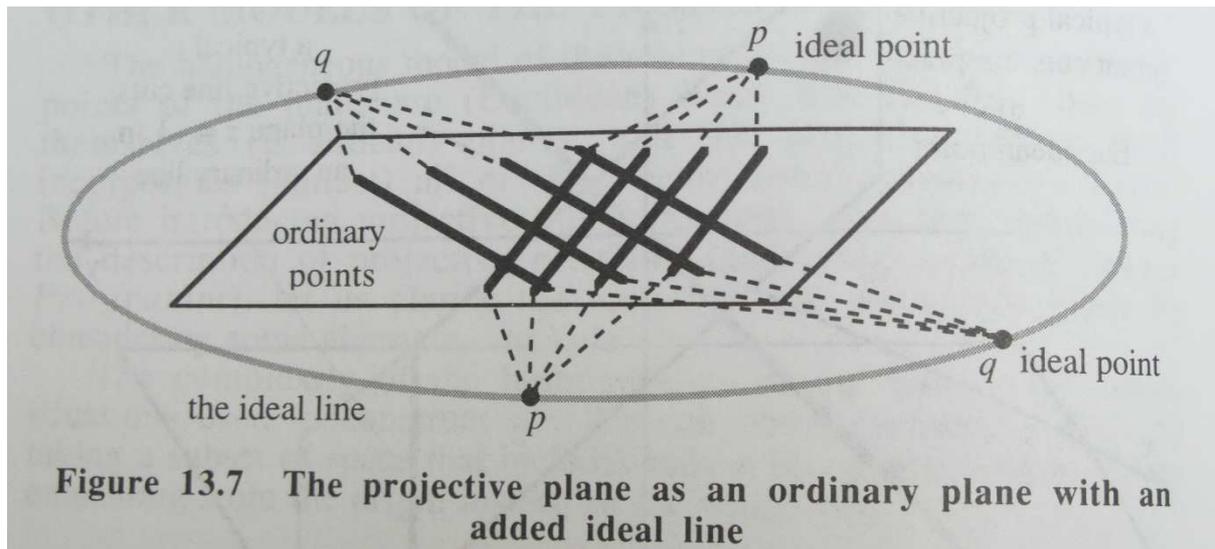


Figure 2.3: A Euclidian Space aligned to a Perspective Structure. Copied from Henle (1997: 142)

## 2.4 The Richness Ordering of the Mindset: Layers of Complexity

The institutional-design map ( $\delta$ ) only performs well if the two components on which it operates –  $V$  in the mindset regime  $\psi$ , and  $B = V^* = M(V)$  in the transaction regime  $\theta$  – have a structure in common that allows for relating the two concepts. For the most primitive Fano structure, such a common factor – a duality operator  $*$  or  $M$  – exists. Another question is whether it also exists for more complex structures, including a mindset regime,  $\psi$ , and a transaction regime,  $\theta$ . If such a duality operator exists for some pair of structures, the design map between the two is **feasible**. That means that the map  $\delta$  is a constraint common to both the Mindset and the Domain regime, where  $\delta$  performs as a duality operator between the two.

When introducing complexity or richness of a structure, a measure is required that orders complexity in degrees or layers. For that purpose a correspondence between the complex structure and an ancillary mathematical structure is investigated on the presence and complexity of a duality operator between these two structures. These operators can be ordered and the lowest value that generates a feasible design map is associated with the chosen structure.

Increasing complexity of the relational structure in the mindset regime,  $\psi$ , requires a stronger duality operator generating a transaction regime,  $\theta$ , that is feasible for the complexity of the mind. Let this mind-structure be partitioned in **layers of equal complexity**, that is, a layer that contains only binary relations, only ternary relations, and so forth. The lowest layer in the Mindset contains structures that can be translated by the simplest duality operator, called the **first-order duality** operator characterized by the scalar 1. All concepts in convex algebra, such as production set and utility functions, have their dual concepts based on this operator.

At one layer higher, the second-order duality operator is a binary relation, such as binary connectedness. This concept serves as a common constraint for richer structures, as is shown in the following example.

*Example 2.1: A **second-order duality** between sets in the Mindset and sets in the Transaction Domain.*

Myerson (1977) and Aumann & Shapley (2003) distinguish cooperation structures ( $\psi$ ) from coalition structures ( $\theta$ ) in a coalitional game. Let  $N$  be a nonempty finite set, which can be interpreted as a set of players, but also as a set of relational capacities. A graph on  $N$  is a set of unordered pairs of distinct members of  $N$ . Two options are now open: (i) these unordered pairs assign a third member that is interpreted as the wealth of this link, forming a ternary relation in a mindset, or (ii) these pairs are binary relations or links between

members, representing bilateral cooperative agreements between agreeing players. The second option is the interpretation given by Myerson (1977, 2003), whom I now follow. Let  $g^N$  be the complete graph of all links and  $\Psi$  the set of all possible **cooperation structures** on the set of players.

A coalition is a nonempty subset  $S$  of  $N$ . Two members are *connected* in a subset  $S$  by  $g$ , if and only if there is a path in  $g$  that goes from one member to the other without leaving  $S$ . Given  $g$  in  $\Psi$  and  $S$  in  $N$ , there is a unique partition of  $S$  which groups players together if and only if they are connected in  $S$  by  $g$ . This partition, denoted by  $S/g$ , interprets Myerson as the set of smaller coalitions into which  $S$  would break up, if players could only coordinate along the links in  $g$ . The connectedness partition  $\Theta = N/g$  is the natural **coalition structure** to associate with  $g$ . It follows that the institutional rule of connectedness in a network ( $\delta$ ) imposes a common structure on the members' cooperation ( $\Psi$ ) and coalition formation ( $\Theta$ )<sup>7</sup>. Institutionalization implies a measure to compare transactions.

The **Richness-ordering** of a Factor orders the factor's relational capacities in **Layers of interaction complexity** from a Mind-perspective. It is an inclusion or part-whole ordering, made operational by the required order of the duality operator. For example, when successively higher or richer levels of the Mind is the endowments-perspective for operations that are performed on the Resource factor, then the traits<sup>8</sup> (i) generative computation, (ii) recursive combination, (iii) combinatorial combination, (iv) mental modeling, (v) abstract thinking, are capacities that are ordered correspondingly. Values discovered in the Other-Minds may also result in a richer Own-Mind. Similarly, the capacity of Minds to interact (cooperate) in the Common Mind can be ordered from simple interactions to sophisticated networks. It also includes other Mind-perspective-endowment: the orientation on the Other and, reciprocally, the discovery of Oneself through the Other.

## 2.5 The Refinement Ordering of the Means-factor; Evolution

For each perspective-endowment, an appropriate ordering is defined. The Mind-factor cannot stand alone: it requires a carrier from the Means-factor embodying the relational capacity. Which **layer of Richness** in the Mind-factor can meet with some **layer of Refinement** of the Means-factor or Resource-factor in order to be feasible? The **Partitioning- or Refinement-ordering** a (vertical) partition ordering that orders the relational capacities of factors from the point of view of a specific Resource-perspective-endowment. A factor with a lower Resource partition – a coarser or heavier resource compared to other finer and lighter resources – can incorporate a larger mass of Mind-actors, but at a lower richness. An example is the distance criterion in defining markets, such as the hospital market (see Hentschker e.a., 2014). The level that allows interaction between the three perspectives is given by the *duality-index* assigning the lowest layer of richness,  $cq$ , refinement that allows for feasible interaction between the three pairs of perspective-endowments.

That being done, the *growth* or the **level** of the overall relational capacity of an actor can be captured by a **three-dimensional welfare measure**,  $u(V^{+i}, V^{-i}, M)$ , assigning a value to the level of internal richness, the level of external richness, and the level of refinement of the measuring mechanism. That may be complemented with the corresponding **fitness<sup>9</sup> or relative welfare measure** based on potential behavior,  $u^*(\gamma^{+i}, \gamma^{-i}, \theta)$ . That is, on the demand- and supply-packages that can be obtained strategically from an individual position. That may be compared with Sen's capability concept.

<sup>7</sup> Myerson continues by defining a cooperative game on  $N$ , that is, a function  $v$  which maps each coalition  $S$  to a real number  $v(S)$ . Each number is interpreted as the wealth of transferable utility which the members of  $S$  would have to divide among themselves if they were to cooperate together and with no one outside  $S$ . This interpretation requires transferable utility on the coalitional outcome (option (ii) above), whereas option (i) assigns values to the cooperation structure.

<sup>8</sup> These are the key ingredients of the human mind according to Marc Hauser, "The Mind", Scientific American, Sept. 2009, 30-37.

<sup>9</sup> See Okasha (2006) and Bossert, Qi, Weymark (2013) for the measurement of fitness in biological hierarchies.

Combining the three orderings one may obtain Maslow’s hierarchy of needs (see Figure 2.2), in which a richer capacity in the Mind-factor fits a higher partition of the Means-factor, and vice-versa.

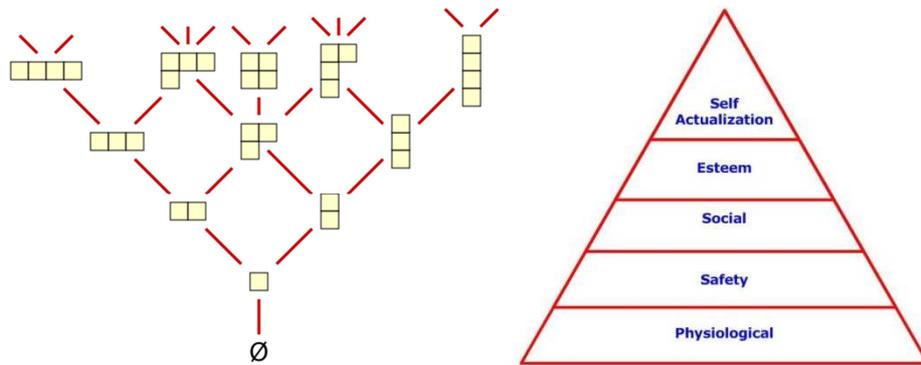


Figure 2.4. Young’s lattice (by David Epstein, 2009, Wikipedia) and Maslow’s Hierarchy, representing, resp., a Richness Lattice ( $\psi(t)$ ) and a Partition Refinement Levels ( $\alpha(t)$ ).

Can organisms and institutions be ordered in terms of relational capacity? The source-ordering of institutional capacities in the domain of the railroad industry can be derived from a recent study by Holterman (2011), see Table 1. The time period is divided in four phases: Innovation (in the 1830s), Consolidation (in the 1880s), Nationalization (between the two World Wars), and Privatization (after 1980), which indicate the prevailing economic mechanisms in the domain. The enterprises (carriers of technical production capacities) align their legal and economic characteristics to their technical complexities and to the available resource mechanisms.

Ordering (t)	V+(t): Mind-Endowments <b>Firms’ technology</b>	V(t): Mind-Endowments <b>Market’s Needs</b>	M(t): Means-Endowments <b>Legal instruments</b>	X(t): Outcome <b>Governance of Railroad industry</b>
2000s	Outsourcing	Sophisticated	Relational contracts	Internationalization
1980s	International	Mass: efficiency	Public tendering	Privatization
1930s	National scale	Military: effective	Political tools	Nationalization
1880s	Networks	Basic transport	Market contracts	Consolidation
1830s	Local scale	Business, Elite	No appropriate tools	Innovation

Table 4.1: Factor-endowments of the Railroad Industry (based on Holterman, 2011)

But first the question posed above has to be addressed. For that purpose an institution is decomposed into the three capacity-perspective factors: the two Mind perspective-endowments – one internally and the other externally oriented – and the Means perspective-endowment. In order to get a feasible transitory institution, these three endowments have to be entangled and to fit. This description of an institution carries over to any system or organism that can be captured by the concept of an actor.

## 2.6 An Actor: Balancing Richness and Refinement

The *fifth step*, finally, is the definition of an actor. The first definition is an intuitive description, based on the institution concept introduced above.

### *Definition 2.1: Actor*

An actor is an evolving medium in an environment of other actors that aims at enhancing her relational capacities, oriented at three perspectives: the richness in giving and taking of the mind-factors and the refinement of the means-factor, all balanced in a generic architecture.

This description can be captured and framed by the geometric tools introduced above, leading to a second definition. The generic comparability and interdependence of actors is expressed by the common perspective structure that orients generic goals and behavior. An actor's specific, endowed goals and behavior is expressed by her perspective-endowments and corresponding regime-endowments. These endowments form historical strings emanating from and oriented by a generic perspective. An Actor is both a feasible nexus of these strings, and an operator on these strings, adapting her specific relational capacities and perspectives according to the generic rules of motion. The feasibility condition requires that a common structure exists between the dependent regimes in the endowment structure. An Actor is *feasible* if in each regime the (interdependent) factor-endowments can interact. Specifically, the transaction regime in a market is feasible if the demand- and supply Bodies can meet. This depends on the conditions about the richness- and refinement level required in this regime for a transaction.

## 3 An Institution Composed of Actors; Institutionally Induced Behavior

### 3.1 Institution Design

#### 3.1.1 The Single Layer Institutional Design Map and its Behavioral Regimes

The change in focus that is possible for a standard agent in the literature, defined above as a composition of actors, is also possible for the concept of an institution or an economic system, equally defined as a composition of appropriate actors, called specific domains, each with its own endowed-perspective structure. Two established approaches are mentioned first.

The position of Douglass North is well-known (2005:62): "Institutions are the rules of the game, and organizations are the players. They entail different modelings to understand the way they operate and interact with each other. Modeling institutions is modeling the man-made constraints on human interaction that define the incentive structure of the society. Modeling organizations is theorizing about the structure, governance, and policies of purposive social entities." However, who is in charge for changing the rules of the game? North admits that he does not give a dynamic theory of change, because such a theory to be manageable would require a more limited approach. "We would have to have detailed understanding of the complex interdependent institutional matrix to unravel those connections." (p. 126)

That argument is precisely the reason why I have chosen to search in the opposite direction: the relational approach. This forces the plethora of human interactions to converge to the unique limit: the Perspective Structure, which is spanned by fundamental perspectives and endowed with a generic goal, enhancing relational capacity. This structure and goal is to be interpreted, identifying a specific Actor, such as an Institution. Since an Institution is composed of all kind of actors, who all have the same Perspective Structure but

differ in specifications, these actors can be compared and their behavior as induced by the Institution is consistent.

The purpose of institutionalization – as conceived in this paper – is to translate a structure of interactive values in the Mindset into a system of behavioral rules which system orients transactions in the institutional Domain towards the goal of enhancing the relational capacity of each actor, inclusive the Institution herself. That uniform goal – specified for each actor in the chosen system environment – allows for comparing the perspectives and performances of players, organizations and systems. The instrument of institutionalization is **Institutional Design**, the design of a system of behavioral rules.

This approach has some characteristics in common with the well-known concept of **Mechanism Design**, developed by Leonid Hurwicz and Stanley Reiter (2006: 14, 266). They describe a (decentralized) mechanism as a formal entity intended to represent a system for organizing and coordinating economic activity. They focus, however, on mechanisms as message exchange processes. The problem of mechanism design is: find a mechanism<sup>10</sup> that assigns an equilibrium message generating the desired outcome. A desired outcome cannot be generated without adequate signals or messages given to the agents in society. The equilibrium message correspondence  $\mu$  represents the behavior of the agents. When ignoring incentives, this behavior may be known or prescribed; this is customarily assumed in the case of the competitive mechanism, for instance, in general equilibrium theory. Or, when we suppose that the behavior of the agents is chosen by them strategically in a game. A game form may then implement the goal function.

So Hurwicz and Reiter focus on allocation mechanisms based on information signals that may converge to an equilibrium message of a static model. The dynamics in this model is restricted to the movements of the message path, the famous tatonnement process of market prices, or any other behavioral parameter.

In the Relational Approach an Institution is introduced as an Actor, for which the generic Factor- and Regime-Perspectives have yet to be identified, specified and refined. The added value of the Relational Approach consists in the fact that the relations between the generic interacting factors are invariant for the specifications and refinements, how sophisticated these factor-specifications and endowments for a given actor may be.

Next, consider the institutional design of the Market Institution as an Actor. In Table 2.1, the generic capacity-factors have been interpreted for a market economy as actor, with consumers, producers, and common resources as perspective endowments. In the market system the consumers' behavior ( $\beta^-$ ) consist of maximizing utility ( $V^-$ ) in their budget sets ( $M$ ), exercising demand ( $B^-$ ). Similarly, the producers' behavior ( $\beta^+$ ), each endowed with the ownership of a technology, ( $V^+$ ), maximizing profits in their market-allocation mechanism ( $M$ ), exercising supply ( $B^+$ ), see the footnote on next page. The interesting additional insight of considering a market as an Actor is the identification of the Mindset regime ( $\psi$ ) in which consumers and

---

<sup>10</sup> A mechanism  $\pi = (M, \mu, h)$  consists in equilibrium form of three elements, a message space, denoted  $M$ , a (group) equilibrium message correspondence, denoted  $\mu$ , where  $\mu: \Theta \rightarrow M$ , and an outcome function, denoted  $h$ ,  $h: M \rightarrow Z$ . Let  $\pi = (M, \mu, h)$  be such a mechanism. When operated in an environment,  $\theta$ , it leads to the outcomes  $h(\mu(\theta))$  in the outcome space,  $Z$ . If it is the case that for all environments in a given space,  $\Theta$ , the mechanism  $\pi$  leads to an outcome desired by the client in that environment, then we say that the mechanism  $\pi$  realizes the goal function  $F$  if for all environments  $\theta$  in  $\Theta$ ,  $h(\mu(\theta)) = F(\theta)$ . This concept can be represented in a commuting diagram:  $\Theta \rightarrow_F Z$  and  $\Theta \xrightarrow{\mu} M \xrightarrow{h} Z$ : an environment assigns a desired outcome; and the same environment generates a message, which message generates the desired outcome.

Translated to the Actor structure, a mechanism  $(M, \mu, h)$  is identified by an Actor  $\nabla^*(\beta^+, \beta^-, \vartheta)$ , where the regimes  $\beta^+ = (V^+, B^+, M)$  and  $\beta^- = (V^-, B^-, M)$  represent (see the footnote below) the behavior of opposite agents, and the regime  $\vartheta = (B^+, W, B^-)$  the balancing outcome function. From the duality between behavioral mode and functional mode, see Figure 2.2, one may observe that these three spanning regimes correspond with the actor in functional mode:  $\nabla(V^+, V^-, M)$ , where the factors  $V$  are the Mind-capacities and the factor  $M$  is the message capacity.

producers interact: they are ‘near-independent’ and cannot be considered in isolation from each other, as is the common approach in textbooks. Under competitive conditions on all markets, with the parameters in the Mind- and Resource-factors, such as utility and production technology, given and fixed, then it has been shown (Arrow and Debreu, 1958) that a competitive equilibrium is feasible in a market system<sup>11</sup>. The market as an Actor, however, is characterized by the fact that its perspective factors, viz., the Mind- and Resource-factors, are interdependent and changing. The Mindset ( $\psi$ ) tells the Mediating Means-factor ( $M$ ) how to move, the Means-factor tells the Mindset how to curve and to accomplish. When both are fixed, there is no true dynamics in the system and nothing can be said about an endogenous transition to another system, namely, from the market economy to the social economy.

