Seeking and Finding

an international exploration of technologies designed to help people find work

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an exploration of international experiences of technologies designed to help people find work
(original Dutch title: *Tussen zoeken en vinden — Een verkenning van internationale ervaringen met technologieën om mensen te helpen bij het vinden van werk*)

Foreword

Many people need help along the road between seeking work and finding it. The question is, what kind of technology is available to help them along the way? Using this question as its basic premise, the Stichting Instituut GAK, a foundation dedicated to initiating and supporting innovative social security projects in the Netherlands, commissioned an exploration into "job-matching technologies", which Prisma & Partners carried out.

Nearly two hundred million people around the world are looking for work at this moment. At the same time, there are tens of millions of official job vacancies, and many more informal ones. How do you find the best possible match between job seekers and vacancies? What is the role, and the added value, of technology in this process?

Everywhere you look, there are enthusiastic, talented people. There are reintegration coaches and job consultants looking to help people find work; software companies creating new algorithms capable of finding the best possible candidate for the job; NGOs focusing on specific target groups; policy-makers in search of effective measures and instruments; entrepreneurs who see special niches in the job market and are initiating new forms of service; researchers using new technologies capable of examining the behavior of job seekers within the labor market.

This report is a presentation of the experiences of — and discussions with — more than thirty organizations worldwide, all involved in a broad span of approaches and technologies. It has been further supplemented by desk research into advancing technology. To this end, it offers a view of the great variety of roles that technology offers in job recruitment. In some cases it is extremely limited in the support it provides; in others it is the jumping-off point in considering new forms of job matching.

The experiences and practical examples we have amassed are all listed in the final chapter in an effort to increase the level of employment. Some questions for the longer term may include:
- What new technologies will have the potential to match the right man or woman with the right job, faster and more accurately?
- Will job recruitment remain a human occupation or are we moving toward a situation in which software agents arrange new jobs for us?

This report offers a range of ideas and suggestions for answers to questions like these without passing judgment on current practices or choosing new activities.

This exploration would not have been possible without the cooperation of a great many people, whom we would like to thank here.

It starts with the people we interviewed at the organizations we visited, for their willingness to meet with us, and the openness and enthusiasm with which they and answered our questions and told their stories. You can find all their names and organizations in the appendix of this report.

Finally — and first and foremost — we want to thank the GAK Institute. The premise they set is new, it provides a cross section of practices throughout social service as it relates to the use of new and existing technologies. As far as we can tell, an exploration of this kind has never been done before. The assignment gave a wide berth to the concept of job matching, in every sense of the phrase, and to our search for practical examples, without pressuring us to find direct applications.

It is the GAK Institute's mission to initiate and support innovative social service projects. Within this framework, the exploration of job-matching technologies is meant to serve as a contribution to the public debate regarding social service. We trust that the reader will find new examples, ideas, and inspiration.

Theo Groen
Jan Wouter Vasbinder

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1 Introduction

The Job Interview
There are many obstacles on the road between seeking work and finding it. The final hurdle, one which every job seeker must clear, is the interview with the employer. It is the final step from seeking the job to getting it.

From another point of view, there are many obstacles between creating a vacancy and filling it. The employer must decide who will get the job after a selection period which also ends with that final discussion.

This makes the job interview the decisive point in the process leading to a match between the job seeker and the vacancy. All the tools that match up supply and demand are ultimately designed to ensure that the final job interview goes well.

Premise For This Exploration
The same aspect that pertains to matching people to work in general, also applies to the issue of solving unemployment, whether short or long-term, and improving the reintegration of the disabled into the workforce. As this issue increases in importance, so does the role of the job coach. This role is expressed in the form of more attention for tools to aid in the matching of job seekers and jobs suited to the specific characteristics of that job seeker; it is expressed also in the active implementation of these tools.

It is within this particular framework that the GAK Institute commissioned an exploration into "the world of available technologies that can be implemented to arrive at the better matching of people and work within the context of the Dutch social services[1]".

This report constitutes the results of this exploration. The original premise bore a number of specific stipulations:

- The question concentrates on the core issue of unemployment and reintegration and specifically on the tools that must help to create a match. (As it turned out, the exact definition of *match* had to be redefined throughout the course of the exploration.)
- The question does not preclude any specific technologies or countries and, as a result, is a broad one. This offered extra freedom in looking at places around the world where innovative approaches are being applied to help people find work. It also called for a reconsideration of the term *technology* as a means of supporting the process.
- The question proved to be an inspiring one for the people we interviewed — everyone from employees on the work floor to scientists and policy-makers. They did much more than speak openly about their work, their motivation, and technology; they also made it clear that the premise for this exploration was new to them and that they were curious to hear of its results.

For the purposes of this exploration, we interviewed sixty-six people at thirty-three organizations in Australia, Belgium, Canada, China, Israel, the Netherlands, Singapore, Taiwan, and the US. This was further supported by discussions with groups in the Dutch social service world. To further supplement the process, we gleaned a great deal of information from the Internet.

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[1] An extensive clarification and description of our working methods is available upon request.

Scope Of This Exploration
The exploration was designed according to the following parameters:

1: The main focus is on job seekers[2] confronted with major obstacles in finding work. These obstacles can take a wide variety of forms, whether to do with the job seeker's background (insufficient schooling or work experience, or "over-age"), or physical or mental limitations in terms of doing work, or a personal situation (such as the need to provide child care) which limits the subject's availability. Obstacles of this kind can be temporary — work experience can be built up, personal situations can change, and schooling can help increase work skills — or they can be enduring, for instance, because of the subject's age or the permanence of the physical or mental disability.

> **Job Seekers**
> For the purposes of this report the term *job seekers* refers either to people who have never had work, people who have lost their job, working people who want to (must) find other work, people unfit for work, people reintegrating into the workforce, and people looking to reenter the workforce after a longer period of absence.
>
> Generally speaking, the work they seek (whether part of full-time) requires little training or special skills. More often it involves work that offers regular pay, or placement in a work reintegration scheme, or a voluntary position with the ultimate hope of finding gainful employment.

Overcoming these obstacles is one of the central aims of the tools used to help people find work.

It is difficult to distinguish clearly between job seekers confronted — or not — by specific obstacles. For this reason, we have also included working methods and tools in this report. These can include technologies used more broadly on the labor market.

2: This is an exploration of tools that can be used to help these job seekers. This report will outline the nature of these tools and experiences along with their application outside the Netherlands. It is not meant to be a comparative study to find the best technology or the best approach to removing the obstacles between job seekers and jobs. Nor is it meant to assess technologies, working methods, or processes used in the Netherlands. Neither does it offer a plan for the implementation of "foreign" technologies, working methods, or processes in the Netherlands.

3: This exploration is not meant to compare social service systems in the countries we visited, or even to describe them. Nevertheless, these systems do comprise the context within which the obstacles arise for the job seekers, it is where they gain significance and where they must be removed. Wherever the significance of this context was explicitly recognizable in the development, financing, and implementation of new processes with which to help job seekers find work, this context has been described.

4: By focusing primarily on job seekers confronted by specific obstacles, this exploration undertook a path that followed job seekers in their search for work. The reasons for seeking work can vary widely. Within the social service system, these can comprise unemployment and disability, whether partial or complete. Other reasons can include reintegration in the workforce and the search for a new or more suitable job.

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[2] In the Netherlands this group is often termed the "abject unemployed" or "hard to employ". Other countries use the terms "labor disadvantaged", "labor disabled", "low-skill", "long-term" or "very long-term unemployed". In this report we will maintain the neutral term, "job seeking" with the advisory that we are referring to job seekers who require assistance and encouragement in greater or lesser degrees to find (or return to) work.

The process (illustrated in figure 1) begins with orientation and search (1) and ends when the job seeker has found work in which he[3] can function well (3)[4]. Throughout the process, he will go through the cycle one or more times, seeking out vacancies and, in some cases, making applications (2). If a job seeker leaves his work prematurely because he is not functioning well there, he returns to cycle of search and application (4). If the job seeker does not succeed in finding a job and ends up abandoning the search, he drops out of the cycle and receives no more help in his search for work (5).

Figure 1: The Process, from Seeking Work to Finding Work
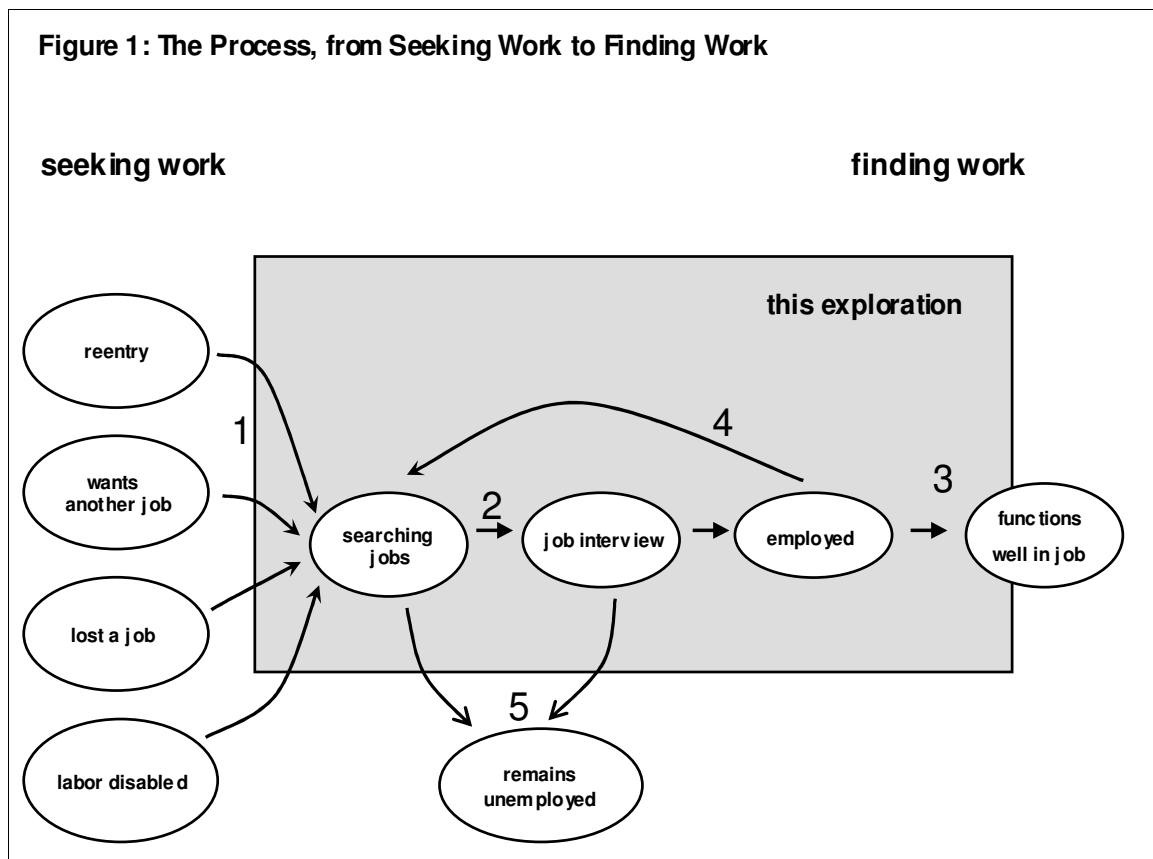
This exploration involved no processes outside this area of study (and, to that end, no supporting technology). On the left side of the graph, these are standard training courses. On the employer's side, to the right, these include prevention from the threat of unemployment, finding suitable jobs for people who are sick and at least partially unfit for work, or employees who are not functioning well in their job, the adaptation of the workplace, and activities aimed at retention of older employees.

