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Global business on the superhighway: implications for the office of the future

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Abstract

Recent and rapid developments in electronic commerce enabled global trading have raised many questions about future offices and future office work. Will the future office be a place or a space? Are the technologies sufficiently mature to support effective inter-organisational systems - and if not, what development work needs to be done, and if so, how best do we diffuse them? How do we manage inter-group synchronous and asynchronous communication? How do we manage multi-cultural and multi-disciplinary teams? How do we change business processes to adapt to, or capitalise on, a global trading environment? These and similar questions were raised at a recent international working conference which focussed on information systems and technology in the "International Office of the Future" (IOF). Contributors were asked to submit "Design Options and Solution Strategies" to deal with aspects of future offices and future office work. A detailed content analysis of those submissions enabled the many socio and technical aspects to be addressed by designers of future office work and the systems and infrastructure to support it to be identified. The aspects that emerged from the analysis are summarised here. The most striking outcomes of this analysis are the degree of attention seemingly being given to the socio aspects of the IOF over that given to the technical, and the interdependent nature of the issues.

Key words

Global Business, Future Office, Electronic Commerce, Internet; Information Systems and Technology Infrastructure

N. Terashima et al. (eds.), *Advanced IT Tools*

1 INTRODUCTION

Global Inc

In September 1997 IFIP WG 8.4[1] will run a globally distributed working conference. The event will run around the clock in three geographic regions over a period of two consecutive days. The regions will be linked by technology of various levels of sophistication to facilitate information exchange and to enable collaboration. The theme is "*The International Office of the Future: Working Apart Together*". To give the event an identity, it has been called "Global Inc". Global Inc is a mythical organisation. It is a concept rather than an entity. Some would call it a virtual organisation. Its line of business is international of the future (IOF) research, development, application, education and information dissemination. Its reason for being is to enable researchers and developers with an interest in any aspect of the IOF to work for a short while in a globally distributed organisation (Glasson 1996a). Global Inc will be more than a conference. It will be a living experiment which will simulate a globally distributed organisation with work flowing around the clock and around the world (see Figure 1 below).

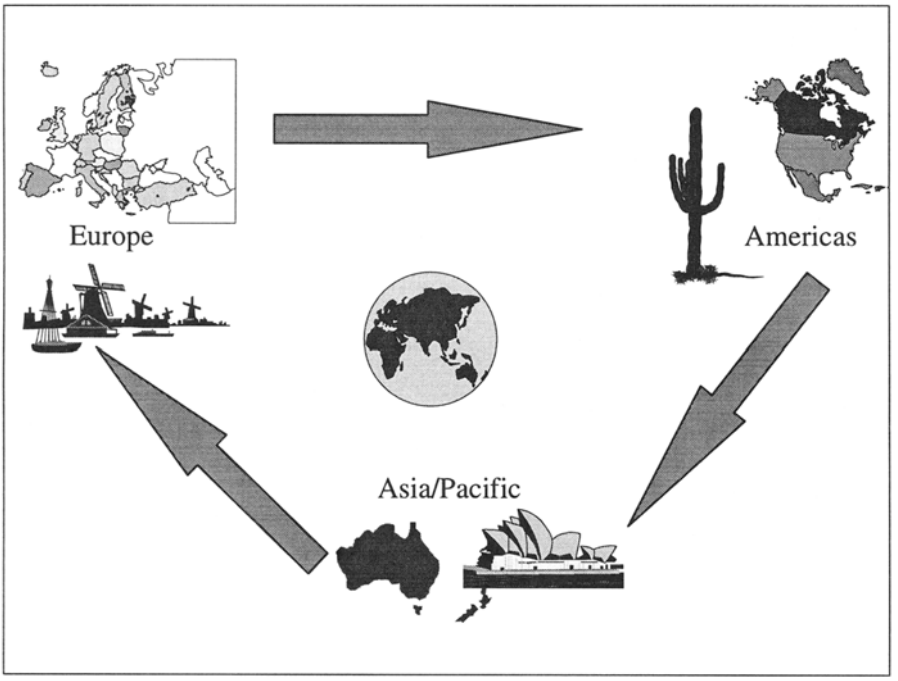

Figure 1 Global Inc Work Flow

[1] Working Group 8.4 has the responsibility within IFIP for promoting research, development, application, education and information dissemination in the field of office systems.