	Generic Capacity Factors		Generic Behavioral Regimes
$V^+(100)$	Giving Minds (micro)	$\beta^+(V^+, B^+, M)$	Institution-dependent Supplier’s Behavior
$V^-(010)$	Receiving Minds (micro)	$\beta^-(V^-, B^-, M)$	Institution-dependent Demand Behavior
$M(001)$	Mediating Means (resources)	$\psi(V^+, W, V^-)$	The Mindset’s interactions and balances
$B^+(101)$	Giving Services (macro)	$\gamma^+(V^+, B^-, X)$	Demand-dependent Supply Behavior
$B^-(011)$	Receiving Services (macro)	$\gamma^-(V^-, B^+, X)$	Supply-dependent Demand Behavior
$W(110)$	Balancing Mind (orientation)	$\delta(W, X, M)$	Institutional Design map
$X(111)$	Nexus of Capacities	$\theta(B^+, W, B^-)$	Institutional balancing rules and transactions
$(F^2, \otimes)$		$(F^{2*}, \otimes)$	

Table 3.1 Capacity-Factors and Value-creating Behavioral Regimes in the Institutional Market Actor

Thanks to the near-decomposability of the Actor-components, the analysis can be decomposed in two parts. First, the macro-relations in which no individual factors are directly involved, and then the micro-relations that govern the individual behavioral factors directly.

Let the Market-actor,  $\nabla^*(\beta^+, \beta^-, \vartheta)$ , be given in terms of its behavior regimes (and consequently, in its constituting capacities) described as in Table 3.1. The Equation (2.1) – see Figure 2.2, Section 2.2 – presents the generic **Institutionalization Relation** of a System,  $\vartheta = \delta(\psi)$ . It expresses the idea that the Mindset ( $\psi$ ) tells the Mediating Means-factor ( $M$  in  $\vartheta$ ) how to move, whereas the Means-factor tells the Mindset how to accomplish. The **Institutional Design map**,  $\delta: \Psi \rightarrow \Theta$ , assigns to some combination  $\psi$  of values in the Mindset  $\Psi$  a fitting institutional Actor:  $\theta = \delta(\psi)$ . For that purpose the different types of values that characterize layers in the Mindset are specified in Section 3.2. The carriers that are apt for embodying these different types of values are presented in Section 3.3. The embodiment of the values into appropriate carriers results in an institutional body for each layer combination; this is presented in Table 3.3.

<sup>11</sup> An economic allocation  $(x_1, x_2, \dots, x_d, y_1, y_2, \dots, y_s)$  is a specification of a consumption vector  $x_i \in X_D$  for each consumer, and a production vector for each producer  $y_j \in Y_S$ . The allocation is *feasible* if the sum of consumption vectors equals the sum of production vectors plus the initial endowment vector. The allocation  $(x_1^*, x_2^*, \dots, x_d^*, y_1^*, y_2^*, \dots, y_s^*)$  and with price vector  $p^*$  is a *competitive equilibrium* in a private ownership economy, if the following conditions are satisfied: (i) for each firm  $j$ ,  $y_j^*$  maximizes profits over the production set  $Y_j$ ; (ii) for each consumer  $i$ ,  $x_i^*$  maximizes utility over her budget set in the consumption set  $X_i$ ; (iii) for each commodity, demand equals supply. Under appropriate conditions this competitive equilibrium exists. These conditions are: for every consumer her preferences are continuous, strictly convex and strongly monotone; the production sets are convex, closed and contain the negative orthant. Arrow-Debreu have shown its existence, based on Brouwer’s fixed point theorem. If  $\beta_i = \theta^M(\gamma_j)$ , for  $\theta^M$  the Market System, then  $\sum D^i = D$ .

The consistency between these macro-rules and the behavior of the micro-actors of the institution is expressed by the following relations. The generic **Institutional Behavior Relations**,  $\beta^+ = \theta(\gamma^-)$  and  $\beta^- = \theta(\gamma^+)$ , see Equation (2.2) in Section 2.2, let providers' behavior correspond with 'supply-dependent demanders' behavior', based on 'institutional balancing rules and transactions',  $\theta$ , which contains institutional roles with rules of behavior that induce individual behavior. That is described by the **Transaction-Behavior Equation Map**  $\theta: \Gamma_j \rightarrow B_i$ , from the set of *Demand Strategies*,  $\Gamma_j$ , to the set of *Supplied bundles*,  $B_i$ , following Equation (2.2):  $\beta_i = \theta(\gamma_j)$ . This map assigns to any *strategic action* ( $\gamma_j$ ) of an external micro-actor  $j$ , a *reaction* ( $\beta_i$ ) by an internal micro-actor  $i$ , which reaction is induced by the institutional system  $\theta$ .

Under the rule of the market institution, in which the micro-actors maximize profits and utility, this concept leads to a Nash-equilibrium. It also allows for predictable behavior of micro-actors and to a predictable macro outcome. The market institution, however, is based on specific perspectives and properties in the Mind-factors and the Means-factor

### 3.1.2 The Mindset-regimes of a Societal System of Multilayered Give and Take Values

The *Mind-set*  $\Psi = (V^+, V^-, M)$  of an actor, introduced in Section 2, represents a regime containing three Perspective Factors: *two opposite value capacity-factors*,  $V^+, V^-$ , and its *balancing capacity-factor value*,  $W$ . The relational approach implies that each such capacity-factor cannot be considered in isolation: it implies the existence of another factor both in the Mindset and in other regimes, with which it is related and contrasted, and by which it receives its identity. The opposite capacities are here indicated by receiving (negative sign) and giving (positive sign) values. A receiving (or demanding) actor cannot exist without a giving (or supplying) actor.

For both receiving and giving values in the Mindset, three types of capacity are distinguished, **ordered according to their richness**, that is, their capacity to value complex and encompassing values. A Mind-factor is poorer if it can separate interacting values such that it can fit with the properties of the carrier in which it may be embodied. For the purpose of this section it is sufficient to distinguish three types, each characterizing a **layer** in the capacity factors of the Mind-set ( $\Psi$ ), each with a *characteristic interaction capacity* (*charge/force*). Two of these values may be specified by two types of individuals, the Human and the Econ that Kahneman (2012) describes. These concepts can be described by the two dimensions of relational capacity: richness and refinement of an actor. The **Human** are fast thinkers: they have incorporated relational capacities that enable them to assess a complex situation fast, such as: altruistic or selfish, mediating, reciprocity, intrinsic motivation, ethical, environmental, and social values; group-instrumental values as survival of the species, level of sociality: equity and justice. The **Econ** are slow thinkers: they are endowed with specific but refined separable values, converging to an individual's values. The richness factor belongs to the Mindset of an actor, the refinement properties to the Means-factor. The third layer I add to the Mindset-factors is the polar extension of an individual thinker: it is a crowd's awareness that has been accumulated for a long time and is immediately disposable. This type of values I call **Imperial** values, which incorporate the base of emotional and moral values, sensations, feelings, ideologies, religion, imitation, assimilation, fear, hate, and love, indoctrination, inspiration, suppressing individual nuances (a flow), intuitive, instinctive. The lack of boundaries for these values implies the use of coercion when being confronted with these values.

These concepts are first applied to the Mindset of an Actor, and in the next sections to the Means-factor and the Body structure:

- $V_i$       *Imperial Values*  
This type is endowed with (formally) rich, inseparable, global values, with examples as morality, religion, culture, vision. Collective inseparable value capacities: fast and wide (values of the Crowd).

- $V_h$       *Human Values*  
This type is endowed with (formally) locally rich, inseparable values experienced by a local community. Fragmented inseparable value capacities: fast and focused (values of the Human).
- $V_e$       *Econ Values*  
This type of values can specify characteristics as absence of externalities and limited information. Isolated value capacities; slow and focused (values of the Econs).

These value-capacities generate relational value-capacities, as is represented in Table 3.2.

Layers of Giving (+) Values, (→) from rich to specific:	Value-Layer $V_i^+$ <b>Imperial Giving Values (Collective)</b>	Value-Layer $V_h^+$ <b>Human Giving Values (Social)</b>	Value-Layer $V_e^+$ <b>Econ Supply Values (Individual )</b>
Layers of Receiving (-) Values (↑) from specific to rich			
Value-Layer $V_i^-$ <b>Imperial Receiving Values (Collective)</b>	<i><math>W_{ii}</math>: Balancing Imperial Give and Take Values: Morals, Culture, Vision</i>	<i><math>W_{ih}</math>: Human Giving Values, balancing with Collective Receiving Values</i>	<i><math>W_{ie}</math>: Econ Supplying Values balancing with Collective Receiving Values</i>
Value-Layer $V_h^-$ <b>Human Receiving Values (Social)</b>	<i><math>W_{hi}</math>: Collective Giving Values balancing as Part of Human Values</i>	<i><math>W_{hh}</math>: Balancing give and take Human or Social Values</i>	<i><math>W_{he}</math>: Econ Supplying Values balancing with Receiving Human Values</i>
Value-Layer $V_e^-$ <b>Econ Demanders' Values (Individual)</b>	<i><math>W_{ei}</math>: Collective Giving Values balancing with Receiving Econ Values:</i>	<i><math>W_{eh}</math>: Human Giving Values, balancing with Receiving Collective Values</i>	<i><math>W_{ee}</math>: Balancing give and take Econ or Individual Values: (utility and pro- duction technology)</i>

Table 3.2. The Societal System of Multilayered Give and Take Values, each pair of Factors generating an unstable balance of giving (supplying) – receiving (demanding) values in the Mindset

Each pair of values generates a balancing value, with reciprocal values on the diagonal. These values are unstable as long as they are not embodied in carriers described in the Means- or Resource-factor. The concepts in Table 3.2 are defined without making use of institutional characteristics, such as the ‘non-profit’ criterion, but are apt for being institutionalized by specific forms.

### 3.1.3 The Means-factor: containing Carriers for Values that are ordered by Refinement

The toolkit for designing and maintaining institutional systems resorts under the Means-perspective. It contains a variety of domains, notably the legal domain. These instruments are bundled to generate the institutional design map.

The **Institutional Design Map ( $\delta$ )** assigns to each layer in the Mindset ( $\mathcal{P}$ ) a system of transaction properties – an allocation system or institution – in the Resource Factor ( $M$ ) consisting of roles in an architecture, such that it can handle a variety of values in the Mindset. This map constructs the glasses, so to speak, through which the values can be observed and handled; they transform interaction values in concrete transactions. The carriers of these roles form a base for the following functions:

- Embodying (inseparable) relational capacities and values into (separable) measurable and bounded units for all Perspective-factors of an Actor; among which:
  - The various types and extents of values to which Property rights<sup>12</sup> can be assigned, allowing for Commoditization, that is, fragmentation of values and power.
- Assigning Architectures, containing Roles and their Behavioral Rules, among which:
  - Defining Balancing outcomes, a Balance of Power, and appropriate welfare indicators
  - Defining Surplus creation and measurement.
- Enable the construction of Level Capacity Fields, consisting of congruent carriers or actors, such as the Level Playing Fields in a Market.

The following example illustrates the importance of developing carriers of values that allow for fragmentation of services.

*Example 3.1. Fragmentation and commoditizing of the Means-factor: Transition in a Market Economy*

By the early 16th century Antwerp had become northern Europe's main center of international trade and finance (Van der Wee 1963, 1993). To sustain the commercial capital of his sprawling empire, Emperor Charles V issued legal rules for key commercial transactions such as the transfer of bonds and bills of exchange, thereby considerably widening the scope of Antwerps financial market and thus facilitating the city's fast expanding trade (De Smedt 1940-1941, Van der Wee 1993). Merchants from the Low Countries, roughly the area of present-day Netherlands and Belgium, started to explore ever more adventurous trade destinations: Russia, Italy, the Levant, West Africa, the Americas. The VOC (*United East-Indian Company*) was a hybrid organization, a specific-purpose partnership modified to suit public tasks. Its charter harnessed the commercial aspirations of the merchants leading the 6 *voorcompagnieën*, pre-companies, to the military and political goals of the state by giving the company a monopoly on the Asian trade plus rights to wage war and conclude treaties in the Estates Generals name. The VOC therefore possessed three characteristics of modern corporations, that is to say a separation of ownership and management, limited liability for shareholders, and transferable shares, but lacked three more, i.e. a permanent capital, full limited liability for managers, and legal personhood (Gelderblom, De Jong and Jonker, 2013; Dari-Matiacci). In 1623 the Amsterdam chamber, referring to a dispute with investors over the directors personal liability for debt, adopted a new form of bond contract specifically excluding that liability, thereby indirectly giving the company legal personhood.

### 3.1.4 The Transaction-regimes of a Societal System of Multilayered Demand and Supply

The art of Institutional Design is to construct institution that transform the volatile interactions between giving and taking values in the Mindset (Table 3.2) into solid transactions between Demand and Supply. For that purpose the Demand and Supply carriers are distinguished in the three layers introduced above, which correspond with the main established institutions in society. It makes a Societal System of nine combinations of demand and supply factors. These are presented in Table 3.3. The institutional capacities and powers of each factor are empowering micro-actors in specific roles, which follows in the next section.

---

<sup>12</sup> A property right is the exclusive authority to determine how a resource is used, whether that resource is owned by government or by individuals. Society approves the uses selected by the holder of the property right with governmental administered force and with social ostracism. A Property right over a resource is a relation between actors determining how and by whom a resource is used and owned. Resources can be owned (the subject of property) by individuals, associations or governments. Property rights can be viewed as an attribute of an economic good. This attribute has four broad components: the right to use the good; to earn income from the good; to transfer the good to others; to enforcement of property rights. Ordered from no property rights defined to all property rights being held by individuals: (1) Open access property (2) State property (3) Common property, and (4) Private property.

Three layers of supply and demand are distinguished, which distinction is coarsest one that can describe my goal of explaining societal architecture and performance, but it is not exhaustive, of course. The demand and supply 'bodies' result from the (near-independent) interaction between the values and the available means in the Institution-dependent Supplier's and Demand Behavior,  $\beta^{\pm} = (V^{\pm}, B^{\pm}, M)$ , located in Table 3.1. When values and means are specified sufficiently, the 'body-factors' follow. The interaction between these 'body-factors' is presented by the varies Institutional Transaction-regimes,  $(\vartheta^I)$ ,  $(\vartheta^H)$  and  $(\vartheta^E)$ , which regime is determined by the societal institute in force, viz., the Imperial, Human, or Econ institute, each appropriate for the corresponding layer of values. These two regimes are specified as follows:

**The Institution-dependent Suppliers' and Demanders' Behavior,  $\beta^{\pm} = (V^{\pm}, B^{\pm}, M)$ ,**

$B_i$  Community's Imperial-Supply and Demand Behavior ( $\beta^{I\pm}$ )

embodying Collective (Imperial) Giving and Receiving Values into measurable **Crowds** under an appropriate Resource Mechanism, apt for balancing the opposed parties,  $B^{I\pm}$ . The values are all-encompassing/embracing /comprehensive/empathic ideas for the community. The crowds can be measured by an *attention force* they can exercise.

*Architecture:* leadership, hierarchical, implying the use of force by and on the crowd.

*Countervailing power:* a political-military power equilibrium, or a media-propaganda offensive.

$B_h$  Cooperatives' Human-Demand and Supply Behavior ( $\beta^{H\pm}$ )

embodying Cooperative (Human) Values in comparable **Membership Cooperatives,  $B^{h\pm}$** , with Rights and Duties, by giving a concession to those cooperatives that perform best for their members, who vote with their feet.

*Architecture:* democracy, trust, aristocracy.

*Countervailing power:* concession equilibrium.

$B_e$  Private agents' Econ-Demand and Supply Behavior ( $\beta^{E\pm}$ )

embodying Econ Values in Demand or Supply by **Private Ownership Bodies,  $B^{e\pm}$** , exercising monetary power by maximizing profits or utility under budget constraints.

*Architecture:* congruent competitive micro-actors, implies ownership.

*Countervailing power:* competitive equilibrium in the money value of demand and supply.

**The Institutional Transaction Regimes,  $\vartheta = (B^+, W, B^-)$ .**

$B_i$  The Community's Imperial Transaction Regime,  $(\vartheta^I)$

balancing Collective (Imperial) Crowds under an appropriate Resource Mechanism, which may be a voting mechanism, resulting in a transaction value between opposing parties( $W^I$ ).

*Architecture:* leadership, hierarchical.

*Countervailing power:* political-military, and/or media power

$B_h$  The Cooperatives' Human Transaction Regime,  $(\vartheta^H)$

balancing Cooperative (Human) Parties in the society under an appropriate Resource Mechanism, which may be a concession mechanism, resulting in a transaction value between opposing parties( $W^H$ ),

*Architecture:* democracy, trust, aristocracy.

*Countervailing power:* assignment of demand and supply concessions to cooperatives with governance power.

$B_e$  The Private agents' Econ Transaction Regime,  $(\vartheta^E)$

balancing Econ Values in the society's under an appropriate Resource Mechanism, which may be the Market mechanism, resulting in a transaction value between opposing parties( $W^E$ ), possibly market prices.

*Architecture:* congruent competitive micro-actors.

*Countervailing power:* assignment of monetary demand and supply power.

The countervailing power in the Institutional Transaction-regime is installed in the two opposite factors: the Supplier and the Demander actors. For each actor, the three layers of characteristic relational capacities, distinguished in Table 3.2, are transposed to three types of power (bodies) in the Institutional Transaction-regime. That results in nine types of transactions in Table 3.3. ‘Pure’ transactions are situated on the diagonal. The balancing values resulting from the balance of power on this diagonal are indicated as, respectively, an *Attention equilibrium*, a *Concession equilibrium*, and a *Market equilibrium*. The rules generating these equilibriums are specified in the corresponding institutional domains, viz., the political-legal-military domains, the social domain, and the economics domain. These domains can be refined and aggregated by applying the methodology of the Relational Approach. The upper-left field (i,i), for example, describes a.o. the legal codification process of moral conceptions.

