

## **CO-INVESTIGATION OF SOCIAL CAPITAL**

**DAVE BECK, THE UNIVERSITY OF GLASGOW, SCOTLAND**  
**HELEN MARTIN, INVERCLYDE COMMUNITY APPRENTICESHIP PROJECT,**  
**SCOTLAND**

Presented at: **PASCAL International Conference**

*Making Knowledge Work: Building Sustainable Communities through  
Partnerships in Place Management, Social Capital and Lifelong  
Learning*

**University of Stirling Scotland, 25 – 28, October 2005**

The PASCAL Observatory is a consortium of RMIT University, Australia, the University of Stirling, Scotland, the State Government of Victoria, Australia, the Scottish Executive, Scotland and Kent County Council, UK.

<http://www.obs-pascal.com/>

---

## CO-INVESTIGATION OF SOCIAL CAPITAL

Dave Beck, The University of Glasgow, Scotland

Helen Martin, Inverclyde Community Apprenticeship Project, Scotland

This paper outlines a research project carried out in Inverclyde by an academic from the University of Glasgow and a Community Learning and Development practitioner and a group of students from the Community Apprenticeship Project. As part of the local response to develop community capacity, the project was established to give local activists and workers access to Higher Education in the form of the Certificate in Community Learning and Development, delivered by the University of Glasgow. The programme gives local activists and workers the opportunity to consider the wider picture of community regeneration both in terms of broader sweeps of social policy and the context of social theory. It also develops analytical skills with which to understand, challenge and shape the forces which shape their lives. As such it fits centrally into the Scottish Executive's policy thrusts of social inclusion, active citizenship and lifelong learning. The rationale for this type of approach has been previously discussed in greater depth (Beck, 2000).

In more recent work (Beck, Jordan and Purcell, 2003) the link between this approach and the development of Social Capital has been tentatively explored. In order to further investigate this link, a brief research project was undertaken. A group of trainee community workers from the Inverclyde Project, along with an academic from the University of Glasgow and an experienced Community Learning and Development practitioner worked together to explore themes around Social Capital using a variety of popular education techniques. The intention was to subvert the traditional power imbalance between researcher and the researched as subjects and objects and, within transformed social relationships, to produce new, authentic knowledge. Further, its intention is to blur the distinction between researcher and practitioner, the academy and the field, in an attempt to forge a new, more broad-based research community.

The paper therefore seeks to answer three questions. Firstly, what is the understanding of the concept of Social Capital amongst this group of front line workers, working within marginalized communities? Secondly, how do they experience Social Capital both personally and professionally and how is it affected by the various development initiatives they are involved in? And finally, does co-investigation using popular education techniques have a useful contribution to make to this field of research and what alternative models for research communities is suggested and can be developed in future work?

Conceptually the work picks up Bourdieu's interest in Social Capital as it relates to social inequality and Coleman's exploration of the interplay between Social Capital and educational attainment. The use of these two theoretical models will allow us to examine the development and effect of Social Capital at both the local and the structural level.

The outcomes and recommendations arising from this research indicate the possibilities and limitations of Social Capital as a way of understanding community based social action. It also suggests how community stocks of Social Capital can have an impact on power relationships both within and beyond the community and as such can be an engine for social change.

Before going on to discuss the work undertaken by the group, we discuss the context of the project in terms of the social background of the students, our understanding of Social Capital and the framework of popular education and collaborative research which shaped our methodology.

## Inverclyde

Inverclyde is an area primarily comprising three small towns on the banks of the river Clyde. Once a major shipbuilding area, Inverclyde has seen industrial decline and a declining population; figures from the Office for National Statistics indicate this trend will continue, with an 18% fall in population between 1996 and 2013. Currently the employment rate in Inverclyde is 64%. This is significantly lower than the Scotland average of 75%.

The Scottish Executive's response to areas such as Inverclyde has been the establishment of Social Inclusion Partnerships (SIP). SIPs are broadly based partnerships, which comprise the local authority and other public agencies such as local enterprise companies, local health boards and the voluntary and private sectors with the aim of regenerating the most disadvantaged neighbourhoods, so that people living there can take advantage of job opportunities and improve their quality of life.

## The Community Project

The Community Apprenticeship Project was established through the work of the SIP in January 2003. Its aims are to:

Enhance individual career prospects.