5: As a brief description of the subject matter of this exploration, the term *matching* was used in the basic premise. There is a certain charm in the conciseness of this word, but it can also create confusion. This report will, in fact, include four different aspects of matching:

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[3] For the sake of simplicity, we will refer to job seekers, employers, and job consultants as "he". Let it be clear that we are referring to both men and women.

[4] To properly judge if a match is successful — thereby determining that the job consultant has done his job well — sufficient time is needed to see if the new employee is functioning well in his new position.

A. *Profiling*, which offers information about vacancies, job seekers and, in some cases, employers, preparing for the search for suitable vacancies by the job seeker, or the search for suitable candidates for vacancies offered by employers.

B. The *search*, in which the first links are made between job seekers and employers. Job seekers can go in search of multiple vacancies and an employer can look for more than one job candidate. The job seeker, the employer, or a job consultant (to bring the other two together) can perform the search.

C. The *matching process* in the more precise sense, in which the degree of commonality — the "fit" — between the demands of the job and the job seeker's qualifications is determined. Matching in this sense of the term often results in *ranking* — a score indicating which applicants are best suited to the vacancy, or which jobs are most appropriate for the job seeker. Matching precedes the application, and ensures that the job interview offers the greatest possible chance for both parties.

D. The *job interview* is the meeting (most often personal) between employer and job seeker[5]. This meeting is the final aim — and the ultimate test — of all the preparatory work. It answers the question of whether the job seeker and vacancy fit well together in the judgment of both employer and job seeker[6]. It is at this moment — now that the two are meeting in person — that the employer can see that the job seeker may not be suited to the work for which he came, but will be very well suited to a job that will open up in two months from now (and hasn't even been announced yet). This kind of match could never have been planned in advance, but proves to be a fast and effective way of working.

The roadmap on the next page offers a brief description of the organizations described.

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[5] One special form of job interview involves a trial job placement initiated by the job consultant if the interview itself doesn't reveal enough about the job candidate.

[6] For this reason, the term *matching* could also be used for the job interview itself or, even more broadly, to include points A to D. For the purposes of this report, matching refers only to point C — the comparison of information about job seeker and vacancy with the aim of determining the mutual suitability and/or obviating unnecessary job interviews.

Roadmap

Employment Programs
General, low-threshold ICT: Hong Kong Job Centres
General, virtual: Taiwan Virtual Employment Services Centre
Hard-to-employ: Taipei-Keelung Employment Services Centre
Hard-to-employ, disabled: North Carolina Vocational Rehabilitation Services
Minorities, specific target groups: Israeli National Employment Service
Psychological problems, social support: Canadian Mental Health Association
Disabled and long-term unemployed: Link Up
Hard-to-employ, social support: Brotherhood of St. Lawrence
Hard-to-employ, activation: Hong Kong Social Welfare Department
Hard-to-employ, schooling: Matchworks

Job Matching Within Large Organizations
Group-oriented, constraint-based, highly educated: IBM Haifa
Group-oriented, agent-based: Naval Postgraduate School

Developers of Matching Software/Assessments, Tests
Employability competences: Chandler Macleod
Based on what job seekers like: QuietAgent
Skills, behavior, interest: Profiles International
Employer's assessment determines testing method: HRVision
Motivation, personality, basic behavior: Synques
Personality, culture, generation gap: Omnia
Motivation, personality, culture: De Witte & Morel

Generic Matching Software and Platforms
Fuzzy, adaptive matching, generic tool: WCC Group
Career patterns, self-teaching pattern recognition: Burning Glass

Vacancy/Job Sites Using New Matching Models
Profiles of what you like: QuietAgent
Free format profiling: The Regeneration
Time slots: Daywork
Job scrapers: Flipdog and similar companies
Sites using text mining: Monster and followers
Search algorithms in combination with human assistance: Mahalo
Agent-based matching: Almende

Authorities
Singapore, long-term planning competences for the labor market: Ministry of Manpower
Australia, job opportunities: DEWR
Schooling for the hard-to-employ: Employment Retraining Board Hong Kong

Communities
Tools: Linedin, Wink, Spock
Wikipedia-technology: Knewco

Research and Experimental Projects
Research into the functioning of the labor market: Simulations
Agent-based negotiation: FuzzyMan
Medical diagnostics and matching: AO-diagnostiek
Translation software and case-based matching: TREE project
Complex adaptive systems: Santa Fe Institute

2 General Conclusions and Observations

Introduction
Visiting 33 organizations around the world — commercial and public, large and small, working in the real world and formulating policy — introduced us to a wide range of working methods for and approaches to removing obstacles for people seeking work.

The next six chapters offer an image of the great variety of processes, technologies, and approaches, and show practical examples from Australia, Belgium, Canada, China, Israel, Singapore, Taiwan, and the United States.

This chapter discusses the characteristics which, despite the wide variation, are remarkably similar. They constitute the general background to describe and understand all these differences.

This general background will be described according to five points of view:
- The conflict between the wish and the inability to find work
- The decisive role of the job interview
- Technology is only a tool
- The brain — the great unknown
- The pressure to find work and fill vacancies

The Conflict Between Wish and Inability
The inability to find a job without assistance is an enormous obstacle in the labor market. This weakens the position of people who want to work but cannot find work. It is ultimately the employer's decision who gets to fill the vacancy. He often has a wide choice of candidates and can make his decision according to all his criteria. Charity or pity play no role here. Only those candidates who can offer him added value are of interest. The people who do not manage to get through to him, those who cannot convince him of their value, fall by the wayside.

> **No Charity**
> Providing work is not charity; it is a business consideration. They employer wants the best available candidate and only employs someone if that decision creates more yield than cost. Employing job seekers for the sake of taking pity will not increase the job seeker's chances of finding a permanent job.

People who seek work but cannot find it need help. These people exist in a state of conflict — they do not get the chance to demonstrate their added value and are unable to create the opportunity themselves. They need help in learning how to show what they have to offer[7]. This help can take a variety of forms, whether in looking for suitable vacancies, or gaining a trial placement in a job where they can then demonstrate their abilities. Help can also take the form of schooling, retraining, or coaching and assistance in the job interview process.

The Decisive Role of the Job Interview
The job interview is the all-important turning point in the process between seeking work and finding it. Third parties can assist in that process by obtaining and sharing information (either

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[7] This help comes from people referred to in this report by the general term of job consultant (*intermediair* in Dutch) — a generic term for functions in the Netherlands such as reintegration consultant and in other countries by terms such as job consultant, case manager, job lady, or employment officer. It is their task to remove the conflicts, the obstacles, that job seekers encounter. Job consultants are usually paid to help job seekers find work, whether they work for private or charitable organizations, or for governmental authorities.

in digital form or on paper), by helping to select the right candidates or vacancies, or by preparing a job seeker for an upcoming interview. Ultimately, however, it is up to the employer and job seeker to communicate directly with one another and decide whether they can see eye-to-eye.

The role of consultants and their tools is to narrow the gap between job seekers and employers, to make it more likely that a job interview will take place, and to increase the chance that the interview will end well for both parties.

Technology Is Only A Tool

Finding an employer or a good candidate for a vacancy does not require technology. Although technology can speed up parts of the process, for example selecting a job seeker or a vacancy (see Chapter 3), in the vast majority of cases the job seeker, the employer or a job consultant can do everything that technology does.

It is only when technology results in experimental forms of matching that processes may arise in which the employer or job consultant become unnecessary.

Job consultants can help keep candidates from applying for unsuitable jobs, whether or not they use technology to do so. They can also encourage job seekers to consider categories of work other than those that they initially had in mind. But it is the face-to-face interview — the moment when the employer and the job seeker see and talk to one another — that constitutes the final and conclusive step of the process.

Improving the match between the demand for labor and the supply of job seekers therefore means two different things. First, in practical terms it means improving or making more effective use of the tools designed to result in that all-important interview. Second, during the interview itself, it means that both the employer and job seeker can accurately assess each other's potential value. It is interesting to note that one project using technology to digitize the job interview was canceled because the client feared losing track of the process.

The Brain — The Great Unknown

No one really knows precisely why a job seeker decides to apply for a particular job. No one can tell precisely how an employer decides to hire a particular candidate. The workings of the mind are a mystery. That may be why there are so many different ideas about what finding work really involves, and what factors are decisive when deciding to hire someone. Those ideas have a major impact on the various approaches used to help people find a job.

- One approach is based on the idea that the match between a job seeker and a vacancy depends largely on the degree of similarity between the job seeker's competencies and the competencies required by the job.
- Other approaches are based on the idea that the job seeker's personality must suit the culture of the organization offering the vacancy.
- In yet another approach, preliminary testing and assessment of the job seeker is kept to a minimum or done away with entirely. Instead, the job consultant attempts to find a trial placement as quickly as possible, so that the employer can see what the job seeker is actually capable of.

Each of these approaches has its own tools — methods, standard processes and unique technology. In the approach based on competencies, for example, the tools may be used to arrive at an objective assessment of someone's competencies. Opinions often vary among proponents of this approach as to what a "competency" actually is, resulting in a wide range of different competency assessment tools. Chapter 4 provides a number of examples.

Pressure to Find Work and Fill Vacancies

Job seekers are under pressure to find work, and employers are under pressure to fill vacancies.

- Job seekers are almost always under financial pressure to find work. Regardless of whether they live in Western Europe with its generous social benefits or in a country that does not have a formal unemployment benefits system, the long-term unemployed always get into financial difficulties eventually. Many job seekers also find being temporarily unemployed undesirable, unpleasant and socially humiliating. An additional problem is that the longer people are unemployed, the harder it is to find work as they become unaccustomed to the patterns of working life.
- Employers need to fill vacancies for economic reasons. Every country we visited enjoys economic prosperity. That means there is a plenty of work to be had and it would make good economic sense to take on more employees. That, in turn, would improve job opportunities for unemployed people having trouble finding work.
- Each of the governments concerned believes that work is good for people, the country and the national economy. The prevailing notions are that work is better than receiving benefits, that job seekers on unemployment should "do something in return," and that job seekers who refuse to cooperate should feel the repercussions — generally financial ones. What the various governments emphasize in their policy depends mainly on the state of the economy, the political balance, and a variety of other matters such as the country's culture, history, population breakdown, and the role that volunteer work plays in the community. All these factors (and probably many others) affect the financial and other rewards of job seekers and employers, the way assistance for job seekers is organized, and the measures — such as education and training — intended to clear away obstacles for those who want to work but cannot find a job on their own.

Besides these general observations, a number of aspects involving the matching of job seekers and vacancies could be found in just about every interview. Using the wisdom of hindsight, the organizations we met with (or who found their way into our desk research) could all be characterized by the working methods that they maintained as basic premise:

- Providing direct support for the job seeker — the "warm connections" line;
- Creating profiles of job seekers and vacancies (through assessments, etc.) as well as preparing job seekers for interviews — measure and know;
- Creating jobs and extending the job market — the job line;
- Using new technological opportunities — the technology line.

The practical experience reflected in this report is divided along the lines of these four groups.

