INFORMATION TECHNOLOGY: IS THERE A SPIRIT IN THE MACHINE?

By DAVID ELEY

JOHN GRIERSON'S 1936 FILM *Night mail* documents the efficiency and hard work of a mobile post office, which was part of British Rail's overnight use of the main lines to separate and sort the mail while travelling at high speed to northern destinations. It was a celebration of the Post Office workers and of technology but seeing it today everyone is ready to admit that there have been enormous changes since the days of the fast steam engine, the telegraph and pigeon holes for hand sorting.

In this essay I would like to consider the phenomenon of contemporary information and communication technology, explore some of our Christian attitudes to it, and then develop a proposal towards a spirituality of electronic culture based on some of the dominant themes of the Christian tradition generated from other confrontations with changing information cultures in the past. But the future is the principal concern and the development of a Christian spirituality for a *milieu divin* yet to come.

I have chosen two examples of communication technology which are experimental and not in general commercial use to highlight their newness and to give us an opportunity to observe our own instinctive attitudes.

1. Apple's Knowledge Navigator and Hypertext.[1]

Apple's researchers are convinced that knowledge does not reside privately in individuals' minds, or in text books, or journals, or libraries, or laboratories or databases. Knowledge resides in a complex web that encompasses all of these. Hypermedia is the delivery of information in forms that correspond to the charted patterns of human learning. Content and organization become complementary tools that act on each other. The technology is centred on a video-disc system. The screen displays a hypertext

document which outlines different topics which can be entered through 'windows'. Each term opens to a further document or lecture from a vast electronic library. The colour icon, the touch screen of multiple images, is arranged to help answer the questions 'what, how and why' by providing vast amounts of information. It can then be used for simulation to answer the 'what if' questions. For example, if the motion of a bouncing ball were known, we could ask how would a bouncing ball behave on the planet Neptune. To these technologies is added 3-D high intensity motion graphics. But it is not the display output which is most impressive, it is the machine's ability to cooperate with human intelligence.

2. M.I.T.'s The Media Lab.[2]

The goal of Media Lab is for the audience to take control, to make mass media an individualized media. 'Nicholas Negroponte, director of the Media Lab, has a vision of the future that includes personalized computers, televisions, even books that know the user so intimately that the dialogue between machine and human brings about ideas unrealizable by either partner alone—machines so perceptive they can respond to the user's voice, gesture and subtle movement of an eye.' There are fifteen separate projects being developed but here are a few examples: 'A violinist strokes once more into a difficult piece, trying it with a slower tempo. The piano accompanist adapts perfectly, even when the violinist changes tempo in the middle of the piece.' The uncomplaining accompanist is an exceptional musical computer.

The lab is developing a telephone which recognizes the voice patterns of individuals and then can 'converse' with them. A machine is also being designed to read lips and eyes to 'interpret' states of mind.

Both these experimental efforts try to break through monopoly and control that massive one-way information providers, like television networks and news agencies, exert over their large publics. The concentration of power that is represented by the contemporary press, broadcast services and the entertainment industry is about to be broken down because in the hands of totalitarian governments it is oppressive and in the hands of rapacious capitalists it is suffocating.

But as we struggle to find some objectivity for ourselves in the public realm, to establish some patterns of agreeable diversion in the entertainment sector and seek to find cultural nourishment among artistic activities, we must begin to question how our

theological understanding of the world is dependent on these same messages and values. Our spiritual understandings and practices are growing out of the same soil.

At root, I suppose we would admit that our relationship with God is changing too since it has always been conditioned by our history and culture. Being a member of a Christian community does not shield us in any way from the determined drives of our culture to develop new informational technologies. They are introduced and then refined with or without us. Our choice at times seems to be a take-it-or-leave-it, remain actively involved in the development of our culture or try to ignore it and continue with our traditional spiritual practices. Or even worse, we try to live like a Luddite in an imagined other century. Few or no technological innovations were introduced with a specific religious intent; so we are usually integrating them into our use, feeling a bit defensive religiously.

Ontology of the information machine

Informational technology is in a different category of machine from other industrial technology such as weaving machines or a train because communication technology can be interacted with. Communication technology organizes and presents human messages in images and sound, and these messages imply values and social actions. This technology is not just another object in the world, like a living tree, it is the product of human work and design, and embodies some of the understanding and sense of purpose of the makers. These machines are doubly expressive of human culture in that regard.

