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# *The Adoption of Information Technology by U.S. National Unions*

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*This paper offers and tests a model for national union adoption of information technology (IT). Data come from a mail survey of national unions that were active in the U.S. in 1997. Consistent with the model's predictions and prior research on union innovation, results indicate that rationalization and size are key predictors of IT adoption. Results also suggest a role for decentralization, employer use of information technology, and prior innovation. IT adoption may be one of the most important areas of union innovation in decades, and may have substantial impacts on union outcomes and possibly on the nature of unions. Understanding the nature and causes of IT adoption by unions may provide insight on the changing nature of unions and their roles in the future.*

The electronic transfer of information has revolutionized the management of organizations throughout the world. The term "information technology" describes the various electronic devices which are used to store, interpret, and transfer data. Devices include computers, satellite links (both portable

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and fixed base), electronic mail systems, various types of telephone links, and the associated cables and other connecting devices. The development of new information technology proceeds at a blinding rate. The effect of such change [...] remains uncertain, but exciting.

— O'Connell (1997: 164)

Unions too are being swept up in the "Information Revolution." Unions have used new IT to conduct organizing campaigns over the Internet, to keep members informed of specific bargaining and strike-related developments via web sites, and more generally to improve communications with members and assist organizing, bargaining, and political efforts (see Hendrickson 1998, Peter 1997, Fiorito and Bass 1999, respectively). An on-line paper by staff members from several unions cites numerous examples of creative and innovative uses that unions are making of IT, and the Internet in particular (Ad Hoc Committee on Labor and the Web 1999). A recent cover story in the AFL-CIO's *America@Work* entitled "Virtual Organizing" describes how "organizers across the country are harnessing the unique power of the Internet to reach and mobilize workers" (Lazarovici 1999: 9).

While there are insightful case studies, normative exhortations, and speculative writings on IT use in unions (e.g., Lee 1997, Shostak 1999), there has been no systematic effort to assess union adoption of IT in the U.S. (but see Templer and Solomon [1988] on Canadian unions, and Dancsok [1996] for a comparative study). Why are unions joining the revolution? Are all unions marching together, or if not, why are some leading while others lag? Is IT simply another management tool for making organizations, including unions, more efficient? Or is something more fundamental, perhaps a "transformation," afoot? Shostak (1999), for example, discusses a qualitative distinction between differing levels of IT use in contemporary unions ("Cybernaught, Cyberdrift, and Cybergain") versus an emerging union form he calls "Cyberunion" that represents a qualitative change (or transformation) in how unions use IT. Shostak's Cyberunion concept involves applying IT extensively to a broad range of union functions, but also an emphasis on futuristics, innovation, service, and tradition ("FIST"), i.e., a comprehensive strategic approach to IT use rather than a piece-meal adoption. Shostak sees the potential for dramatic union revitalization in his Cyberunion type.

In a very real sense, information management has long been near the core of union functions. Picketing provides information to dissuade consumers and workers from aiding employers in adversarial situations. Organizing uses information to persuade workers to pursue their interests through collective action. Union political activities entail considerable information management in providing members with information on

candidate voting records and views, and in conveying worker preferences to policy makers. More fundamentally, local unions provide information on wages and working conditions to assist workers in establishing and maintaining union standards. They strive to prevent often secret "side agreements" whereby workers are lured into competition with their peers that threatens common standards designed to serve the collective good. National unions take this process to another level, by assisting locals in parallel efforts to take wages and working conditions out of competition. As Lee (1997) notes, IT advances have greatly increased the potential for international unionism that has thus far largely eluded national union movements, but that has become evermore critical in a global economy.

Although union functions have not typically been cast in informational terms, and one should not underestimate the importance of organizing, representation, and regulatory mechanisms for contract enforcement, it is nonetheless clear that information management is a central activity for unions. The technology for its management, IT, is thus of central importance to unions, and rapid changes underway in IT use truly hold the potential for transforming unions. A full assessment of how IT is transforming unions might be premature, but it is an appropriate time to begin examining how and why unions are adopting IT.

### ***WHY SHOULD INFORMATION TECHNOLOGY MATTER?***

Beyond the observation that information is critical for unions, there are established theoretical concepts suggesting an important influence for IT on union outcomes. Caution is advisable in transplanting business strategy concepts to unions. Nonetheless, Barney's (1997) notion of "organization" as a source of sustainable competitive advantage, an idea very similar to Leibenstein's (1966) earlier notion of "X-efficiency," has relevance. Although unions do not generally compete with each other, effective use of IT offers potential for unions to improve their services to members, their political and public relations efforts, their performance in bargaining, and their ability to organize new members. Thus, IT offers a potential source of competitive advantage when unions do compete; one can easily imagine key roles that IT can play in a raiding situation. More importantly, IT offers a potential edge in *competing with employers* over the form of workplace governance (i.e., employer unilateralism vs. joint union-management determination). The importance of *more rapid* information transfer for unions should not be overlooked. Although IT involves more than sheer speed, being able to respond *quickly* to bargaining developments or employer actions in organizing campaigns is itself of considerable value. The momentum of an organizing campaign, for example, can

be a fragile thing. Delays in response to unexpected employer tactics can be disheartening to union supporters and adversely affect worker views of the union's value (i.e., erode instrumentality perceptions). IT cannot assure timely responses in such circumstances, but it can facilitate them. In what was at the time the largest union organizing victory in two decades, the Machinists' union won representation rights for 19,000 airline workers in 1998 by, among other things, using the Internet:

[T]o keep information flowing freely — no easy task in a nationwide effort... The organizing campaign set up its own website ([www.iamnow.org](http://www.iamnow.org)) and filled its pages with press releases, photos and testimonials from workers around the country, a weekly election summary, a screen to submit comments and questions, a section on questions and answers about the election and the IAM, handbills that could be downloaded, sample provisions from IAM contracts with other airlines — and even an online authorization card (Lazarovici 1998: 9).