Figure 2: Routes Between Seeking and Finding
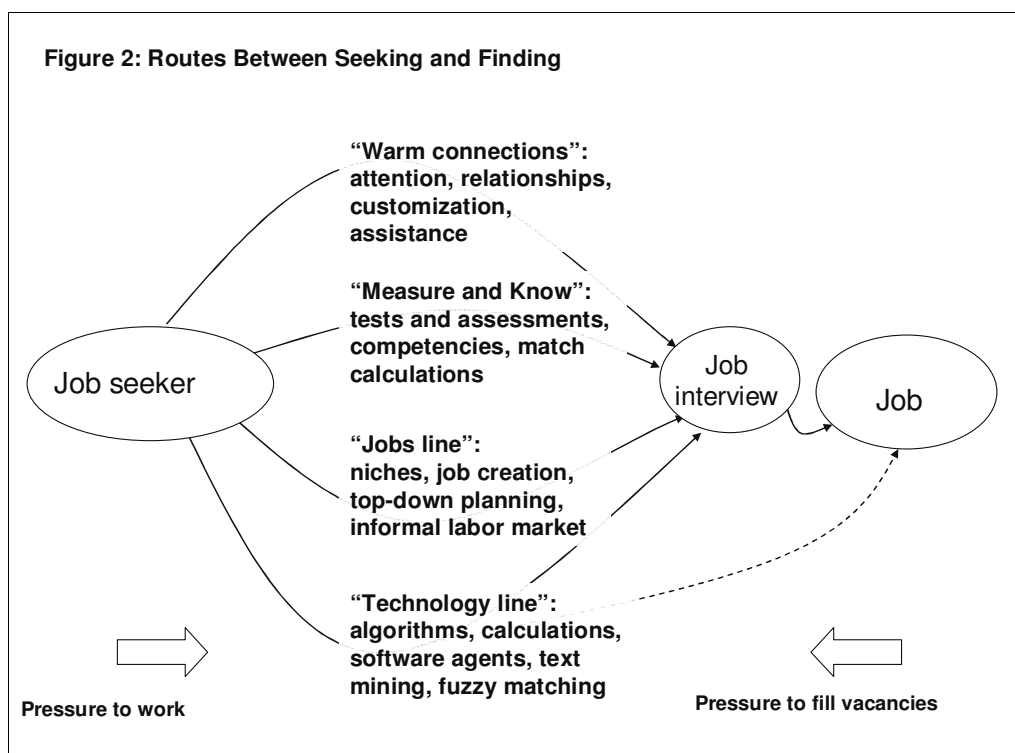
Roadmap
The report of this exploration into job-matching technologies is based in part on the lines as drawn in Figure 2, and are constructed as follows:
Chapter 1: Introduction
Chapter 2: General conclusions and observations
Chapters 3-5 describe the first three groups of practical experience:
As part of chapter 3: Warm connections
As part of chapter 4: Measure and Know
As part of chapter 5: The Jobs Line

Chapter 6 is an interlude in the running narrative, to describe the current significance and role of technology in job-matching.

Chapter 7: Practical experiences with the fourth group — the Technology line.
Chapter 8: New developments in technology and research.
Chapter 9 links the findings of this exploration to the assigned task of improving the general employment rate. This chapter focuses on the specific situation in the Netherlands but is relevant to the task as it exists in many countries, to get more people working.

Appendix: List of organizations visited and people interviewed[8].

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[8]   The English-language reports of the interviews are available as PDF files on request.

3 Practical Experience: Warm Connections

Introduction
This chapter is a presentation of seven practical examples of organizations using innovative approaches to get people working. All of these groups have a few things in common — they offer active support, they show respect for the job seeker, they build lasting relationships with their contacts, and offer low-threshold assistance. We call them the "Warm connections".

They are:
- Canadian Mental Health Association
- Link Up Employment Services
- North Carolina Vocational Rehabilitation Services
- Employment Services Centre Taipei-Keelung
- Israeli National Employment Service
- Brotherhood of St. Lawrence
- Hong Kong Job Centers

Canadian Mental Health Association
The target group of the Canadian Mental Health Association (CMHA — www.toronto.cmha.ca) comprises mentally disabled people. CMHA offers a complete service package to help them find work and provide them with social support.

> **The CMHA's Target Group**
> People with severe mental handicaps are known to be extremely hard to employ. Nevertheless, the CMHA has managed to find work for between 65% and 75% of its clients, while many of these people have never worked before.

Here, too, the client stands front and center at the Toronto office, managed by Jennifer Robinson. This means that the program respects its clients and uses any ideas they might have as a basic premise for getting back to work, even if the client has strange or unrealistic ideas: "I don't like angels so I don't want to work near a church". CMHA lets its clients discover what is realistic and what is not.

CMHA replaced its approach of "first train, then place" with one of placing the job seeker somewhere as quickly as possible combined with a strong emphasis on looking at what the job seeker is capable of. This change came about as a result of the evaluations that CMHA holds regularly.

This approach calls for worldly wise job consultants. They must understand the interests and motives of businesses; they must be able to talk knowledgeably with SME employers, who are the easiest to approach. Besides that, CMHA takes the initiative to create jobs themselves, for instance, in the catering and cleaning sectors. All of this means that CMHA job consultants must be enterprising of their own accord.

> **Quoting Jennifer Robinson:**
> - Get people into a job, then organize support around them instead of getting them ready and then placing them in a job.
> - The client description of the job that he/she wants is leading, we search an employer who *fits* the most.
> - We avoid assessments, but get people in the job and see there what they do and how they actually do it.
> - Training and support are given in the course of the job as needed and not before the job has started.
> - It is essential that a job consultant has a positive attitude towards the chances of finding a job for his client.

Another way CMHA goes about putting the client first is by offering ongoing assistance and care to the people they have helped to find work. Assistance is not linked to the usual half-year period to measure success, coupled to the financial reimbursement for proper placement. Generally speaking, CMHA tries to build long-term relationships between the job consultants, employers, and clients. Building relationships

calls for an investment but pays back in a big way over time if for no other reason than that, *if* things go wrong, the job consultant will have built up so much credit that the employer will still be willing to give it another chance, either with the same employee or a new candidate that the CMHA puts forward. The ultimate result being that 80% of all clients continue to function in paying jobs — despite the periodic misfortune.

Link Up Employment Services

The job consultants at Link Up Employment Services (www.linkup.ca) in Toronto focus on one of the hardest target groups there is to help — people with moderate to severe physical disabilities and who have been unemployed for longer than three years.

> **Link Up's Target Group**
> The unemployment rate among Canadians with a moderate to severe physical disability is no less than 98%. A Canadian law stipulates that job consultants on the government's payroll may only help people who no longer receive unemployment benefits and, therefore, have not had a job in more than three years.

According to founder Bob Santos, this particular target group does not benefit from assessments, training courses, or intricate job-matching schemes. His secret is marketing. It has to do with how you sell the job seeker's substance and capacities to the employer — not the "packaging". Before it becomes clear what kind of work they are going to do, Link Up provides its job seekers with little training or schooling, or none at all. Instead, the job consultants go straight to work, trying to convince employers that it is good to have disabled people in their workforce; not out of some sense of pity, but to fill the vacancies they have had so much trouble filling.

> **Quoting Bob Santos:**
> • Employment is based on ability, not on disability.
> • Finding jobs for the disabled will only work if you have a relationship with the employer.
> • Line ups are for movies, not for services.
> • The compassion is in your speech and in your voice, not in your tools.
> • The basic principle behind the service towards the employer is: I am here to help you make money.

The intermediaries at Link Up are trained to recognize the objections employers have and then defuse them. They know how to best present the job seeker and how to modify the workplace. They speak with employers until it becomes clear just what they want. Very often, it is different than what was posted in the want ad. Every year, Link Up helps between 300 and 500 disabled job seekers to find work. Technology plays practically no role in any of this. Building good relationships with employers and understanding what they need — this is what counts.

Link Up's working methods have been drawing international attention. Representatives from Brazil, England, China, and five US states have gone to visit. And, chances are they have all had the same thought, "If this works for such a hard-to-help group as this, it has to work with our clients".

North Carolina Division of Vocational Rehabilitation

North Carolina Division of Vocational Rehabilitation Division (http://dvr.dhhs.state.nc.us/DVR/VRS/vrconsumer.htm or DVR is one organization to have derived inspiration from Link Up. One difference, however, is that DVR is a governmental authority. It is much larger than Link Up and accustomed to different working methods.

It was exciting to see if the Canadian marketing approach could be scaled up, and if it was possible to teach job consultants accustomed to a set of working methods — some of them having done so for years — to work differently.

Stephanie Vinson, from the Employer Services department set up an intensive training program involving six of the thirty-four DVR offices with help from Bob Santos. A total of 130 job consultants were trained in nine months. The program involved marketing technology as well as techniques for building working relationships with employers, practical exercises, and ways of creating an environment in which consultant and employer both gain confidence in the job seeker.

> **Quoting Stephanie Vinson**:
> - A disability is any impairment that prevents you from working.
> - Without employers, no jobs.
> - We cannot serve the client if we cannot serve the employer.
> - The method is aimed to building trust with employers, understanding their needs and how they can be convinced with the right arguments: reframing the decision of the employer
> - Our work is not technology driven, it is relationship driven.

The new working methods involved a considerable change for the job consultants, from a "single-client approach" — involving the job seeker and his personal issues — to a "dual-client approach", in which the employer is the second half of the equation, and in whom the consultant invests time and effort. Stephanie Vinson says it simply, "Without employers, no jobs". A second change in mind-set involved the shift in emphasis on the job seekers' problems to their abilities — referred to as reevaluating the client[9].

At the time of the interview at DVR it was too soon to assess the changes. This will only become clear in 2008. If it is considered a success, the other offices will be brought in as well. Stephanie Vinson has already established some clear changes — the job consultants are out in the field much more now, the number of contacts with employers has increased dramatically, and the employers are responding positively. She feels convinced that it is only a question of time until the number of job placements increases.

Taipei-Keelung Employment Services Centre

The Taipei-Keelung Employment Services Centre (http://job.evta.gov.tw/klesa) is one of 350 job placement centers in Taiwan. Director Yuh-shan Wang is very clear about the fact that, at the center, it's all about keeping things simple and maintaining a low threshold. Job seekers can borrow PCs from the center — or use touch-screen terminals — to look for vacancies.

The system provides easy-to-use search facilities for suitable vacancies based, for instance, on job type, age, educational level, availability, and location. For those not versed in PC use, the Centre provides all its

> **Quoting Yuh-shan Wang:**
> Plans for 2008 are to invest in a higher reliability and speed of the computer system, not new sophisticated functions.

information on paper and, every day, the printed vacancy lists are refreshed. The local information system is linked to a nationwide database. By the end of 2006, the database contained information on 760,000 job seekers and 1,050,000 vacancies — and free to use by employers and job seekers alike. But, apart from all the machinery, the main purpose is to provide help — whenever and wherever they can. Anyone who needs assistance can turn to case managers, who make appointments on behalf the job seekers and then phone the employers afterward to hear how the job interview went.

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[9] The Link Up method employs a pragmatic breakdown into four types of job seekers, each of whom requires a different strategy:

A: Largely able to find work themselves, limited support, certainly in terms of training.

B: Sufficient competencies to find work, but has trouble getting in the door — a marketing problem

C: Insufficient competencies and difficulty getting in the door — needs a lot of support.

D: Motivational problems or people who do not want to work and sabotage the process.

The Council for Economic Planning and Development, the advisory body concerning the economy and job market in Taiwan, has taken a step closer to the job seekers, operating from the assumption that people in this group have limited computer skills and can do very little with all the web-based facilities.