Strengthen the capacity of the local community and voluntary sector to deliver services to disadvantaged individuals and groups across Inverclyde.

Address issues of social and economic cohesion by supporting and encouraging local people to develop the skills required to become effective community practitioners.

Raise confidence and motivation in communities with the potential to increase the local economic activity.

The funding provided for the project is specifically targeted at unemployed people in Social Inclusion Partnership who are involved in community work on a voluntary basis, in particular individuals who could be deemed disadvantaged i.e. lone parents, those affected by disability or others whose circumstances are recognised as a barrier to training and employment.

## Social Capital

Current discussions about forms of capital can be traced back to Marx's theories of Capitalism. 'Capital... is not only a sum of material products; it is a sum of commodities, of exchange values, of social magnitudes.' (Marx, 1849). Thus we can see that Economic Capital is understood within the context of a particular set of historical and social relations. Throughout his writings, Marx highlights the inequality and essential antagonistic nature of the relationship between Capital and Labour. It follows that people with greater stocks of economic capital have greater power and therefore are able to exploit and oppress those who have less. Bourdieu later states that Economic Capital is at the root of all other forms (Bourdieu, 1997; p54). If what he says is true, we can therefore expect to see inequalities and exploitation taking place where other forms of capital are accrued. This is an analysis which is absent from some discussions of Social Capital where a purely benign concept is posited.

## Human Capital

The concept of Human Capital was developed in the 1960s to demonstrate the economic return to company, society and the individual on the investment of education and training inputs (Field 2003). Human Capital is discussed by Becker (2002) as an individual's 'stock' of knowledge, skills, health, values and habits. Becker suggests that that the greater a person's human capital

the greater their ability to generate economic capital. Much of the activity in Scotland which purports to be developing Social Capital is in fact dealing with human capital of individuals.

### Social Capital Theorists

We will now consider four theorists of Social Capital: Bourdieu, Coleman, Putnam and Woolcock. I suggest that each has an important contribution to make to a rounded understanding of what Social Capital is and how it functions in our society.

#### Bourdieu

The French sociologist, Pierre Bourdieu sought to understand the mechanisms whereby forms of social inequality were maintained. Based on his work with Algerian tribespeople, he developed the concept of Cultural Capital. He noted that people in that context used cultural symbols to indicate their place in the social order. He further observed that some types of cultural taste enjoy more status than others; for example, listening to Opera and going to the theatre indicates a higher social position than playing darts and going to Bingo.

An example of the link between Cultural Capital and Human and Economic Capital is seen within middle class families, where cultural investment strategies lead to their children optimizing their yield from the education system. A cultural investment strategy includes the types of books read, trips to museums and art galleries etc. these types of cultural activities are in accord with the culture of schooling and therefore give the child an advantage in that setting.

Bourdieu's definition of Social Capital is, 'the sum of resources, actual or virtual, that accrue to an individual or a group by virtue of possessing a durable network of more or less institutionalized relationships of mutual acquaintance and recognition' (Bourdieu and Wacquant, 1992; p119). He notes the Social Capital of the powerful and suggested that this functions to reproduce social inequality. An example he cites, is that membership of a private golf club both signals a particular social position and develops a network of contacts which can facilitate business deals, the development of economic capital and therefore power.

Bourdieu's idea of Social Capital links to the Gramscian concept of Hegemony which suggests that the political and moral leadership of a society is won by a ruling class through state apparatus and by cultural activity within civil society. The cultural forms of the ruling class are privileged within that society and transmitted or imposed through education, church and the mass media. The cultural forms of the dominated class are seen as inferior and deficient. The task of Social Capital development by the state is therefore to adjust working class cultural forms to be more in line with the ruling hegemony thereby reinforcing unequal power relationships.

#### Coleman

The American sociologist James Coleman emphasised on the role of the family and church groups in developing Social Capital. Coleman defines Social Capital in terms of what it achieves, 'Social Capital is productive, making possible the achievement of certain ends that in its absence would not be possible' (1988, p98). He theorised that Social Capital is the unintended outcome of individual action, where individuals are driven by self interest, as in Rational Choice Theory which is based on the assumption that individuals maximize their self-interest, i.e. it is rational and self-serving to create Social Capital that you can draw upon in the future (Brown, 2002).