As the above passage and other sources suggest, speed, while a key virtue, is not the only benefit from IT advances. Making worker testimonials and contract provisions available on-line, for example, illustrates credibility, convenience, and cost benefits in comparison to alternatives such as organizer speeches and transporting already-organized workers to meetings with prospective members. IT also offers greater flexibility, as negotiations or grievance hearings might be conducted over the Internet or at least facilitated with e-mail as a supplementary communication method. Organizers in the field can also make use of the Internet to download information quickly in response to management's latest claim, and using software on their laptops, produce professional-looking flyers (or e-mail attachments) in response. Consider the task and expense of telephoning or writing (hard copy) to thousands of members to solicit their calls to legislators on a key bill, as compared to the task of e-mailing an existing list of member addresses. Many such potential and realized benefits of web use are noted by the Ad Hoc Committee on Labor and the Web (1999) and in Shostak (1999).

Although much has been written about the information revolution and its consequences, there has been little academic attention to how unions use information technology. Ironically, the letters "CIO" have taken on a new meaning in business circles, "Chief Information Officer," but unions have only recently begun to establish comparable functions: Only a few unions in Gifford's recent *Directory of U.S. Labor Organizations* (1999) list a staff title including terms such as "information technology." The popular and business presses, and a smattering of more academic sources, have highlighted some particular aspects or instances of IT's role in relation to unions. For example, during the 1997 strike at UPS, both UPS and the Teamsters maintained special web sites for updates on strike developments

(e.g., [www.ups.com/news/update](http://www.ups.com/news/update) and [www.teamster.org/ups\\_tentative.htm](http://www.teamster.org/ups_tentative.htm) on August 19, 1997). Greenhouse (1997) cited the Teamsters' efforts to keep its members informed via the web and other means as a significant part of their success at UPS. Contract negotiations between the Pilots' union and American Airlines in 1997 also show how unions can use IT to support bargaining. Katz and Kochan note:

[This] may have been the first time a union used the Internet and modern video conferencing to mobilize the membership [and] communicate on-line negotiating events as they occurred... This may be a signal of more to come as unions and companies begin to use more of the information technology available today for communicating to constituents scattered in diverse locations (1999: 207).

Interestingly, in this same dispute, a rebel movement within the pilots' union waged its campaign for contract rejection largely via the Internet (McCartney 1997). As a further illustration, Peter describes how a "cyberstrike" that she credits for hastening a contract settlement with Bridgestone is "just one example of how unions are using the Internet to get the word out, organize the masses and agitate the opposition" (1997: 82). Textbooks and scholarly discussions of future union organizing have begun to note that telecommuting is one of a number of developments that raise challenges to conventional union membership arrangements and organizing strategies. In an *Information Week* article, "Workers on the Net, Unite!," Illingworth (1994) describes how some union leaders' attitudes have changed from viewing IT as a threat to viewing IT as a resource to strengthen unions. Part of AFL-CIO President Sweeney's reorganization of the Federation has included appointing a Director of Information Technology who describes his charge largely as using IT to free resources for redirection to organizing (Mountjoy 1997).

These examples and IT-related developments collectively indicate that the information revolution has arrived for unions. As yet, few academics have taken more than a passing notice. IT has played a modest role in the concepts and measures of innovation considered thus far. For example, in Fiorito, Jarley, and Delaney's (1995) study of organizing effectiveness or Delaney, Jarley, and Fiorito's (1996) study of union innovation, only a few of many items used to assess innovation involve IT, e.g., whether computerized data analysis is used to aid bargaining or organizing. Clearly, many of the IT developments occurring in unions involve innovation in Daft's (1982) sense of being new to the adopting organization, and conversely, some key parts of the innovation occurring in unions involve IT. Union use of IT clearly deserves more attention; yet in the U.S., at least, there has been little systematic research to investigate this topic.

In Canada, Templer and Solomon (1988) launched a survey of union use of IT long ago. As a pioneering effort, Templer and Solomon stressed

description and leader perceptions of union staff attitudes toward IT rather than analysis of IT uses, causes, and consequences. They did note however, that their data showed a fairly strong relation between IT use and union size, and suggested that economies of scale and resources could be the reasons. They also suggested, but did not test, the hypothesis that employer sophistication in IT use influences union IT use. More recently, Dancsok (1996) conducted a survey in Europe and North America, finding North American unions were more advanced in IT use than were those in Britain and continental Europe. Due to a small sample and limited survey scope, however, Dancsok's study provides a very limited basis for generalizations.

Our general expectation is that models of innovation should apply to the particular case of IT use. Most union IT use (e.g., use of e-mail, websites) is a relatively new phenomenon for unions, and hence qualifies as innovation (Daft 1982). Further, Damanpour's (1991) meta-analysis suggests that innovation is a general organizational phenomenon, in that organizations that innovate in one area or form tend to innovate in others. Thus, we expect the effects hypothesized by Delaney, Jarley, and Fiorito (1996) for innovation should hold for IT use. Consequently, the model of union IT use we propose closely follows earlier work on union innovation.

### ***A MODEL OF UNION INFORMATION TECHNOLOGY USE***

What factors shape union decisions to adopt IT? Again, by recognizing that IT is a form of innovation, this question can be answered by extending previous models of innovation. This leads us to suggest that certain organizational and environmental variables will affect IT use as they represent indicators of IT's costs and benefits. In organizational theory terms, this essentially represents a structural contingencies approach (Scott 1987).

*Rationalization.* Rationalization refers to unions operating in a reasoned, business-like manner as opposed to an ideological or political fashion (e.g., "we vote on *everything*" or "who you know"; Barbash 1969). As noted earlier, Illingworth finds that some union leaders have begun to see IT as a tool for unions rather than a threat. More rationalized unions will be more prone to assess IT in terms of its potential benefits, perceive such benefits, and thus adopt IT. More rationalized unions stress operating the union efficiently, and clearly IT has demonstrated considerable value in improving organizational efficiency. This is especially true in the more rationalized union, considering that formalization, standardization, and specialization are among the various facets of rationalization (or "structuring of activities"; see Warner 1975). IT is clearly valuable in these facets;

in record keeping (formalization), automating particular actions in response to appropriate cues (standardization), and in coordinating activities among specialized functions (specialization and coordination). Aside from valuing IT because of its efficiency-enhancing value, more rationalized unions are more likely than less rationalized unions to be aware of IT potential, as they are most likely to systematically scan their environments for new developments (Delaney, Jarley, and Fiorito 1996), and in fact, environmental scanning may be a facet of a more general rationalization concept (Jarley, Harley, and Hall 1998). The specialization facet of rationalization suggests that more rationalized unions will have IT specialists monitoring new IT developments and recognizing their potential value to the union.