For this reason, the Council started a new national project in 2006 using special consultants referred to as "job ladies". Every morning, they report to the Employment Services Centres, where they download a selection of the most recent job vacancies in their locality onto a PDA (handheld computer). They then head into villages and, in this way, literally bring the vacancies to job seekers with no access to the Internet. So far, there are more than 400 women active — themselves recruited from among poorly schooled job seeking women. This has done more than create work for these women. It gives substance to the understanding that the job consultant must be able to empathize with the job seeker.

Israel National Employment Service

To receive unemployment insurance or financial assistance in Israel, one must register with the Israel National Employment Service (INES — www.taasuka.gov.il) and be willing to look for work through the INES. This legal proviso results in a pool of about 200,000 people being registered with the INES, while the Service has no more than 20,000 jobs to offer each month.

To help job seekers, the INES offers the full spectrum of support, from PCs and easy-to-use touch screen terminals (similar to those at the Taipei-Keelung Employment Services Centre in Taiwan) to training courses, temporary jobs in which to gain experience, help with job applications, to assistance for single parents such as child care and subsidy for transportation costs to and from work — and all free of charge.

At its intakes, the INES maintains a few simple rules of thumb, all based on experience, to categorize people (see footnote 9.):

1   Will have no trouble finding a job.
2   Will need special assistance
3   Will be difficult to help
4   Welfare swindler

The INES has developed a specific strategy for each of these groups. For Group 1, it involves taking down the person's information and matching it to all the available jobs, for instance, using the computer. Group 2 will require special training or schooling and job placement. All training must ultimately lead to placement. For Group 3, these will be programs focusing, for instance, on teaching people how to work. According to Geula Havilio, director of external relations and special projects, Group 4 must be handled as "Clever against clever".

INES is also extremely active in helping to motivate minority groups not (or not yet) active in the job market. These include a large number of orthodox Jewish women, Arab women, and Ethiopian immigrants.

These groups are often hindered by a cultural threshold between them and the labor market — one that only their own leaders can remove. To this end, the INES works to build a relationship of trust with the rabbis, husbands, village elders, and clan chiefs. Only after these people have given their blessing can the INES begin preparing the women for the job market. The programs must conform in every way to the cultural preconditions of each target group. Courses for Jewish women are led only by women, the groups are always small, and there are many people to lend assistance — all from the same cultural background.

The result of these programs is that they tap into a great reservoir of talent.

One important aspect — and unique to Israel — is the direct influence of Jewish organizations outside the country, for instance, the STRIVE program which focuses on drug addicts and other hard-to-integrate groups. These foreign organizations are often the initiators, designers, and financiers of such programs. Some of them are highly successful.

> **STRIVE**
> Support and Training Result in Valuable Employees (STRIVE www.strivenational.org) started 21 years ago in a cellar in Harlem, New York. The unique program, that takes 1 month, focusses on changing all job-seekers that have trouble finding a job, or keeping one, into people ready for the labor market. Participants are taught to keep to their appointments and to improve their contactual and self-restrainment skills. They have to show that they can use their new skills to find work. When done with the STRIVE-training, one is considered "job-ready". After the training the students receive another two years of intensive assistance. More than 80% of all job-seekers to find a job through STRIVE, are still working after two years.

As a result of STRIVE, 85% of the addicts are now finding work compared to 25% previously. INES has taken it upon itself to copy this program.

Brotherhood of St. Lawrence
With its 700 employees and more than 1000 volunteers, the Brotherhood of St. Lawrence (BSL; www.bsl.org.au) is a major Non-Governmental Organization in Melbourne, Australia. BSL carries out the Individual Personal Support Program (IPSP) for harder to employ individuals.

The IPSP first determines the job seekers' skills, experience, and preferences, as well as the specific barriers obstructing these people from finding work. In addition to job placement, job seekers are set up in individual programs designed to remove these barriers, for instance, housing closer to the workplace.

The local authority, Centrelink, performs intakes for new job seekers and then refers them to the BSL. As part of the intake, Centrelink estimates the degree of difficulty with which each individual will be able to find work, expressed in its Job Seeker Classification Index. According to Daniel Perkins of BSL, however, the index does not work well. Very often, an overoptimistic estimate by the people at Centrelink will place job seekers in the normal program while they should really be in the IPSP. The problem lies in the intake procedure, which does not reveal the job seekers' personal barriers properly.

> **The Importance of Sustainable Matching**
> Daniel Perkins perceives it as a hidden negative social impact when people are forced to work at jobs in which they don't feel comfortable. Unemployment may drop on the short term but, on the long term, people lose the motivation to improve their lives. This does not result in activation but in hidden unemployment. Perkins estimates that hidden unemployment — people stuck in the wrong or in stifling jobs — runs at about 7%, more than one and-a-half times that of the 4% unemployment rate in Australia.

Hong Kong's Job Centres
In 1995, Hong Kong started a Job Matching Programme which combines individual help with a low-threshold information system for vacancies and résumés. In its twelve Job Centres[10] (www.labour.gov.hk) job consultants provide assistance

> **Hong Kong Social Welfare Department**
> The Social Welfare Department (http://www.swd.gov.hk/en/index/) offers a supplemental range of specific activities and programs for the long-term unemployed as part of its Comprehensive Social Security Assistance Scheme. Before job seekers can take part in this scheme, they go through intake with a coordinator who will then serve as that person's case manager. Unemployed people who participate in one of the activities must continue to search actively for work on their own. The active assistance focuses on specific target groups — drug addicts, disenfranchised youth, the homeless — and its central aim is to get people from these groups back on their own feet.

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[10] Furthermore, there is a specialized Job Matching Centre which helps employers to fill difficult vacancies.

both to job seekers and employers and intermediate between them. The Centres also organize job fairs, training courses for job seekers, trial placements, and other initiatives.

The Job Centres have built up a large-scale information system in support of its efforts. In 2006, the website was visited just under a billion times — this in a job market area of 3.6 million people. The computer system also functions as an access point to the eight largest sources of job vacancies in Hong Kong.

In 2002 the Centres introduced Vacancy Search Terminals (VSTs) for job seekers with few computer skills or Internet experience. Since 2003, the system has also offered Internet access. The VSTs have been installed in more than 200 public buildings in Hong Kong. The system features easy-to-use functions including the ability to search by date, job type, location, and salary. The jobs have no further textual description nor do they list the competence required. Instead, each is accompanied by the name of an administrative consultant whom either the job seeker or the employer can contact.

Notable points about "Warm Connections"

It is of essential importance in the approach of warm connections to build up good relationships with the employers. It is also important to assume a positive attitude when working with job seekers and offering them help. Both points — building good relationships with the employers and maintaining a positive attitude — call for special qualities on the part of the job consultant.

Other points:
- Marketing job seekers and relationship management with employers is something you can learn.
- Being consistent in maintaining a low threshold means bringing the vacancy to the job seekers if they don't come to you.
- That which the employer says he's looking for is not necessarily what he really needs. Inquiring more deeply into what is really needed and thinking together about organizing things differently at work can open doors to candidates who originally did not appear to qualify for the job.
- Standard financing mechanisms used to place job seekers do not provide sufficient yield on the investment in a long-term relationship with employers and job seekers, although the investment pays itself back because the chance of placement increases, as does retention.
- Within the framework of hot links, technology has a limited supporting role.
- The importance of a positive attitude on the part of the job consultant is an underestimated success factor in job placement[11].

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[11] In our interview with professor Hollingsworth at the University of Wisconsin, Madison, he pointed to research that demonstrates, among other things, the significant correlation between professional attitude, the personal convictions and value sets of the program leaders, and the program's success.

4 Practical Experience: Measure and Know

Introduction
No one knows exactly what goes on in the mind of the employer or the job seeker while they are searching, talking, negotiating, and making decisions. Furthermore, none of these cogitations can be simulated in any form of automation, database, or sophisticated algorithm. In fact, they don't even come close.

Anyone making tools designed to support job seekers in their quest for work (or employers in their search for suitable employees) will ultimately have to make some assumptions about what all those brain cells are doing and how they handle all that information. The brain is made up of a hundred billion nerve cells and a trillion connections in between. This very fact will compel the software designer to make some choices and do a fair amount of simplification.

One result of this fundamental failure to understand human thought is that a whole range of assumptions, simplifications, and choices has arisen concerning the question of which aspects[12] the job seeker considers most important in a job. When assumptions are not assessable, they may become convictions.

The practical examples in this chapter have one thing in common. In preparation for that all-important job interview, they attach importance to measurement — assessment, testing, analyzing, profiling — with one or more of the following aims:
- To establish to what degree the job seeker avails himself to those characteristics considered important, for instance, motivation or leadership qualities. It is preferable to establish these traits objectively and in a standardized fashion.
- To compare the score against the characteristics called for by the vacancy. That means establishing these requirements. It also means that the characteristics of the applicant and the vacancy must be set in comparable terms.
- To pass judgment on the degree of fit between the characteristics of the job seeker and the job. This calls for a calculation of the degree of commonality — from rough, in the sense of "yes" or "no" to refined, in the sense of scores or multiple variables.
- To calculate the likelihood that the job seeker can fill the vacancy well[13].
- To find those vacancies the characteristics of which suit the job seeker best, whether in an absolute sense based on a score or a standard, or in a relative sense by comparing the vacancies to find the most appropriate one.
- To establish which characteristics on the part of the job seeker require improvement so that supplemental coaching, schooling, or training can be applied.
- To establish how the job seeker's characteristics compare to those of a specific group — such as all job seekers or current employees — or to those of the exemplary employee ("We need more workers like Mary!")

All these assessments, tests, and measurements have been automated and are available online for job seekers, employers and for the job consultants helping them. In every case, the software converts all these different measurements and scores into a variety of overviews, graphs, and reports. The age of paper and putting a little "x" in a box with a pencil are gone

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[12] *Characteristics* is used here as a collective term for competencies, skills, personality traits, and other such sets.

[13] This is possible in the absolute sense based on a standard (the assertiveness score is 7.3; however, the job calls for a score of 8.0) or in a relative sense by comparing job seekers to find the best candidate (Bob's score is the same as that of Mary, whose employer views as exemplary).

for all time. From the thousands of simple vacancy sites to the most sophisticated psychological tests, ICT has become the standard supporting technology.

So much for the commonalities. Now to the convictions. What is the true key to finding a good match between a job seeker and a vacancy?

Organization:	The key:
Matchworks	Warm communication lines supported by the Employment Skills Profiler measurement instrument.
Chandler Macleod	Development and commercialization of the Employment Skills Profiler measurement instrument.
QuietAgent	"What do you love to do?"
Omnia	"Do you fit the organizational culture?"
The Regeneration	Marketing of the job seeker as a unique "brand".
Profiles International	Behavioral characteristics
De Witte & Morel	Motivation, personality, cultural fit
Synques	Motivation, personality, basic behavior
HRVision	Self-learning matching algorithms, the employer's judgment concerning performance determines the choice of tests.

Matchworks

As a non-profit organization, Matchworks (www.matchworks.com.au) is involved in carrying out programs created by the Australian government to find work for the unemployed. The organization operates in Sunshine, an underprivileged neighborhood in Melbourne. Having privatized its job seeker support, Australia has a number of things in common with the Dutch system. There is one big difference, however: the government is the central purchaser of all job seeker services and it functions as such. This makes it simpler, for instance, when standardizing tools.