Where Bourdieu conceptualised Social Capital as the endowment of the powerful, Coleman sees evidence of it at work within working class communities. His research analysed the results of children in Catholic schools and compared them to those in similar socio-economic situations. He found that the results were better and hence something other than economics was a contributing factor. Within the Catholic Schools he studied, the common values that were held and applied by families, teachers and priests, which valued work, respect for authority etc. meant that children

were more predisposed to apply themselves in school, there were lower truancy and drop out rates and therefore pupils achieved better results. For those reasons, individuals were able to achieve more within that social network than they would have been able to do if that network did not exist. Coleman saw that as evidence of Social Capital.

#### Putnam

Robert Putnam's book, *Bowling Alone* (Putnam, 2000) popularised the concept of Social Capital across many disciplines. His work is based on large surveys in USA including General Social Survey and National Election Records. He noted the link between high levels of Social Capital and good health, economic prosperity etc. For him, Social Capital refers to the features of social organizations such as trust norms and networks that can improve the efficiency of society by facilitating coordinated actions. He placed greater emphasis on the role of looser bonds.

Putnam (2000) identified two forms of Social Capital - Bonding and Bridging. Bonding Social Capital refers to the strong bonds which exist between homogenous groups such as church groups, some ethnic organisations and women's groups. Bridging Social Capital refers to the bonds between dissimilar groups. A community example of this could be community forums that bring together wide varieties of groups and agencies to collectivise community issues.

#### Woolcock

Woolcock (2001) building on Putnam's work, develops the idea of a third form, Linking Social Capital. This he understands as a vertical form which links different levels of the social world enabling, for example, marginalized communities with high levels of bonding and bridging Social Capital to lever in resources from more powerful or affluent sections of society. It is the different combinations of bonding, bridging and linking Social Capital that are responsible for the range of outcomes we observe (Woolcock, 2001).

#### Why Is It Important?

Within all of the discussions above about Social Capital there is a common theme: Social Capital makes a difference. Bourdieu suggests that it functions to keep the powerful in their positions of power, Coleman that it can enhance individuals' performance, Woolcock that Linking Social Capital enables marginalised communities to lever in resources and Putnam points to compelling empirical evidence that there is a correlation between high levels of Social Capital and many community benefits. If any or all of these are to be believed, educators whether community or institution based ought to have a clear understanding of how it works and how it can be developed or challenged.

#### Collaborative Research

Based on the values of popular education discussed below, we designed a research methodology which treated people as subjects not objects and attempted to fully utilize their potential as knowledge makers (Curry and Cunningham, 2000). We attempted to develop knowledge which was a product of the whole group – students, project worker and university worker – collectively examining our experience and understanding of Social Capital. This draws upon a model of Collaborative learning (Bruffee, 1993) in which it is assumed that knowledge is socially, rather than individually, constructed. Because of this, our results are expressed as a consensus group view.

The fact that the research was initiated by a joint interest of the project and university workers does not invalidate it as an example of a participatory approach since:

In practice the participatory research process of intervention is initiated by an external agent, such as a community development agency, an extension service of a university, or a church group. A researcher or a team of researchers working with this intervenor enters the community to stimulate the community's interest in participating in the research activity. (Park et al., 1993; p9)

The research process could be understood as an example of hermeneutical research in as much as the data analysis is not a separate process from data gathering (Lawrence, 1997). As a group we discussed our experience and understanding of Social Capital and then reflected on those experiences and understandings which in turn developed new knowledge. This is similar to what Gummesson (1991) calls the 'hermeneutic spiral', where each turn of the spiral builds on the understanding at the previous turn.

### Popular Education

Popular education offers us a framework and methodology to engage with marginalised people in our communities. The process which Freire (1972) refers to as problem posing education enables the learners own experiences and stories to become the focus for reflection and action (praxis). Fundamental to this process is the realisation by the teacher of the existing knowledge that already exists within the group. This enables a mutual exchange of knowledge by valuing the experiences of both the teacher and learner in a co- learning situation.

In this process, teams listen for the issues/topics that reveal strong emotions in the community, demonstrated through fear, anger, sadness, joy or sorrow. From this information 'generative themes' emerge, these are the problems/ issues about which people have a critical curiosity which leads to transformative action. The generative theme is re-presented to the community as 'codes' (Freire, 1972), which are concrete representations of the generative theme used to stimulate dialogue. These can take the form of pictures, songs, stories etc. The code does not offer a solution but presents the issue as a problem to be solved by the group, through a process of de-codification.