<b>Supply Carriers:</b> (→) from rich to specific values (coarse to fine carriers)  <b>Demand Carriers:</b> (↓) from rich to specific values (coarse to fine carriers)	Factor $B_i^+$ <b>Community Supply</b>  Competing in Imperial-Level Supply Playing Fields	Factor $B_h^+$ <b>Cooperatives Supply</b>  Competing in Human-Level Supply Playing Fields	Factor $B_e^+$ <b>Private Supply</b>  Competing in Econ-Level Supply Playing Fields
Factor $B_i^-$ <b>Community Demand</b>  Competing in Imperial-Level Demand Playing Fields	<i>Parties in a Moral-Legal-Political Attention-Equilibrium in Giving and Taking</i>	<i>Community Demand for Socialized-Community Services facing Cooperative Suppliers (Public Agencies, Regulation Authorities, SGI)</i>	<i>Community Demand for Commoditized-Collective Services facing Private Econ Suppliers (PPP, Public Utilities, SOEs, SGEI, artists)</i>
Factor $B_h^-$ <b>Cooperatives Demand</b>  Competing in Human-Level Demand Playing Fields	<i>Cooperative Demand facing Community Supply of Services: (Political Parties Lobby, NGOs)</i>	<i>Cooperatives in a Concession-Equilibrium: Cooperative-Human Demand facing Cooperative Human Supply</i>	<i>Cooperative Demand for Commoditized Services facing Private Econ Suppliers; (social consumer enterprises)</i>
Factor $B_e^-$ <b>Private Demand</b>  Competing in Econ-Level Demand Playing Fields	<i>Private Econ-Demand facing Community Supply of Services (Public Goods Equilibrium, Social Choice, corruption)</i>	<i>Private-Econ Demand facing Cooperative Service Supply (social producer enterprises)</i>	<i>Private Actors in a Market-Equilibrium: Econ-Demanders facing Econ-Suppliers (a Competitive Econ Equilibrium)</i>

Table 3.3. Pairs of (macro) Transaction-factors in each of the three layers of Values in the Societal System, qualified to determine an exchange value in the appropriate Institution

An important feature of this approach is that none of these nine types of institutions can stand alone in a society or in an economy. The market requires regulation, which is a Social Service of General Interest (SSGI), delivered by a Public ‘Authority’. The Community (government) requires taxes to be received from the market participants. But these participants need the social services from the cooperative sectors, and, vice versa, these cooperative sectors need support from the markets. The cost and benefits of these transac-

tions should be accounted for when assessing the performance of near-independent actors. One solution may be the ‘ancillary’ concept, introduced in the next section.

*Example 3.2. The force and weakness of Imperial Values in a Political Economy (A Multilayered Societal System)*

The loudest institutions are undoubtedly situated in the political domain: institutions as the clan or the family are usually dominated by the organization of the state. These institutions are, however, of crucial importance for the performance of the state. The historical transitions in this domain are relevant for the developments today.

Analysis of, for example, the architecture of the Roman Empire shows that the Institutional Mindset with its identity, the Pax Romana, and the body of law, was supported by multiple social institutions providing characteristic Social Services of General Interest (see Table 3.3). The services provided to the bottom of society, such as the famous games and the distribution of war-booty (agricultural land), served to convince the crowd – living in a hierarchical top-down ordering under the rule of obedience – of the superiority of both the Mindset and the Transaction Regimes of the Empire. The Roman nobility was the dominating social institution providing a stable government: a ‘Social Service of General Interest’. The church emerged as another social institution providing a different ‘Social Service of General Interest’ in the institutional mindset: giving a moral perspective to policies otherwise built on brute force. This model survived in Europe until the 19<sup>th</sup> century, when new social institutions emerged. The political institutions were made dependent on a crowd requiring voting power. But once an electorate was chosen, it realized the necessity of some form of hierarchical top-down governance<sup>13</sup>. That implies usually general redistribution recipes for the lower income classes, where bottom-up corporations producing ‘social services of social interest’ would indeed improve access and empowerment.

As for the Balance of Communities’ Power, Kissinger’s foresees four probable concepts for an International Order: sovereign states (Europe 1648); multi-ethnic Islamic super-state; the hierarchical Asian states; and the US-model, policing peace and democracy. Kissinger is rather pessimistic about the future, and I think he is right if the future develops along his perspectives.

### 3.1.5 Interdependence of Societal Institutions; Ancillary institutions

Example 3.2 shows that there exists a circular motion, a *circular flow of values and resources*, between the Community Values and the Cooperative Values in the four upper-left fields of Table 3.3. In field (h,i), Cooperative Demand increases the value of Community Supply of Services through Political Parties Lobbies and NGOs. That adds to the ‘imperial’ community values in field (i,i), which values are embodied in a finer resource, the Cooperative Supply factors in field (i,h), etcetera. These processes disturb the temporary balancing equilibria, first by making the community values richer, then by making their carriers finer. Such a circular process can be observed in each square of the matrix.

Apart from the field (h,h) on the diagonal of Table 3.3, for identifying and assessing *the roles of social enterprises in a Societal System* the shaded fields of Table 3.3 are quite relevant. The fields in the upper-right corner contain community supply services that are delegated to finer institutions, such as regulation authorities, public enterprises, or State Owned Enterprises (SEOs), or production cooperatives. The fields in the

---

<sup>13</sup> This top-down governance concept hinders today the development of a European Union, because people fear the capability of the top to understand the local culture and flavors at the bottom. The institutional means are not capable (yet) to embody the richness of the European values into finer carriers of values than the weak but sovereign states. A revision of the bottom-up international governance architecture seems indispensable.

lower-left corner contain community demand services that are partly determined by finer institutions, such as political parties, public goods-mechanisms<sup>14</sup>, or consumer cooperatives.

In principle, the institutions in all fields are self-supporting when they use their 'home' powers, that is, the powers attributed to them by their Institutional Balancing Regime ( $\vartheta$ ). In a communist society, for example, the state has sufficient power to allocate all Human and Econ resources, how coarse that allocation may be. This solution, however, is inferior to a system in which finer allocations are possible, with the knowledge of place and time. One such a system is the Market economy, in which the State is combined with the Market. In that case, the State loses instruments to attain its goals, for example its force to allocate individual resources over its citizens. That make its equilibrium-performance impossible. For that loss, the State is compensated by the power to tax and to skim resources from the Market sector. Since the State delivers the richer values, how coarse the may be, the State, is considered to be the **dominant** institution and the Market an **ancillary** (or auxiliary) institution.

The same situation occurs between the Human Cooperative institutions and the Market, where the Market is supposed to contain all actors with private ownership, including volunteers, benefactors and Maecenas. This Market in an ancillary institution for the cooperative institutions, if these cannot be self-supporting in their own relational capacity powers.

### 3.2 Micro-behavior induced by Institutional Governance; Rationality and Trust

The effect of the institutional macro-rules and roles on the individual micro-actors, as described by the **Transaction-Behavior Equation Map**  $\theta: \Gamma_j \rightarrow B_i$ , from the set of *External Transaction Strategies*,  $\Gamma_j$ , to the set of *Internal Service Provision*,  $B_i$ , following Equation (2.2):  $\beta_i = \theta(\gamma_j)$ . This map assigns to any *strategic action* ( $\gamma_j$ ) of an external micro-actor  $j$ , a *reaction* ( $\beta_i$ ) by an internal micro-actor  $i$ , which reaction is induced by the institutional system  $\theta$ . These maps constrain and frame 'internal providers' behavior' to 'external providers' incentives', and vice versa, based on an' institutional service-balancing rules and transactions',  $\theta$ , which contains institutional roles with rules of behavior, inducing individual behavior.

Apart from the Econ-type and the Human-type distinction that has been introduced by Kahneman (2012), there are other types of micro-actors studied in the social sciences that can be associated with types of institutions:

- The homo economicus, or the rational economic human, is the concept used in many economic theories; humans are considered rational and narrowly self-interested actors who have the ability to make judgments toward their subjectively defined ends. The homo economicus attempts to maximize utility as a consumer and economic profit as a producer.
- The Homo Moralis; Reciprocans man as a cooperative actor who is motivated by improving his environment and wellbeing; [Samuel Bowles](#) and [Herbert Gintis](#).
- The Homo Socialis (fulfilling social roles)- (Dahrendorf, 1958) family, tribe, survival, solidarity, sense of belonging,
- Homo Faber (artisan);
- Homo administrans:
- Homo Ludens (Huizinga, 1938)
- The 'Political Man', the Administrative Man in the Political System
- The 'Social Man' in Social Systems; her rationality: Socializing Private Interests
- The 'Red Man' (Alexijevitsj, 2014), being led by the Crowd-Mind and Rules
- The marginal and the populist man.

---

<sup>14</sup> The duality between an equilibrium of Individualized Collective Values ( $W_{ei}$ ) in an economy with only collective (public) services for individual needs and in one with only individual (private) for individual needs ( $W_{ee}$ ) has been established by Ruys (1972, 1974).

These types are each endowed with a specific rationality. According to the standard definition, an individual acts **rational** if, whenever she chooses an action from a set of perfectly transparent and available actions (alternatives), she chooses the best (or an optimal) action according to her preferences, satisfying transitivity and monotonicity. Rational behavior is a necessary assumption for being able to model, to analyze, and to predict the consequences of repeated *private* choices in comparable situations by a large number of different *individual* decision makers, that is, to model a competitive equilibrium. Standard individual rationality, however, is too restrictive to explain individual behavior. Several solutions have been proposed to update the concept, such as bounded rationality that limits the information content, and rule-rationality.

Aumann (2008) introduces a two stage procedure, composed of **Rule-rationality** and **Act-rationality**. People first adopt a rule (mode of behavior) that maximizes some measure of expected utility over all situations to which that rule applies; next they choose an act that is in accordance with the rule. This concept may be integrated into the concept of **Institution-Rational Behavior** introduced above. The choice of an institution includes its rules and values and is decisive for the individual's set of available actions. So if an actor first chooses an institution (an action team of a higher level), with a given institutional rule rationality, and then decides how to act individually rational, she acts *Layered rational*. In general, an actor may be said to behave **rational** in a (two-layered) choice situation if – according to an observer – a decision model of that choice situation can be designed such that the outcome is compatible or corresponds with the choice of the actor (Ruys, 1983). Rationality depends on the regime in which the actor finds herself, or which she chooses to be found in.

The norms and rules assigned in the Institutionalization map involve also the expectations about what other people are doing (the  $\gamma$ -regimes). Stabilization of such a norm may be supported by the peoples' wish to conform to each other. In the rational, stationary model it follows from the fact that a (Nash)-equilibrium only exists if rational decisions correspond with expectations (that is,  $\beta_i = \theta(\gamma_j)$ ). A heuristic model (Chiara Lasciandra, 2014) with probabilistic considerations leads to the emergence of social norms, or of any other perspective-factor, as described in Section 2.6.

The aggregate or macro-actor has the micro-actors as constituent members. In a single-layer organization, micro-actors in *the same role* have all a congruent actor-identity. They constitute a **Level Playing Field** in a specific role of the macro-actor. Due to this congruence, the actors in that regime are governed by the same (isomorphic) rule of behavior<sup>15</sup>. The standard example of a level playing field is the set of firms in a market environment, where each firm has comparable relational capacities, implying that all firms should behave similarly, but not equal, as determined by fair rules of the market.

In level playing fields, organizational structures, practices, and performance are *affected* through three mechanisms:

- coercion: legal mandatory requirements;
- normative prescriptions: habits, rituals, routines, values;
- mimicry: seeing others switch behavior induces discomfort of the laggard, and stimulates adaptation in case of uncertainty.

These mechanisms impose *institutional isomorphism* (Meeus, 2010, DiMaggio and Powell, 1983) on organizations in a level playing field, creating uniformity, and resulting in a uniform *mode of governance* for that

---

<sup>15</sup> Natural examples abound: boys and girls have each their own level playing field, each governed by norms fitting their capacities and age (Hume, 1739; Huizinga, 1937). Teams in a level playing field satisfy an equivalence property depending on the identifying capacities, which is comparable to the legal principle 'all are equal for the law'. A level playing field is a concept about fairness, not that each player has an equal chance to succeed, but that they all play by the same set of rules. However, it is not a single layer concept. Deeper layers, determined by cultural or historical experiences, require that these rules also take account of aspects present in such a deeper layer.

level playing field. Examples are: the rules of the market for competitive, commercial firms; the rules of bureaucracy for public task organizations.

*Example 3.3. An Ant Colony: the policing of institution-rationality in a colony; surplus revealed by the survival measure*

An Ants Colony is a community of ants, endowed with a hierarchical architecture that is aimed at a common goal: the survival of the colony. For that purpose, various roles are designed: the Queen, the Workers, the Soldiers, and the Males. The Queen is the only egg productive organism in the colony; the Workers care her eggs and assemble food from the external ancillary system; the Soldiers defend the colony against the external system, and the Males fertilize females before they establish a colony themselves.

A rule-rationality is imposed on the various roles in the architecture, which makes the colony a smoothly running organization. This rule-rationality is behavioral-stable by an enforcement mechanism on female workers, repressing their act-rationality (originating from an earlier system from which she descends). That is proved by an experiment on an ant population was set up to observe the oppression of unruly behavior in an ant colony<sup>16</sup>. It was expected that enforcement of reproductive altruism (policing) in ant societies is a major force in maintaining high levels of cooperation. In order to be able to enforce altruism, ants need to identify reliably the reproductive cheaters. The authors mimicked reproductive cheaters by applying a compound typical of fertile individuals on nonproductive workers. This treatment induced nestmate aggression in colonies where a cheater was present. It failed to do so in colonies without a queen where workers had begun to reproduce. So the hydrocarbon biosynthesis in the cuticle of an ant gives reliable information about the reproductive physiology of an ant, because it cannot be suppressed by the individual.

The rule of the ant-colony aims to realize a common value: the survival of the species, called ***the rule of gene-survival***. Since the species has survived for 150 million years, that rule has been very stable and very successful. But also at a cost: the 'common mind' of the ant-species has not changed in 150 million years! The strong policing characteristic in an ant society protects its common mind and value, but at a cost. Although a worker-ant (in a colony or team) may want to produce her own offspring and is capable to do so, it is costly for her, because, if she acts rational in her own gene's interest and breaks the rule she will be expelled from the colony or killed. Therefore she prefers in her assigned role the ***rule of obedience***, a layer in the colony's institutional rationality.

The values aimed at by the Ant Colony are realized by their social Institution, which institution imposes individual behavior that supports the performance of the institutionalized Ant-community.

- The Institutional Mind regime: the Colony is a crowd:
  - with a Collective Mission: the survival of the genes (species);
  - with a Role (Rules)-architecture: each ant endowed with a 'Social Services of General Interest (SSGI)' producing gene, apt for filling in the various roles in the system.
- The Institutional Transaction regime: the Colony is a Political Power Equilibrium
  - indoctrinating individual ants to enter and accept an SSGI-Role-architecture as a Public-Private Partnership: workers, soldiers, and males.
  - with a transaction constraint: the coalitional (=colony) equilibrium
  - with disciplining elements: policing offenders.

---

<sup>16</sup> From "Enforcement of altruism in a social insect (an ant society)", *NRC* 2009-01-13. Referring to Smith, A.A., B. Hölldober and J. Liebig (2009), "Cuticular hydrocarbons reliably identify cheaters and allow enforcement of altruism in a social insect", *Current Biology*, 19, Issue 1, 78-81.

*Example 3.4. The Jungle Economy: co-evolution of values- and power-fragmentation; surplus revealed by the fitness and attention measures*

Next, consider a community in which the common value: the survival of the species, is still predominant, but an additional layer in the value-system of the Mind-regime emerges: the value of separable individual fitness. Let this value be correlated with the survival value of the group. An institutional rationality has then to be designed that integrates both layers of rationality. The community goals are: social fitness and a stable and efficient allocation of resources. Piccione and Rubinstein (2007) show that this is achieved when resources are allocated to the strongest individuals, according to the **rule of the strongest**, which behavior results in an efficient and stable competitive equilibrium.

This jungle economy is more primitive or poorer (see Section 2.5) than the competitive market economy, where *the rule of the best* (in Greek: an *aristocracy*) holds. So changing an allocation rule to a lower or higher level of richness may leave some institutional properties invariant. The more primitive jungle mechanism, however, has not the same outcome as the more sophisticated market mechanism, where the rule of the best holds. For, the best producer is making the most efficient use of resources and allocates the expansion of her budget-set under competitive conditions to a Pareto-optimal allocation, weakly-benefitting all. Therefore, the rule of the strongest may be *allocative-stable*, but it is not *institutional-stable* because members of a society (the homines Econ) can improve upon their situation by changing the rule. However, a *homo Ludens*, the behavioral type of the playing man, may have a layers of preferences that surpass the benefits of the homo Econ.

## 4 Social Enterprises: developing appropriate layers in Factors and Regimes

Difference in Perspectives. Does regulation change the system?

“[Political economy] does not treat the whole of man’s nature as modified by the social state, nor of the whole conduct of man in society. It is concerned with him solely *as a being who desires to possess wealth*, and who is capable of judging the comparative efficacy of means for obtaining that end.” (John Stuart Mill, 1836, in Wikipedia)

### 4.1 Adapting Enterprises to a Market economy

#### 4.1.1 Two-layered firms: Commoditization

A firm can be considered as an actor in a wider context, such as an actor in a sector, or in a societal system, or it can be considered as a near-independent actor on itself. The relational approach allows for these changes of perspective.

In this section, a firm is a near-independent actor in a market economy that faces at least two layers of interactions, in which its relational capacities are challenged. The Human layer contains the interactions between performers and receivers of relational services in the market; the Econ layer refers to the Econ-Transactions between providers and procurers of these services, who determine the Transaction values of the services: see Figure 4.1. The Human-Interactions between Service Receivers and Performers generate the Human Value of the firm. The firm therefore generates values on two layer: the Human-Interaction value and the Econ-Transaction value. Both values are a factor in the Mindset of the firm, but they are generated by differ-

ent regimes (see Tables 3.1 and 3.3): the cooperatives regime and the market regime, each with own rules of behavior.

Assuming that the Econ-value covers all the cost of the other, non-Econ layers of the firm, the firm can be considered to be a private, two-layered Econ-firm in a Market Economy. Such a firm is part of the Econ-Level playing field in the third column of Table 3.3. That requires that its services are commoditized.

#### Definition 4.1. Commoditization of Relational Services

The embodying a relational service in a **commodity** that can be processed in a market mechanism is called the **commoditization** of that service, if the market-price of that commodity suffices to compensate all layers of the input – including transaction costs – with allocated market-values.

The process of Commoditization of services – whether consumer services or labor services<sup>17</sup> – makes them apt for being subject to transactions and processed in the market. The fictitious productivity of labor in government service (which is situated at a higher level) allows for considering this delegated government service as a commodity.

#### Definition 4.2. A competitive, two-layered Firm in a Market Economy

A firm in a Market Economy is competitive if – at the market equilibrium price – the market-value of its commoditized services supplied exceeds the market value of its commoditized services demanded (labor).

The profit-maximizing behavior of a competitive firm (with all its services commoditized) implies optimizing her relational capacity, as the relational values are covered by the market prices.