> Matchworks uses a working method employing warm lines of communication as described in the previous chapter but makes use of the Employment Skills Profiler (ESP), an instrument developed recently to provide a quick measurement of just how much chance a job seeker has for a particular vacancy and which jobs are most appropriate[14].

> As executive organ, Matchworks receives its job seekers from the local CentreLink. During the first 13 weeks of their unemployed status, job seekers must try to find work on their own. If they do not succeed, then budget is freed up for assistance by a job consultant or employment officer, either from Matchworks or other organization designated to help job seekers.

The Australian System in Brief
The Australian government runs an active, centralized policy to integrate the long-term unemployed into the workforce. Responsibility for the policy lies with the Department of Employment and Workplace Relations (DEWR, www.dewr.gov.au). The organization central to the process is called CentreLink (www.centrelink.gov.au), a government agency designated to help people to become self-sufficient. CentreLink registers all job seekers who come to the government for support. The actual reintegration measures are performed by a Job Network Provider (JNP), a private or municipal organization operating under contract from CentreLink and whose aim is to find work for job seekers, and the long-term unemployed in particular. MatchWorks is a Job Network Provider.

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[14] See also the description of Chandler Macleod hereafter.

Assistance is applied immediately and intensively. It starts with a standard training course adapted to the specific needs of the individual job seeker. The course offers skills to help the individual get back to work — how to look for work, how to approach the informal job market, how best to apply for a job. In addition to skills of this kind, the training is designed to alter the job seeker's attitude and make it more positive, thereby serving to motivate him. When the training is complete, the job seeker receives assistance in finding work. While the entire path can last up to two years, Matchworks has managed to help 85% of its job seekers to find full-time or part-time work.

Initial experiences with ESP have been positive. The instrument is put to use within the first week to measure the job seeker's competencies and skills. And, as ESP is linked to a standard list of jobs, and to the competencies and skills that they demand, the built-in software can start calculating immediately what type of job will be most appropriate for a particular job seeker.

Chandler Macleod

Chandler Macleod (CMcL; www.ChandlerMacleod.com) is the company behind the Employment Skills Profiler (ESP) that Matchworks and other Australian organizations are using. The group is one of Australia's largest HRM companies with experience in the development of assessments, HRM consultancy, recruitment, and development of online testing and assessment tools.

Based on existing tools being used commercially, CMcL developed ESP together with the Department of Employment and Workplace Relations and the business world to serve as a tool designed specifically to measure "employability skills". Using this tool, the Department had hoped to lower the cost of measurement while arriving at better matches between job seekers and jobs.

CMcL's Employability Competences:
- Communication
- Teamwork
- Problem Solving
- Initiative and Enterprise
- Planning and Organizing
- Self-management
- Learning
- Technology

CMcL has broken down the concept of employability into eight generic competencies. Furthermore, they have mapped out which of these eight competencies are required for 1400 different jobs, and to what degree they are required. ESP does not measure characteristics such as "motivation".

ESP is available on the Web for job consultants at all Job Network Providers throughout Australia. Job consultants are first trained in the use of ESP. The job consultant goes though the tests with the job seeker. This takes between 60 and 90 minutes. (ESP cannot be used for self-assessment.) ESP determines the job seeker's profile in four consecutive tests:
- The ability to understand instructions
- Numeric skills
- Language skills
- Personality profile

Based on the assessment and the database of 1400 job descriptions, ESP compares the competency scores to the score on the four tests. It produces three kinds of report:
- a report that indicates the most suitable job for the job seeker;
- a report of the job seeker's strong points and points for improvement;
- a detailed report of the nature and degree of matching between a job seeker and a specific vacancy.

The job consultant goes through the assessment results with the job seeker. ESP's approach emphasizes the job seeker's strong points so the test results can be used immediately for a résumé. ESP is not only useful for job seekers — the reports it produces also give the job consultant a foothold for further discussions with the job seeker. This can allow the job consultant to ask if the job seeker can truly manage the job he is hoping to get. Another positive effect is that a report of this kind can make the job seeker aware of previously unknown jobs, or jobs he had not understood correctly, but do require the competencies that he has to offer. It is essential to the success of ESP that the business world was and is directly involved in its development.

QuietAgent

QuietAgent (www.quietagent.com) works to find the most effective link between job seekers and jobs by zeroing in on what the job seeker in question actually likes to do ("what makes him tick"). Jason Kerr, QuietAgent's CEO, believes that competencies are useful, but only if they are defined on the basis of the job seekers' "pleasure profile".

> **Quoting Jason Kerr:**
> For youth job seekers, QuietAgent is useful as they have no job history, no experience with jobs, don't know their skills and have no overview of the content of jobs, but usually they know what they like and therefore can be matched according to that.

The job seeker uses a web-based tool for linking labor supply and demand to describe what he would like to do most. What counts is not his employment history, his educational background, his interests or his assessment results, but only what he actually enjoys doing — regardless of whether he has had years of experience doing that type of work or has never attempted it before.

The underlying idea is simple: the more closely a particular job resembles what the worker likes to do, the more likely he is to stay with it. That is true not only of ordinary job seekers but most certainly of hard-to-employ job seekers.

QuietAgent uses various algorithms developed in-house to translate the job seeker's pleasure profile into a set of twelve standard competencies, which it then compares with the massive O*net database, which contains descriptions of 48,000 jobs and the competencies they require. This is how QuietAgent connects what the job seeker wants and the most appropriate jobs for him. Job seekers and employers can search QuietAgent's database and contact one another for an interview.

> **O*Net Competences**
> Worker Characteristics:
> - Abilities
> - Occupational Interests
> - Work Values
> - Work Styles
> Worker Requirements:
> - Basic Skills
> - Cross-functional Skills
> - Knowledge
> - Education
> Experience Requirements:
> - Experience and Training
> - Basic Skills (entry level)
> - Cross-functional Skills (entry level)
> - Licensing

The New Zealand government has made QuietAgent the compulsory starting point in helping the unemployed find work, for two reasons:
- QuietAgent produces a better fit between the job and the unemployed person, increasing the likelihood of a longer period of unemployment;
- In practical terms, QuietAgent has led to a 30% improvement in efficiency within the New Zealand Department of Labour.

The QuietAgent approach is gaining a foothold in the US as well. The government agency National Able recently began using it, and the City of Chicago intends to launch a pilot project in the near future.

Omnia

A good match that is likely to result in long-term employment relationship requires more than a suitable fit between the job seeker's skills and the requirements of the vacancy. Whereas QuietAgent focuses on what the job seeker prefers to do, Omnia (www.omniagroup.com) concentrates on the employer. You can put a lot of effort into profiling skills and vacancies and calculating how close the fit is, but if the candidate and his new

According to **Julie Studer**, Senior Vice President Operations and Business Development, the employer should use the results of the assessments to prepare for the job interview. She warns, however: *"An assessment is always a snapshot and the applicant may have had an off day filling in his profile. Any assessment should count for no more than 30% in the total decision-making."*

boss and co-workers don't "click", then education and competencies count for very little. Omnia has developed two assessments, one to identify the job seeker's personality traits and the other to characterize the employer's organizational culture. The two are defined separately to arrive at a good match. It is the employer who asks to have an assessment carried out.

One notable feature of the Omnia method is the division of tasks between man and computer. Omnia uses an algorithm developed in-house to convert a questionnaire completed by the job seeker into a personality profile with eight variables. The interpretation of that profile, however, and of the extent to which it matches a particular vacancy and organization is entirely in the hands of trained analysts. Attempts to leave

Omnia's Elements of Behavior
- Assertiveness
- Conservativeness
- Gregariousness
- Skepticism
- Impatience
- Persistence
- Independence
- Need for structure

this entirely to the computer failed. It is work that requires skills, experience, and subtlety that cannot be automated.

Besides the degree of fit between job seeker, job and organizational culture, the analysts can use the profiles to indicate which cultural and personal pitfalls might pose a threat to the pending employment relationship. Omnia remains in touch with employers for a long time to assess how well the new employee actually performs.

Omnia is currently working on a new type of assessment that will characterize the cultural differences between generations more precisely to arrive at better matches.

The Regeneration

Noel Jones and Peter Landis founded The Regeneration (www.theregeneration.com.au) in late 2005. At first glance, their website resembles one of the dozens of standard Australian job seekers' sites. What makes The Regeneration special, however, is the way the job seeker profiles himself. The customary method is to derive a fixed

The Regeneration Skills
"Skills ...are really anything a person can do, knows and has experience with, thus including his hobbies, his handling of his personal life, his activities within and his knowledge of the community he lives in."

set of competencies from a vacancy and assess the extent to which the job seeker has these competencies.

On The Regeneration site, however, the job seeker describes his skills in his *own* words. It is by no means a requirement for that description to be based on his employment history. Someone who likes fixing up old cars might list "car mechanic" as a skill and then specify "fixing old Volkswagens". The image of someone's qualities that emerges is more accurate and broader than the standardized traditional résumés and profiles used on other vacancy sites.

The Regeneration requires every job seeker (regardless of their prospects, their wanting a serious job or temporary work, or their employment status) to fill in his unique set of 15 personal skills. Taken as a whole, these constitute his SkillSignature®. The job seeker pays to have his SkillSignature placed on the site; in other words, The Regeneration helps job seekers to market their skills on the website. Employers can search the database of job seekers freely, and at no cost, and get in touch for an interview.

The Regeneration targets two groups of employers: small companies that want to keep recruitment costs to a minimum and the informal labor market of companies and private parties (estimated to be four times the size of the formal labor market).

Profiles International

Profiles International (www.profilesinternational.com) operates in the international marketplace and has its headquarters in Waco, Texas (USA). The company has developed a huge number of HRM tools, one of which is the Profile XT (PXT) assessment, intended for general candidate selection, employee training and career planning purposes. PXT is used mainly by businesses, but Profiles International has also introduced a version to test students and for a number of Workforce Development Programs in the US.

> **Theoretical basis for PXT**
> PXT is based on the "Big Five" personality traits as pioneered by Warren Norman:
> ▪ Extroversion
> ▪ Agreeableness
> ▪ Conscientiousness
> ▪ Emotional Stability
> ▪ Intellect/Openness

Chuck Wilson, Senior Vice President of the company's international division, has made it clear that PXT was not designed to measure educational level and work experience — there are already plenty of tools on the market that do just that. Instead, PXT identifies the job seeker's personality and "style" by measuring three main traits:

> **Quoting Chuck Wilson:**
> "Many job descriptions are mainly factual. There are enough assessments that can determine to what extent a candidate fulfils those requirements".
> "PXT assessments show personality and style characteristics that can help to understand someone's behaviour and thus can help prevent conflicts or misunderstandings."

- Cognitive abilities (capacity to learn, language and math skills, reasoning)
- Behavioral traits (including assertiveness, attitude, independence)
- Occupational interests (expressed in occupational categories such as "technical" and "services".

The report that PXT generates from the tests identifies the three areas mentioned and provides an overview and suggestions for questions to be posed during job interviews.

De Witte & Morel

Hudson De Witte & Morel (DW&M; http://jobs.belgium.hudson.com), located in Ghent (Belgium), is part of the Hudson Highland Group, Inc., a major worldwide supplier of HRM and recruitment products and services. DW&M has its own 17-person R&D department and, since 2000, has developed all its psychological and other tests (as well as software) in house. The department supplies both the Hudson Highland Group and external clients such as company HRM departments.