Their ontological form is revealed in that they invite specific human communicative interaction. Their being is a being towards: towards further understanding, further appreciation, further complexity and linkage with other persons and other parts of the world. They are something like a work of art, a painting, or a theatrical piece. Their being is to embody some human expression, an expression that is offered to the viewer.

All our expressions are technically mediated and require a specific embodiment. They are the products of creativity and ingenuity and they are constitutive of the shared meaning and value of our world. Also they are necessarily instrumental in our developing consciousness as are spoken and written language.

So, there is the question almost posed. Is it that our sophisticated, electronic culture of communicative machines is a godless culture? Is it even a way of denying God's sway and dominion, access to our hearts, as in most post-Enlightenment thinking? Learning is enhanced, yes, business and commerce, certainly, and overlooking for a moment the one-way flow of most mass communication, informing the nation for political and social purpose is improved, but is our fundamental relationship with God eclipsed, made antiquated and by negative implication, irrelevant? Are God and the Church at best reduced to become content for the media and is all of this technological development at war with the spirit?

Changing cultures and spiritual adaptation

This confrontation with new technology is not a unique experience for the twentieth century. Every epoch had some new invention which demanded some reorganization of the existing social and cultural order. But perhaps the rapidity of change and the formidable expansion in technical scope are distinctive of our generation. Electronic communications are contributing to the creation of a new cultural era. It may be profitable for us to identify the sometimes enormous changes in culture that have occurred throughout Christian history.

Walter J. Ong in *Orality and literacy,*[3] has identified four cultural stages which have marked western cultural development since the Greeks. They are: oral culture, chirographic culture, print culture and a culture of second orality. Although these developments are successive and took hundreds of years to have a transforming effect on society, the dominant technologies are carried forward from one period to the next and overlap each other into the present age.

In an interesting but not quite parallel way, each person as he/she develops from child to adult goes through the same cultural stages, from babbling childhood, through the organization of spoken language to literate writing through to the brave new worlds of electronic second orality. Ong delineates the psychodynamics of each of the ages: orality—additive rather than subordinate, aggregative rather than analytic, redundant etc.; writing—alphabets, literacy, written records etc.; print—space and silence, indexes, critical comparisons etc. The contemporary electronic age is characterized by the concentration of economic and interpretive power, an almost religious presence which redefines the successful values of the world, musters immense authority, emphasizes immediacy

rather than reflection. Although these stages are conditioned by different technologies, they more importantly suggest very different organizations of thought and value. It is not surprising that we are wary of the brave new globe; we know that the preoccupations and dominant values of our present culture are being transformed and replaced.

Our Christian culture was founded and developed in a very different era from our own. The principal technologies of that era allowed certain communicative events to take place and these shaped the communities which were formed around these activities. We can look back on the oral character of the society at the time of Jesus to understand the birth of the new Christian communities. From Jesus's hand we have no written records, although he could read and write (Lk 4,16). His communicative power was the spoken word, reinforced by the actions of his life. His communities were bounded by the range of his voice and by the distance he could travel on foot or by boat.

His followers, the evangelists, did write letters and manuscripts and travel by sea around the Mediterranean world. Contact between the small communities was developed and maintained through visits and writing. The roads and delivery systems had been provided through the ingenuity of the Roman Empire. Early Christianity was dependent on the available technology that was developed for purposes different from its own. In the case of the apostles one gets the impression that their passion and enthusiasm for proclaiming Jesus as the Christ was coupled with their excitement for the much larger Mediterranean world with its multicultural and multi-linguistic character.

When we reflect on the agricultural societies after 1100, feudal administrative structure, Gothic architectural style, the Latin language, manuscript scholastic scholarship, provided many forms of interconnectedness among divers regions. The feudal political organization harnessed the agricultural and trade potentials while the Church developed large cooperative monasteries, creating surplus crops, wealth and an extensive Christendom. Such were the libraries and cataloguing practices that new organization could be introduced into the Church. The pope became more centralized and the clergy, under a renewed canon law, were more subject to their bishops.

Later the printing era was coincident with reform and the national fracturing of the Christian civilization.[4] Private reading

(of the bible and other foundation documents) in one's own home became possible for the much larger number of Christians who could read. Canonical authority was now not everything. Images too played a combative role in the heated conflicts. During the Counter-Reformation seminaries were organized and doctrine, now disseminated though printed books and catechisms, became the unifying defence for the Roman Church.