The following property revisits the Coase theorem, stating that transaction costs may be cheaper handled within a firm than on the market, causing a firm to expand. It generalizes this theorem in that it refers all relational services, including transaction costs<sup>18</sup>.

#### Property 4.1. The size of a Firm supplying commoditized services in a Market Economy

If the cost of commoditization is an increasing function of production, the size of the firm with Human services as input, is bounded. However, if the cost of Human input-services embodied in Econ services supplied to the market is a decreasing function of production, then the size of the firm grows until it is restricted by the demand side of the market.

The relational approach allows to focus on the firm as a near-independent actor on itself: see Figure 4.1, as a cooperative with the performers participating in the Mindset regime, and the CEO as the common resource, the leader inspiring the crowd and imposing a hierarchical architecture on the firm. At the same time, the CEO represents the cooperative on the market, bargaining about the transaction value of the cooperative's output.

---

<sup>17</sup> See Beck (2012) for an historical inquiry into dismissals in the United States workplace.

<sup>18</sup> By considering the firm as a near-independent actor, the problem of determining **the boundaries of the firm** – in the sense of Coase and Williamson – is described as follows. The firm as an actor sees her laborers as a Mindset regime, dividing labor between labor with contracts within the firm and contracts with external laborers on the market. The costs of a contract depend on asset specificity involved, determined by the richness of the services asked for. *An efficient contract* for these services is determined by *the refinement of the transaction costs mechanism*. For 'poor' or 'Econ' labor, a precise external contract can easily be made up and bought on the market, whereas 'rich' or 'Human' labor is cheaper contracted by a coarse internal contract. Since a firm is considered as a nexus of contracts, its boundaries are determined by the interaction of both factors in the incorporation regime.

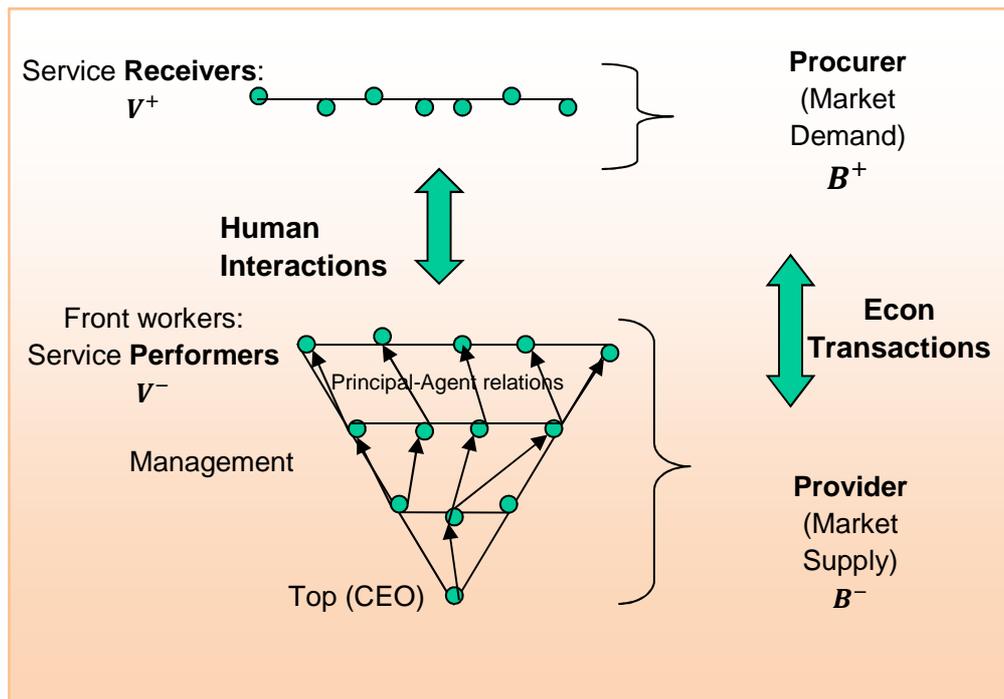


Figure 4.1: Roles in a Two-layered Firm in a Market for Services with Production Cooperatives

#### 4.1.2 The Social Enterprise and its eco-systems in Europe

Stevens (2011; p14) defines a *social enterprise* as an organization that aims at providing certain goods or services – possibly on a market and in competition with commercial enterprises – with the purpose to create a certain societal utility, and with boundary conditions on the financing of activities and on its financial position. The social enterprise distinguishes itself from a *for-profit firm* in that (i) large amounts of resources are received which have not to be paid back; (ii) its purpose is not defined in terms of profit; (iii) there are no owners of the assets of a social enterprise; and (iv) the price mechanism as coordination mechanism is lacking.

The European Commission (2014) launched a Mapping Study in April 2013 as a follow-up to Action 5 of the Social Business Initiative (SBI) to help fill this gap in knowledge. This Study maps the broad contours of social enterprise activity and eco-systems in 29 European countries (EU 28 and Switzerland) using a common ‘operational definition’ and research methodology. The operational definition incorporates the three key dimensions of a social enterprise that have been developed and refined over the last decade or so through a body of European academic and policy literature:

- An *entrepreneurial dimension*, i.e. engagement in continuous economic activity, which distinguishes social enterprises from traditional non-profit organizations/ social economy entities (pursuing a social aim and generating some form of self-financing, but not necessarily engaged in regular trading activity);
- A *social dimension*, i.e. a primary and explicit social purpose, which distinguishes social enterprises from mainstream (for-profit) enterprises; and,
- A *governance dimension*, i.e. the existence of mechanisms to ‘lock in’ the social goals of the organization. The governance dimension, thus, distinguishes social enterprises even more sharply from mainstream enterprises and traditional non-profit organizations/ social economy entities.

Each of these dimensions are operationalized in the Mapping Study by a set of core criteria:

- The organization must engage in economic activity;
- It must pursue an explicit and primary social aim;
- It must have limits on distribution of profits and/or assets;
- It must be independent from the State and traditional for-profit organizations; and,
- It must have inclusive, participatory governance.

When a firm cannot cover the cost of the relational Human services it supplies, then relying on its commoditized services is not a sustainable strategy. It has to find auxiliary or ancillary actor that provides the necessary funds. Consider the following example.

#### **4.1.3 Moore's Public Enterprise**

Moore (1995) introduces a Strategic Triangle that describes the essential challenges for a public enterprise in its task creating public value: (i) Creating Public Value; (ii) Organizing Legitimacy and Support; (iii) Acquiring Operational Capabilities.

The interaction between these three factors may be made transparent by realizing that both (i) the Public Value and (ii) Organizing Legitimacy and Support are (opposing) Perspective factors, the first on the Demand side, and the second on the Supply side of the Entrepreneurial Institution. These are embodied by the third Perspective factor, (iii) the Operational Capabilities, or the Means. The interaction with the Means generates the Demand and Supply for Public Value, which is created when Demand and Supply meet.

## **4.2 Hybrids: Temporarily Mixing Regimes**

### **4.2.1 The Public Enterprise (State Owned Enterprises): Market vs. Government failures**

State-owned enterprises are hybrids that combine public and private sector characteristics. According to the standard economic theory of regulation, state intervention in private markets can be justified in cases where markets do not deliver goods and services at desirable levels from either an efficiency (economic) or from an equity (social) perspective, or from a combination of both. These cases are usually described as instances of 'market failure'. State intervention to address market failure on efficiency and equity grounds can take four forms: (i) regulation; (ii) financing; (iii) public production; and (iv) income transfers.

Regulation (the setting and enforcing of rules, often in a sector-specific context) may affect both the quality and the quantity produced as well as prices; finance involves subsidies or taxes applied to the prices of the services produced; production means that the state takes over the supply side (bringing it into the public sector); and income transfers can be tied either to specific expenditure (such as energy or housing benefits) or generic (such as social security benefits that can be spent as needed).

Due to the need to match or outperform competitors in order to maintain or increase market share, private provision under competitive conditions is generally seen by mainstream economists as inherently more efficient than public provision (or for that matter private provision) lacking similar incentives. The lack of "private" ownership would not provide to public managers the incentives for cost minimization. Public missions and "private" agendas of insiders are seen as a burden. Thus, Public Enterprises are expected to be broadly inefficient, if not to systematically incur losses, to be accommodated by soft budget constraints.

(Public) Task organizations (the agency) controlled by a preceding, dominant policy organization. Certain commodities and services at the disposition of her principle. Their products cannot be sold on markets (how to measure quality?). They have to listen closer to politicians and the public, and are supposed to have high

moral standards. They are often monopolists. They have a different culture (Jane Jacobs, 1992): that of a watcher (tradition, obedience, discipline, loyalty; cheating for the public cause, passive, fatalistic, inefficient) rather than of a merchant.

Florio (2014) highlights that despite the fact that SOEs still play a significant role in many countries, economists and policy makers no longer seem to have a firm understanding of why SOEs exist, and that this “vacuum in economic theory and policy” reflects a “mismatch between doctrines and reality”. In turn, the traditional public economics textbook assumed a benevolent social planner, no asymmetric or incomplete information setting for principals and agents, i.e. ministries and managers, and public monopoly. This was often unrealistic in the last century, and futile nowadays. The question for contemporary research is: Can we have a model that explains when, why and how managers of Public Enterprises are innovative and efficient, given their own objectives and constraints?

How best to raise income levels in the poorest regions without just doling out money? Some argue that making labour markets more flexible, so that people can move in search of work, reduces the labour supply in areas of high unemployment. Joblessness can easily become entrenched. In Calabria in Italy, the unemployment rate has fallen sharply, from 26% in 2000 to 12% last year, but largely because the jobless have given up looking for work. Only about 40% of working-age people actually have jobs, compared with 65-70% in northern Italy.

“Theoretical and empirical research should focus on inefficiencies for the PE correlated with this complex external governance game, and for a wide discussion based on the example of public ownership and regulation in the water industry. Overloading a PE with contradictory messages, and multiple supervision mechanisms, is a good recipe to weaken or kill it.

Paradoxically, the more the external governance model is overloaded, the greater the risk of gaps in the incentive structure for managers, as different branches of government may think that it is not in their remit to define a public mission or to establish a monitoring and evaluation system for the PE. This, in turn, may favour uncertainty or opportunism in managerial behaviour. Further research should try to design a model of external governance of PE that minimizes such tensions and gaps.” Florio (2014: 7)

#### **4.2.2 State Capitalism: the top-down model reaffirmed**

The Economist (2012-01-21) observes an important development in the political economy domain: the rise of state capitalism. This is an extremely relevant issue when designing an architecture of the social economy. The relational approach allows for correctly situating this development in the wider context of multilayered social systems.

“The crisis of liberal capitalism has been rendered more serious by the rise of a potent alternative: state capitalism, which tries to meld the powers of the state with the powers of capitalism. It depends on government to pick winners and promote economic growth. But it also uses capitalist tools such as listing state-owned companies on the stockmarket and embracing globalisation. Elements of state capitalism have been seen in the past, for example in the rise of Japan in the 1950s and even of Germany in the 1870s, but never before has it operated on such a scale and with such sophisticated tools. ...That raises some tricky questions about the global economic system. How can you ensure a fair trading system if some companies enjoy the support, overt or covert, of a national government? How can you prevent governments from using companies as instruments of military power? And how can you prevent legitimate worries about fairness from shading into xenophobia and protectionism?... The invisible hand of the market is giving way to the visible, and often authoritarian, hand of state capitalism.”

A balanced assessment of state capitalism has to allow for three caveats. The first is that there is no clear dividing line between state-owned and private companies. “Private” champions such as Huawei, the telecoms giant, have repeatedly been given government help. This makes it hard to produce precise calculations about the productivity of the two sectors. Second, ownership is not the only thing in play. Some of the problems, and the successes, of state capitalism have more to do with rapid development than with state ownership. Third, everything depends on context. It is quite possible for state capitalism to work well in some areas (eg, infrastructure) and badly in others (eg, consumer goods). It is also possible for it to boost growth at one stage of development and impede it at another.

State capitalism's most obvious achievements are in infrastructure. There is striking evidence that state-owned companies are not only less innovative but also less productive than their private competitors. But poor productivity has not stopped them from making lots of money. Yet there is little chance that state companies will be reformed soon. They provide comfortable berths for leading politicians and their children and hangers-on. Institutions that are nominally owned by the people have been taken over by ruling elites—the Communist Party in China, the security high command in Russia and the royal families in the Arab world. The 99% who do not benefit from these arrangements are getting increasingly angry with the 1% who do. But unlike their contemporaries in the West they have few ways of showing it.

But state capitalism's biggest failure is to do with liberty. By turning companies into organs of the government, state capitalism simultaneously concentrates power and corrupts it. It introduces commercial criteria into political decisions and political decisions into commercial ones. And it removes an essential layer of scrutiny from central government. “

Aldo Musacchio and Sergio Lazzarini (2014) observe that the first caveat, which is particularly popular in China, refers to the case that the state submits an SOE to the governance standards and investor scrutiny that come with a stockmarket listing while retaining the bulk of the shares. In the second, which accounts for about half of SOEs, the state retains just enough influence, through its minority stake, to swing some important decisions. In the third, the state seeks to invest in companies—including ones not previously government-linked—through public development banks (of which there are currently 286 in 117 countries), sovereign-wealth funds, pension funds and other vehicles. “

#### **4.2.3 Enterprises that are ‘too big to fail’**

Close to the problems mentioned in the previous section is the phenomenon that some enterprises may be too big for a given size of the economy to fail. Or that some multilayered initiatives and services are just not feasible because of the required size of the enterprise. The example of the 2008-crisis caused by the banks and paid by the taxpayer and the unemployed are still fresh in our memories. Those banks have shown irreparable shortcomings in the market economy; irreparable because no international authority exists that can prevent or cure these market failures. Only a change in economic order that accounts for a separation in regimes for services delivered in different layers, can help both preventing disasters and promoting social growth. In the following section I offer a blueprint.

### **4.3 Design of an Architecture for a Social Economy**

#### **4.3.1 The Social Enterprise in a Strong Institutional Environment**

When considering a Social Enterprise seriously, it has to be firmly embedded in a wider institutional environment. Just as the market participants on the Econ-level cannot perform satisfactorily without institutions as a Competition Authority, so relational-cooperatives at the Human-level cannot perform satisfactorily without ‘Concession Authorities’.

A **Social Enterprise** is an evolving medium for multilayered actors, providing and receiving 'Human' (in contrast to 'Econ') services on a specific domain and in a specific region, called a **Concession**, in a societal institutional environment, called the **Social Economy**. She aims at enhancing the relational capacities of the assigned participants, that is, richness of the mind-factors and refinement of the means-factor.

For attaining this goal, a Social Enterprise depends on the following tools:

A **Concession Authority** in a Social Economy is an Institute having received the power to grant a Concession to operate a Social Enterprise of a certain size in a certain region. The Concession Holder is a specification of the ternary *relation* between the factor 'receivers', the factor 'performers' and the factor 'human-value', which is the relational capacity added by the pair of factors. That Concession is based on the relative performance of the Cooperative belonging to the Social Enterprise in terms of relational capacity. When the 'Human-value' – normalized by the Concession Authority – shrinks or expands, so does the concession.

The second tool concerns the connection between a Social Enterprise and the Market Economy in which the Social Enterprise is embedded. With any (Human) Cooperative, an (Econ) commercial and for-profit corporation can be associated, called the Social Enterprise's **Ancillary Corporation**. The Cooperative of Social Enterprise is subjected to the rules of the Concession Authority, and the Ancillary Company is subjected to the rules of the 'Market' authorities.

When this concept of a Social Enterprise has been established in a Market Economy, this economy may evolve into a real Social Economy. This is characterized by the possibility of an economic policy that can focus on specific 'Human' activities of Social Enterprises. It can develop policies where local cooperatives are empowered to enhance local relational capacities. For that purpose, the Social Enterprise installs two accounts, one for itself in terms of the 'Human value', and one in terms of euros for its Ancillary Company. The assets in the Cooperative in 'Human-value' are exchanged in euros on the basis of commoditization of the services rendered and received by the 'Human' Cooperative. Similarly, economic indicators of the Ancillary Company, such as the solvability, are derived from 'shadow-values' and translated in euros. The exchange rate can be determined locally, just as the national currencies used to be determined 'locally', which may be floating against the euro that covers the whole continent.

The Social Enterprise owns the indivisible Human Cooperative with its social and human capital, as well as its commercial Ancillary Company. It cedes enough assets before commoditization to its Ancillary Company to act as a strong, independent participant in the market. Apart from its social and human capital, its most important assets of the Cooperatives are the capacities for product innovations, products that can be commercialized and sold by the Ancillary Company on the euro-markets. Also in that sense, the Social Enterprise is innovative and entrepreneurial. It is not unfairly competing on the market, as the human-investment cost in research has to be reallocated to the profit making Ancillary Company to curb losses in the Cooperative.

#### 4.3.2 A blueprint for the Health Sector

An ordering of performers' health-service values is proposed in Figure 4.3. The values contained in the services goes from a rich and encompassing mind, but with a coarse carrier (national policies), to specific values in fine carriers, such as individuals. Since the Econ-values are separable and ruled by markets, they are at the top of the graph, carrying the Human values. These giving values are the performers of medical services (suppliers) related with receivers (demanders) in the ternary relations presented in Table 4.2. A level lower are the more complex values embodied in health professions, and so forth.

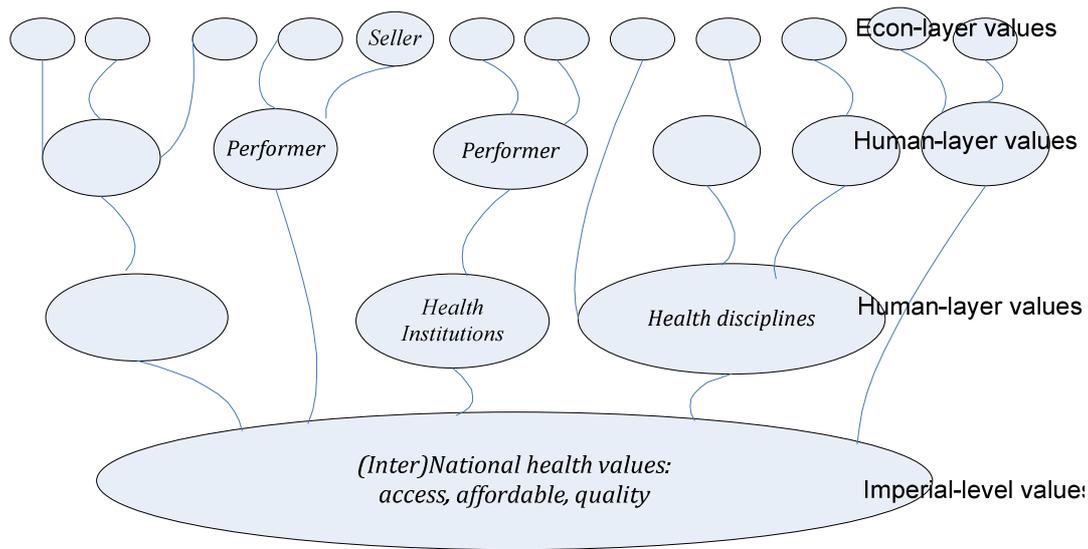


Figure 4.3: A Multilevel ordering of giving health values: from Rich/Coarse to Specific/Fine

The ordering of health services at the supply side is represented on the X-axis of Table 4.2. The demand side is on the Y-axis of the table. A pair of fields form a ternary relation in the Transaction Regime. It is assumed that each factor is competent to enter into a Transaction with the related factor. The Cooperative 'Human' hospital is situated at the crossing of patients groups and professions groups. The Commercial 'Econ' hospital is positioned at the crossing of the performers' group and the market, selling hospital products. The Concession Authority receives its mandate from the sector's 'Imperial Demand', which contains the moral, legal, and political values of the sector, and imposes these values on the professions group. The 'Econ' ancillary company exploits innovative commercial products originating from the hospital on the market, whereas the 'Econ' commercial hospital commoditizes hospital services and sells them on the markets to patients.