According to Etienne van Keer, Director of the R&D Department, Hudson's R&D approach is tailor-made, grounded in science and based on understanding the client's world and delivering excellence. DW&M uses a set of 40 basic competencies, divided into approximately 110 subcompetencies. It takes only eight to describe all jobs, but a custom

approach is always required that is tailored to the client's specific situation. DW&M recently developed the Career FIT Indicator for job-matching purposes. This tool measures the candidate's personality, motivation, and "cultural fit" and compares the scores with the vacancy's requirements.

A more recent development is the construction of a simulation tool to test how applicants behave in the work situation. The tool simulates a hectic week beset by project-management problems. The software offers the candidate the relevant information in the form of e-mails and reactions to his responses with new information and further complications.

DW&M works only for the middle and upper segments of the labor market. Etienne van Keer suspects that more poorly skilled job seekers who are difficult to place have specific requirements. If a test were to be developed for this group according to the DW&M approach, the following would have to be considered:

- The target group has fewer PC skills, something that the tests would need to take into account.
- If testing is to be kept to a minimum for cost considerations, a general intelligence test should be given; that will always offer the best forecast of success, regardless of the candidate's educational level.
- If the jobs are less demanding in nature, a subset of four or five competencies is probably enough for an accurate description.
- It is important for the job seeker to feel at home in the organizational culture.

> **Quoting Etienne van Keer:**
> Testing based on behavioral approach that goes back to Jung and Adler is not applicable in the HRM context. "Jung has no place in an industrial context". HRM managers in client organizations want to know and measure another dimension of candidates.
> That dimension is expressed in competences: observable, measurable elements of human behavior that can be linked directly with job requirements and are understood by managers and HRM consultants.

Synques

Synques (www.synques.com) is located in the Netherlands and India. Synques's services are based on a psychometric analysis of human behavior. The tests and software are developed in-house. Synques's work in the Dutch social services sector consists of training, coaching, and placement for job seekers, but it also provides tests and the associated software for major HRM companies such as Ruhmann Associates in the US. Ruhmann Associates considers Synques an innovative developer of assessments.

> **Quoting Roy Ramdjanamsingh:**
> The personal relation between a counsellor and his client is a key factor for successful coaching; the methods and the tools that the counsellor uses are far less important than the fact that the client has trust in his counsellor and vice versa.

Roy Ramdjanamsingh, CEO of Synques, says that the company's approach is based on DISC[15], which claims to offer a universal language for describing human behavior (regardless of language, culture, or other factors). The system distinguishes between "basic behavior" and "situation-related behavior" (for example in a working environment). The DISC-derived assessments and tests can help job seekers understand their self-image, their basic behavior and their ideal work setting. That not only helps them find a better job match; it also helps them feel more at home in their work and communicate more effectively with their co-workers and boss. Synques also trains job consultants in the Dutch social services sector, teaching them to identify the basic behavior, work style, roles and internal motivators of their

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[15] DISC stands for four aspects of human behavior: Dominance, Inducement, Steadiness and Compliance, first noted as a group by the psychologist William Marston.

clients. They look for vacancies that match these motivators and their work style. Synques has worked with Professor Emeritus Eugene Valentijn (University of Groningen) on a benchmark for 220 categories of occupation, with the requirements (cognitive, competencies, behavior) having been mapped out for each one. For example, they have found that the occupation of accountant requires an introvert work style. A candidate with an extrovert style who wants to be an accountant must be aware of the discrepancy between his work style and that of the company.

HRVision
One special company in this chapter is the Israeli company HRVision (www.hrvision.com). Compared to the other approaches in this chapter, the roles are reversed. It is not determined beforehand — whether practically or theoretically — which test or assessment is best. The employers determine that, and in a most simple way: they indicate, on a scale of 1 to 6, how well their employees are performing.

Following that, HRVision utilizes a broad range of tests to assess a portion of the existing employees. The tests vary from cognitive skills to stress tolerance. Thereafter, self-learning algorithms seek out[16] the strongest correlations between the employer's evaluation of his staff and combinations of their individual test results. First of all, this reveals which tests make the most sense to use and, second, which combination of scores offers the best predictions. The best scores in the test which are deemed most relevant then constitute the tests (specific to each organization) for job seekers.

The highest possible score is by no means a precondition for parameter tests. A number of average scores may correlate more highly with good performance than the highest possible scores for traits such as assertiveness and customer-friendliness.

> **Quoting Emmanuel Cohen:**
> The analysis may show that a specific combination of scores on two or three different tests has the highest correlation with optimal performance.

HRVision does not analyze vacancies, nor does it look at job seeker competence. By creating a direct link between employer assessment and test results, HRVision claims to have an extremely high prediction rate. Retention is "built in", as it were, in these tests. The fact that someone has functioned well for a longer period of time also weighs heavily in the employer's evaluation.

HRVision's working method makes use of advanced statistical methods and self-learning algorithms. In that sense, the company is highly technical by nature. Here too, however, the final outcome of all the analyses comes from job interviews.

Notable Points about "Measure and Know"
The practical experiences in which "Measure and know" plays a major role, reveal a huge variety of opinions and ideas about what exactly should be measured. Although there are points of overlap in what the various assessments measure, we can distinguish between three general categories:
▪ Competencies that are correlated with occupations;
▪ Cognitive skills;
▪ Personality traits, with or without "motivation" as an important aspect.
Opinions also differ as to the need for standardization. One method is to reduce what is being measured to a standardized[17] set (of competencies, personality styles and so forth).

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[16] Chapter 7 gives more examples of comparable technologies.
[17] The job consultant or employer often has the option of modifying the profiles so that a specific vacancy can be given a tailor-made description.

Another opinion, however, is that standardization is a stricture that will prevent the essential characteristics of job seekers and vacancies from becoming visible.

Other points:
- Competencies and subcompetencies can be classified and categorized in many different ways. Compare, for example, Chandler Macleod's eight skills to the eight general competency factors of the international SHL Group:
    - Leading and Deciding
    - Supporting and Cooperating
    - Interacting and Presenting
    - Analyzing and Interpreting
    - Creating and Conceptualizing
    - Organizing and Executing
    - Adjusting and Coping
    - Enterprising and Performing

  These factors are divided into multiple "dimensions" which, in turn, are divided into "components." For example, "adjusting and coping" consists of the dimensions "adjusting and dealing with change" and "dealing with pressure and setbacks". The latter is further divided into the components "emotional self-control" and "dealing with criticism".

  Each of these systems of competencies, skills, and their subdivisions has its own underpinnings, mostly derived from psychological theory. Each also has a measurement method developed to make these competencies, skills and so forth operational; to express them in key figures and validate them. There are no objective benchmarks comparing these methods, however.

- More than one interviewee said that the decision to hire someone should never be based only on an assessment. Virtually nothing is known about the way the employer (or the job consultant) combines the information derived from an assessment with "other" information and weighs it against that information.
- When a government (such as in New Zealand and Australia) has the power to make a particular assessment a compulsory standard for all job seekers in the country, its doing so will do much to promote standardization, comparability of data, and the creation of historical data on the labor market's requirements and changes in the demand for and supply of labor.
- Although on the surface of things, HRVision appears to be related to the other methods described in this chapter, it is in fact quite different. The basic premise is not which competencies are most relevant for a job, but the results of tests taken by the existing group of employees, the results of which are correlated with their actual performance. The performance of these employees, as assessed by their employer, becomes an objective benchmark for the job applicants. As a result, HRVision becomes part of a diverse group of organizations (including Link Up, Employee Retraining Board, Canadian Mental Health Association) that focus on the needs of the employers and attaches great value to what they want and believe. HRVision's method may well offer a starting point for developing a general benchmark to determine the value of the various methods designed to identify competencies.

5 Practical Experience: The Jobs Line

Introduction
Although the examples given in the previous chapters vary in their approach and practical details, they all operate in the mainstream of job placement. They concern normal jobs, with job consultants mainly focusing on placing job seekers and with the existing range of vacancies as a given.

In this chapter we look at organizations focusing mainly on the labor market — finding new niches, quick matching, formalizing informal jobs and planning long-term staffing requirements.

Organization	What they do:
Daywork	Access the niche consisting of jobs with unusual/short appointments and irregular working hours
Employee Retraining Board Hong Kong	Refresher and retraining combined with job creation
Singapore	National competency requirement planning to determine long-term education and additional training of the labor force
Virtual Employment Services Centre Taiwan	Quick, one-stop, 24-hour help for job seekers; focused on quality and standardization

Daywork
Many vacancy sites focus on normal jobs in the formal labor market. The informal market is much larger, however. In Australia, it is estimated to be four times the size of the formal labor market. The informal market consists partly of temporary or short-term vacancies and partly of job seekers who are only looking to work part time. Carolyne Taylor, founder of Daywork (www.daywork.com.au), has designed a vacancy site for short-term jobs, moonlighting and odd-jobbing.

> **Quoting Caroline Taylor:**
> "Daywork is dedicated entirely to part-time and temporary jobs."

Speed and availability are more important in the odd-job market than detailed matching or a long résumé. The point is to match time slots. Who needs help on Tuesday and Thursday morning? And who's available at those times?

Daywork is a market for time slots and offers no other services beyond its website. The employer does the actual matching, after it has found someone in Daywork's database who is prepared to work on Tuesday and Thursday mornings for three months.

Matching is based on the availability of the job seeker in this niche. Daywork's website has a search engine that operates on such variables as type of job, availability and distance. It also checks whether the employer's age and educational requirements have been met.

Daywork mobilizes a group of potential job seekers who may be of interest to employers: women with small children (whether or not they are highly educated) who would like to work part time and can do so, but cannot find jobs with schedules that suit theirs. The people in this group are generally not registered as unemployed or as job seekers. What Daywork does is give employers access to them, and give them access to jobs that they will find appealing.

Employees Retraining Board

The Employees Retraining Board (ERB; www.erb.org) in Hong Kong aims to use courses, training programs and other services to ensure that the competencies of Hong Kong's labor force continue to meet the changing demands of the labor market. Its most important target group consists of job seekers who are older than 30 and have little or no education. The ERB receives more than 130,000 applications every year, trains approximately 100,000 job seekers each year, and is able to find 84% of them a job. About 69% are still working nine months later. The ERB has its own training centers and organizes job fairs and mutual support groups where job seekers can network with their successful counterparts.

Patrick Pang, ERB's Deputy Executive Officer, emphasizes that employers play a major role throughout in the design, testing, roll-out and evaluation of the new training programs. ERB's courses and programs reflect what employers actually need.

> **Quoting Patrick Pang:**
> "The ERB course sets the standard for a high level of graduates, in fact so high that graduates can later easily find work at the private market."

Job seekers do not receiving training with no further obligation. Each training program ends with a compulsory test. The requirements are strict and may even be harsher than those set for comparable positions in the private sector.

Besides its courses, ERB is active in uncovering and developing informal job markets, where there are many hidden jobs. The first successful example is the market for local domestic helpers. Such jobs used to be taken by immigrants; now they are filled by local job seekers. ERB is working to develop a market for masseuses and is considering the market and jobs for elderly care and babysitting.

Singapore (Ministry of Manpower / Workforce Development Board)

Singapore is actively pursuing long-term, strong growth in the number of jobs. Central government is aiming to achieve a job surplus combined with a well-regulated influx of temporary foreign workers. The Ministry of Manpower (www.mom.gov.sg) has drawn up long-range plans for matching labor supply and demand. For example, it has calculated a shortage of 400,000 jobs for the 2007-2010 period in the event of 4-6% growth in GDP. Its plans — a form of pro-active, long-term job matching — focus on general educational level and economic sectors, and not on the detailed level of job categories. Reality does not always cooperate, however, and this top-down approach to long-range matching is easily disrupted.