Global Business

We are certainly at the beginning of, if not already in, an era of global business. The maturation of network technology and the commercial interest in the internet is providing the supply-side technology push for a new era of electronic commerce (see for example Piel (Piel 1991)). At the same time the forces of globalisation are providing the demand-side pull (see for example Tapscott et al (Tapscott 1993)). These supply and demand forces foreshadow a new era of computing and telecommunications enabled international business - an era of global business based on global information technology bringing with it a number of opportunities and challenges (eg. (Ives 1991)). It also raises many questions. Will the future office be a place or a space? Are the technologies sufficiently mature to support effective inter-organisational systems - and if not, what development work needs to be done, and if so, how best do we diffuse them? How do we manage inter-group synchronous and asynchronous communication? How do we manage multi-cultural and multi-disciplinary teams? How do we change business processes to adapt to, or capitalise on, a global trading environment? What would be the worker, work-place, organisational and even societal outcomes of the IOF? This global business trend and the questions it generates caused WG 8.4 to embark on a series of research activities focussing on the IOF which culminates with Global Inc.

Opportunity to "walk the talk"

Global Inc is intended to simulate the operations of a globally distributed organisation which is at work 24 hours-a-day in different parts of the world. Such organisations might be real (eg a large scale engineering company with design teams on one continent and construction teams on another), or "virtual" (eg consumer/supplier strategic partnerships with the parties located in different parts of the world). It will provide an opportunity for participants to "walk the talk" and experience around the clock work. It will also provide the opportunity for experimentation using different combinations of IOF work mode variables namely place (same or different location); time (synchronous vs asynchronous); face-to-face (eye contact vs no eye contact or electronic eye contact); interaction type (real time or in turn); and action type (initiator, respondent, or observer).

Design Options and Solution Strategies

Creating an entity like Global Inc. requires considerable preparation and planning. As part of that preparation WG 8.4 ran an earlier working conference with the theme "The International Office of the Future: Design Options and Solution Strategies". The purpose of that conference was to surface possible information systems and technology (IS/T) infrastructure designs for Global Inc. While Global Inc was the focus, the issues raised and the solutions proffered are to a large extent generalisable.

Lessons to be Learned?

Given that Global Inc is a simulation, the issues raised in planning for it will, for the most part, apply to global business generally. There are lessons to be learned from work done to date. This paper summarises the results of a content analysis of the "design options and solution strategies" proceedings (Glasson 1996b). The analysis identified a set of relevant IOF topics and their dependencies. This set of topics and their dependencies may well need to be considered by any organisation planning to conduct business on the so-called information superhighway.

2 RESEARCH APPROACH

Research Aim

The research aim was to identify common themes, topics, issues or views that emerged from the 1996 conference. The analysis concentrated on five questions:

1) What research approaches are being used in the IOF field?
2) What are the key IOF topics as expressed by the authors individually?
3) What are the major IOF topics that emerge from a reading of the papers?
4) Is there any indication as to the relative importance of these topics?
5) To what extent are these topics interdependent and is there any combination of topics that is more or less important than others?

Content Analysis

The research approach used was content analysis. Content analysis is labour intensive and judgemental. To be rigorous, the content analysis must be systematic and consistent. The approach used here was an adaptation of Miles and Huberman's "tactics for generating meaning" - in tactic 10.A.3, Clustering, and tactic 10.A.5 Counting (Miles 1994, pp 245-262). The approach also relied on computer-based tools and procedures where possible; to reduce the need for clerical work; to reduce the opportunity for human error; and to unsure consistency of treatment. The automated tools used were - the Word for Windows[2] version 6.0 word processing package for text manipulation; purpose-written software programs and Word for Windows macros to handle word counts and word or phrase substitution; and the NUDIST[3] version 3.0 indexing package to assist with clustering and counting.