Today, because of the fixed quality of a printed text, it is not difficult to appreciate the ecclesiastical weight of a doctrine or the sway of an encyclical letter. We are less able to ascertain the importance of a televised papal visit. It is more ephemeral.

In our century, at the beginning of the global electronic and satellite age, the Church has been appropriately preoccupied with her place in the modern world, her essential ministries and new forms of integration with a scientific and pluralistic culture. The Church is also challenged by a new internationalism opened up by commerce, travel, military advantage and communicative developments.

What we have been as a community is now seriously put into question. Even the central core of what we believe has been challenged for several centuries under first a rationalist and now a scientific banner. Now the machines that have been produced in this scientific culture are producing radical changes of mentality and values in many people, as did the manuscript and the printing press before them.

There has always been a critical and suspicious current in Christianity. Jesus's Kingdom is not simply 'of this world' or to help us to adjust to this world. His preaching was critical of religious and social hypocrisy. Some of his followers, perhaps with the expectation of a very proximate end-time, were rejected by 'the world' and found it opposed to the light (Jn 15,18). If one were to dwell on the Roman persecutions of the Jewish and early Christian communities, one could appreciate this critical stance. The desert hermits, too, St Augustine and the early Fathers, St Benedict and St Scholastica and the early monks and nuns all shared a strong rejection of the 'city of man' in favour of their creation of alternative communities of the Church. The theme recurs in different generations with organized renunciations of the values of the particular culture.

In our own age the prophetic and critical power of the gospel values can unmask structures of injustice and of dehumanizing

economic and personal conditions. We are suspicious of the mainstream society particularly where active Christians are in the minority. Well we might be. A century that has produced the technology of two world wars, a holocaust, scores of other horrible conflicts, including Vietnam, Lebanon and Northern Ireland, the development and use of the atomic bomb, is not a century to be embraced warmly and uncritically. How can we face our Christ and his message of good news if we open our hearts to all of this? We are rightly suspicious of the dominant culture, its products and its electronics.

We are, however, at the deeper cultural level, part of this world. The Church's alternative values do not create a separate and alternative society. We flirt with rank materialism because we know that the gadgets and products, although not necessary for life, do make life more efficient and comfortable and allow us to live a fuller and more personally involved life.

Spiritually we know, by celebrating our life with God or by reflecting on the terminal nature of our existence and on the value of the human person throughout her/his life, that the Kingdom is not of this world. When there is too close an identification with the present and its achievements as an embodiment of the Kingdom—in Poland, Nicaragua or by a television evangelist, for example—we withdraw our assent. Some triumphs and advancements do echo or symbolize the coming of the Kingdom, but the Kingdom of God will not be fully embodied here; it is not of this world.

Our Christian distrust is supported by an intellectual distrust that reaches back well into the history of electronic machines. After 1848 and the catastrophic collapse of Romanticism, in a great mood of despondency there was a turning towards a realism. Realism rejected the idealistic dreams for a better world within ethnic nationalism and committed itself to stay close to the materially possible and do-able. The 'saving' force was now to be a reduction to the objective and search for certainties.

It is not really conclusive that we have a better and more humane society today than our ancestors had before the sophisticated technology. The machines have not proved definitely that they provide a better life despite our best efforts. Often the communication technology, lasers, micro-chips, and satellites are developed for military use, and only secondarily employed for medical, educational or general use. Most often these advancements are developed and owned by big businesses, and are available to the

more wealthy, which increases the gap between the classes and the income groups. Certainly the differences in cultural technology between the First World which produces all the electronic hardware, with the cooperation of a few outposts like Korea and Singapore, and the Third World are enormous. When we talk about new technologies and cultural realignments we are talking about the First World. In fact, many of the new technologies are used to exploit the developing countries. Again there are serious reasons here for distrust and suspicion.

Add to all of the above considerations, the increasing quantity of cultural trash that is being produced and distributed to keep these new electronic networks active. Evidence abounds to support arguments of the trivialization of values and meaning. Nor should we overlook the exploitative violence and dehumanizing pornography in which we can find no redeeming value. Charles Dickens and Victor Hugo experienced gloom in the mid-nineteenth century. We can experience a more complex gloom at the end of the twentieth.