> **Growth in Singapore**
> "If we want our economy to grow, if we want to be strong internationally, then we need a growing population and not just numbers but also talents in every field in Singapore… we need immigration [and to] welcome talent to come to Singapore."
>
> **No Need for Unemployment Insurance**
> The best insurance against unemployment involves ensuring that there are more jobs than the people capable of filling them.

Singapore has a dedicated program for enhancing its own labor force that is being carried out by the Workforce Development Agency (WDA; www.wda.gov.sg). The WDA uses the Ministry of Manpower's forecasts and consults employers. Every year, it ensures that approximately 100,000 employees are retrained or receive additional training and that 22,000 job seekers are placed. It runs three complementary programs:

- the Employability Skills System, focusing on upgrading the skills of the labor force;
- the Workforce Skills Qualifications program, aimed at identifying career paths for specific sectors and the related training and educational requirement;
- the National Skills Recognition System, a program that identifies the skills and competencies required for jobs in Singapore's priority economic sectors; the competency requirements of ten of these have been mapped out.

Virtual Employment Services Centre

The Virtual Employment Services Centre (VESC; www.ejob.gov.tw) in Taipei was set up by the Taiwanese government in 2004, when it faced the challenge of making better use of its "own" labor force. While many Taiwanese were unemployed, foreign workers had to be brought in to keep the country's economy going.

Alongside this challenge, the Taiwanese Council for Economic Planning and Development was keen to speed up the job placement process for job seekers and to arrive at a form of standardization. It set itself the aim of helping job seekers round the clock and offering a one-stop shop for everyone who called or e-mailed asking for help finding a job.

The VESC is now entirely set up to offer rapid, comprehensive assistance. It has 35 staff members and is available to anyone in Taiwan looking for work or for a different job. The VESC is entirely virtual — job seekers cannot visit in person.

Manager Jason Tseng has translated the demand for standardization into specific measures. All the job consultants must be all-rounders. They go through a demanding four-week training program to ensure that their work is consistent. The VESC sets daily and monthly production (contacts) and performance (placement) targets for its consultants, along with 100% quality control and peer reviews among the job consultants. The VESC takes its targets very seriously. One of its aims is to set an example of service and customer-friendliness for other government organizations in Taiwan.

> **Quoting Jason Tseng:**
> "All consultants have the same four weeks training to learn to work in the same way, follow the same process and have the same interpretation of legislation."

Notable Points about the "Job Line"

- There are a huge number of jobs that never appear on the ordinary vacancy sites — odd jobs, part-time jobs, jobs that require working unusual hours, etc. depending on the attitude of the person searching for a job or offering the vacancy.
- By focusing on the nature of these jobs and what job seekers and employers specifically require of them, we can develop search engines (and related software) that serve precisely that market segment. Daywork's product is a good example.
- There are a huge number of employment opportunities that are not currently referred to as "jobs" — domestic help, babysitter, elderly carer, etc.
- It is possible to create formal jobs at various levels by offering courses .

6 Interlude: Job Matching and the Roles of Technology

<u>Introduction</u>
Organized economies and, therefore, labor markets have been around for thousands of years. Until the mid-19th century, there was no technology available to help match job seekers and employers. They found one another through personal contacts or through the mediation of others.

The first major change in this process came with the advent of printing technology. The large-scale production and distribution of printed matter began in 1556, when the monthly *Notizie Scritte* was published in Venice. More than three centuries later, in 1864, William James Carlton began selling advertising space in newspapers. Not long thereafter, employers discovered that they could advertise vacancies to a much larger audience in this way, at a very low cost. Job seekers, in turn, had access to a much larger number of vacancies than they had had by word of mouth or through their networks.

All this meant a change in the way information was provided. Employers now had to describe the job they were advertising in a text without knowing who would read the ad. It was important for them to describe the vacancy as accurately as possible, including their ideas about the ideal candidate. That was because the greater reach had a disadvantage — many more job seekers could apply for the job than before, and every applicant above and beyond that one ideal candidate only cost the employer money.

Printed matter remained the "technology" with which employers found job seekers for the next hundred years or so. There were various innovations that lowered the cost of advertisements and improved the speed with which publications were distributed, but the basic principle remained the same: matching began by employers distributing news of their vacancy in printed form, with applicants responding either in writing or by telephone.

<u>ICT and Its Consequences</u>
Printed matter (national, regional and local newspapers) is still an important source of vacancies for job seekers. Around 1994, however, a shift began from printed matter to the electronic publication of information. This made it possible to process, manage and search through large numbers of vacancies and résumés any time and anywhere. Paper-based distribution (which was expensive and slow) was gradually replaced by the Internet and e-mail. CareerMosaic (now <u>CareerBuilder</u>) and Monster were the first companies to offer vacancies online — now there are thousands of such companies all around the world. This change has had three important consequences:

- Because standard ICT cannot "understand" non-structured texts or inaccurate information, the need arose to break down vacancies and résumés into its constituent data and to standardize them. Relational databases and search engines based on such databases require structured, complete, and well-defined data. The text "I am looking for a job close to where I live" does not present any problem in a letter of application, but it is an insurmountable barrier for a standard search algorithm.
- ICT has led to a sharp drop in the cost per advertisement — and per application. That has removed the barrier to the wide-spread advertising of vacancies and distribution of résumés, and has encouraged job seekers to apply for many different jobs. As a result, ICT is now deployed to filter large numbers of job application e-mails automatically.
- People with insufficient PC skills are losing sight of part of the job market, or are unable to respond effectively to vacancies. This is certainly a barrier for more poorly educated and older job seekers. They need the help of job consultants, or must have access to

equipment that is easy for them to work with (such as the Employment Services Centres in Taiwan, the Employment Job Centres in Hong Kong and the Israel National Employment Service).

Basic Roles of ICT
The practical examples and desk research show that ICT plays the following basic roles in the labor market:
- It provides quick access to information about available vacancies and job seekers;
- It allows employers and job seekers to extend their search;
- It lowers the cost of filling a vacancy or applying for a job;
- It makes it easier to find suitable job seekers and vacancies by offering simple testing on a fixed set of criteria.

ICT is also used to alert people to job openings, for example by sending an e-mail as soon as a vacancy arises that suits the job seeker. Finally, job consultants use information systems to keep track of their clients' progress (case management) and to monitor their schedules and work load.

Web Technology as Commodity
Websites advertising job vacancies around the world are countless in number. In western countries alone, their numbers jumped dramatically as web-building technology became common practice. Even so, their existence in places such as South Africa, India, the Middle East, and South America is massive. In some cases these are nationally sponsored websites or largely customized for international enterprises such as Quintcareer, Monster, 4ICJ, and other such companies. Examples include www.4icj.com/za (South Africa), www.careerindia.com (India), www.gulftalent.com (Middle East), and www.braziljob.com (Brazil).
    Websites like these are not of great use to an exploration such as this. Web technology and the underlying programming and telecommunication tools are a commodity. Assessing a person's suitability to a job is easy to program. What is more, websites and search-and-match technologies are easy to copy. For instance, copies of the model for Daywork's website appeared quickly (and, in their view, illegally) both in Australia and China.

These basic uses of ICT are highly common and non-specific. Where the use of ICT remains basic, the actual matching is left largely to the job seeker and employer, who exchange more detailed information by e-mail and/or by means of a job interview. That is what happens at countless temporary employment agencies and on countless vacancy sites, as well as at the Employment Job Centres and Virtual Employment Service Centre of Taiwan in our examples. Daywork also leaves the actual matching to the job seeker and employer, after establishing the initial contact. Interestingly, the Vocational Rehabilitation Services, which will be introducing Link Up's "technology-free" method, is assembling an information system that is not intended for matching, but only for case management.

Matching Technology
In addition to its basic roles, for the past ten years, ICT has also been used to digitize part of the matching process. Algorithms are used to compare a large number of vacancies and job seekers to pre-select matches. The main point of this process is to increase the likelihood of an employer only interviewing the right candidates and to avoid sending job seekers on interviews for jobs they have little chance of getting.

The technology mainly serves to:
- draw up a shortlist of the best candidates for a job and/or the most suitable job for a job seeker;
- calculate the degree of fit between job seeker and vacancy;
- make proposal for the best combination of job seeker and vacancy.

In addition to the basic data (age, education, suitability), information drawn from assessments and tests is also added into the calculation, producing a link between the characteristics (and requirements) of the job seeker and the characteristics and requirements of the job. As we saw in Chapter 4, there are many different opinions as to the characteristics important to a good match.

What is clever about such ICT applications is that they use algorithms to calculate the fit and arrive at a match. The advantages are:
- the match is more accurate (contact is limited to the job seeker and employer who have a good chance of a mutual fit).
- the job seeker gets a better idea of his position in the labor market and which jobs are most suitable for him.

To some extent, these advantages are generated and enhanced by the option of Internet-based assessment and testing. That saves time and money. All in all, using ICT in this manner lowers the cost of mass job applications for large organizations.

It is important for the calculation of the fit and ranking to be traceable and explicable, certainly if the algorithms are complex ones. Should any doubts arise, the employer, the job consultant, and the job seeker must be able to see how the ICT tool arrived at its result. Another aspect of such tools is that they have only become possible thanks to the computer. The statistical calculations require so much processing capacity that they could not longer be performed without a computer. The same is true of assessment-related simulations. The software has a whole range of built-in situations and scenarios and responds to the actions of the applicant.

Chandler Macleod's ESP and the products and services of QuietAgent, The Regeneration, Profiles International, Omnia, and De Witte & Morel are examples of such ICT applications. It is a field that is still in a state of transition. Each of these organizations is working to refine and extend its tools. The services they provide are becoming broader and more differentiated as a result, but the essence of the matching method remains the same.

Following this interlude, we will look at the fourth and final group of practical experiences: the technology line. This goes beyond calculating a fit or producing a ranking as part of the matching process; it involves matching methods that exist merely by the grace of advanced ICT. We already had a taste of this in our discussion of HRVision in Chapter 4.

The technology line is divided into two chapters. Chapter 7 concerns current developments and experiments. Chapter 8 looks further into the future and describes experiments and research that may, in the long term, lead to new job matching applications.

7 Practical Experiences: The Technology Line

Introduction
This chapter looks at practical experiences representing the technology line. It describes experimental applications that exist merely by the grace of advanced ICT. The technology line has various branches, of which we discuss three in this chapter: fuzzy matching, matching with agent-based models, and constraint-based matching. All three are grounded in modern mathematics and/or information technology, and we provide practical examples of each one.

Fuzzy Matching
Fuzzy matching is a tool based on a branch of mathematics known as fuzzy logic. Whereas in standard ICT, information must be unambiguous (0 or 1), fuzzy logic covers the gray area *between* 0 and 1, using terms such as "a little", "perhaps", and "similar to". Fuzzy matching makes use of this approach in that it represents methods that deal cleverly with information (both text and numbers) or that are capable of adapting or learning.

Organization	What they do
WCC Group	Adaptive and generic matching software
Burning Glass	Self-learning matching program based on career patterns
Mahalo	Combination of search engine and human expertise

WCC Group
WCC (www.wcc-group.com) is a commercial developer of matching software in the Netherlands. The company's software platform, ELISE, is an advanced search-and-match tool. It is being used for the labor market in the Netherlands (CWI), Germany (German Federal Employment Agency), the US (WORKFORCE West Virginia), Belgium (Flemish Employment and Training Service), and England (Job Centre Plus). Users include job seekers, employers, and job consultants.