Source Data

The principal outcomes of the IOF design options and solutions strategies conference are, for the most part, captured in the twenty three full research papers accepted for the conference. That set of papers provides a sample of current thinking as to the IS/T issues that need to be addressed in establishing the social and technological infrastructure to support an IOF. The papers were selected after a strict blind reviewing process, where each paper was reviewed by at least three members of the international program committee. The criteria used in selecting the final set of full papers was quality. Recognising that the IOF concept is relevant to a range of professional interests and that the conference call could well lead to a heterogenous set of submissions, the editors agreed to accept all quality submissions rather than eliminate those that fell outside some preconceived homogeneous "model". Other conference submissions, namely the research in progress summaries and panel position papers, were not included in this analysis because the selection criteria for those submissions was more subjective. So the set chosen is an indicative sample of serious research insight into the design of an ideal IOF environment to support global business. As program chair for the 1996 conference and principal proceedings editor, the author had both hard and soft copies of the papers at his disposal for the purpose of analysis.

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[2] Word for Windows © Microsoft Corporation, 1983-1993

[3] NUDIST © Qualitative Solutions and Research Pty Ltd 1993, 1994

3 OUTCOMES

Question 1 - Research Approaches
A reading of the set of papers indicates that the research approaches being used in IOF work are both multiple and wide ranging. While the majority of the researchers chose one approach (56.5%) many (43.5%) chose to use two or three research approaches in some combination. The most popular singular approach was the case study (used alone or in combination in 43.5% of the papers). And the approaches used were equally divided between the scientific and the interpretivist approaches (Galliers 1991). The results of an analysis of the research approaches used are shown in Table 1 below.

Table 2 Research Approaches Used (Adapted from Galliers (Galliers 1991 p 339))

Approach	**Paper #** (Glasson 1996b pp v-vi)	**Approach**	**Paper #** (Glasson 1996b pp v-vi)
Theorem Proof		Simulation and game/role playing	1, 12, 16, 22
Laboratory Experiment	5, 12,	Subjective/ argumentative	8, 13, 21, 23
Field Experiment	4, 22	Descriptive/ interpretive	3, 7, 9, 15, 18,
Case study	2, 6, 10, 11, 14, 15, 17, 18, 19, 20	Action research	2, 15, 18,
Survey	3	Engineering	4, 14
Forecasting and futures research	1		

Question 2 - Explicit Keywords
The collective set of "keywords" provided by the authors gives an insight into their perception of key IOF topics. Table 2 below, lists the keywords explicitly used by the authors.

The set of keywords is wide-ranging and the overlap quite small. This is not surprising. First the IOF concept is new. Second establishing an IOF and managing its work will require input from a number of professional fields. So a range of key topics is to be expected. What may or may not be surprising is the actual topics themselves.

A second observation is that a cursory and subjective scanning of the keyword list indicates that there are approximately one third more "technical" keywords than there are "social". Again this is not surprising given the computer and communications technologies underpinning's of electronic commerce. What is surprising is that the analysis of the content of the papers gives a different view as we will see. While the express set of words chosen by the authors as keywords to summarise the thrust of their papers indicates that the subject matter pertaining to the IOF is predominantly technical, the implied summary based on an analysis of the paper content gives an even stronger impression that the issues are predominantly socio.

The summary of keywords gives some insight into the important IOF topics, but it has limitations.

Table 2 Authors' Keywords

Keywords	**Keywords (Contd)**	**Keywords (Contd)**
Cited in 6 papers	*Cited in 1 paper (cont'd)*	*Cited in 1 paper (cont'd)*
computer-supported collaborative work (CSCW)	continuous media	international information systems
Cited in 5 papers	cooperative systems	internet real-time conference
group support systems (GSS)	core values	interpretive flexibility
internet	corporate culture	information systems infrastructure
Cited in 3 papers	culture building	information technology platform requirements
groupware	cyberclub	knowledge-creation nets
Cited in 2 papers	decision making	learning environments
electronic commerce	design	management game
future office	desktop multimedia conferencing	MBone
group techniques	desktop video conferencing	meeting support
hyperknowledge	development cooperation	model workplace
information superhighway	development planning	operating system
national culture	dispersed group working	organisational structure
project management	distributed facilitation	organisational change
telecommunications	distributed teamwork	organisational interfaces
Cited in 1 paper	dual information systems	organizational knowledge
abuse through technology	e-mail	organizational learning
act orientation	electronic meetings	policy
action learning	electronic social space	power and politics
adaptation	executive education	pre-meetings
applications	experiential learning	problem structuring
appropriation	face to face group working	qualitative research
architecture (communications)	facilitation	research collaboration
architecture (IS)	gaming	research methodology
Austria	global markets	service quality
BioMedNet	global trade	social space
business strategy	group decision-making	systems architecture modelling
China	group productivity	tele-media
classroom	homepage	teleteaching
client/server	IBIS	theory building methodology
communication technology	impact assessment	training
computing and communications technology	information technology	video conferencing
computing infrastructure	inter-organisational systems	world wide web
conference room	international business	