The format for the de-codification is

Description - what do you see

First analysis - why is it happening

Real Life - does this occur in your situation

Related problems - what problems does this lead to

Root causes - deeper analysis of root causes of the problem

Action planning - what can we do about it

(Hope and Timmel 1995,)

The research process described below adopted this method for gathering and exploring the issue of Social Capital. However, the area of action planning is less well developed. It is hoped to pick this up in further work with the learning group.

### The Research Process

The group of students were invited to a research day which would explore our understanding of Social Capital. This was a term that they were familiar with, both in terms of their work experience and from having studied it briefly on the certificate in Community Learning and Development.

We introduced codes in the form of statements made by the Scottish Executive about the nature and impact of Social Capital. We then had a structured dialogue where we posed the questions: what do you understand, how do you feel about it, how do you experience it both professionally

and personally, what do you add to it by what you do and is there a down side? The discussions were recorded on flipcharts in the form of mind maps which enabled us as a group to see and develop emerging themes. After a short break we presented an input on Bourdieu's understanding of Social Capital and again had a structured dialogue on two linked questions; does this challenge your understanding and your practice.

## Results

### Understanding

Essentially they recognised Social Capital as a bottom up process, where groups of people act together. If genuine it should respond to the community's agenda but there is also a role for the local authority to build community capacity to take an active part in democratic processes. They felt that the greater levels of Social Capital within communities should result in clearer and more effective challenging of those who had power.

They believed that in order to develop Social Capital, people had to develop their knowledge. This should not, however be only seen in terms of qualifications, linked to vocational progression but should also develop a belief that change is possible within the community and beyond.

They recognised that there was a link between Social Capital and human capital and felt that this could impact on levels of economic capital both at an individual and community level.

### Feelings

Dialogue about their feelings in relation to Social Capital, as implemented through the local authority and other agencies, revealed a much more complex picture.

There was a great deal of suspicion that, what purported to be community capacity building or Social Capital development was at best tokenistic and at worst, a continuation of oppressive structures and processes which were being re-branded to appear more palatable. It was similarly felt that the main driving forces were available funding streams and the government policies which were behind them rather than the expressed needs of the community.

They were concerned that much of the language used by regeneration practitioners was exclusionary. This coupled with excessively bureaucratic structures meant that only "the same old faces" could participate in local democratic structures – giving the illusion of a locally controlled process but denying access to the majority.

Fuelled by anger at all of the above there was a desire in the group to reclaim and re-express Social Capital in a way which could act as a catalyst for transformative social action.

### Experience

Personally people within the group recognised that they had significant reserves of Social Capital in the form of family relationships, their learning colleagues at university, church membership, sporting organisations, involvement with other parents through childcare activities and the local pub. These various networks provided a sense of belonging, personal support and the release of pressure, sharing of skills, a vehicle for working through difficult questions and choices. Conversely they were also a source of questions and conflict.

Professionally, group members were part of formal networks such as the health network and the early years network. They were also part of informal networks where people with similar professional values would work on issues of common concern. These networks provided a place to share new ideas, share resources and challenge agencies, policies and local practices. These benefits were hindered by a culture of competition created by an over-emphasis on outcomes and chasing new funding.

### What They Add To Social Capital

They felt that their personal experience of living in the community was valuable in helping agencies deliver services and engage with the community in appropriate ways. Using a problem posing methodology (Freire, 1972) they were able to challenge practices which were discriminatory or excluding of local people. They offered a variety of personal supports to local people and other workers ranging from encouragement and enthusiasm to formal mentoring. Organisationally, they helped new groups to form and developed communication systems, processes for sharing resources and piloting new ways of working. Finally, they were involved in a wide range of training and informal skill-sharing activities both on the individual and collective levels.

### The Down Side

The group were clear that Social Capital is not a cure-all. Groups rich in Social Capital tended to get the available resources and funding. This had the unintended outcome of further disadvantaging the most excluded members of the community. A strong sense of belonging sometimes leads to increased inter-community tensions; territorialism would be an example of this. In terms of the Scottish Executive's response to Social Capital development, the group observed that often existing networks were overlooked. This resulted in new structures being imposed on the community which were often detrimental to levels of participation on community activities and informal democratic processes.