Further, the Church herself has carried other suspicions in the realm of spirituality which do not prepare her for this cultural experience. Concerns of the spirit have been detached from concerns for the body. We have become very head-orientated and uncomfortable with the body and sexuality. A lot of spiritualities seem to be about a total disembodiment.[5] I suspect we cannot have a healthy spirituality which is not rooted in the body and open to embodiment in cultural structures. Spirituality has been uncomfortable with the machine[6] partially because we are uncomfortable with the more obvious forms of embodiment and so the extensions of human knowledge and feeling into these social technologies are not instinctively included in the topology of the spiritually important.

Towards a spirituality of electronic culture

The Churches' memory goes back a long way and their customs have been developed over many centuries. The central paradigm of Church life is the Eucharist, and congregations have been celebrating with bread, wine and a candle for millennia. Have we assumed that the Church has no need of the new technologies since it could be fully a Church long before their advent? Or how necessary are today's forms of embodiment?

Perhaps a 'discernment of spirits' on the new technologies and the electronic culture is appropriate, to examine our collective

experience, probe our instinctive attitudes, positive and negative, in the hope that this will lead us to some spiritual position about the place of the new technologies in future Christian culture.[7] This is not easy to do.

This conflict of world views is a good example of the Church in the modern world. How do we discern the appropriate place of a technology in our Christian life individually or collectively? I do not think this is a case of the new technology being judged by spirituality. Technological culture is somewhat autonomous as a human endeavour and will be justified on its own terms. The traditions of spirituality are themselves under great critique in our age for their applicability to the laity, for their full openness to spiritual realities and for their authoritarianism.

With those limitations in mind let us consider some spiritual traditions to see if we have some resources to guide us in this discernment. Obviously reflections from the biblical era or from the Counter-Reformation, for example, will not address the specifics of our task but they will provide an orientation.

At root, we are looking for the presence of the Holy Spirit at work in today's culture. By implication we are desiring an openness to a new understanding, a fresh revelation, to get beyond ourselves. I propose three views followed by an example.

1. Many of the creation narratives, the seven days (Gen 1), the rib of Adam (Gen 2,4), focus on the cosmos and the world of living things. The stories build up to the presentation of the woman and man. But the work of co-creation with the Spirit of God, with Wisdom and intelligence, is not celebrated so succinctly. One must read beyond the mythological explanations on into the Laws and the History books to discover the unfolding cultural innovation, both technological and social. Surely the successive stages of human unfolding do demonstrate the cooperative role we play in the building up of our world as the cultural context of God's people.

Also the attempts to build a Christian community by the followers of Christ has usually been considered one of the fonts of revelation, the on-going tradition, along with the scripture. Ought not these activities along with a host of technological and artistic achievements be considered a human sharing in God's creative act, the on-going creation, one of the human acts in cooperation with the Spirit which involves us in what is most divine, creativity and ingenuity?

Along with our renewed interest in the environment after centuries of exploitation, and no doubt because of it, creation theology,

with its attending controversies, also can lead us to our role in and responsibility for cultural co-creation with God's Spirit.

2. There has been a renewed understanding of the themes of peace and justice in the mission of the Church. It has its biblical roots in the Exodus experience, and in the death and resurrection of Christ. Many of the controversies of liberation theology have arisen because of the particularity of culture. Specifically, war, economic and political oppression and cruel poverty have demanded a very different contextual emphasis in the method and content of theology. But it seems clear that the theme of liberation has not been exhausted by the distressing condition of the Third World. People in the First World, some of whom also are poor, experience the need for a liberation. But this liberation is probably more from cultural oppression than from economic or political. Does the gospel of Christ promise and encourage liberation too?

3. The Church is a community with a message which is formed and sustained in ongoing communication. What finally is communicated is the person of Christ, the body of Christ. 'The Church must not only practice what it communicates, it must also communicate what it practises.'[8] The Church's mission has always been to effectively communicate the risen Lord to the people in the present and in the language of the contemporary culture, be it with the sacrament of the Eucharist, or from the pulpit, or in a newspaper, or on radio etc. The Church should not be naive about the social, political, economic and cultural preconditions of human societies. The Spirit urges us to explore every realm of the imagination, the mind and the society in which we live, expend our energies and find meaning and value. Some of this has been expressed by Paul VI in 1976:

> But evangelization would not be complete if it did not take into account the unceasing interplay of the Gospel and our concrete life, both personal and social. This is why evangelization involves the explicit message adapted to the different situations constantly being realized about the rights and duties of every human being, about family life, without which personal development and growth is hardly possible, and about life in society, international life, peace, justice and development, a message especially energetic today about liberation.[9]

Now the example. Four Canadian Jesuits[10] were sufficiently motivated by these three principles that they designed a nine-day

retreat that would explore in a prayerful and guided way the culture of the mass media through the four weeks of the Exercises of St Ignatius.