*Decentralization.* Decentralization of decision making is likely to increase IT adoption for two reasons. First, decentralization necessitates coordination to maintain unity of purpose, and IT provides a mechanism for improved coordination. Trends toward decentralized bargaining underscore this effect. As industry or company level bargaining arrangements give way to more localized bargaining, IT provides a means for maintaining timely contact between union negotiating teams, exchange of information on proposals, and maintaining unity in positions. Similarly, in organizing IT provides a means for field organizers to tap and contribute to common data bases that might yield help in anticipating and countering tactics commonly used by particular companies or "union busting" consultants. In general, more decentralized unions will find greater value in IT. Second, as with innovation generally, decentralization allows for greater possibilities of experimentation with new ideas, and thus more opportunities for successful IT applications to "bubble up" through the organization, be recognized as valuable, and disseminated throughout the organization. This argument is consistent with Damapour's (1991) finding that decentralization is positively associated with innovation generally.

*Strategic Scope.* Strategic scope, or the breadth of issues and methods pursued by unions, should increase the value of IT. Delaney, Jarley, and Fiorito (1996) stressed the diversity of membership experience and the broader scope of activities unions must undertake with diverse memberships as key factors leading to a positive relation between membership diversity and innovation. As unions take on more issues, the need for information and for technology to manage information rises. Similarly, as more methods (e.g., bargaining, political action, direct benefit programs) are used, IT needs expand. Coordinating the administration of political action committees or benefits programs for thousands of members are tasks well-suited to IT applications. Thus while we stress the union's strategic scope as the driving force, our argument for its effect on IT is similar to Delaney, Jarley, and Fiorito's reasoning regarding membership diversity's effect on innovation.



*Size.* Union size is likely to increase union IT use for a variety of reasons (e.g., Templer and Solomon 1988). First, many IT tools entail fixed costs. Being able to spread the costs over a larger membership base effectively lowers the cost in relative terms. Second, larger unions simply have more resources they can draw upon to acquire IT. National unions vary greatly in size, roughly from tens of members to over 1 million, and their respective capacities to afford IT vary in tandem. Third, size also enters the “benefit side” of the cost-benefit calculus. Technologies that have as a major virtue their ability to perform repetitive operations quickly (i.e., computers) are obviously of greatest value to large organizations dealing with large numbers of members, employers, or organizing campaigns. Given the modest fixed costs of many IT forms (e.g., desk-top computers), even the smallest unions should find them affordable. More advanced IT uses (e.g., web site design, software, hardware, and maintenance with all the latest “bells and whistles”) are likely to involve more substantial costs, and this suggests that all three reasons combine to produce a positive size-IT relation.

*Prior Innovation.* Innovation is a general phenomenon in organizations: Although distinct types or forms of innovation can be identified, those that innovate in one area or form tend to innovate in others (Damanpour 1991). Consequently, we expect unions that have been innovators in the past will be most likely to innovate via IT adoption as well.

*Membership Change.* Following previous arguments that can be summarized simply as “necessity is the mother of invention” (Delaney, Jarley, and Fiorito 1996; Fiorito and Jarley 1992) we expect that unions experiencing membership declines will be most motivated to experiment and change. IT adoption is of course one form of experimentation that relatively distressed unions may seek. Conversely, complacency stemming from relatively healthy membership trends should discourage IT adoption, or at least fail to provide the perceived need and motivation for change.

*Industry IT Use.* We expect that unions dealing with employers who are more advanced in IT use will perceive greater value in IT adoption. In part, this may stem from members’ familiarity with IT via their jobs. Experienced IT users will have a better sense of how IT might be applied to union affairs, making them more likely to support IT innovation in their union. Also, and probably more important, the union is likely to perceive a need to match the employer’s IT sophistication in order to effectively perform in bargaining with the employer. In effect, it would feel disadvantaged by the employer having greater and more rapid information access, ability to communicate rapidly with its subunits, and so forth, and thus be motivated to upgrade its own IT capabilities.

## ***DATA AND MEASURES***

Our principal data source is the Survey of Union Information Technology (SUIT), a mail survey conducted in summer and fall, 1997. To develop the survey, we began with previous surveys: The Canadian union IT survey conducted by Templer and Solomon (1988), and the (U.S.) National Union Survey (NUS) conducted by Delaney, Fiorito, and Jarley (1991). In brief, we compressed some key issues addressed in the NUS into a small fraction of the SUIT, and devoted the vast majority of the SUIT to emerging issues of IT use in unions. Draft instruments were reviewed by and discussed with IT specialists in academe (faculty and staff) and unions. The final survey consisted of approximately 200 distinct response tasks. A personalized cover letter explained the study, assured confidentiality, offered summary results, and requested participation. The survey was pre-tested with a more or less random subset of addressees in the sample frame. (The first 100 addresses in the alphabetical mailing list provided a diverse mix of unions and a full range of officer and staff roles.) When this pre-test indicated no serious problems aside from a low response rate (more on this below), mailings were sent to the balance of addressees in the sample frame.

A sample frame of 120 national unions active in the U.S. was identified primarily through Gifford's directory of labor organizations (1997). (Several of these unions include large Canadian memberships, e.g., the Machinists, Teamsters, and Steel Workers.) Gifford's directories list top officers and staff by function, and we mailed surveys to four to six top officers and staff in each union when sufficient detail was provided. We specifically "targeted" Presidents, Secretary-Treasurers, and Directors of Research, Organizing, Communications, and Education (or similar titles), based on our judgment that these types were most likely to be able to provide the requested information. Whenever possible, we checked union web sites to verify incumbents' identities, or to update information. The final mailing list included 592 addressees. Ten days after the survey mailing, a reminder card was sent to all addressees. Approximately one month after the initial mailing, telephone calls were used to contact individuals from unions for which no response was received to try and secure at least one response for each union. Often this led to a new contact person who was described as the "right person" to answer questions about IT. If possible, a commitment to complete the survey was obtained, and a new copy was mailed to the contact person if necessary.

Usable responses were received from 93 individuals, from 75 different national unions. For unions with multiple responses, the responses were combined, generally by averaging. At the level of the individual respondent,

the response rate is approximately 16%, although after adjusting for bad addresses, defunct unions, etc., it would be about 20%. At the level of the union, the response rate is approximately 63%, and the responding unions represent more than 60% of U.S. union membership. Typical reasons cited for nonresponse, if offered, were that the survey did not apply (low IT use was cited), that the union did not complete surveys as a matter of policy, or that the organization was not in fact a union (i.e., an “umbrella” organization with no members of its own).