Question 3 - Emergent Topics

In order to get a deeper understanding of the perceived key IOF design and implementation topics the papers themselves were subject to a four step analysis. First the papers were read to identify IOF-significant words or word combinations. As each paper was read the significant words or word combinations were added to a cumulative list. Second, as that cumulative list of words began to develop, in this case after about the third paper, the author began clustering the words into emergent groups. There was no attempt to force a pre-conceived categorisation, in so far as possible the categories were allowed to emerge (Glaser 1992). Steps one and two were carried out iteratively. As more papers were read and more significant words identified, the emergent categories changed. What resulted was a set of nineteen categories each with its own cluster of significant words or word combinations as shown in Table 3 below.

These first two steps in the analysis were manual and the author relied on his judgement to identify the significant words, iteratively develop topic clusters, and come down on the set of topic categories. Even though every effort was made to be objective and consistent, the reliance on one person's judgement in this way is an obvious limitation for this study.

The third and fourth steps in this analysis involved counting and crosschecking.

Question 4 - Relative Topic Importance

The third step in the analysis was to attempt to obtain some measure of relative importance by counting the number of references to each of the emergent topics within the collective set of papers. The computer packages WORD 6.0 and NUDIST 3.0 were used for this step. The unit of analysis chosen was the paragraph. That is, all meaningful paragraphs from the twenty three papers (ie exclusive of headings, sub-headings, references, figures and tables) were combined into one text file. Using a combination of WORD 6.0 macros and NUDIST command files, each paragraph was searched for an instance (ie one of the words or word combinations in the topic cluster) of each topic category. If an instance occurred, that paragraph was counted as one reference to the topic category. The first instance only was counted, multiple instances of the one topic category within a paragraph were ignored. That is to say the count was of the number of paragraphs in which that topic category was mentioned. But as the count was of the first instance of each and every topic category, one paragraph could be counted several times. For instance a paragraph which discussed among other things "senior managers' behaviour at meetings" would be counted as an instance of the topic category "human actors" and the topic category "meetings". The count summary is shown in Table 4 below.

The stand-out topic category is "human actors" which was mentioned in some form of words in 41% of the significant paragraphs. This was followed by "IOF work type" (29%), "efficiency focus" (28%) "culture/cultural" (26%), and "communication technology" (23%). The least significant topics show up as "business strategy" (1%), "IOF organisation" (3%) and "IOF environment" (4%). One should not read too much into the set of "least significant" topics. The conference call intimated that the "strategic" decision to create Global Inc had been taken and that certain organisational and environmental decisions were firm if not fixed. Therefore the papers collectively had an IOF design and implementation focus so it is not surprising that these topics were given less attention that the more operational ones.

From a socio/technical perspective, if we sum the number of paragraph instances for those topics that have a clear socio focus (ie 5, 11, 14, 15, 16, 17) and for those that have a clear technical focus (ie 3, 4, 7, 12, 13) and compare the two, the total number of socio instances exceeds the total number of technical instances by some 50%.