> The Spirit of God is at work in the world, expressing Himself in contemporary culture in its many forms, including what is unique to our times, the mass media. Christians, contemplatives in action, live in this milieu. They experience it, are shaped by it, work and pray in it. The goal of the retreat is to help us understand this phenomenon and the forces that shape and control it, to further our ability to discern and choose, helping us to achieve a conscious and responsible freedom in relating to it, and by our lives communicating the Spirit of God to the people of God in terms relevant to the contemporary culture.

They invited retreatants to centre upon their relation with Christ. But would it be with the Christ who is in culture or the Christ who is against our culture? Or, to follow H. Richard Niebuhr's categories, a Christ who is beyond or apart from daily culture, or one again who is transforming and redefining it? By exposing ourselves to sacred texts, films, videos, music, stories, images, by dwelling in quiet reflection (*contemplatio, lectio divina*) upon these experiences, by sharing our experience with others, and celebrating them in daily liturgies (*oratio*) a new meaning for the words, 'the following of Christ' was generated.

It is a wondrous journey to consider the divine, extraordinary and expansive sources of energy, radiating love, person, the world itself and then turn to the broken world and its dehumanizing culture, its sin, its refusals and our part in it or complicity with it. Through the images which intrigue us, refer to the events of our times and awaken our inner imaginings and desires, we set out to explore our Christian vocations, freely chosen, as communicating members of the Church. The First Week of the Exercises of St Ignatius is the crucible in which to consider the cultural sin of the world, its orientation and dynamics. We prayed to know our deviations from the imperative to communicate with God and with others the goodness and meaning which has been poured into our lives. It is not only the Church that has failed our culture but by our own refusal to be active co-creators with God's Spirit we have failed ourselves in what we desire to be, known and loved by God and by our fellows, involved in creative relationships.

Thus we set out to re-experience the Ignatian Exercises, from the recognition of the dark (structures of cultural sin) to the gift of the Spirit (living with hope in a broken world). We acclaimed these 'mysteries' in the messages and new technologies of our late twentieth-century culture.

This experiment with the Spiritual Exercises and media culture is just one approach to the larger dialectic of the new technologies and Christian spirituality.

I would like to enunciate a set of lesser 'foundations' that emerged from our contemporary spiritual reflection. They do not replace a more involved cultural commitment, which is a prerequisite, nor do they prescribe in advance a Christian attitude. But they echo some of our deep Christian instincts and may enlighten our eyes to see the spirit in the machines.

1. All revelation, both scriptural and traditional, has used instruments. These instruments, be they the spoken word, the poetic text, organizational and sacramental structures, are embedded in the symbols and values of specific cultures.

2. The Trinitarian notion is a dynamic and relational one. It implies a communicative activity internally and externally. Our deepest good is to share in God's life since we have been created in the image and likeness of God. We are embodied, relational and communicative. To be able to communicate with God and with God made flesh, Christ's body, will lead us to happiness.

3. We are the responsible extension of God's delegated will through our creaturehood. Part of our religious response to God's self-communicating is to struggle from the core of our beings to be creative with our communication as a moral response to the evils and opportunities of our culture.

4. The theological and philosophical notions of relationship and communication are ancient and defensible. What remains problematic is their extension in a technological and electronic culture. But the central anthropological importance of communication leads us to explore the creative possibilities within specific cultures. The meanings and values are embodied in the networks. Incarnation means a commitment to specific cultural conditions.

5. Social and cultural analyses of media activities are an important precondition to developing a healthy spirituality of the new technologies. All the critical tools—of sociology, psychology, aesthetics, systems theory—need to be employed. Communal activity is important for a more structural understanding of networks, uses

and regulators so that we can get beyond our alienation from the new culture and the experiences of confusion, bewilderment and helplessness.

6. It is important to identify collectively cultural sin, as an environment of meaning and value beyond our personal experience. We need a community to transcend the isolation and individualism which some communication technology imposes. And we need a social theology and and communal spirituality to meet the fragmented cultural realities.