Due to the modest individual-level response rate, we compared responding and nonresponding unions based on information provided in Gifford (1997). Responding unions tend to be slightly more advanced in IT use (e.g., more likely to list a web site) and structurally more complex (e.g., had more specialized departments) than nonresponding unions. The two groups did not differ in size, founding date, interval between conventions, and several other criteria. More details on survey method issues are provided in Fiorito, Jarley, and Delaney (1998).

Table 1 summarizes the measures used in this study. Several measures follow those used by Delaney, Jarley, and Fiorito (1996) in their study of general innovation in national unions. Additional measures developed specifically for this study, including the dependent variable are also described. Although not included in the model, a two-item measure for contemporary general innovation is also presented in Table 1 for later comparison purposes.

### *Dependent Variable: Union IT Use*

Two alternative multi-item scales for IT use were initially constructed. The first combines 17 pairs of items. The first part of each paired set asked whether the respondent used a particular *form* of IT (e.g., e-mail, chat rooms, web sites; Table 2 lists all 17 items), planned to use it in the next two years, or did not use it or have plans to use it. If the respondent indicated that the union currently used the IT form, he/she was asked to answer the second part of the paired set of items, which asked about the *extent* to which the IT form was used in a four-point Likert-style format. We combined these pairs of items to form 17 consolidated items, coded as: 1 = Not used; 2 = Used very little; 3 = Used a moderate amount; 4 = Used quite frequently; 5 = Used extensively. These 17 consolidated items were then summed and averaged to form an “IT Forms” scale.

The second multi-item scale for IT use focused on *functions*. Seventeen pairs of items similar in structure to those for IT Forms asked about areas in which IT was applied (e.g., to track organizing efforts, coordinate local bargaining, assist lobbying efforts; Table 2 includes all 17 items).

TABLE 1  
**Measures: Summary Variable Definitions**

<i>IT Use</i>	Composite of two multi-item scales for IT use. Subscales represent, alternatively, the number of types of IT used, or IT forms (e.g., e-mail, chat rooms, websites), and the number of functions in which the union applies IT (e.g., organizing, lobbying, bargaining). Table 2 provides details on items for this scale.
<i>Rationalization</i>	Five-item scale for rationalization or structuring of activities.
<i>Decentralization</i>	Three-item scale for the extent to which decisions are made at lower organizational levels (e.g., members or locals rather than national headquarters).
<i>Size</i>	Number of union members represented.
<i>Strategic Scope</i>	Three-item scale to assess the breadth of issues the union addresses and the breadth of methods the union uses to accomplish its goals.
<i>Membership Change</i>	Percentage change in membership over the four-year period, 1991–95.
<i>Prior Innovation</i>	Eleven-item scale to assess union use of innovative tactics (1990 NUS).
<i>Industry IT Use</i>	Proxy for employer IT sophistication based on “CIO-100” rankings of IT excellence in organizations.
<i>Innovation</i>	Two-item scale for general innovation.

Note: See text and Table 2 for details on measures.

Here too, each pair of items was consolidated, and all 17 items were summed and averaged to form a composite scale we call “IT Functions.” We combined responses to both scales to form an overall “IT Use” scale (34 items).

### ***Predictors of Union IT Use***

*Rationalization.* Rationalization (or “structuring of activities”) is measured with a five-item scale. Each item is a four-point Likert-style scale representing a subdimension of the larger rationalization concept. The subdimensions represented are standardization, coordination, formalization, communication, and environmental scanning. These items were added to yield the composite rationalization scale, with higher values indicating a higher level of rationalization. Delaney, Jarley, and Fiorito specified environmental scanning as a distinct measure and other items to tap it were

**TABLE 2**  
**Items in the IT Use Scale**

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*Types or Forms of IT*

Instructions: The following are different types of information technologies. Please consider how much each one is used by your union and circle the appropriate number in Part 1 (1 = Not used and no plans to use in next two years, 2 = Not used but will be used in next two years, 3 = Used now). If a technology is presently used, please also circle the appropriate letter in Part 2 (a = Used very little, b = Used a moderate amount, c = Used quite frequently, d = Used extensively).

- a. Word processing
- b. Spreadsheets (e.g., Lotus, Excel)
- c. Database applications (e.g., Access, Foxpro, Approach)
- d. Desktop publishing
- e. Statistical analysis
- f. Tutorials/training modules
- g. Access to the internet and other external resources
- h. Communicating with members (e-mail, electronic bulletin boards)
- i. Communicating with office employees (e-mail, electronic bulletin boards)
- j. Providing web sites for particular campaigns or issues
- k. Providing web sites with general information
- l. Accessing legal information databases or web sites
- m. Accessing government databases or web sites
- n. Satellite/cable TV
- o. Video-conferencing
- p. Communications among members via e-mail, web sites, chat rooms, etc.
- q. Participation of members via web sites, e-mail, chat rooms, etc.

*Functions Where IT is Used*

Instructions: Please consider how information technology is used by your union and circle the appropriate number in Part 1 (1 = Not used and no plans to use in next two years, 2 = Not used but will be used in next two years, 3 = Used now). If information technology is currently applied in an area, also please circle the appropriate letter in Part 2 (a = Used very little, b = Used a moderate amount, c = Used quite frequently, d = Used extensively).

- a. Compiling demands from locals
  - b. Comparing related contract settlements
  - c. Analyzing employers' offers
  - d. Coordinating local settlements
  - e. Carrying out bookkeeping
  - f. Streamlining office processes
  - g. Coordinating group health/dental plans
  - h. Producing newsletters
  - i. Communicating with regional offices
  - j. Calculating COLA and other analyses
  - k. Assisting lobbying efforts
  - l. Tracking contract compliance
  - m. Analyzing possible organizing targets
  - n. Tracking current organizing efforts
  - o. Maintaining updated membership or dues payment data
  - p. Tracking employer activities (filings, permitting, etc.)
  - q. Tracking changes outside your union
-

included. They found that rationalization and environmental scanning correlated moderately ( $r = .53$ ,  $p < .01$ ), and their regression results showed consistent positive coefficients for both predictors across all innovation criteria. Due to construct overlap, and length limitations in the SUIT that allowed only a single environmental scanning item, we combined the single item for environmental scanning with the other rationalization items to form the present rationalization measure.