### Reflections on Bourdieu

The group acknowledged that much of the work around social inclusion and Social Capital development is based on middle class values and does not therefore reflect the aspirations of the local community. The changes which are produced is not 'real change'. It makes a local and superficial change but does not impact on hierarchical power structures. This lack of real change explained for the group why people are reluctant to get involved and are branded as being apathetic.

There is resistance from within the community to people moving on, since that violated some of the cultural norms within the community.

Workers get incorporated. As they develop new lifestyles, language and values they lose contact with grassroots concerns and serve to replicate social inequality.

Their response to this was the desire to establish groups which could support people to analyse what was happening in their community and beyond and generate collective social action which would change the power balance within communities. It was observed that many ordinary people had high levels of Social Capital through friendships, family and workplaces but that this does not give them access to resources, funding or influence over policy makers. The role of community learning and development could be to provide that critical analysis and the organisational skills to harness those stocks of Social Capital in order to effect change.

### Reflection

Although the group could see that Social Capital was a potentially useful way of understanding the community and developing their potential for action, there are many deficiencies in the models espoused by both central government and local authorities in Scotland.

The overly optimistic model of Social Capital which is posited by the Scottish Executive fails to recognise the possibility for conflict which is produced by its development. High levels of bonding Social Capital can result in oppression of members within those groups. This was exemplified by one group member who had a strong church connection, who felt that her individuality and scope

for questioning was restricted by other church members. Tension between highly bonded groups can be seen for example in instances of territorialism which is experienced within communities. Finally, groups with lower levels of Social Capital become even more marginalised as more developed groups secure greater access to resources and opportunities.

It was appreciated that there is a role for the local authority in developing Social Capital however it is one that is fraught with difficulties. Top down initiative to develop Social Capital are seen as tokenistic, counterproductive or the development of individual skills and knowledge which is human capital and not Social Capital at all. Exclusive language and practices further marginalise disempowered groups and create elite volunteers within communities whilst not changing existing power structures. However, bottom up approaches which enable communities to think and act collectively can be successful, but current power holders must be willing to give away some power and be prepared to change structures to let the community in.

Perhaps the greatest omission within current models is the lack of critical analysis. Action, not linked to an understanding of structural inequalities, will result in a recycling of poverty, since root issues are neither considered nor tackled. The potential role for Community Learning and Development workers in response to this gap would be in line with Gramsci's idea of the organic intellectual. "The mode of being of the new intellectual can no longer consist in eloquence ... but in active participation in practical life, as constructor, organiser, permanent persuader and not just a simple orator..." (Gramsci, 1971; p10). It must be appreciated that the potential for role conflict here is very high since this is counter-hegemonic activity; pressure from employers, funders and even colleagues to toe the line will inevitably come. Again, Gramsci's idea of the War of Position is useful here. Workers and community organisations alike build alliances which in turn contribute towards a new hegemony based on different world view and values. Perhaps this is where the notion of Social Capital is both useful and radical. Developing norms of reciprocity trust and networks with a view to overturning unjust social conditions, is a project worth engaging in. Without this wider aspiration, Social Capital becomes merely rearranging the seats on the Titanic in close cosy circles.

#### Evaluation of the Research Process

Whilst we as researchers believe that this is a useful and valid way of conducting social research, we would like to end this paper by sharing the participants' experience of the research process. We held a follow-up half-day event where we posed the following series of questions:

What did you get out of the event?

The group found it to be an enjoyable event where they felt comfortable and able to explore new ideas without feeling that they would be criticised or thought stupid. They felt that they were able to participate in and shape the process, rather than just being passive.

The discussion helped them to realise that they already knew about Social Capital – gave words to their experience. It gave them an opportunity to link the theory to their personal and professional practice and to link Community Development Theory to ideas about Social Capital. Through the process, they felt as if they had developed new understandings as individuals and developed a shared understanding as a group.

What did you learn?

They learned that they had already been operating in ways that developed Social Capital but now they had a language to describe it. They also recognised that Social Capital is something they are involved with, and benefited from, in both their personal and professional lives. Further, the creation or destruction of Social Capital is something everyone was involved in.

They have come to understand that if their definition of Social Capital did not include the idea of change and bridging gaps between the powerful and the powerless, that much of their efforts could result in reinforcing the status quo, even if Social Capital, by some definitions, has been developed.