The 'Econ' commercial hospital and its network of 'focus clinics' may be much larger than the 'Human' hospital. They may have accidental ties with the 'Human' hospital. But the ties between the 'Human' and the 'Ancillary' are of a different nature: they aim at a complementary coexistence in different regimes, in order to support the 'Human' values involved.

Suppliers: Receivers:	Carrier $B_i^+$ Society's, Founder's Supply of Services	Carrier $B_{h1}^+$ Performers' Group Profession, Hospital Supply (Human)	Carrier $B_{h2}^+$ Performers' Individual Supply (Human)	Carrier $B_e^+$ Sellers, Providers, (Econ)
Carrier $B_i^-$ Society and Sector Imperial Demand	Mission, Culture; Vision	Concession Authority	Professional standards	
Carrier $B_{h1}^-$ Patients' Group; Demand (Human)		'Human' Hospital Concession Equilibrium	Supervisory Board	'Econ' Ancillary Company

Carrier $B_{h2}^-$ <b>Patients Individual Demand (Human)</b>	<i>Patients' Rights</i>	<i>Stakeholders</i>	<b><i>Patient-Doctor Relations</i></b> <i>D&amp;S Equilibrium</i>	
Carrier $B_e^-$ <b>Buyers/ Insurance Demand (Econ)</b>	<i>Health care for Uninsurable risks</i>	<b><i>'Econ' Commercial</i></b> <i>(insurance)</i> <i>Hospital</i>		<i>Private HealthCare Transactions;</i> <i>D&amp;S Equilibrium</i>

Table 4.2. Pairs of Transaction-factors (Roles) with Layered Values, qualified to determine an appropriate exchange value (Transaction Regimes in a Social Enterprise)

## 5 Conclusion

A Social Economy is established to support and expand a type of values, called 'Human', which cannot be supported by the Market Economy, nor by the State, but which are generated by the cooperative sector. The differences between the three types have been analyzed in this paper by means of a novel tool: an actor modeled in a projective geometry, based on relational capacity. The growth of social welfare is connected with sophistication of society's relational capacity, requires a policy that aims at both increasing the richness and complexity of relational give- and take-values and at increasing the refinement of the common tools.

When democracy is understood as a continuous process to empower people taking responsibility for their neighborhood and country, then extending voting power is by no means sufficient for the times to come. It is the bottom-up approach of cooperatives empowering people to produce 'Human' values that gives a country a social and democratic face. People focusing on the 'democratic deficit' in Europe and elsewhere (Rodrik, 2011) focus on one aspect: the power received from periodic voting ballots. Although this tool remains important, the design of (international) cooperatives and social enterprises in a social economy may face better the recent supranational challenges, and bring closer a democratic attitude.

When welfare is understood to be equivalent to purchasing power or to GDP, it is reduced to a concept that only takes account of 'Econ' values. 'Human' values matter, of course, but how to formally model them in a society next to the market economy? Giving innovative suggestions to tackle this question is the purpose of this paper.

## 6 The Modeling of the Relational Capacity Approach

### 6.1 Social Epistemology

The novel concept introduced in the relational approach is that of an actor. An actor is defined in Definition 2.1 (formally in Section 6.2) as an evolving medium in an environment of other actors that aims at enhancing her relational capacities, oriented at three perspectives: the richness in giving and taking of the mind-factors and the refinement of the means-factor, balanced in a generic architecture. It is a model representing a wide class of phenomena, from micro to macro and from groups to individuals, contributing to social epistemology. A caveat has to be made, however, about the use of the term 'individual', as the approach is fundamentally relational and any factor can only be identified in relation to another factor, opposite in some sense.

Pettit and List (2009) hold the view of social epistemology, where groups are considered epistemic agents that can have collective motivation, resources and actions. An organism or a group of organisms – which is

again an organism – has a relational capacity that includes a social identity. Any organism has the capacity to act and interact, and implicitly to choose, although the level of choice may vary considerably.

Consider, for example, people's herd behavior, and strategies of flocks of fishes evading a predator, both having group cognitive capacities. Recent experimental studies<sup>19</sup> of group problem solving and group memory reveal that specific cognitive capacities are aptly ascribed at the level of groups. Groups have organization-dependent cognitive capacities that go beyond the simple aggregation of the cognitive capacities of individuals. Group cognition is thus an emergent phenomenon in the sense of Wimsatt (1986), see also Allen (2011), and Bekoff e.a., (2002, 2007). For the moment I refer to action theory, which holds that a value motivates and steers the behavior of an organism, whereas the power component determines the opportunities and restrictions for actions. In philosophical terms, distinguishing the semantics or meaning of a model from its pragmatics, the concrete empirical appearances that are carried by the model.

A second motivation is proposed by Sandy C. Boucher (2014), elaborating on van Fraassen's suggestion that many philosophical positions should be construed as 'stances' rather than factual beliefs. He defends a particular account of stances, the view that they are pragmatically justified perspectives or ways of seeing the world, and compare it to some other accounts that have been offered.

The communal paradigm in the value hierarchy is supported by Granovetter (1985), Schwartz (1999), Licht (2008), Pettit and List (2010), and Taylor (2007). Values are not only present in valuable 'things', but also in culture and in the tradition of things. At a more local level it is well known that cultural or family values precede individual values (Hofstede, 1997). Experiments in behavioral economics show that social ties are valued apart from individual monetary incentives (see for example Bandiera, e.a., 2010). That type of values is identified as: Interpersonal, Social or Cultural Values, which describe conceptions of the desirable at the social level; values that are shared by other persons in a specific group and are characteristic for those specific groups or cultures. These values may be incorporated or embodied in rules of behavior that (promise to) make people happy or promote collective creativity. Each group has rules to identify or aggregate these interpersonal values.

## 6.2 An Actor as Operator on its Factor-Perspective Space

Let a set of positions be given on which an interaction operator is defined, generating a ternary relation of three positions. The sets of these three positions are called minimal dependent sets. Sets of positions that are not dependent are called independent. Since no interpretation has been given to a position other than that they are dependent in some combination and independent otherwise, only the relative position of a position in the position-structure remains as distinctive property for the position.

Next, relations in the relational-structure, derived from the position-structure, can also be assigned positions in that dual relational structure. These structures are usually different from each other. However, by imposing the condition that this relational structure is equal to the positional structure, the stunning fact results that this structure of ternary relations between positions is unique.

A position has three characteristics, which number is both the minimum and the maximum for this structure to exist. The position 100, for example, indicates that the first characteristic is present in the position, but the other two characteristics absent. This position 100 is therefore interpreted as an ideal point, or a *perspective* on the first characteristic from the point of view of the positions that don't contain this characteristic. A pair of positions may amalgamate under the interaction operator,  $\otimes$ , to a third position: this operation (called pairwise addition module 2) assigns to some pair of positions, say (100, 010), the position 110, or  $100 \otimes 010 = 110$ . The way these three positions interact in a ternary relation determines their regime, which can be ana-

---

<sup>19</sup> Pratt and Edwards, 2009; Wilson 2004

lyzed in partial isolation; indirectly, however, each position depends on all other factors in the structure. That is why the structure is called *near-independent*.

An important feature of the Factor-Perspective Structure is that not all interpretations, as well as definitions, can be given independently: they are dependent in the sense that they have to obey the rules of the Fano projective structure. That means that for three spanning positions, interpretations can be given independently. For the other positions the interpretations follow.

#### Definition 6.1: Actor

An Actor,  $\nabla(t) = (F_2(t), \otimes(t))$ , is both a feasible nexus (amalgation) of strings of relational capacity endowments, and an operator on these strings, endowed with a generic architecture that is isomorphic to the smallest projective space,  $\nabla_t(V_t^+, V_t^-, M_t) = (F_2(t), \otimes(t))$ . The operator induces rules of behavior that aim at enhancing the relational capacity of these strings. Each string emanates and grows from a generic perspective, to mention: the Giving Mind-factor,  $V_t^+$ , the Receiving Mind-factor,  $V_t^-$ , and the Means-factor,  $M_t$ . Each string is marginally extended by the interaction between the behavioral regimes in the dual space,  $\nabla^*(t) = \{F_2^*(t), \otimes^*(t)\}$ , spanned by the Mind-embodying regimes,  $\beta_t^+$  and  $\beta_t^-$ , and either the Transaction Regime  $\vartheta_t$ , or the Mindset Regime,  $\psi_t$ .

These strings of relational capacities have emerged in the past from interaction between her three perspective factor-endowments according to her corresponding behavioral regimes:  $\nabla_t(V_t^+ V_t^- M_t) = (F_2(t), \otimes(t))$ . This *operational* strategy of an Actor implies a *strategic* aim: to enhance her relational capacity by transforming her factor- and regime-endowments into to a “richer”, “more refined”, and still feasible endowment structure. The Actor behaves locally, but has a global effect; just as Adam Smith observed that in a competitive economy an entrepreneur achieves indirectly a *global* aim by maximizing profits *locally*.

#### Property 6.1: Factor and Regime Reconstruction of an Actor, $\nabla_t(V_t^+ V_t^- M_t) = \nabla_t(V_t^+ V_t^- M_t B_t^+ B_t^- X_t W_t)$ .

An Actor can be disentangled into seven factor-perspective endowments, which are empirically observable or revealed by her regimes. Similarly, her behavior is composed of – and can be decomposed in – seven near-independent regime-behaviors, induced by the pair of factor-endowments (forces) that span the specific regime.

#### Definition 6.3: Regime equilibria; The Actor’s Balancing Behavior; Stability of an Actor

Regime equilibrium is a string of factor-perspective endowments that balances the spanning forces in that regime. The set of Regime equilibria is stable if the entanglement all augmented strings is feasible, and identifies the Actor. If it is not stable, the Actor tries to restore imbalances by a minimax strategy: successively focusing on her worst performing regime, and implicitly her worst performing factors. This behavior is called her **balancing** between regimes.

These definitions have a remarkable consequence with regard to the individuality of an actor. This property is characteristic for the Relational Approach<sup>20</sup>.

#### Property 6.2: an Actor’s Individuality

Let the Endowed regimes of an Actor be given and let the Actor’s Internal Embodying Regime represent the individual. Then it is just a near-independent factor, which co-determines her behavior with what the Actor sees as her external Mind, resulting in the Actor’s Common Mind. This common mind is in fact her ‘social’ norm that coordinates her behavior. It follows that an Actor cannot be individualized in the sense of being an object separated from its environment.

<sup>20</sup> Although the Methodological Individualism Paradigm speaks about individual people (agents) and not about actors, this Property 2.2 remains relevant. For an agent is composed of. and characterized by actors in several domains.

However, whether the Actor is a group or not a group, the Actor's Institutionalization equation implies a relation the Mindset regime and the Transaction Regime (see Section 2.2). Cartwright and Wooders (2014) have specified this relation as a correlated equilibrium<sup>21</sup>.

The concept of an actor has many faces, from an individual animal to a flock of birds, from an entrepreneur to an organization, from a patient to a medical sector, and from a for-profit firm to a social enterprise. The goal of an actor is to enhance her relational capacity in a complex, competitive and hierarchical environment. This is – for any actor – an everyday assignment in her strives for survival.

The more complex and sophisticated an actor's Mindset is, the more complex and sophisticated has to be her institutional Means-factor, in order to support a feasible and stable outcome. Two theorems by Gilles, Lazarova and Ruys (2007, 2014) support this statement.

**Theorem 6.3: on Stable Behavior Induced by Institutions in a Matching Economy (Gilles, Lazarova and Ruys, 2007, 2014)**

Consider a matching economy (the Actor) and focus on the Common Mind factor and the Means-factor. The Common Mind indicates the complexity in the exchange structure: from bilateral to multilateral matching, with and without external effects, with a common preference for allocative efficiency and stability. The Means-factor indicates the institutional restrictions to be imposed on agents' behavior in order to attain a desired allocation.

Gilles et al. show that a richer, more complex allocation can only be attained by means of a finer institutional setting. For the simple case of bilateral matching they show that for an efficient and stable allocation of matches a simple bipartition restriction on agents is necessary and sufficient. For more complex behavior, represented by the underlying multilateral relationship network structure, more stringent and more complex restrictions on the institutional structure are required.

The concept of a fit is based on a dynamic interpretation of the cooperation structure and the coalition structure. A cooperation structure is *richer* as it relates more relational capacities. A coalition structure is *finer* as its partition is smaller. Those two orderings are opposite; and a balance between the two is found in a feasible institutionalization, when the two regimes fit. Before addressing the governance of these processes, the ordering of these regimes is investigated.

### 6.2.1 The induced Behavioral Regimes

The (Institutional) Design map  $\delta: \mathcal{P} \rightarrow \mathcal{O}$  expressing the institution's capacity to translate a cooperation structure into a transaction structure, co-determines the behavior of the institution's members.

The two members' regimes – the institutionally-ruled behavioral regimes ( $\beta^i$ ) and the strategically-ruled behavioral regimes ( $\gamma^j$ ) – are related by the **Transaction Behavior Equation**:

$$(6.2) \quad \beta^i = \theta(\gamma^j), \text{ with } i, j \in N, i \neq j, \text{ or } i \in N^+, j \in N^-, \text{ or, inversely } \gamma^j = \theta^{-1}(\beta^i).$$

The feasibility constraint implies that an action determined by the *institutional rule*,  $M \in \beta^i$ , based on own expectations and resulting in  $B^+ = M(V^+)$ , is supported by the other members' expectations following the

---

<sup>21</sup> Cartwright and Wooders (2014) argue that the relation between a social norm and the coordination of behavior within social groups can be expressed by a correlated equilibrium. Given a social group structure (a partition of individuals into social groups), we propose four conditions that one may expect of a correlated equilibrium consistent with social norms. These are: (1) within-group anonymity (conformity within groups), (2) group independence (no conformity between groups), (3) homophily (individuals in the same group have similar attributes), and (4) predictable group behavior (*ex post* stability). We demonstrate that correlated equilibrium satisfying (1)–(3) exist very generally and equilibrium satisfying (1)–(4) exist in games with many players. We also consider stereotyped beliefs—beliefs that all individuals in a social group can be expected to behave in the same way—and show that stereotyping is not costly to the person who stereotypes but may or may not be beneficial to society.

*strategic rule*,  $X \in \gamma^j$ , resulting in  $B^+ = X(V^-)$ . This transaction equation allows members in principle to deviate from institutional rules, but in modeling this possibility is usually excluded. It is here where practice and theory deviate, and where law is coming in to impose rules on people.

This transaction feasibility constraint is quite complex and difficult for members to implement. In game theory, strong stability conditions are therefore introduced to arrive at operational descriptions. For example, in a non-cooperative game a Nash-equilibrium exists if a player is informed about the other members' actions and decides that she cannot improve upon this allocation by changing her action. The coalition and cooperation structures in this game are reduced to individual members. This in contrast to a cooperative game: here members are bound to a coalition in which they cooperate.

### 6.2.2 An Actor's Ex-ante generative and evolutionary Capacity

Aoki (2000) clarifies the conceptualizations of institutions with game theoretic apparatuses. He realizes, however, that the analogy of the economic process with a game can be dated back as far as Adam Smith: "In the great chessboard of human society, every single piece has a principle of motion of its own, altogether different from that which the legislation might choose to impress upon them" (Smith, 1775, Part 6, ch.2). In the Relational Approach, however, Smith's observation that every single piece has a principle of motion of its own is adapted by substituting actors for the single 'pieces' with a generic rule of motion common to all, and with the endowed endowments that create the actor's particular rules of motion. Aoki develops the 'endogenous-rules-of-the-game' view, in which view institutions are identified with substantive characteristics of self-enforcing rules for action choices by agents that are universally believed to be relevant in a repeated game situation and thus are able to govern agents' ongoing interactions. He regards these rules as endogenously created through the interactions of agents in a relevant domain and thus self-enforcing.

Broadening Aoki's 'endogenous-rules-of-the-game' generated by interaction of *agents* in a relevant domain, the Relational approach extends the interactions between a pair of *capacity-perspective endowments*, localizing the regime in the generic perspective (projective) structure. Repeated interaction in that regime creates a new capacity-endowment. Based on this capacity, new pairs of capacity-endowments generates a new regime with a corresponding rule.

Depending on the specification of factor-endowments, actors are operators on those factors that produce specific values, being oriented by three specific endowment-perspectives. This generation of values is aimed at enhancing the relational capacity of the actors involved. An actual specification of endowment-perspectives shows a great diversity and a large variety in values to be produced: the actors' productive capacity. But still the wishes for diversity and variety in relational capacity may not be exhausted. For realizing this growth in welfare, the actual endowment-perspectives have to be updated. That is obtained by the process of Generative Factor Interaction, which originates in an Actor's state of disequilibrium with factors being out of balance.

*Generative Factor Interaction* is the interaction between two opposed factors in an Actor's regime that generate a third factor, which consists of a combination of the two spanning factors. The Generative Factor Interaction is essentially reproduction and recombination; it conforms to the generic rules of motion in the Factor-Perspective Structure that carry over to the transitory Factor-Endowments Structure. The outcomes generated by a regime have a probabilistic character and are therefore behaviorally unstable. As time passes, the regime may 'learn' from its experimental behavior, being subjected to tests of communicability in the Resource domain. The successful behavioral traits become eventually a factor itself in the renewed, higher level actor (based on Darwinian selection).

This process is made possible by distinguishing the Mind-factors from the Body-factors in an Actor. Both are semi-independent, but the Body-factor may experience a scarcity that was not yet in the Mind of an Actor. It then induces a change in that Mind-factor, generating a higher level in the Mind.