*Decentralization.* Three items are combined to measure the extent to which decisions are made at lower organizational levels (e.g., members or locals rather than national headquarters). Each item deals with a different area of decision-making, namely bargaining, organizing, and "overall." Delaney, Jarley, and Fiorito noted that in analyzing unions, "questions of centralization cannot be divorced from notions of democracy" (1996: 600), and this is an appropriate juncture at which to note that we will not include a distinct measure for democratic structure. We do not have available contemporary content-coded data from union constitutions such as Delaney, Jarley, and Fiorito used to create their measure. A number of factors lead us to discount the importance of this omission. First, as Delaney, Jarley, and Fiorito noted, the distinction between [de]centralization and democracy is fuzzy at a conceptual level. Second, as their correlational data showed, the empirical distinction between the two concepts is also not sharp ( $r = -.51$ ,  $p < .01$  for centralization with democratic structure). Finally, in their regression results, Delaney, Jarley, and Fiorito found no support for hypotheses concerning either variable for the perceived innovation and innovative tactics criteria. Given the moderate intercorrelation between the independent variables, this may stem from collinearity. It seems likely that in specifying only a decentralization measure, the gains in efficiency are likely to offset losses in detail.

*Size.* Union size is a single item which asked respondents to report their union's "number of members." Note that Delaney, Jarley, and Fiorito also examined government data on union dues receipts as an alternative indicator of resources. The correlation between their two measures was .95 ( $p < .01$ ), and the regression results were, not surprisingly, insensitive to these alternatives.

*Strategic Scope.* Delaney, Jarley, and Fiorito (1996) created an index of membership heterogeneity based on member composition in terms of gender, minority status, occupation, and industry. Comparable data on occupation and industry were not available to us from the 1997 SUIT or other sources, prompting us to take a different tack. Delaney, Jarley, and Fiorito stressed the diversity of membership experience and a broader scope of activities that a union must take in serving diverse membership as key considerations (1996: 601) leading to their prediction of a positive

heterogeneity-innovation relation. We use items intended to tap a similar concept, items addressing union strategies.

Three items were designed to assess the breadth of issues the union addresses and the breadth of methods the union uses to accomplish its goals. These are: (1) "This union devotes significant resources to all of the issues that concern our members, on or off the job;" (2) "In this union, providing good representation to our current members is more important than organizing new members" (reverse-scored); and (3) "Collective bargaining is our main concern, and all else is secondary" (reverse-scored).

Obviously, membership heterogeneity and union strategies are different concepts, but in examining the Delaney, Jarley, and Fiorito arguments for why heterogeneity should affect innovation, it became clear that there is overlap. Also note that Fiorito and Jarley (1992) found support for their hypothesis predicting a positive effect of strategic scope on a particular innovation, associate membership forms. Further, the adverse effect of using heterogeneity type measures on case availability due to missing data was substantial. Many unions assert that they do not track their members' race or gender, or at least are not willing to divulge this in a survey. For multivariate analyses below, we utilize a strategic scope measure rather than a membership heterogeneity measure, expecting a positive relation with IT use.

*Membership Change.* Although Delaney, Jarley, and Fiorito found only weak evidence supporting their hypothesis involving environmental pressure to innovate, the hypothesis retains considerable theoretical appeal and has some support in previous literature (e.g., Fiorito and Jarley 1992). We developed a membership change variable from published sources on per capita payments to the AFL-CIO or, when necessary, other membership estimates (e.g., Gifford 1997). Following Delaney, Jarley, and Fiorito, percentage change in membership over the 1991–95 period is used to predict IT use. Consistent with prior arguments on membership loss as a pressure for change, we expect a negative effect on IT use.

*Industry IT Use.* As noted earlier, Templer and Solomon (1988) proposed, but did not test, the hypothesis that union IT use was partly a response to employer sophistication in IT use. Unfortunately, there are no ready measures of employer IT use. The trade publication *CIO*, however, regularly publishes a list of "leaders in IT excellence" which names 100 top organizations, the "CIO-100," and provides information on their product (or service) lines, number of employees, revenues, and information systems budget (CIO 1997). Although we do not have systematic information on the identities of unions' bargaining partners, we do have information on their primary industries (from our survey). Using the CIO-100 information on product lines, we created an index of IT sophistication by

2-digit SIC code. In addition to product lines cited in the CIO-100 list, we checked listed organizations' websites for related business lines supporting the main product lines. In brief, a mention of a product line was coded as one point for the associated 2-digit SIC. We then summed points by SICs across the CIO-100. (Details are available from the authors.) Our top three 2-digit SIC industries via this method were: (1) Business services (SIC 73, 41 points); (2) Wholesale trade, durable goods (SIC 50, 25 points); and (3) Wholesale trade, nondurable goods (SIC 51, also 25 points). Numerous industries received only one or two points, and we coded industries that received no mentions as zeroes. Although this measure is crude, it provides at least a plausible proxy for employer IT sophistication, and thus the possibility of testing the hypothesized positive effect on union IT use.

*Prior Innovation.* Finally, noting Damanpour's (1991) observation that innovation generalizes across various areas, we include union innovation in 1990 (Delaney, Jarley, and Fiorito's "innovative tactics") as a predictor of union IT use in 1997. We expect a positive relation with IT use.

## ***RESULTS***

Table 3 presents descriptive statistics, bivariate correlations, and reliability information for measures. We acknowledge that bivariate correlations provide only a limited indication of support (or lack thereof) for hypotheses. Still, it is notable that IT use correlates directly and significantly with current general innovation, rationalization, size, and prior innovation, as expected. Positive but nonsignificant correlations occur for decentralization, industry IT use, and membership change, while a negative nonsignificant relation is found for strategic scope. Although not significant, the last two relations are contrary to expectations. (We realize that nonsignificant correlations do not have a sign, strictly speaking, but at this point we are merely attempting to describe basic associational results rather than formally assess hypotheses.)