7. It is a deep religious desire to be an instrument of communication of Christ and his gospel.

8. Our response to the new technologies invites a threefold action; critique, embrace and a creative use.

(a) We need to be sufficiently 'literate' to discriminate critically between what is dehumanizing, morally corrupt and aesthetically and ideologically bankrupt and what leads to learning, wise living and appreciation of the beautiful. 'You have asked for yourself understanding to discern what is right' (1 Kg 3,11).

(b) At the same time we must be capable of celebrating and embracing even the partial steps that are taken towards the human and genuinely hopeful. Not every parable in the gospel expresses the full mystery; so may we be ready to affirm the comedy, the farce, the narrative, even the interactive learning database all as opportunities for the healthy development of the human community and person.

(c) Further, are we not called to use the new technologies ourselves for cultural expression, for education, for participation in the public forms of discourse and artistry, and for those inspired to public ministry to use the new technologies to enliven the Church? Our focus here can not just be on the machines but on communities and social uses principally.

Conclusions

The spirit of these 'foundations' is a far cry from a timid refusal to enter at all into the world of the new technologies or a nostalgic clinging to other times, such as the nineteenth century, in the mistaken belief that they are more authentically Christian than our own. This spirit embraces the traces of God in our present culture, wherever he can be found, in the conviction that the goodness of God's presence can be discerned in his universe, even in our present age with all its fragmenting woes and hurtful injustices.

Further there is implied here a tentative confidence that Christ and his Spirit are well ahead of us and lead us into our future as is expressed in the prophet Jeremiah:

> For surely I know the plans for you, says the Lord, plans for your welfare and not for harm, to give you a future with hope. Then when you call upon me and come and pray to me, I will hear you. When you search for me, you can find me; if you search for me with all your heart (Jer 29, 11-13).

The future is only black and godless when we declare it to be so.

Ignatius ends his Spiritual Exercises with the Contemplation to Attain the Love of God (Exx 230). He suggests that we reflect on the 'gift quality' and labours of God in creation and redemption.

> God dwells in his creatures; in the elements giving them existence, in the plants giving them life, in the animals conferring upon them sensation, in humankind bestowing understanding. So he dwells in me and gives me being, life, sensation, intelligence; and makes a temple of me, since I am created in the likeness and image of the Divine Majesty.

What I want to add to this is that God labours in the works and technologies of the human community and not only in nature. Perhaps this is understood by Ignatius in the word 'redemption'. This labour is a part of God's incarnation and the Spirit is discernible in these cultural products. The communitarian extension through electronics is a community we can trust as much as other intentional communities, the state or the university. Through our involvement we become more embodied. Our response is an 'act of co-operation in the divine work of creation and conservation'.[11] Then it is not so hard for us to hear the same word of God, as it was spoken in creation, in the demanding voice of the prophets, in the perplexing voice of Jesus, also spoken in our own body through the electronic extensions for the praise of God and building up of human community.

NOTES

[1] 'The journey continues: John Sculley on Apple's optical future', *Hypermedia* (Summer 1988), pp 18–22.
[2] 'The Media Lab: Stewart Brand helps invent the future at MIT', *Hypermedia* (Summer 1988), pp 10–14.
[3] Ong, Walter J.: *Orality and literacy: the technologization of the word* (London: Methuen, 1982).
[4] Eisenstein, Elizabeth L.: *The printing press as an agent of change: communication and cultural transformation in early modern Europe*, 2 vols (Cambridge: Cambridge University Press, 1979).
[5] Loftus, J. A.: 'One reality, two perspectives', *Compass* (November 1990), p 10.
[6] William Blake is as fine an example as any. Edward Yarnold S.J. does include place, architecture, apparel, sacred art, and ceremonies in his consideration of liturgy in 'Media of spirituality', *The study of spirituality* (Oxford 1986). That same attitude might be extended to other media.
[7] I feel a debt here to the work of Pierre Babin and Marie-France Kouloumdjian: *Les nouveaux modes de comprendre: la génération de l'audiovisuel et de l'ordinateur* (Paris, 1983).
[8] Richard McBrien from a talk to UNDA-USA.
[9] *Evangelii nuntiandi*.
[10] John Costello, John English, Marc Gervais and myself.
[11] *Communio et progressio* 7, also *Gaudium et spes* 34.