This **evolutionary process** in the *Generative Factor-Interaction model* represents the ability to create a limitless variety of relational capacities. It does so by recursive repetition within a regime, or by a combinatorial process between regimes. In the first process the regime becomes a factor on a higher level. The latter process may change the spanning factors of actors and when these are overall feasible, it enhances the relational capacity of the whole actor. These processes, however, not only induce instability, but they also only occur if the Actor experiences imbalances in her regimes which incite her to restore balance by enhancing relational capacities in her factors-endowments.

An actor cannot only grow in relational capacities, but can also decline and possibly terminate. An individual agent can as well switch between various actor-identities. For every identity, there exists *some level* in the combination of the three factor-endowments that is basic in the sense that lowering or diminishing that level means the end of that specific identity. A medical doctor, for example, loses her license after some time. That license belongs to her means-factor, which signals her mind-technology to her patients' minds. Losing a license in the means-factor *reveals* a too poor technology in the mind-factor of the actor. This statement implies that the behavioral performance of the license administering agency, the Actor, can be trusted. The presence of a 'license administering agency' in the means-factor of an actor implies that there exists another actor that has designed and incorporated this ruling agency.

### 6.2.3 Wholes and Parts; Levels and Layers; an Agent

In the standard economic approach an 'individual' is introduced as primitive concept. A set is a collection of objects of any kind, for example, a set of individuals or a set of organizations. Primitive concepts have their own irreducible fundament from which other concepts, such as an organization, are derived. In the relational approach, the primitive concept is an Actor, defined by generic relational capacities, on which the generating intertwinement of strings of endowments is based and organized in a specific **Architecture** to which **Roles** are assigned. This structure is a building stone for all social entities and unifies the approach to Wholes and to its Parts (compare Lange, 1965). When a Whole is the **macro-Actor**, her Parts are **micro-actors**. Furthermore, each Part in a Whole is itself a Whole, if it satisfies the criteria for an Actor. That is a **Part-Whole relation**<sup>22</sup>.

This evolutionary process may have been concentrated on specific or isolated fields in society, causing the emergence of clusters, called **Domain of Specialization** or **Disciplines**. A domain is an Actor on itself, identified by its spanning factor-perspectives endowments, and is governed by its own endowed architecture. The only ordering that applies on all independently developed domains is the time (and place) factor. Those domains of factors may stretch over a multitude of actors. Examples are the legal or economic discipline in an allocation mechanism.

Let a set of Endowed Actors and their Domain be given. An actor has a higher relational capacity **level** in some domain than another actor, if her feasible Welfare index – as described in Section 2.4 – in the relevant

---

<sup>22</sup> This implication can be repeated indefinitely, from which follows that the 'Whole' is unbounded. That follows from the introduction of a projective space describing a Perspective Structure, which includes capacities at infinity, meaning a possibility rather than a given fact. The Whole can be made bounded by fixing the perspectives (utilities, technology and resources) and convexifying the structure. That has been done by Richter and Rubinstein (2014) in their Convex Economy. Since the Actors behave locally in the Relational Approach, one may confine the analysis of an unbounded Actor to its neighborhood of directly interacting Actors, which are given in bounded endowments. This partial analysis is applied in the sequel.

Domain is higher in all three dimensions. An actor’s architecture contains multiple **levels** if the actor can be decomposed in sub-actors in appropriate sub-domains, each with a characteristic level of relational capacity.

The traditional concept of an **agent** is thus defined as a composition of actors in appropriate and overlapping domains. In standard theory, these distinctions are considered implicitly. Here one may decide whether to focus on a *specific actor* in the agent, with precise, axiomatic properties, or to focus on an *organic actor* in the agent with composite and fuzzy properties. The fundamental generic perspective structure, however, remains valid for both approaches.

### 6.3 The Fano-Matroid and the Perspective-Structure

A *geometry* is a pair  $(S, G)$  consisting of a nonempty set  $S$  and a transformation group  $G$ , which is a collection of transformations  $T: S \rightarrow S$  such that  $G$  contains the identity, its inverse and its compositions. A figure is any subset of  $S$ ; two figures  $A$  and  $B$  are congruent if there exists a transformation  $T$  in  $G$  such that  $T(A) = B$ , where  $T(A) = \{T(z): z \in A\}$ . A set of figures is invariant if, together with any one figure  $B$ , it contains all figures congruent to  $B$ ; a function is invariant if it gives the same value for congruent figures (Henle, 1997).

Let  $P_n$  be a *projective plane*, which is a finite vector space of non-zero vectors of dimension  $n$ . The *projective space* consists of a set of positions  $P_n$  on which a binary operation  $\oplus$  is defined. Each position in that space is a vector of  $n + 1$  coordinates; each coordinate is either 1 or 0, but not all are 0. The operation  $\oplus$  assigns to any pair of distinct vectors a unique third vector in the space by the following rule:  $0 \oplus 0 = 1 \oplus 1 = 0$  and  $0 \oplus 1 = 1 \oplus 0 = 1$  for each coordinate. The operation is called coordinate-wise addition modulo 2. The number of positions is equal to  $(2^{n+1} - 1)$ .

A *projective geometry*  $PG(n,2)$  is an  $n$ -dimensional projective space  $(P_n; \oplus)$  over the field with two elements,  $\{0, 1\}$ . With each position  $x = (x_0, x_1, \dots, x_n)$  in  $P_n$ , a unique subset  $H(x) = \{p_0, p_1, \dots, p_n\}$  can be associated, where  $p^i = (p^i_0, p^i_1, \dots, p^i_n)$ , that consists of the  $n+1$  solutions of the equation:  $x_0 p_0 \oplus x_1 p_1 \oplus \dots \oplus x_n p_n = 0$ . This subset is called a *hyperspace*. The map  $H: P_n \rightarrow P_n^*$  is called the *hyperspace map*. A 1-dimensional subspace is spanned by two independent positions, say  $x$  and  $y$ , and is equal to the set  $\{x, y, x \oplus y\}$  in  $P_n$ . The number of these 1-dimensional subspaces is equal to  $(2^{n+1} - 1) (2^n - 1) / 3$ . A ternary relation is a 1-dimensional subspace.

In finite geometry, the *Fano plane* (after Gino Fano) is the finite projective plane of order 2, having the smallest possible number of points and lines, 7 each, with 3 points on every line and 3 lines through every point: see Figure 5.1 .

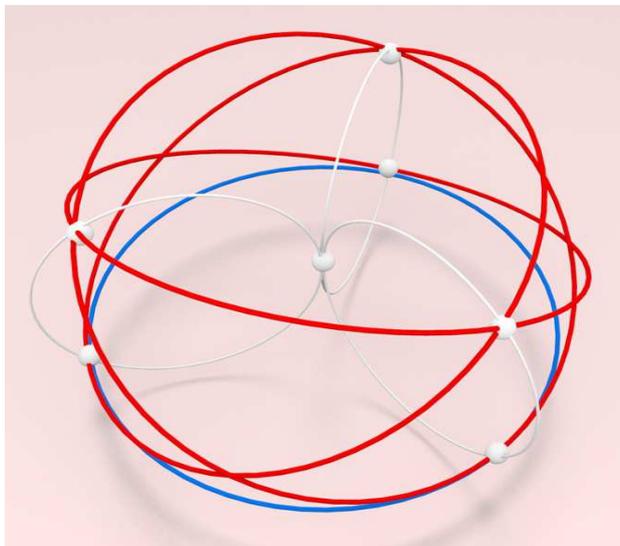


Figure 6.1: The Fano Projective Graph

The Fano graph is a projective geometry  $(P_2, \oplus)$ , which is representable as a Matroid: the Fano matroid. There are 35 different combinations of three positions in  $G$ , 7 of which are minimal dependent subsets or circuits in the set  $G$  and constitute the set  $G^*$ . The 28 other sets of three positions are independent in  $G$ . Any independent set of three positions spans the whole structure. It has 7 positions each identified by a vector with 3 coordinates having a value 1 or 0, which means that some characteristic is present or absent. There are three positions containing 1 characteristic; three positions containing 2 characteristics, and one position containing all 3 characteristics (see Figure 16). There are also 7 relations. A unique one where the 3 member positions contain 2 characteristics (the circle), three symmetric relations that each contain 2 positions with 1 characteristic, and three symmetric relations that each contain 1 positions with 3 characteristics. Any two positions in this structure determine 42 a minimal interaction relation, i.e., a line or circle in the diagram. For example, 100 and 010 determine uniquely the position 110 through the interaction operation  $100 \oplus 010 = 110$ , and thus determine the relation  $\{100, 010, 110\}$ . Any position in this relation can be derived from the other two, e.g.,  $010 = 100 \oplus 110$ , these three positions are called interactive or dependent. On the other hand, the positions 100, 010 and 001, e.g., do not interact directly and are called independent because  $100 \neq 010 \oplus 001$ .

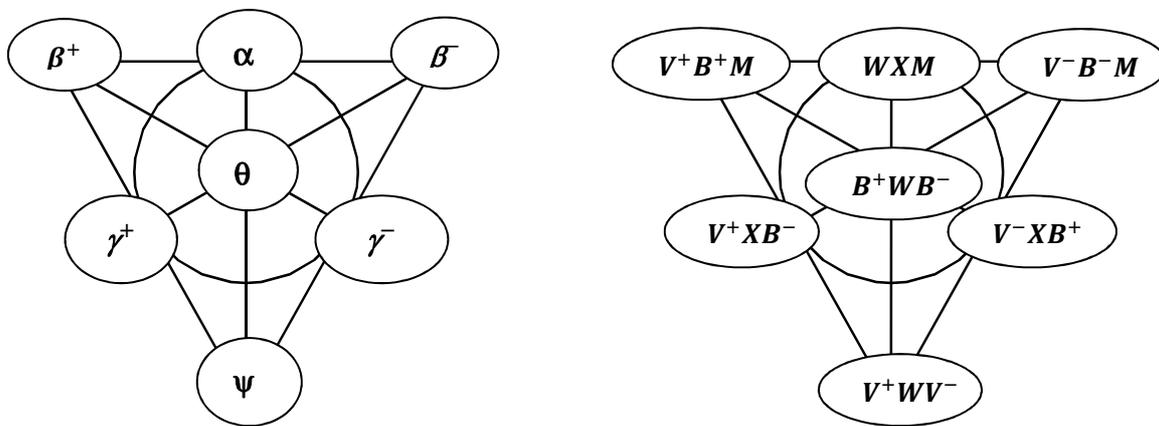


Figure 6.2: The Structure of Generic Behavioral Regimes

In the *projective Perspective space*, chains with the same perspective are parallel and converge to that perspective (ideal point) on the horizon (see Figure 2.2). Those parallel lines are taken here as branches of a tree, with starting point one of the three spanning ideal capacities. A *projective tree* is a graph that contains no circuits and has one vertex attached to an ideal point in a projective geometry. Since any two vertices are connected by exactly one path, any vertex is connected with the ideal point by one path, with the ideal point as its initial vertex. (A path is a sequence of vertices, in which all vertices as well as all edges between vertices are distinct.) The root of a chain is a perspective, which gives an orientation to all subsequent factors in any sequence starting from that root.

### 6.3.1 Ordering Factor Perspectives: Projective Factor Spaces, Lattice Geometry, and Mereology<sup>23</sup>

Can perspective-factors be ordered? An answer on this question is fundamental for addressing reproduction and evolution of organisms. Okasha (2006: 14) observes that reproduction, or multiplication, is generally understood to mean the production of offspring entities that occupy *the same level in the biological hierarchy*

<sup>23</sup> This section heavily borrows from Wikimedia Foundation contributors, sections: "Part-Whole Theory", "Mereology", "Ordinals", [http://wikimediafoundation.org/wiki/Part-whole\\_theory](http://wikimediafoundation.org/wiki/Part-whole_theory).

as the parental entity. Thus when organisms reproduce they give rise to offspring *organisms*, when cells divide they give rise to offspring *cells*, and so on. This does not explain evolution, however. Okasha (2006: 18) concludes that “a population of entities evolves by natural selection where heritable differences between entities lead to difference in their reproductive output; reproduction is understood as giving rise to an offspring entity that occupies the same hierarchical level as the parent, unless otherwise stated. Entities satisfying these conditions are units of selection; the level in the hierarchy which the entities occupy is the level of selection.”

Okasha’s description of evolution by natural selection on the same level leaves room for other explanations: “unless otherwise stated”. In the social sciences, evolution may cause an increase of the level of offspring compared to the level of the parents.

Regression to the elementary Factor-perspective structure allows for three endowment-perspectives. This number is multiplied by starting from more differentiated perspectives-endowments in the endowments-strings. Consider, for example, the famous refinement ordering in Darwin’s Tree of Life, presented in his [On the Origin of Species](#) (1859). Today, the [biological classification](#) – the Phylogenetic Tree of Life – orders the six major [taxonomic ranks](#) as follows: Phylum – Class – Order – Family – Genus – Species. This ranking is based on rRNA genes, which may be considered relational capacities in the Resource factor<sup>24</sup>. A *level* of an actor implies an embodiment of the corresponding *layer* in the actor’s factor.

Danilov, Koshevoy and Sostkov (1997) introduce an ordering of production stages that describes the creation of innovations. They consider an innovation as a subset in the whole list of qualities. This list they assume to be given and partially ordered as a lattice. This ordering of innovations is proposed here for two of the factor perspective-endowments: see below.

A **lattice**  $L$  is a set endowed with two operations, the join  $a \vee b \in L$  and the meet  $a \wedge b \in L$ , which are idempotent, commutative, associative, and satisfy the absorption law. A lattice  $L$  is distributive if  $(a \vee b) \wedge c = (a \wedge c) \vee (b \wedge c)$ ; it is a modular lattice if  $a \leq c$  implies  $(a \vee b) \wedge c = (a \wedge c) \vee (b \wedge c)$ , for all  $a, b, c \in L$ . A non-zero element  $e \in L$  is said to be join irreducible if a relation  $e = a \vee b$  implies either  $a = e$  or  $b = e$ . The base of a lattice consists of all join irreducible elements in  $L$ , and is denoted by  $P(L)$ . This set is naturally endowed with the lattice order,  $a \geq b$  if  $a \vee b = a$ , for all  $a, b \in L$ . Therefore it is an ordered set. A lattice satisfies the following two axioms. (i) Existence of binary joins: for any two elements  $a$  and  $b$  of  $L$ , the set  $\{a, b\}$  has a join (also known as the least upper bound, or the supremum). (ii) Existence of binary meets: for any two elements  $a$  and  $b$  of  $L$ , the set  $\{a, b\}$  has a meet (also known as the greatest lower bound, or the infimum). The first axiom says that  $L$  is a *join-semilattice*; the second says that  $L$  is a *meet-semilattice*.

Consider a set of elements,  $\Omega$ , on which a **partial order** (poset) is defined, that is, a binary relation  $\leq$  which is reflexive, antisymmetric, and transitive. Two elements  $a$  and  $b$  in  $\Omega$  are comparable if  $a$  is a predecessor of  $b$ ,  $a \leq b$ , or a successor,  $b \leq a$ . A **chain** of a partially ordered set is a subset of pairwise comparable elements. The length of a chain is its cardinality minus one. The height  $r(p)$  of an element in  $p \in \Omega$  is the longest chain in  $\Omega$  with maximal element  $p$ . If  $\Omega$  is a lattice, the term “rank” is used instead of “height”. The **rank**,  $r(p)$ , of an element  $p$  in the lattice  $L$  is the length of the longest chain in  $\Omega$  with maximal element  $p$ . An **order ideal** is a subset  $A$  in  $\Omega$  with the property that it contains all smaller elements of any element in  $A$ :  $p \leq q \implies p \in A$  for all  $q \in A$ . its unique infimum is its source.

**Part-whole theory** is the name of a loose collection of historical theories, all informal and nearly all unwitting, relating wholes to their parts via inclusion. Part-whole theory has been overtaken by **mereology**. Peano was among the first to articulate clearly the distinction between membership in a given set, and being a

---

<sup>24</sup> The ranking in real life is in fact more complex than the refinement ordering modeled in the Tree of Life. This is an unavoidable consequence of modeling. The concepts developed in this paper also approach reality, although much better than existing models with the same purpose.

subset of that set. A subset of a set is usually not also a member of that set. However, the members of a subset are all members of the set. In set theory, a singleton cannot be identified with its member. In part-whole theory and mereology, this identification necessarily holds. A mereological system requires at least one primitive binary relation (dyadic predicate). The most conventional choice for such a relation is Part-hood (also called "inclusion"), "x is a part of y", written  $Pxy$ . Nearly all systems require that Part-hood partially order the universe. Overlap: x and y overlap, written  $Oxy$ , if there exists an object z such that  $Pzx$  and  $Pzy$  both hold.

Mereology has been axiomatized in various ways. A common element of such axiomatizations is the assumption, shared with inclusion, that the part-whole relation orders its universe, meaning that everything is a part of itself (reflexivity), that a part of a part of a whole is itself a part of that whole (transitivity), and that two distinct entities cannot each be a part of the other (antisymmetry).

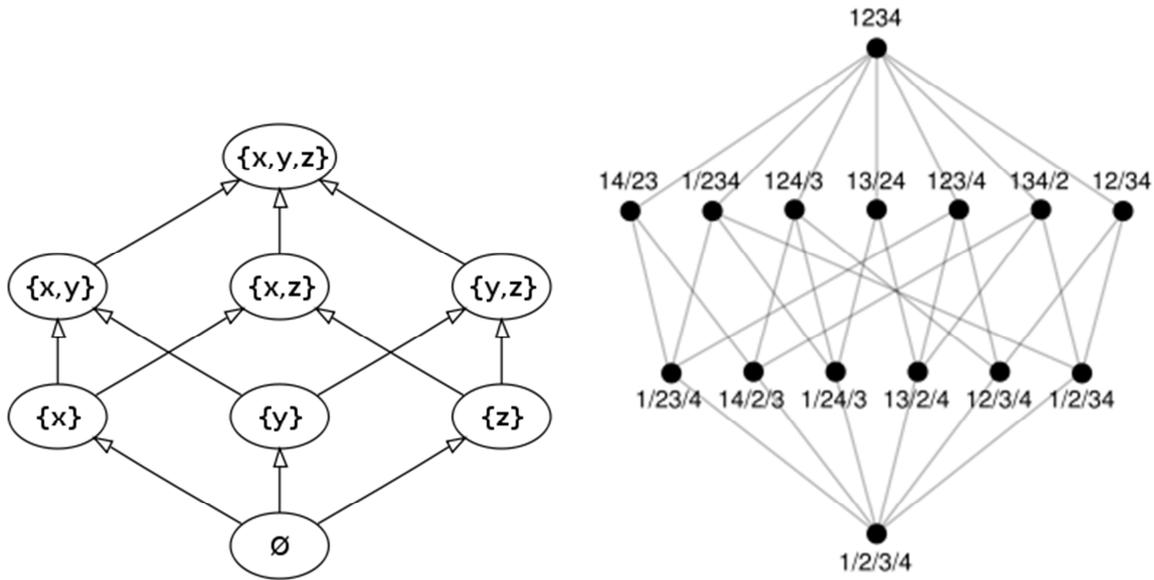


Figure 6.3: Lattices: the collection of all subsets of a set  $K$ , ordered via subset inclusion,  $(K, \subset)$ , and the collection of all partitions of  $M$ , ordered by refinement,  $(M, \leq)$ . (Wikipedia).