The first two equations in Table 4 assess our extension of the "basic" Delaney, Jarley, and Fiorito (1996) innovation model to union IT use, while the last two expand the model to include prior innovation and industry IT use. Rationalization shows a significant positive effect across all equations, as predicted, although the effect is only marginally significant ( $p < .10$ ) in a one-tailed test. Decentralization shows no effect in the basic model, but in the presence of the covariates for industry IT use or industry IT use and prior innovation, a positive impact appears, consistent with expectations. In fact, in the presence of both these covariates, the effect is highly significant ( $p < .01$ ). The strategic scope measure consistently fails to achieve significance, possibly as a result of its poor internal consistency reliability



TABLE 3  
Correlations Matrix (Decimals Omitted) and Descriptive Statistics

Variables	Mean	SD	1	2	3	4	5	6	7	8	9
1. IT Use	3.0	.8	(94)								
2. Rationalization	2.6	.5	41*	(59)							
3. Decentralization	2.5	.6	20	16	(51)						
4. Strategic Scope	2.6	.6	-2	-0	-17	(32)					
5. Size (Membership: 000)	164	331	53*	25*	13	33*	(-)				
6. Membership Change	-5.3	17.8	12	19	6	-7	-5	(-)			
7. Industry IT Use	1.8	4.5	23	2	-13	-4	5	-6	(-)		
8. Prior Innovation (1990)	3.0	.6	64*	35*	-3	37*	50*	-3	20*	(77)	
9. Innovation	2.6	.9	45*	42*	29*	14	35*	7	-3	46*	(70)

\* Significant at the 90% confidence level or better in a two-tailed test. Sample sizes for correlations range from 42 to 74. Figures shown in parentheses on diagonals are Cronbach alpha reliabilities for multi-item scales.

( $\alpha = .32$ ). Size shows a consistent and strong positive impact, as expected, except in the presence of prior innovation. Initially, the industry IT use measure shows a fairly impressive impact, but like size, in the presence of the prior innovation measure this effect “fades out” (falls below conventional significance levels). There is no support for the predicted negative effect of membership change. In fact, it is consistently “wrongly” signed and its unstandardized coefficient is large relative to its standard error ( $t = 1.4$ , not shown) in the final equation. Prior innovation, added in the last equation, shows a strong positive impact on union IT use.

TABLE 4  
Standardized Regression Results for Union IT Use

<i>Variable</i>	<i>IT Use</i>	<i>IT Use</i>	<i>IT Use</i>	<i>IT Use</i>
Rationalization	.22*	.22*	.20*	.20*
Decentralization	.11	.12	.18*	.35***
Strategic Scope	-.09	-.08	-.06	.02
Size (Membership)	.44***	.43***	.43***	.16
Membership Change		.09	.09	.16
Industry IT Use			.28**	.08
Prior Innovation (1990)				.45***
R-square	.34***	.35**	.43***	.65***
Adj. R-square	.27	.26	.32	.56
N	46	40	40	34

\*\*\*  $p \leq .01$ ; \*\*  $p \leq .05$ ; \*  $p \leq .10$  or better (one-tailed tests for slope coefficients).

Finally, the overall model is highly significant in all equations. Modest explanatory power is evident for the first three equations (R-squares range from .34 to .43), but somewhat higher explanatory power is shown for the final equation (R-square = .65). The addition of predictors (going from the first to last equation) tends to reduce the available sample due to list-wise deletion for missing data within each equation. The final equation thus includes only about three-fourths of the cases in the initial equation, and hence its superior explanatory power is partly attributable to an increasing parameter-to-cases ratio. Still, the adjusted R-square of .56 for the final equation effectively adjusts for this “inflation,” and is quite respectable.

### ***CONCLUDING REMARKS***

Persistent but modest support was found for the expected positive impact of rationalization on IT use. Consistent with Delaney, Jarley, and

Fiorito's results for general innovation, operating in a reasoned "business-like" manner is associated with adopting IT to conduct the union's affairs. In a sense, IT adoption represents a contemporary outgrowth of rationalization phenomena described long ago by Barbash (1969).

A hypothesized positive effect for decentralization found partial support in the results. In "basic" versions of the model designed to extend the Delaney, Jarley, and Fiorito general innovation model, no effect was evident (as in the Delaney, Jarley, and Fiorito model). In the presence of covariates for industry IT use or industry IT use and prior innovation, however, a modest to moderately strong positive relation (respectively) was found. This suggests that the hypothesized effect, whereby innovations in IT emerge and diffuse more easily in a less-controlled organizational environment, does indeed exist. The effect is not huge, however, and may be obscured in less complete models as a result of confounding influences. Also, finer distinctions in union structure or structure-environment interactions may be useful in future studies. Coordinated responses may be critical to two manufacturing locals in direct competition, but inconsequential to two public sector locals in widely differing jurisdictions. Thus IT benefits may differ for two comparably decentralized unions. Such refinements go beyond the scope of this paper.

The strategic scope measure consistently failed to reach significance in predicting IT use. This contrasts with some evidence for analogous effects in prior studies (Fiorito and Jarley 1992, Delaney, Jarley, and Fiorito 1996), but may reflect weakness in the strategic scope measure employed here, as noted earlier. In addition, other related factors such as the occupational/industrial composition of the union's membership and, if data permit, the ethnic and racial composition of membership should be considered. Recall that these were among factors Delaney, Jarley, and Fiorito (1996; as part of their membership diversity index) found relevant to union innovation. Occupational composition may be particularly important in a different vein, given that IT sophistication varies with occupation, although the relation may differ for alternative aspects of IT use (Fiorito et al. 2000: 26-29).

Union size generally shows a strong positive effect on union IT use. This effect is consistent with the arguments about economies of scope and scale, resources, and differential benefits underlying the predicted effect and prior evidence on size effects on innovation and IT use (e.g., Delaney, Jarley, and Fiorito 1996, Templer and Solomon 1988, respectively). That this effect "fades" in the presence of prior innovation is not too surprising given the strong correlation between size and prior innovation ( $r = .50$ ,  $p < .01$ ). Union size does appear to have an influence, but prior union size also influenced prior innovation, and the correlation between size and prior

innovation makes it difficult to detect a unique size effect in the presence of the prior innovation measure.