Table 3 Emergent Topics and Associated Words or Word Combinations

applications advertising; application(s) (enhancement automation, communication); bar codes; CBIS; CCF; classroom (lessons); collaborative (applications, editors); communications (internal, inter-organisational); complex (compound) documents; conferencing; data tools; decision conferencing; direct marketing; distributed (computing, meetings); document collections; electronic commerce; group activities; industrial seminars; information (distribution, services, tools); knowledge acquisition; legacy systems; money markets; office systems; on-line sales; organisational memory; post-sales customer support; public relations; shared (calendaring, data, text data bases); speech organisation; stock broking; task management; tele (cooperation, presence, teaching); training; tutorials; work flow
business strategy business (strategy (links to), opportunities); information brokers; small businesses; strategic information
CMCS/CSCW/Groupware bulletin boards; computer conferencing; computer mediated communication (CMC); computer mediated communication systems (CMCS); computer supported communication (CSC); computer supported cooperative work (CSCW); decision centers (DDC); desk top video conferencing; document board; group decision support (systems) (GDSS, GDSSs); group systems; groupware; groupwise; GSS; list-servers; Lotus notes; mail groups; on-line discussion; SODA/COPE; teamware
communication technology audio; audio conferencing; cameras; communication technology; data ; display panels; electronic (super) highway; electronic walls; electronic (interactive) white boards; facsimile (fax); fibre optic; interpersonal; ISDN; LANS; LCD; multi media ; multi-point; multiple addressing; network; packet; packet-switched; projectors; protocol; real-time conferencing; recordability; routers; routing; scanners; smartboards; sprint link; switch; technical; telecommunications ; teleconferencing; telemedia; telephone; telnet; tunnels; video (conferencing, links, players, walls); voice; WANS ; white board; white board link; X400
culture/cultural authoritarian; autocratic; behaviour; bureaucratic; conduct; control/autonomy; corporate; culture/cultural; culture (different, office, organisational, same); customs; democratic; dictatorial; diversity; hidden agenda; Hofstede; human group; multi-cultural; multi-national; norms; old guard; over-control; people; perceptions; personality; political; politically sensitive; politics; power; regulatory; shared (rules, understanding); social (adaptation, space); societies; socio; status; structuration; tyranny (tyrant); value(s) (core, group, rules, significant, systems, work-related); weness; working relations
development issues application program; authoring support; BPR; business processes; change (agents, processes); computer literacy; development methods; diffusion; disruptive; down sizing; frameworks; implementation; innovation vs standards; introducing new technology; language; modelling approaches; models; Object-Oriented; programming environment; programmer; system (design, development); technology transfer (adoption); toolbox; toolkit; visual authoring
EDI electronic data interchange
effectiveness focus benefit; client; competitive advantage; consumers; cost; cost/benefit; customer(s); economic (development, growth, outcomes); economy; effective; investment(s); leverage; market place; outcome; partners; partnership; productivity; supplier; transaction costs
geographic dimension across borders; continents; countries; cross-department; geographical; geography; global (globe, trade, village); inter organisational; interdependent; international(isation); international systems; intra organsisational; local; lower barriers; multi-location; national; regional; remote groups; single location; spread; time zones; transnational; virtual (businesses, enterprises, organisations); worldwide; world-wide; world
human actors board members; chairperson; clients; co-workers; colleagues; committee(s); executive(s); facilitator(s); group(s); identity; individual(s); IWOF; knowledge; manager(s); members; multi-user; officers; participant(s); participant; person(s); PGOF; role; staff; team(s); user(s); worker(s)