A Factor is a realization of some perspective in the Perspective Structure, described by some semi-lattice, having that perspective as its root. A **Mind-factor** is ideally oriented at expanding its relational capacity, represented by a subset of the capacity space,  $K$ . This space is ordered by the subset inclusion relation, a Part-Whole relation, which expresses the extension of a given set to a new configuration (a whole), which contains the given set. This relation is called a **Richness-ordering** on the Mind Capacity Space, as a higher 'whole' is a configuration with more relational capacities.

An **Encompassing-factor** is oriented at creating boundaries and at containing a variety of dependent capacities under the same denominator. An all-encompassing capacity can only be used for the poorest mind-set. For richer mindsets the encompassing capacity has to be finer. That is expressed by the **Refinement-ordering** on the Encompassing Capacity space. This ordering is in a sense dual to the richness-ordering: a higher 'whole' is a configuration of smaller sets with finer boundaries, in which each set contains a richer relational capacity. Its root contains the set of carriers with the single poorest relational capacity, which is the largest set.

A Factor-Perspective endowment is a realization of some perspective in the Perspective Structure, described by some semi-lattice, having that perspective as its root. A *Mind-factor* is ideally oriented at expanding its mental relational capacity, which capacities are represented by a subset of the capacity space. This space is ordered by the subset inclusion relation, a so-called Part-Whole relation, which expresses the extension of a given set to a new configuration (a whole), which contains the given set (see Figure 5.2). This relation is

called a **Richness-ordering** on the Mind-Capacity Space, as a higher 'whole' is a configuration with more relational capacities.

A *Means-factor* is oriented at containing and comparing a variety of dependent capacities under the same denominator. An all-encompassing capacity can only be used for the poorest mind-set. For richer mindsets the encompassing capacity has to be finer. That is expressed by the **Encompassment-ordering** on the Means-Capacity space. This ordering is in a sense dual to the richness-ordering: a higher 'whole' is a configuration of smaller sets with finer boundaries, in which each set contains a richer relational capacity. Its root contains the set of carriers with the single poorest relational capacity, which is the largest set.

Grabisch and Labreuche (2002), who refer to Bilbao (2000), have introduced such an ordering to construct a binary alternative structure that allows for defining scores on a bipolar scale. These scores can be based on a ternary alternatives with the general form  $(1B; -1A; 0(A[B]c))$  for the set  $Y(k_i; k_j)$ . A function  $v$  on  $Y(k_i; k_j)$  defined by:  $v(A; B) = u(1A; -1B; 0(A[B]c))$ , where  $u$  is the scale-vector for the various scores. The function  $v$  is called in the literature an *aggregator*; it is called a *bi-capacity* if  $v$  is also monotonous, that is,  $v(A) \geq v(B)$  whenever  $(A; A0) \geq (B; B0)$ .

The Other-perspectives reflects the force of the unknown or the outward orientation (exploration). The ground set of all organisms is derived from the set of subsets of a given set  $\Omega$  of capacities; it is indicated by  $\mathcal{N} = \mathcal{P}(\Omega)$ . The hierarchical order has been defined by set inclusion of the capacities incorporated by respective organisms:

$$a \leq b \text{ if and only if } \omega(a) \subset \omega(b),$$

where  $a$  and  $b$  are organisms in  $\mathcal{N}$ , and  $\omega$  is a correspondence that assigns a bundle of capacities (an identity) to an organism in  $\mathcal{N}$ . This partial order is indicated by  $\mathcal{N} = (\mathcal{N}, \leq)$ .

The preference ordering is defined on the Cartesian product of the set  $\mathcal{N} = \mathcal{P}(\Omega)$ , the set  $\mathcal{N}^2 = \{(A, B) \in \mathcal{P}(\Omega) \times \mathcal{P}(\Omega) | A \cap B = \emptyset\}$ , which is a Level Team Field, the level being determined by the ground set  $\mathcal{N} = \mathcal{P}(\Omega)$ ; it contains all possible relations or interactions between organisms with diverse compositions of capacities. Figure 4 may represent the ocean of possible interactions.

Once it became clear that mereology is not tantamount to a denial of set theory, mereology became largely accepted as a useful tool for formal ontology and metaphysics. Lewis (1991) went further, showing informally that mereology, augmented by a few ontological assumptions and plural quantification, and some novel reasoning about singletons, yields a system in which a given individual can be both a member and a subset of another individual. Mereology replaces talk of "sets" of objects with talk of "sums" of objects, objects being no more than the various things that make up wholes.

The standard definition, suggested by John von Neumann, is: each ordinal is the well-ordered set of all smaller ordinals. In symbols,  $\lambda = [0, \lambda)$ . Formally: A set  $S$  is an **ordinal** if and only if  $S$  is strictly well-ordered with respect to set membership and every element of  $S$  is also a subset of  $S$ . Note that the natural numbers are ordinals by this definition. For instance, 2 is an element of  $4 = \{0, 1, 2, 3\}$ , and 2 is equal to  $\{0, 1\}$  and so it is a subset of  $\{0, 1, 2, 3\}$ .

Any nonzero ordinal has the minimum element, zero. It may or may not have a maximum element. For example,  $\omega + 2$  has maximum  $\omega + 1$  and  $\omega + 6$  has maximum  $\omega + 5$ . On the other hand,  $\omega$  does not have a maximum since there is no largest natural number. If an ordinal has a maximum  $\alpha$ , then it is the next ordinal after  $\alpha$ , and it is called a **successor ordinal**, namely the successor of  $\alpha$ , written  $\alpha + 1$ . In the von Neumann definition of ordinals, the successor of  $\alpha$  is  $\alpha \cup \{\alpha\}$  since its elements are those of  $\alpha$  and  $\alpha$  itself. A nonzero ordinal that is not a successor is called a limit ordinal. One justification for this term is that a limit ordinal is indeed the limit in a topological sense of all smaller ordinals (under the order topology).

**Transfinite induction** holds in any well-ordered set, but it is so important in relation to ordinals that it is worth restating here. Any property that passes from the set of ordinals smaller than a given ordinal  $\alpha$  to  $\alpha$  itself, is true of all ordinals. That is, if  $P(\alpha)$  is true whenever  $P(\beta)$  is true for all  $\beta < \alpha$ , then  $P(\alpha)$  is true for all  $\alpha$ . Or, more practically: in order to prove a property  $P$  for all ordinals  $\alpha$ , one can assume that it is already known for all smaller  $\beta < \alpha$ .

We have mentioned that any well-ordered set is similar (*order-isomorphic*) to a unique ordinal number  $\alpha$ , or, in other words, that its elements can be indexed in increasing fashion by the ordinals less than  $\alpha$ . This applies, in particular, to any set of ordinals: any set of ordinals is naturally indexed by the ordinals less than some  $\alpha$ . The same holds, with a slight modification, for *classes* of ordinals (a collection of ordinals, possibly too large to form a set, defined by some property): *any class of ordinals can be indexed by ordinals* (and, when the class is unbounded in the class of all ordinals, this puts it in class-bijection with the class of all ordinals). So we can freely speak of the  $\gamma$ -th element in the class (with the convention that the “0-th” is the smallest, the “1-th” is the next smallest, and so on). Formally, the definition is by transfinite induction: the  $\gamma$ -th element of the class is defined (provided it has already been defined for all  $\beta < \gamma$ ), as the smallest element greater than the  $\beta$ -th element for all  $\beta < \gamma$ .

Two lattices are **isomorphic** if a one-to-one correspondence exists, called isomorphism, which preserves binary meets and joins. Any isomorphism of lattices is monotone with respect to the associated ordering relation, that is,  $a_1 \leq a_2$  and  $b_1 \leq b_2$  implies that  $a_1 \vee b_1 \leq a_2 \vee b_2$  and  $a_1 \wedge b_1 \leq a_2 \wedge b_2$ . Since any finite distributive lattice  $L$  is isomorphic to the lattice of order ideals of the ordered set  $P(L)$  (and to the lattice of their characteristic functions), all finite distributive lattices look alike; see Koshevoy (1998).

The assumption that the set of capacities, and consequently the set of organisms, can be partially ordered and form a lattice is one of the building stones for the Relational Capacity model. The ordered set of actors can be represented by a network or a graph<sup>25</sup> of actors in the form of a **source-tree**, compare Figure 4 or Figure 5. The source-ordering can be read in two directions: a top-down orientation that looks to common predecessors, both in time and in space, and a bottom-up orientation that focuses on diversification, specialization, and eventually on growth. Any such sequence of organisms is called a **source-chain**. Take, for example, the sequence *{client-retailer-manufacturer-upstream plants}* in Figure 4. Ancestor or predecessor relations may also be interpreted as authority relations between organisms, as has been done by Gilles, Owen and van den Brink (1992). They have interpreted this directed network as a permission structure on players.

### 6.3.2 A Convex Economy (Richter and Rubinstein) and a Perspective Balancing Equilibrium

In their paper, Richter and Rubinstein (2014) propose a new abstract definition of competitive equilibrium: a profile of alternatives and a public ordering (prestige, price or a social norm) such that each agent prefers his assigned alternative to all lower-ranked ones. The equilibrium operates in an abstract setting built upon a concept of convexity borrowed from Convex Geometry. The “magic” of linear equilibrium prices is put into perspective by establishing an analogy between linear functions in the standard convexity and “primitive orderings” in the abstract convexity. They apply the concept to a variety of convex economies and relate it to Pareto efficiency.

In my interpretation, the “primitive orderings” are the orderings of the three factor-endowments in the perspective structure  $(F_2(t), \otimes)$ , defined in Section 2.1. For each set  $A \subset (F_2(t), \otimes) = X$ . A set  $K(A)$  of elements that are “between elements in  $A$ ” is specified by the factor-orderings via *subset inclusion*  $(U, \subset_U)$ ,  $(V, \subset_V)$ , and the collection of all partitions of  $M$ , ordered by *refinement*,  $(M, \leq_M)$ . The set of orderings  $\{\subset_U, \subset_V, \leq_M\}$  generates the operator  $K : 2^X \rightarrow 2^X$ , if for all  $A$ :  $K(A) = \{x | \exists a = (a_U, a_V, a_M) \in A \vdash x \subset_U a_U, x \subset_V a_V, x \leq_M a_M\}$ .

A set  $A$  is *convex* if  $K(A) = A$ . One interpretation of this representation is that agents have a set of criteria (perspectives) in mind with which they reflect on alternatives. A set is convex if for any element outside the set, one of the criteria ranks it “inferior” to all elements in the set. The primitive orderings play an analogous role to that of linear functions in the case of standard convexity. In standard analysis,  $K$  is the convex hull operator.

<sup>25</sup> A network is represented by a directed graph  $G$ , which is a pair  $(V(G), E(G))$ , where  $V(G)$  is a set of elements called vertices or points, and  $E(G)$  is a set of ordered pairs of (distinct) elements in  $V(G)$ , called edges or lines.

A *convex geometry* is an operator  $K$  that satisfies the following properties: (i)  $A \subseteq K(A)$  and  $K(\emptyset) = \emptyset$ . (ii)  $A \subseteq B$  implies  $K(A) \subseteq K(B)$ ; (iii)  $K(K(A)) = K(A)$ ; and (iv) if  $A$  is convex,  $a, b \notin A$  and  $a \in K(A \cup b)$ , then  $b \in K(A \cup a)$ . Richter and Rubinstein present a new representation theorem of convex geometries, stating that (a) for every finite convex geometry, there is a set of orderings that generates it, and (b) any set of orderings generates a convex geometry. This theorem generalizes a property that holds in the standard convex geometry in Euclidean spaces: A point is in the convex hull of a set if and only if, for every linear ordering, there is a weakly lower element in the set. That is, a point is outside the convex hull of a set if there is a linear ordering that places it below all members of the set<sup>26</sup>.

A *convex economy* is a model that consists of: (i) a set of agents; (ii) a set of elements from which each agent chooses; (iii) the agents' preference relations over the set of elements; (iv) a feasibility constraint on choice profiles; and (v) a set of primitive orderings that generates a notion of convexity. This is represented by the tuple  $\langle N, X, \{\preceq^i\}_{i \in N}, F, \{\subseteq_U, \subseteq_V, \leq_M\} \rangle$ .

After establishing this framework Richter and Rubinstein proceed to analyze several definitions of competitive equilibrium, which I reinterpret in accordance with the previous sections.

They define a *primitive competitive equilibrium* (PCE) in the convex economy as a profile and one of the primitive orderings,  $\langle \{\preceq^i\}_{i \in N}, P \rangle$ , such that (i) the profile is in  $F$  and (ii) for each  $I$ , the element  $x^i$  is  $\preceq^i$ -optimal in the set  $B(P, x^i) = \{z | x^i P z \vee z = x^i\}$ . For a profile to be a competitive equilibrium there must exist a perspective ordering such that each agent is satisfied with his assigned allocation given his ability to replace it only with an element that is considered less rich according to the perspective ordering.

Generalizing this concept to a *perspective balancing equilibrium*, there are three ordered spaces, the factors  $X_U, X_V$ , and  $X_M$ , oriented by the richness-orderings,  $\subseteq_U$  and  $\subseteq_V$ , then the economy orients agents to the internal, respectively the external richness perspective. When  $P$  is the refinement ordering,  $\leq_M$ , then the economy orients agents to the means perspective (see Section 2.1). These three orderings are in real life amalgated in a 'free product', the 'nexus' in Figure 2.1. This amalgation operation, indicated by  $\otimes$ , integrates the three nearly-independent structures. This composition operation involves interaction between the structures, which mathematical description goes beyond the reach of this paper. Its inverse, the decomposition of the amalgated structure has important policy implications. At this stage, these can only be described verbally.

The difference between a *convex geometry* and a *projective geometry*, which I introduce in this paper, lies in the dynamics of the models. The perspectives in Richter and Rubinstein's convex economy are given and fixed. The relational approach, however, is fundamentally relational, also in the perspective-factors. Those perspectives are continually interacting according to generic rules of motion and continue to add new elements and complexity to the strings of factor-endowments. That affects, of course, the character of the properties a model has.

## References

- Acemoglu, Daron and James Robinson (2012), *Why Nations Fail*, Crown Business.
- Akerlof, George A. and Kranton, Rachel (2010), "Identity Economics, *The Economists' Voice*": Vol. 7 : Iss. 2, Article 6.
- Alexander, C. (1999), "The Origins of Pattern Theory: The Future of the Theory, and the Generation of a Living World," *IEEE Software*, 16(5), Sept./Oct., 1999, pp. 71-82.

<sup>26</sup> Koshevoy (1999) pointed out a connection between the literature on convex geometry and that of choice theory for finite sets.

- Allen, C. & Bekoff M. (2007), Animal consciousness. In M. Velmans & S. Schneider (eds.) *Blackwell Companion to Consciousness*. New York: Blackwell Publishing; pp. 58-71.
- Aoki, Masahiko (2010), "Between Game Theory and Institutional Studies: The Dual-Dualities of the Institutional Process", SSRN: <http://ssrn.com/abstract=1624003> .
- Aoki, M. (2000), "Institutional evolution as punctuated equilibrium", in: C. Ménard, ed., *Institutions, Contracts and Organizations*, Edward Elgar, p. 11-33.
- Aumann, R. (2008), "Rule-rationality vs. act-rationality", The Hebrew University, Center for the Study of Rationality, DP497.
- Beck, Matthias (2012), *The Elusive Search for Job Security: A Historical Inquiry into Dismissals in the US Workplace*, Nova Science Publishers.
- Bekoff, M., C. Allen and G. M. Burghardt, (2002), *The Cognitive Animal: Empirical and Theoretical Perspectives on Animal Cognition*, MIT Press.
- Bénabou, R., and J. Tirole (2009), "Individual and corporate social responsibility", DP 4570, IZA.
- Bénabou, R., and J. Tirole (2006), "Incentives and prosocial behavior", *The American Economic Review*, 96, 1652-1678.
- Besley, T., and M. Ghatak (2007), "Retailing public goods: The economics of corporate social responsibility", *The American Economic Review*, 95, 616-636.
- Besley, T., and M. Ghatak (2005), "Competition and incentives with motivated agents", *The Journal of Public Economics*, 91, 1645-1663.
- Bilbao, J.M., and P.H. Edelman (2000), "The Shapley value on convex Games", *Discrete Applied Mathematics*, 103, 33-40.
- Bouchard, M.J., ed., (2010), *The Worth of the Social Economy*, CIRIEC, Peter Lang.
- Branden, van de Donk, Putters, (2005),
- Brink, René van den (1994), *Relational power in hierarchical organizations*, PhD Dissertation, Tilburg University.
- Brink, René van den, and Rob Gilles (1994), "A social power index for hierarchically structured populations of economic agents", in: *Imperfections and Behaviour in Economic Organizations*, eds. R. Gilles and P. Ruys, Kluwer, p. 279-318.
- Brink, René van den, and Pieter H.M. Ruys (2008), "Technology driven organizational structure of the firm", *Annals of Finance*, 4, p. 481-503.
- Cartwright, E., and M. Wooders (2014), "Correlated Equilibrium, Conformity, and Stereotyping in Social Groups", *Journal of Public Economic Theory*, 16, p. 743-766.
- Cserne, Péter, (2010) "Consequence-Based Arguments in Legal Reasoning: A Jurisprudential Preface to Law and Economics" TILEC Discussion Paper No. 2010-036.
- Coleman, J.S. (1990), *Foundations of social theory*. Cambridge: Harvard University Press.
- Coase, R. (1937), *The Nature of the Firm*,
- Damsa, L. (2014), "The Incomprehensible Post-Communist Privatisation" , *Global Journal of Comparative Law*. Warwick School of Law Research Paper No. 2014/13.
- Danilov, V., and G. Koshevoy (2009), "Choice functions and extensive operators", *Order*, 69-94.
- Danilov, V., G. Koshevoy and A. Sotskov (1997), "Equilibrium analysis of an economy with innovations", *Journal of Mathematical Economics*, 27, 195-228.
- Defourny, J. (2001), "From third sector to social enterprise", in: C. Borgaza and J. Defourny, eds., *The Emergence of Social Enterprise*, Routledge, 1-28.
- DiMaggio, P.J., and W.W. Powell (1983), "The iron cage revisited: institutional isomorphism and collective rationality in organizational fields", *American Sociological Review*, 48, 147-160.
- Dowding, K., and M. van Hees (2009), "Freedom of choice", in: P. Anand, P.K. Pattanaik and C. Puppe (eds.), *The Oxford Handbook of Rational and Social Choice*, Oxford UP, 374-392.
- Drucker, P. (1954), *The Practice of Management*, revised edition 2007, Butterworth-Heinemann.
- Eisenberg, Melvin A. (1998), *The Conception That the Corporation Is a Nexus of Contracts, and the Dual Nature of the Firm*, 24 J. Corp. At: <http://scholarship.law.berkeley.edu/facpubs/547>.
- European Commission (2014), *A map of social enterprises and their ecosystems in Europe*, A report submitted by ICF Consulting Services, Charu Wilkinson, Lead Managing Consultant.
- Faigle, U. and C. Herrmann (1981), "Projective geometry on partially ordered sets", *Transactions of the American Mathematical Society*, 266, 319-332.