The membership change measure consistently failed to yield support for the "necessity is the mother of invention" argument. Although it makes sense for relatively distressed unions to be most prone to innovate in IT and elsewhere, we cannot offer empirical support for that view here. The views of top union leaders may be a critical but omitted moderator, and their omission may account for our results. Some leaders may interpret their union's decline as irreversible. Their efforts may focus on simply managing their union's shrinkage. Investing in new technologies may seem a poor use of ever-diminishing dues revenues. This perspective might be most likely in a small union that strongly identifies with a single declining industry or occupation (e.g., railroads, farriers). (See Shostak's [1999] discussion of "Cybernaught" unions in this regard.) In contrast, unions with more general jurisdictions may interpret decline in a given sector as motivation to launch new efforts elsewhere, consistent with our hypothesis. For now, we can only speculate that such differences may underlie the results for this variable.

Industry IT use showed a moderately strong positive effect in the absence of prior innovation but, like union size, its effect faded in the presence of prior innovation. A positive impact is consistent with our prediction based on previous speculation by Templer and Solomon (1988). Given a modest correlation between the two predictors ( $r = .20, p < .10$ ), it is more difficult to attribute the "fading" of this effect to shared variance with prior innovation than in the case of the union size effect. Still, this remains a possibility, and we consider the combined evidence to provide partial support for the hypothesis. The proposition that unions are spurred to augment their IT capabilities to match their bargaining partners is eminently sensible, and we suspect that failing to find a more persistent effect says more about the quality of our proxy and shared variance than about the validity of the hypothesis. It should be noted that union leader *perceptions* of industry sophistication may be more relevant than the "objective reality." Dancsok (1996) describes how her own union's leaders felt disadvantaged by employer use of fax machines, perceiving that they were constantly on the defensive. After initially considering purchasing fax machines for their locals in response, her union opted instead to fund a network of computers as this would not only aid rapid communication, but also serve other perceived computer needs such as creating documents and maintaining membership lists. Future studies should consider union leader perceptions of their bargaining partners' expertise and the role of those perceptions in IT adoption. Another form of employer influence on union IT is suggested by the UAW-Ford announcement that the union and

company will assist workers in obtaining PCs and Internet service for home use (at a cost to workers of \$5 per month; Anonymous 2000). Such joint programs (or unilateral employer or union programs) will enhance the importance of union use of IT for member-union interaction. Employers will also be influential via their policies on employee use of employers' IT resources. Case law on employer restrictions and how such restrictions are to be balanced with free speech and union representation rights is still developing (Labor Research Associates 1999).

Our final predictor, prior innovation, showed a strong positive effect on IT use, as expected, and consistent with Damapour's (1991) conclusion about the generality of organizational innovation. In fact, the introduction of the prior innovation measure appeared to sap the influence of union size and industry IT use, as discussed above. In accord with Damapour's conclusions, IT use appears to be partly a reflection of a more general innovative tendencies that vary among unions.

As with any empirical study, our conclusions must be tempered by limitations of our study. As suggested by our previous discussion, concerns about the quality of some measures and sample size should be kept in mind. Also, we noted that our sample tended to be a bit more advanced in IT use than the typical national union in 1997. Although this is a limitation in trying to draw inferences about unions as of 1997, this may work to our advantage in the sense of making our results a bit more current than a fully representative sample. That is, given continued adoption and diffusion of IT in unions since 1997, the sample reflects the direction of IT trends in unions.

There is also the issue of heterogeneity; that is, the possibility that the national unions we treat implicitly as having internal uniformity may be in fact heterogeneous. Clearly this is a potentially greater problem in amalgamated or recently-merged unions where distinct subunits may be relatively autonomous. In addition, one must always be cautious in leaping from statistical associations to causal inferences, particularly in cross-sectional analyses such as this where associations may reflect reverse causality or spurious associations. One possibility that comes to mind in this regard is that IT use may enhance decentralization and rationalization, rather than, or in addition to the other way around. And, of course, broad-based survey research such as this can most certainly be complemented by more in-depth studies of particular unions or instances of IT adoption (e.g., see Shostak [1999] for many personal accounts of union experience with IT). Such research, e.g., case studies and intensive interviews, helps to better establish the meaning of findings.

Change and innovation are obviously vital issues to unions as they belatedly face up to their declining status. New leadership at the AFL-CIO

and many national unions has been and will be taking a hard look at innovation and how it can help to promote union renewal. IT, in particular, will likely be a key piece of the puzzle as unions attempt to develop renewal strategies in the midst of the information revolution. Few would be foolish enough to suggest that IT alone is a magic elixir for unions. Union decline has resulted from a complex combination of factors, and it would be naïve to suppose any one change could reverse such effects.

The definition of IT presented at the outset of this paper noted that the effects of IT remain *uncertain*. Union sources clearly see much potential, as do some outside observers. IT holds promise as a tool to improve organizing, service to members, bargaining and political effectiveness, solidarity among members, and leader-member communications. IT may also have important symbolic value in helping unions improve their image as being “with it” (Shostak 1997), or overcoming the “dinosaur image,” as Hurd (1998) so aptly put it. Of course, there is always some danger of a “Faustian bargain,” i.e., the possibility that unions will “lose their souls” as collective worker representation instruments by changing themselves into something else. At present, at least, that danger seems small, and the greater danger appears to be the possibility that unions will not change *enough* to reverse their decline.

We should note that IT adoption does not necessarily involve using the most sophisticated forms of IT. As an anonymous reader of an earlier draft pointed out, several years ago fax machines were adopted for union use on a widespread scale. Ease-of-use hastened their adoption and greatly added to their utility. Fax machines were relatively new to many unions, but clearly not “cutting edge” IT at that time; this was after introduction of PCs but prior to widespread Internet access.

Whether IT use in conjunction with other changes constitute a transformation, a new union form (e.g., Cyberunions) remains to be seen. International comparative studies, studies of local IT use, and studies focused more specifically on Internet use and web site presentation (e.g., a content analysis of union web sites), among others, would help to illuminate matters. At a minimum, it seems safe to say that IT adoption will likely have substantial effects on how unions carry out their traditional roles, and IT may well be a catalyst in helping unions assume new roles. The effects of IT on union outcomes, unions themselves, and the transformation question must be addressed more fully by future studies.