If you were exploring the idea of Social Capital in your community, what would you do differently?

In general, they felt that the principles of the process would be appropriate with community groups. Particularly, they would ensure that people were involved as subjects, not just objects of scrutiny. They would start the process using concrete experiences drawn from people's everyday life to explore the concepts of Social Capital and then introduce new language and terminology. They felt that an important dimension, from the perspective of community development workers, was that study and research should link to personal change and collective action; having understood the world, they would work to change it.

Do you think this is a good way to research a new topic?

Yes. There was time to make people feel safe as relationships were developed. In this context, people were able to explore and investigate new ideas freely. They were also able to help develop one another's understanding through dialogue. However, they felt that this still left scope for differences of view and opinion to be developed and valued.

Is there anything else you would like to tell us?

They felt that this research process would be particularly successful in well-established social groups.

They felt that it revitalised the group by giving them fresh energy and vision for the work they were involved in.

## References

Beck, D. (2000) The linking of work and education to enable social inclusion Paper presented at SCUTREA (Standing Conference on University Teaching and Research in the Education of Adults), University of Nottingham

Beck, D., Jordan, L, Purcell, R. (2003) More Ways of Seeing the World Than I Had Ever Imagined: Govan Community Development Training 1996-2003, Glasgow, The University of Glasgow, Glasgow

Bourdieu, P. (1985) 'The Forms of Capital', Chapter 9 in Richardson JG (Ed.) Handbook of Theory and Research for the Sociology of Education. Connecticut, Greenwood Press

Bourdieu, P. and Waquant, L. (1992) An Invitation to Reflexive Sociology, Chicago, University of Chicago Press

Brown, T. F. (2002) Theoretical Perspectives on Social Capital <http://hal.lamar.edu/~BROWNTF/SOCCAP.HTML>, Accessed 22.3.05

Bruffee, K.A. (1993) Collaborative learning, higher education, interdependence and the authority of knowledge. Baltimore, The Johns Hopkins University Press

Coleman, J. (1988) 'Social Capital in the Creation of Human Capital', American Journal of Sociology 95,S95-S120

Curry, R.M., Cunningham, P. (2000) 'Co-learning in the Community' *New Directions for Adult and Continuing Education*, Issue 87, pp73- 82

Field, J. (2003) *Social Capital*, London, Routledge

Freire, P. (1972) *Pedagogy Of The Oppressed* Sheed and Ward, London

Gramsci, A. (1971) *Selections from the Prison Notebooks*, London, Lawrence and Wishart

Gummesson, E. (1991) *Qualitative methods in management research*, Newbury Park, Sage

Hope, A. and Timmel, S. (1995) *Training for Transformation: Handbook for Community Workers*, London, ITDG Publishers

James, K. (2003) 'Self-esteem as a barrier to learning: literature review and report', *Journal of Access and Credit Studies*, vol 4(2), pp122-36

Lawrence. R. (1997) *The interconnecting web: Adult learning cohorts as sites for collaborative learning, feminist pedagogy and experiential ways of knowing*, 1997 AERC (American Educational Research Conference) Proceedings

Narayan (1997) *Voices of the Poor: Poverty and Social Capital in Tanzania*, World Bank, Washington D.C., USA

Park, P., Brydon-Miller, M., Hall, B. and Jackson, T. (eds) (1993) *Voices of change: participatory research in the United States and Canada*, Toronto, Ontario Institute for Studies in Education

Putnam, Leonardi and Nanetti (1993) *Making Democracy Work: Civic Traditions in Modern Italy*, Princeton University Press, Princeton, USA

Putnam, R. (2000) *Bowling Alone – The Collapse and Revival of American Community*, Simon and Schuster, New York

Simian, R.(1982) *Gramsci's Political Thought: An Introduction*, Lawrence and Wishart, London

Woolcock, M. (2001) 'The Place of Social Capital in Understanding Social and Economic Outcomes', *Isuma: Canadian Journal of Policy Research* 2,1, pp1-17

---

Copyright © 2005 Dave Beck and Helen Martin - All rights reserved.

All rights reserved under Australian Copyright Law. Apart from any use permitted under the Copyright Act 1968, no part may be reproduced, stored in a retrieval system or transmitted by any means or process whatsoever without the prior written permission of the authors.