- Florio, Massimo (2014), "Contemporary public enterprise: innovation, accountability, governance", *Journal of Economic Policy Reform*, DOI:10.1080/17487870.2014.913823.
- Fujishige, S., G. Koshevoy and Y. Sano (2007), "Matroids on convex geometries", *Discrete Mathematics*, 307, 1936-1950.
- Gelderblom, O., A. de Jong and J. Jonker (2013), "The Formative Years of the Modern Corporation: The Dutch East India Company VOC, 1602-1623", *Journal of Economic History*, 73, 1050-1076.
- Gilles, R.P., H. Haller, P.H.M. Ruys (1994), "Modelling of Economies with Relational Constraints on Coalition Formation", in: *Imperfections and Behavior in Economic Organizations*, ed.: R.P. Gilles and P.H.M. Ruys, Kluwer, p. 89-136.
- Gilles, R.P. (2010), *The Cooperative Game Theory of Networks and Hierarchies*, Springer.
- Gilles, R.P., E. Lazarova and P.H.M. Ruys (2007), "Stability, specialization, and social recognition", *Division of Labor & Transaction Costs (DLTC)*, 2, 83-110.
- Gilles, R.P., E. Lazarova and P.H.M. Ruys (2014), "Stability in a Network Economy: The Role of Institutions", Discussion Paper.
- Gintis, H. (2009) *The Bounds of Reason: Game Theory and the Unification of the Behavioural Sciences*. Princeton: Princeton University Press.
- Granovetter, M. (1985), "Economic action and social structure: the problem of embeddedness", *American Journal of Sociology*, 91, 491-510.
- Guala, F., L. Mittone and M. Ploner (2009), "Group membership, team preferences, and expectations", CEEL Working Paper, 6-09, University Trento.
- Halman, L., R. Luijkx and M. van Zundert (2005), *Atlas of European Values*, Tilburg University.
- Hammond, P.J. (1976), "Changing Tastes and Coherent Dynamic Choice", *Review of Economic Studies*, 43, 159-173.
- Hammond, P.J. (1995), "Social Choice of Individual and Group Rights" in W.A. Barnett, H. Moulin, M. Salles, and N. Schofield (eds.), *Social Choice, Welfare, and Ethics*, Cambridge University Press, pp. 55-77.
- Heijden, E. van der, J. Potters and M. Sefton (2009), "Hierarchy and opportunism in teams", *Journal of Economic Behavior & Organization*, 69, 39-50.
- Hofstede, G. (1980), *Culture's Consequences*, Sage Publications.
- Holterman, M. (2011), *The Transaction Costs of Semi-Public Institutions ; Railway History as a Challenge for Coase*, Dissertation, available at <http://ssrn.com/abstract=1967094>
- Hovenkamp, H.H. (2010), "Coase, Institutionalism, and the Origins of Law and Economics", University of Iowa Legal Studies, Research Paper 10-07.
- Huber, M., M. Maucher and B. Sak (2006), "Study on social and health services of general interest in the EU", DG EMPL/E/4, VC/2006/0131, EU
- Huizinga, J. (1938), *Homo Ludens : a Study of the Play Element in Culturei*, Boston, The Beacon Place, 1950.
- Hume, D. (1739), *Treatise of Human Nature*, Buffalo: Prometheus Books, 1992.
- Huppert, F.A., Marks, N., Clark, A., Siegrist, J., Stutzer, A. & Vittersø, J. (2008), "Measuring well-being across Europe: Description of the ESS Well-being Module and preliminary findings" *Special Issue of Social Indicators Research*.
- Hurwicz, L., and S. Reiter (2006), *Designing Economic Mechanisms*, Cambridge UP.
- Jensen, Michael C. & William H. Meckling (1976), "The Theory of the Firm: Managerial Behavior, Agency Costs, and Ownership Structure", *Journal of Financial Economics*. 305.
- Kaplow, Louis (2008), *The Theory of Taxation and Public Economics*, Princeton University Press.
- Kahneman, Daniel (2012), *Thinking fast and slowly*, Penguin Books Ltd.
- Karré, Philip M. (2011), *Heads and Tails: Both sides of the coin, An analysis of hybrid organizations in the Dutch waste management sector*, Eleven Publishing
- Klemperer, P. (2008), "Competition policy in auctions and 'bidding markets'", in: *Handbook of Antitrust Economics*, ed. P. Buccirossi, MIT Press.
- Koshevoy, G. (1998), "Distributive lattices and products of capacities", *Journal of Mathematical Analysis and Applications*, 219, 427-441.
- Koshevoy, G., nd D. Talman (2011), "Solution concepts for games with general coalitional structure", Working Paper, Tilburg University.
- Lancaster K. (1966), "A new approach to consumer theory", *Journal of Political Economy*, 74, 132-157.
- Lange, Oskar (1965), *Wholes and Parts, A General Theory of System Behavior*, Pergamon Press.
- Lazarova, E., R.P. Gilles and P.H.M. Ruys (2014), "Stability in a Network Economy: the Role of Institutions", TILEC DP 2014-036.

- Lazarova, E., R.P. Gilles and P.H.M. Ruys (2007), "The provision of goods and services through cooperatives", mimeo, Virginia Tech.
- Lazonick, W. (2003), "The theory of the market economy and the social foundations of innovative enterprise", *Economic and Industrial Democracy*, 24, 9-44.
- Licht, Amir N. (2008), "Social norms and the law: why peoples obey the law", *Review of Law and Economics*, 4, 715-750.
- Lindenberg, S. (2006). "Social Rationality", in: Jens Beckert and Milan Zafirovski (Eds.) *International Encyclopedia of Economic Sociology*, (pp.616-618), New York: Routledge.
- McDonald, R., F. Pereira, K. Ribarov, and J. Hajč (2005), "Non-projective dependency parsing using spanning tree algorithms", *Proceedings of Human Language Technology Conference*, p. 523–530, Vancouver.
- Meeus (2010)
- Meslec, N., P L Curșeu, M T H Meeus, O C Iederan Fodor (2014), "When none of us perform better than all of us together: the role of analogical decision rules in groups." *Open Access*.
- Mill, John Stuart (1836) "On the Definition of Political Economy, and on the Method of Investigation Proper to It," *London and Westminster Review*, October 1836.
- Mill, John Stuart (1863), *Utilitarianism*, [www.utilitarianism.com/mill1.htm](http://www.utilitarianism.com/mill1.htm), Book 1.
- Moore, Mark H. (1995), *Creating Public Value: Strategic Management in Government*, Harvard UP.
- Musacchio, A., and S. G. Lazzarini (2014), *Reinventing State Capitalism. Leviathan in Business, Brazil and Beyond*, Harvard UP.
- Myerson, Roger B. (2003), "Graphs and Cooperation in Games", in: Bhaskar Dutta and Matthew Jackson, eds., *Networks and Groups*, Springer, p. 17 -22.
- Norris, M., and P. Shiels (2004), "Regular National Report on housing developments in European countries: Synthesis report", Dublin: Stationary Office.
- North, D. C. (1990), *Institutions, Institutional Change and Economic Performance*, Cambridge University Press, UK.
- Nussbaum, M. (2006), *Frontiers of Justice. Disability, Nationality, Species Membership*, Harvard: Harvard University Press
- Nussbaum, Martha, and Amartya Sen (1993), *The Quality of Life*, Clarendon Press.
- Nyssens, M., ed. (2006), *Social Enterprise*, Routledge.
- Okasha, S. (2006), *Evolution and the Levels of Selection*, Clarendon Press, Oxford.
- Pettit, Ph., and Chr. List (2010), *Group Agency – The Possibility, Design, and Status of Corporate Agents*, Oxford UP.
- Piccione, Michele, and Ariel Rubinstein (2007), "Equilibrium in the jungle", *The Economic Journal*, 117, 883-896.
- Postlewaite, Andrew (2010), "Social norms and preferences", in: J. Benhabib, A. Bisin and M. Jackson (eds.), *Handbook for Social Economics*, Elsevier.
- Putnam, R., R. Leonardi, and R.Y. Nanetti (1993). *Making democracy work*. Princeton, New Jersey: Princeton University Press.
- Putnam, R. 2000. *Bowling alone: the collapse and revival of American community*. New York: Simon and Schuster.
- Parsons, Talcott and Shils, Edward (1951). *Toward a General Theory of Action*. Cambridge, Mass.: Harvard University Press.
- Richter, Michael, and Ariel Rubinstein (2014), "Back to Fundamentals: Abstract Competitive Equilibrium", <http://arielrubinstein.tau.ac.il/papers/Convexity.pdf>.
- Robbins, L. (1932), *An Essay on the Nature and Significance of Economic Science*, Macmillan.
- Rodrik, Dani (2011), *The Globalization Paradox: Democracy and the Future of the World Economy*, Norton.
- Rubinstein, Ariel (1980), "Ranking the participants in a tournament", *SIAM Journal of Applied Mathematics*, 17, 1163-1170.
- Ruys, P.H.M., J. Bruil and H. Dix (2007), "Modes of governance in the Dutch social housing sector", *Annals of Public and Cooperative Economics*, 78:3, 381-413.
- Sah, Raaj Kumar, and Joseph E. Stiglitz (1986), "The architecture of economic systems: hierarchies and polyarchies", *The American Economic Review*, 76, 716-727.
- Salamon, L., and H. Anheier (1992), "In search of the nonprofit sector", *Voluntas*, 3:2, 125-151.
- Salamon, L., and H. Anheier (1998), "Social origins of civil society: explaining the non-profit sector cross-nationally", *Voluntas*, 9:3, 213-248.

- Sauter, W. (2008). "Services of general economic interest and universal service in EU law", *European Law Review*, 33(2), 167-192.
- Sauter, W., & Lasance, A. (2008). "NZa houdt vinger aan de pols: aanmerkelijke marktmacht (AMM) in de zorg", *Z-E magazine*, 3(4), 22-27.
- Schwartz, Shalom (1994), "Beyond individualism-collectivism: new dimensions of values", in: Kagitcibasi e.a., eds., *Individualism and Collectivism: Theory, Method and Applications*, Sage, 85-119.
- Sen, Amartya K. (1985), *Commodities and Capabilities*, Oxford UP.
- Sen, A.K. (2004), *Rationality and Freedom*, Harvard: Belknap Press.
- Sen, Amartya K. (2009), *The Idea of Justice*, Penguin Books.
- Stevens, S.A. (2011), *De winst van de maatschappelijke onderneming*, rede, Tilburg University.
- Sugden, R. (1998) 'The Metric of Opportunity', *Economics and Philosophy*, 14, 307-337.
- Valentinov, V. (2006), "The logic of the non-profit sector: an organizational economics perspective", *Zeitschrift für öffentliche und gemeinwirtschaftliche Unternehmen*, 29:2, 214-226.
- Van Hees, M. (2004), 'Freedom of Choice and Diversity of Options: Some Difficulties', *Social Choice and Welfare*, 22: 253-266.
- Van Hees, M. (2010), "The specific value of freedom", DP, Groningen University.
- Welsh, D.J.A. (1995), "Matroids: fundamental concepts", in: *Handbook of Combinatorics*, Eds. R. Graham, M. Grottschel and L. Lovasz, Elsevier, 491-526.
- Wetenschappelijke Raad voor het Regeringsbeleid (2003), *Omgaan met overmaat. De vermogens van de woningcorporaties als sturingsopgave*.
- Wikimedia Foundation contributors, "Part-Whole Theory", "Mereology", "Ordinals", [http://wikimediafoundation.org/wiki/Part-whole\\_theory](http://wikimediafoundation.org/wiki/Part-whole_theory) (accessed June 25, 2014).
- Williamson, O.E. (1975), *Markets and Hierarchies*, The Free Press, New York, NY.
- Wimsatt, W. C., (1995), *The Analytic Geometry of Genetics: Part I: The structure, function, and early evolution of Punnett squares*,
- Young, Peyton (1998), *Individual Strategy and Social Structure: An Evolutionary Theory of Institutions*, Princeton University Press
- Zigurs I., and Khazanchi D (2008), "From Profiles to Patterns: A New View of Task-Technology Fit". *Information Systems Management* 25(1): 8-13, 2008.

This yearly series of working papers (WP) aims to publish essentially works in English or in French resulting from the scientific network of CIRIEC and more specifically its working groups. The WP are submitted to a review process and are published under the responsibility of the President of the International Scientific Council, the president of the scientific Commissions or the working groups coordinators and of the editor of the CIRIEC international scientific journal, the *Annals of Public and Cooperative Economics*.

These contributions may be published afterwards in a scientific journal or book.

The contents of the working papers do not involve CIRIEC's responsibility but solely the author(s)' one.

The submissions are to be sent to CIRIEC, Université de Liège au Sart Tilman, Bât B33 (bte 6), BE-4000 Liège, Belgique.

Cette collection annuelle de Working Papers (WP) est destinée à accueillir essentiellement des travaux en français ou en anglais issus du réseau scientifique du CIRIEC et en particulier de ses groupes de travail. Les WP font l'objet d'une procédure d'évaluation et sont publiés sous la responsabilité du président du Conseil scientifique international, des présidents des Commissions scientifiques ou des coordinateurs des groupes de travail et de la rédactrice de la revue scientifique internationale du CIRIEC, les *Annales de l'économie publique, sociale et coopérative*.

Ces contributions peuvent faire l'objet d'une publication scientifique ultérieure. Le contenu des WP n'engage en rien la responsabilité du CIRIEC mais uniquement celle du ou des auteurs.

Les soumissions sont à envoyer à l'adresse du CIRIEC, Université de Liège au Sart Tilman, Bât B33 (bte 6), BE-4000 Liège, Belgique.

## Publications

- 2014/01 Berliner Wasserbetriebe (BWB) – Water and sewage company in Berlin  
Christina SCHAEFER & Stephanie WARM
- 2014/02 Berliner Wasserbetriebe (BWB)  
Christina SCHAEFER & Stephanie WARM
- 2014/03 Publicization versus Privatization: Recent worldwide evidence  
Stefano CLÒ, Chiara F. DEL BO, Matteo FERRARIS, Carlo FIORIO, Massimo FLORIO & Daniela VANDONE
- 2014/04 Statistical methods for evaluating satisfaction with public services  
Giancarlo MANZI & Pier Alda FERRARI
- 2014/05 The French Post  
Philippe BANCE & Nathalie REY
- 2014/06 Relation entre l'opérateur de transport public à Bruxelles (STIB) et l'autorité organisatrice : entre asymétrie et coopération  
Christophe GOETHALS
- 2014/07 Reviving social economy in Romania – between emerging social enterprises in all sectors, surviving communist coops, and subsidiaries of globalization actors  
Cristina BARNA & Anca VAMEȘU
- 2014/08 Social exclusion and work integration: Social cooperatives for people with mental health problems in Greece  
Sofia ADAM
- 2014/09 Can the Uncertainty Caused by the Questioning of Tax Measures in Relation to Cooperatives by the ECJ Be Solved?  
Sofia ARANA LANDÍN
- 2014/10 Social Economy, Its Perception and Possibilities of Its Development in Conditions of the Slovak Republic  
Lenka PČOLINSKÁ
- 2014/11 Aid and Support for the Social Economy in Poland – The Case of Social Cooperatives  
Karolina MAJDZIŃSKA
- 2014/12 The Portuguese Law on Social Economy  
Deolinda APARÍCIO MEIRA
- 2014/13 Architecture of an Economy with Social Enterprises: A Relational Capacity Approach  
Pieter H.M. RUYS
- 2014/14 Vertu retrouvée ou survie imposée, les banques coopératives dans l'après Coop Bank  
Jean-Louis BANCEL & Olivier BONED
- 2014/15 La mesure de l'impact social : facteur de transformation du secteur social en Europe  
Nicole ALIX & Adrien BAUDET
- 2014/16 The Efficiency of the Portuguese Agricultural Credit Co-operatives Governance Model  
Paula CABO & João REBELO
- 2014/17 Local Public Transport in Vienna by *Wiener Linien* - Governance and Provision of Services  
Thomas KOSTAL, Verena MICHALITSCH & Gabriel OBERMANN

CIRIEC (International Centre of Research and Information on the Public, Social and Cooperative Economy) is a non governmental international scientific organization.

Its **objectives** are to undertake and promote the collection of information, scientific research, and the publication of works on economic sectors and activities oriented towards the service of the general and collective interest: action by the State and the local and regional public authorities in economic fields (economic policy, regulation); public utilities; public and mixed enterprises at the national, regional and municipal levels; the so-called "social economy" (not-for-profit economy, cooperatives, mutuals, and non-profit organizations); etc.

In these fields CIRIEC seeks to offer information and opportunities for mutual enrichment to practitioners and academics and for promoting international action. It develops activities of interest for both managers and researchers.

Le CIRIEC (Centre International de Recherches et d'Information sur l'Economie Publique, Sociale et Coopérative) est une organisation scientifique internationale non gouvernementale.

Ses **objectifs** sont d'assurer et de promouvoir la collecte d'informations, la recherche scientifique et la publication de travaux concernant les secteurs économiques et les activités orientés vers le service de l'intérêt général et collectif : l'action de l'Etat et des pouvoirs publics régionaux et locaux dans les domaines économiques (politique économique, régulation) ; les services publics ; les entreprises publiques et mixtes aux niveaux national, régional et local ; l'économie sociale : coopératives, mutuelles et associations sans but lucratif ; etc.

Le CIRIEC a pour but de mettre à la disposition des praticiens et des scientifiques des informations concernant ces différents domaines, de leur fournir des occasions d'enrichissement mutuel et de promouvoir une action et une réflexion internationales. Il développe des activités qui intéressent tant les gestionnaires que les chercheurs scientifiques.



International Centre of Research and Information on the Public, Social and Cooperative Economy - aisbl  
Centre international de Recherches et d'Information sur l'Economie Publique, Sociale et Coopérative - aisbl

Université de Liège au Sart-Tilman  
Bât. B33 - bte 6  
BE-4000 Liège (Belgium)

Tel. : +32 (0)4 366 27 46  
Fax : +32 (0)4 366 29 58  
E-mail : [ciriec@ulg.ac.be](mailto:ciriec@ulg.ac.be)  
<http://www.ciriec.ulg.ac.be>