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## RÉSUMÉ

### **L'adoption des technologies de l'information par les syndicats nationaux américains**

Les syndicats aussi ont été enveloppés par la vague de la révolution de l'information. Ils ont utilisés la technologie de l'information et des communications (TIC) pour effectuer des campagnes d'organisation syndicale sur l'internet, pour tenir informés leurs membres des développements spécifiques reliés tant aux négociations qu'aux grèves et, plus généralement, pour améliorer les communications avec les membres, pour épauler certains efforts d'ordre politique ou d'ordre des négociations et pour des campagnes d'organisation. Un journal en ligne, publié par des conseillers syndicaux provenant de plusieurs syndicats, fait état d'une foule d'exemples d'innovation et de créativité dans l'emploi des TIC et, plus particulièrement, dans l'internet (Ad Hoc Committee on Labor and the Web 1999). Un article récent en première page de l'AFL-CIO's *America@Work* intitulé : « Campagne d'organisation virtuelle » décrit comment les organisateurs syndicaux à travers le pays s'emparent du pouvoir de l'internet pour atteindre et mobiliser les membres (Lazarovici 1999 : 9).

*Pourquoi s'en préoccuper ?* Au delà du fait que l'information est critique pour les syndicats, il existe des notions théoriques bien établies qui laissent croire à une influence des TIC sur les résultats que peut obtenir un syndicat. Le concept de Barney (1997) d'organisation comme source d'un avantage concurrentiel durable, notion sensiblement identique à celle de Leibenstein (1966) connue antérieurement sous l'idée d'une X-efficacité conserve toute sa pertinence ici. Quoique les syndicats ne sont pas habituellement en concurrence les uns avec les autres, l'emploi efficace des TIC leurs offre une possibilité d'améliorer les services aux membres, de bonifier leurs efforts au plan des relations politiques et publiques, d'améliorer leur performance au plan des négociations et leur habileté à organiser les nouveaux membres. Ainsi, les TIC offrent une source potentielle d'avantage concurrentiel, lorsque des syndicats se retrouvent effectivement en compétition. D'une manière plus importante, elles présentent un levier

potentiel lorsque les syndicats sont en compétition avec les employeurs sur la forme de gouvernement d'un lieu de travail (i.e. l'unilatéralisme de l'employeur versus la détermination conjointe syndicat-employeur des conditions de travail).

*Un modèle dont le syndicat se sert.* On doit généralement s'attendre à ce que des modèles d'innovation s'appliquent à un cas particulier de l'emploi des TIC. L'usage des TIC par un syndicat constitue un phénomène relativement nouveau et, partant, se qualifie comme une innovation (Daft 1982). De plus, la méta-analyse de Damanpour (1991) porte à croire que l'innovation est un phénomène organisationnel général, en ce sens que les organisations qui innovent dans un secteur ou sous une forme en particulier ont tendance à le faire dans d'autres secteurs et sous d'autres formes. Ainsi, les effets anticipés sous forme d'hypothèses par Delaney, Jarley et Fiorito (1996) devraient s'avérer les mêmes dans le cas de l'usage des TIC. Ceci nous amène à croire que certaines variables organisationnelles et environnementales affecteront l'usage des TIC au fur et à mesure que les rapports coûts-bénéfices seront connus. Dans les termes de la théorie des organisations, cette situation reflète essentiellement l'approche de la contingence structurelle.

*Les données.* Notre source principale de données provient du Survey of Union Information Technology (Suit), une enquête par la poste effectuée au cours de l'été et de l'automne 1997. Une lettre d'introduction personnalisée expliquait la nature de l'étude, en garantissait le caractère confidentiel, offrait de fournir les résultats et demandait la participation. Un échantillon de 120 syndicats nationaux menant des activités aux États-Unis a été constitué à l'aide de l'annuaire de Gifford des organisations syndicales (1997). (Plusieurs incluent le membership de grands syndicats canadiens, tels les Machinistes, les Routiers et les Travailleurs de l'acier.) Soixante-quinze syndicats retournèrent des questionnaires utilisables.

*Les résultats.* La rationalisation s'avère un effet positif et significatif sur une échelle multi-énoncés comprenant diverses formes et usages des TIC. La décentralisation ne montre aucun effet si l'on s'en tient au modèle de base ; cependant, la présence de covariances pour l'usage des TIC dans l'industrie, d'une part, et pour l'usage des TIC associé à une innovation antérieure, d'autre part, fait apparaître un effet positif, à la hauteur des attentes. Une mesure d'envergure stratégique échoue constamment à fournir une conclusion significative au plan statistique. La taille présente un impact positif consistant et fort, sauf dans la situation d'innovation antérieure. Au départ, la mesure de l'emploi des TIC en industrie présente un impact positif très impressionnant, sauf que, comme la taille, l'effet s'évanouit devant la présence d'une mesure d'innovation antérieure. On ne décèle pas non plus d'appui à la prévision d'un effet négatif sur le changement

au plan de l'effectif syndical. Enfin, l'innovation antérieure est suivie d'un effet positif fort sur l'emploi des TIC par un syndicat.

*Conclusion.* Le changement et l'innovation constituent sans aucun doute des enjeux vitaux pour les syndicats, au moment où ils doivent faire face au déclin de leur status. Un leadership nouveau à la FAT-COI et dans les syndicats nationaux considère sérieusement l'innovation et se demande comment cette dernière peut conduire à un renouvellement du syndicalisme. Les TIC, en particulier, deviendront probablement un facteur clef au moment où les syndicats tentent de formuler des stratégies de renouvellement dans la tourmente de la révolution de l'information. Il ne faudrait pas non plus considérer les TIC comme un élixir magique. Le déclin du syndicalisme est plutôt attribuable à une combinaison de facteurs et il faudrait être naïf pour penser qu'un changement quelconque pourrait contrer de tels effets.

De toute manière, les TIC contiennent la promesse d'un outil puissant pour bonifier l'effort d'organisation, les services aux membres, l'efficacité au plan politique, à la table des négociations, au plan d'une plus grande solidarité entre les membres et d'une meilleure communication entre les membres et leurs leaders. Elles peuvent également prendre une valeur symbolique importante en aidant les syndicats à laisser croire qu'ils sont dans le coup (Shostak 1997) ou bien en les aidant à surmonter leur image de « dinosaure » (Hurd 1998). Si le fait d'utiliser les TIC en association avec d'autres innovations constitue une transformation, cela ne permettrait pas pour autant de conclure à une nouvelle forme de syndicalisme (e.g. un Cybersyndicat). Au minimum, il serait plus sûr d'affirmer que l'adoption des TIC aura probablement des effets remarquables sur la manière dont les syndicats assument leurs rôles conventionnels et il se peut que les TIC deviennent un catalyseur en les incitant à jouer de nouveaux rôles.