Table 3 Emergent Topics and Associated Words or Word Combinations **cont'd**

information technology architecture; CD-Roms; client/server; components; computer support; computer(s); computing (infrastructure, technology); configuration; connectivity; core vs local; desk top (multimedia); graphical (manner, user interface); hardware; HyperCard; hypermedia; mainframe; manual; media data; middleware; mobile (portable) computing; office technologies; operating system(s); PDE; POS; servers; software; the system; Windows; workstations; computer support;
efficiency focus efficiency; employee(s); fruitful; greater task orientation; learning; management; more with less; organisation; process; professional(s); shorter meetings; staff utilisation; costs (time, travel)
internet CERNET; ChinaNet/NCFC; ChinaNET; compuserv; dialog; e-mail; home page; HTTP; IGMP; information revolution; information superhighway; internet; NET ; W3; Web; world wide web; WWW
IOF environment electronic social space; ergonomics; furniture; interior design; IOF Environment; layout; office (architecture, design, of the future); organisational context; single/multiple (purpose, use); ubiquitous ; virtual room; work place
IOF organisation asynchronous work; club; cluster organisation; complex; culture shift; dispersed groups; dynamic; group processes; group working; Hypertext organisation; Hypertext organization; IOF organisation; IOF organization; networks; portable work; project-based teams; structure (flat, flexible, networked); telecommuting; turbulent; unstructured tasks; virtual; virtual organisation; group(s) (dispersed, work(ing))
IOF work type centralised; collaboration; collaborative (problem solving); collective decision making; computer supported collaborative work; cooperation; cooperative (teams); coordination; decentralised; decision (making, outcome(s), process); distributed (teamwork, work); facilitate; facilitation; group (decision-making, discussion, problem solving, work); ill-structured task; information (exchange, sharing); interaction; interactive; interdisciplinary; international business; knowledge sharing; meeting; modes of work; multi user; office routines; problem solving; reliant on technology; self (management, organisation); single user; working together
meetings brainstorming; clear role; clearly identified; collaborative learning; communication etiquette; decision-making; deliver communication; discussion memory; finalise a decision on; distributed facilitation; easy access; environment/room; familiar(ity) (with technology, with format, with participants) formality; function/purpose; group think; idea (consolidation, generation); information interpretation; interruptions; leaving/joining ; management support for; meeting(s) (participants, preparation); number of (locations, participants); pre-meeting planning; prompt; put an argument; quorum; real agenda; regularity of; rules of; security/privacy; seek feedback ; size of room; soundproof; starting finishing time; starting time; strict time limit; supporting documentation; time (finishing, starting, strict limits);technical staff available; (un)moderated; voting; wandering in and out
operational issues ability to mute; bandwidth; collaborative environments; conference control systems; digital audio/video; distributed multi-media; distributed software; distributed system(s); document management; electronic (documents, mail, meeting support); file transfer; group memory; impact technology; infrastructure; integration; monitoring facility; multicast; multiple (media, platforms); privacy; protocols; real time (access, processing); reliability ; repository ; scheduling policy; schedulers; seamless; security; stream model; technology standards; time advance model; time-constrained media data; variable (format(s), language(s), formats); virtual machines; workflow (automation, management); impact technology; monitoring facility
time/space dimension across time/space; any/different/particular/same (place, time, where, dimension); around the clock; asynchronous(ly); dispersed; face-to-face (FTF); global IT; multi-side; multi-time; synchronous; temporal; virtual common room; 24 hours

Table 4 Emergent Topic Weighting

Emergent topic categories	No.	%	Emergent topic categories (Cont'd)	No.	%
1 Applications	326	16	11 Human Actors	821	41
2 Business Strategy	25	1	12 Information Technology	425	21
3 CMCS/CSCW/Groupware	157	8	13 Internet	347	17
4 Communication Technology	455	23	14 IOF Environment	79	4
5 Culture/Cultural	519	26	15 IOF Organisation	61	3
6 Development Issues	173	9	16 IOF Work Type	587	29
7 EDI	260	13	17 Meetings	249	12
8 Effectiveness Focus	152	8	18 Operational Issues	275	14
9 Efficiency Focus	552	28	19 Time/Space Dimension	239	12
10 Geographic Dimensions	421	21	Total number of significant paragraphs	2010	100

Question 5 - Topic Combinations

The next question to be addressed was "To what extent are these topics interdependent and is there any combination of topics that is more or less important than others?". The approach used was to cross tabulate and count those paragraphs that contained a reference to every possible "pair" of topic categories. Table 5 reports the more significant topics (ie those that appeared in more than 20% of the paragraphs); their three most common topic "pairings"; and the percentage of principal topic paragraphs that also contain a reference to each topic pair.

Overall there seemed to be a high degree of interdependence between topics with 73% of the significant paragraphs containing discussion of two or more topics (ie only 27% focus on a single topic). Furthermore the more significant topics seem also to be highly interdependent. Some 40% of the paragraphs that contain a reference to the most frequently occurring category, human actors, also refer to the next most frequently occurring category, IOF work type. Some 37% of the paragraphs that contain a reference to "human actors" also refer to the third most frequently occurring category, efficiency focus. And some 33% of the paragraphs that contain a reference to "human actors", also refer to the fourth most frequently occurring category, culture/cultural. The highest level of interdependence being between the category "human actors" and the categories - "IOF work", "efficiency focus", and "culture/cultural". Human actors are discussed in 55% or more of the paragraphs that also discuss each of these topics.

4 CONCLUSIONS

The aim of this research was to examine outcomes of the planning process for a global business simulation to be carried in 1997 to see if there are any generalisable lessons to be learned from work done to date. Research submissions submitted in response to a call for "design options and solution strategies" for the proposed simulation were used as data. As with any piece of research the limitations and caveats need to be flagged before we look at the conclusions to put those conclusions in context.

Table 5 Significant Topic Combinations

Principal Topic (% of paragraph instances)	Significant Topic Pair # 1 (% of shared paragraphs)	Significant Topic Pair # 2 (% of shared paragraphs)	Significant Topic Pair # 3 (% of shared paragraphs)
11 Human Actors (41%)	IOF Work Type 40%	Efficiency Focus 37%	Culture/Cultural 33%
16 IOF Work Type (29%)	Human Actors 56%	Efficiency Focus 36%	Culture/Cultural 28%
9 Efficiency Focus (28%)	Human Actors 55%	IOF Work Type 38%	Communication Technology 30%
5 Culture/Cultural (26%)	Human Actors 53%	IOF Work Type 32%	Efficiency Focus 29%
4 Communication Technology (23%)	Human Actors 43%	Efficiency Focus 36%	IOF Work Type 35%
10 Geographic Dimensions (21%)	Human Actors 34%	Culture/Cultural 30%	Efficiency Focus 28%
12 Information Technology (21%)	Human Actors 40%	Communication Technology 31%	Efficiency Focus 31%

The major caveat is that the data is drawn from an indicative sample of IOF research. The submissions are drawn from a range of disciplines and come out of work being done in a number of countries, but there is no claim that the sample is representative. The major limitation is the analysis was done by one person. That person is well qualified to conduct the analysis, with some thirty years of industrial and academic IS/T experience to draw on, and, as chief proceedings editor, well placed to do so. The content analysis procedure used has been evolved over some six projects of similar size to this study and is designed to enable objectivity. So what emerges from the five questions should be taken as a barometer of research opinion as regards IOF design and implementation issues not a prescription. In summary, what emerged is as follows.

The most popular research approach was the case study. Many of the researchers (43%) chose to use a combination of methods. And the spread of methods was evenly divided between the scientific and the interpretivist. All this is consistent with a new field which is emerging from industry practice.

The *express* topics, based on the researchers proffered "keywords", were wide-ranging and technologically focussed. Again in a new field one would expect a range of topics. But the technology focus of the express set of keywords (approximately 30% more "technical" keywords than "socio" ones) is inconsistent with the focus of the implied set as derived from an analysis of the text.

Some nineteen topic categories emerged from a content analysis of the collective set of papers. As a set, the socio topic categories appeared in 50% more paragraphs than the technical topic categories. This seems to say that while the keywords the researchers chose to describe the content of their papers are predominantly technical, the topics that they discuss are predominantly socio.

The major topic category was "human actors" which featured in 41% of the paragraphs. The other five main topic categories featured were "IOF work" (29%), "efficiency focus" (28%), "culture/cultural" (26%), "communications technology" (23%), "geographic dimension" (21%), and "information technology" (21%). One should not read too much into the set of "least significant" topics because of the nature of the call for papers.

Finally all indications are that the topics are highly interdependent. The majority (73%) of paragraphs contained discussion of two or more topic categories. And any paragraph that discussed one of the four most significant topic categories had a good chance (28% to 56%) of also containing discussion of one of the other four.

It seems therefore from this admittedly limited study that the set of IOF researchers whose work was examined here are saying that the human aspects of IOF work are by far and away the most important when it comes to IOF design. What we see here overall is a focus on people (human actors, culture/cultural) and the work they do (IOF work type, efficiency focus) supported by technology. It is important that we do not lose sight of this. On the surface it seems the technological aspects of the IOF are being emphasised. While these aspects are important, the issues that need even more attention are the socio. And all of theses issues, be they socio or technical need to be address in a synergistic way. A simplistic "divide and conquer" implementation strategy in all probability won't work.

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7 BIOGRAPHY

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