ELISE's specific innovation lies in its use of two-sided matching and fuzzy technology.
- *Two-sided matching* refers to the degree of commonality between the demands of the job and requirements of the job seeker. A job seeker may be perfectly suited to a job but, if he doesn't want it, then there is no point in matching them.
- *Fuzzy matching* means that the mutual demands are not necessarily hard and fast. In actual practice, both job seeker and employer must be willing and able to be flexible about their demands. "An employer can go looking for a twelve-fingered guitar player," says Josef Piri of WCC, "but they're few and far between." Employers can relax their demands if the candidate has something else to compensate for it. For instance, work experience can replace training. Conversely, the job seeker may find a job so attractive that he will be willing to travel farther for it, for instance, because of attractive working hours.

> **Limits to the Perfect Match**
> The basic search method, such as can be found in countless job vacancy websites, consists of a "yes or no" search-and-filter process. For example, if the job and the job seeker do not match 100% of the time — say, for instance, the job seeker does not want to commute more than 20 kilometers and the workplace is 22 kilometers away — then there is no match. In this way, interesting candidates can just disappear from the map.

> **Josef Piri on job demands:**
> "Good candidates are hidden in the mass of people that only partly fulfill the demands.

ELISE can calculate and reallocate the importance of demands and place needs and wishes on a sliding scale. It does more than calculate the suitability of a single job seeker to a vacancy; it can also rank multiple job seekers according to suitability and vice versa — providing a list of the most appropriate work for any job seeker.

ELISE's brain consists of a set of algorithms devised by WCC, capable of handling a wide range of variables. This creates the need for an "explain" function. The great quantity of calculations cannot be handled manually and users do not want to lose the ability to ask the system about the source of the results.

Burning Glass

Burning Glass (www.burning-glass.com) develops specialist components for HRM information systems, but does not engage in HRM activities itself. The company is unique in focusing on job careers and in combining two technologies: text mining and neural networks.

- Text mining involves the computerized scanning of huge numbers of résumés and gleaning information from them that can be compiled into a standardized description of a person's career (see also Chapter 8, data mining).
- Neural networks are used to recognize fuzzy patterns in these standardized career descriptions and to calculate similarities between careers. Neural networks are needed to uncover the complex relationships between careers. Because they are self-learning, they can "learn" new résumés.

What is unusual about these systems is that the proposed matching between a job seeker and a vacancy is not based on vacancy requirements and/or on measured competencies and so forth. It is based solely on the best match between an applicant's career and the career of the ideal candidate (who may be an existing employee or a cloned career). Burning Glass claims that similarities between careers are highly predictive of the fit between the candidate and the job.

One notable detail about these systems is that it considers the reason someone moves between jobs irrelevant. The job seeker may have been fired, or his boss may have tried hard to persuade him to stay, but the only thing that counts in terms of the pattern is that he switched jobs.

As far as we are aware, this is the only practical example of self-learning matching at career level[18].

Mahalo

Mahalo (www.mahalo.com) was founded in the summer of 2007 and aims to grow into a "human search engine". Its "fuzziness" is not the result of clever ICT or artificial intelligence, but of its flesh-and-blood employees. They parlay the client's request to various search engines and then interpret, filter, and group the results before sending them back to the client.

Mahalo has a very broad search function that job seekers with an average to higher educational background are already (in the alpha test phase) using to search for jobs. The company plans to complete the test phase in early 2008.

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[18] The Department of Technological Applications, National Center for Scientific Research Demokritos (Athens) has developed an experimental self-learning system that assesses how suitable a job seeker (unemployed) is for a particular vacancy. It makes use of historical application data and takes the social class of the job seeker into account. As far as we aware, this has not been developed into a system or into commercial products that are of practical use to job seekers.

<u>Matching with Agent-Based Models</u>
An agent is software that represents a job seeker, employer, or vacancy. Every job seeker, employer, or vacancy has its own agent[19]. Agents can negotiate with one another "in the computer". They are assigned rules by their "owner" (for instance, "an appointment of at least 24 hours a week, but with Monday afternoons off"). The agent then surveys all the job agents and, if the relevant job agent agrees, goes back to the job seeker with a proposal. One huge advantage is that agent-based models work very quickly and it is possible to match numerous jobs and vacancies at the same time.

Making the agents self-learning is the next step. If self-learning agents note that certain tactics or negotiations are not working, they can change their approach, and they also respond to the altered behavior of other agents. A self-learning agent-based model is therefore a "living" (although highly simplified) model of the labor market. What the agents do together and the effect of their combined action on matching cannot be predicted in advance or calculated by formulas, but it can be shown in simulations.

Organization	What they do
<u>Almende</u>	Agents searching for babysitters
<u>Naval Postgraduate School</u>	Automated matching with negotiating agents that represent vacancies and job seekers

Almende
Almende (<u>www.almende.com</u>) is a Dutch company that researches and develops new concepts for human and agent networks and other research institutes. Almende has developed a low-threshold, agent-based system that can be accessed by phone to search for and find babysitters. Babysitters and "babysitter users" each have their own agent in this concept. As soon as someone needs a babysitter, he calls his agent and states the date, time and any preferred babysitters. The agent then looks to see which preferences are available and reports the result. The "babysitter user" lets the agent know afterward how satisfied he was by assigning the babysitter a score on a scale of 1 to 10. The agents "remember" all the satisfaction scores.

If the preferred babysitter is not available, the agent can search for suitable replacements. The agent then looks for the agents of other babysitter users and asks them which other babysitters have been as satisfactory as the babysitter who is unavailable. The agent searches until it has found a suitable (in the opinion of other users) babysitter of the desired "type." The agents do the matching in this case. The concept is low-threshold (telephone keys are the sole means of communication) and based on the necessary user feedback.

Naval Postgraduate School
The American Navy is its own labor market. Sailors and officers are periodically linked to jobs at naval bases. The situation is clear enough — the vacancies are described in the same terms as the sailors' qualifications. The pay is known and cannot be negotiated. There is only one employer, the Navy, and the Navy is the boss. Preferences — for example, being assigned to one particular base but not another for family reasons — may play a role, but are ultimately nothing more than variables in the process of matching sailors (employees) and jobs (vacancies).

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[19] The Dutch National Vacancy Bank website (<u>www.nationalevacaturebank.nl</u>) has a search agent that searches available vacancies for a job seeker and reports suitable ones to him each day by e-mail.

Bill Gates and Mark Nissen developed computer software for the Naval Postgraduate School (www.nps.edu) in Monterey, California (USA) in which agents do the matching. An agent in this case is software that represents a single sailor or vacancy. These agents negotiate with one another in an electronic market until they have found the ideal combination of people and vacancies. That ideal combination determines which sailor (employee) gets which job (vacancy). There is no job interview. All employees are placed, and all vacancies are filled. The entire process is automated, with the least popular jobs causing noticeably less fuss.

Or, at least, that was the idea. The principle works, but when Bill and Mark proposed the building of a fully operational system, their client refused to green-light the project. The Navy commanders could not accept the idea that a job interview was no longer necessary.

<u>Constraint-Based Matching</u>
Constraint-based matching looks specifically at constraints that job seekers or employers may impose, in addition to their positive requirements, to describe the job or candidate they are seeking more accurately. In this form of matching, the constraints are named explicitly and may include commuting time[20] and educational level; they may also be related to team composition ("this project team has to have at least one member with qualification A or B"). The task of the matching algorithm is therefore twofold — it must not only see that the non-negotiable requirements are met; it must also take all the reported constraints into account, look beyond the individual level to see whether the people who will be working together are a good fit, and preferably find a solution satisfactory for all concerned.

IBM Haifa

IBM has its own matching challenge: linking highly skilled IBM employees to IBM's IT jobs around the world. IBM[21] intends to meet this challenge with the experimental matching tool Optimatch. After a three-year development period at IBM Haifa Labs (www.haifa.il.ibm.com), IBM will be running a pilot of Optimatch this autumn. Optimatch works with constraints. Job requirements and employee characteristics are identified in the usual way: educational level, experience in the field, willingness to travel, and so forth. In addition, both the employers within IBM and the employees indicate their preferences, for example "not available before 15 February 2008", "must have senior-level employee", or "a commute of less than 100 kilometers".

> **Matching Group to Group**
> Yossi Richter, who works in IBM's research lab in Haifa, Israel, describes the problem as follows:
> "In most cases, you start with Job 1 and you go in search of the best candidate. Then you choose the best candidate for Job 2. Things can get difficult at the end of this process — the choices for jobs 99 and 100 will be extremely limited. If you're willing to make concessions with the first jobs, the match for the last one can be much better. However, for both the human intermediary and simple matching software, it's impossible to optimize the process at group level and to start creating matches only after you've surveyed countless combinations of people and jobs."

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[20] <u>Daywork</u>'s approach, which compares job seekers' and employers' time slots, can be regarded as a simple form of constraint-based matching (see Chapter 5).

[21] Company-wide, IBM also participates in "Able to Work", a consortium of 21 leading American enterprises (including Microsoft, Honeywell, and AT&T) that is developing strategies and tools (educational opportunities, job markets and tools for self-testing a disability) to match companies and (disabled) job seekers. At the time of writing, however (November 2007), the consortium's status is unclear.

"Soft" constraints are also possible: if Bob can't get along with Mary in a team, that would also be a constraint. Some constraints may be "non-negotiable", others are preferences.

Once all these requirements and wishes have been surveyed, Optimatch uses an algorithm developed in-house to calculate the ideal match at group level. The result must meet all non-negotiable requirements and take as many of the constraints into account as possible.

Optimatch works in the lab, but the real test will be the pilot project, scheduled to start shortly and produce results in early 2008. The IBM Watson Research Center is already considering how to use the Optimatch concept to find jobs for the disabled in the US, but its plans have been put on the back burner for the time being.

Notable Points about the Technology Line
- The example of the Naval Postgraduate School shows that job interviews cannot be omitted merely for efficiency and optimization reasons. IBM's current pilot project is interesting in that sense, as it will reveal how internal employers at IBM will deal with the proposals generated by Optimatch.
- The example of Almende, on the other hand, indicates that an agent-based approach can work in a clear-cut situation, such as people who are looking for a babysitter.
- Both Mahalo and Omnia have come up with an interesting combination of people and technology as complementary components. Technology can collect and process information rapidly, but people are better at selecting and interpreting that information. Both companies attempt to combine the best of both worlds.
- Burning Glass's attempt at career-level matching is interesting because it also offers a glimpse into the future. Based on a huge collection of existing careers and information about typical career changes and stages, this method can predict how present jobs will develop, which existing employees will be able to change along with their job, what vacancies will arise as a result, and who will qualify for those vacancies. When used in local and regional labor markets, analyzing career patterns may be an additional method for forecasting how a job seeker will develop in a job and for coordinating educational activities.

8 A Glimpse Into The Future

Introduction

The previous chapter gave practical examples of advanced technology being tested on the ground to explore new job matching methods. This chapter looks into the future by describing ideas and experiments that may be useful for job matching in the longer term, or that could lead to different forms of job matching if applied on a much wider scale.

We will briefly discuss four developments already being used in job matching or that have potential. They are data mining, tools designed to support communities, simulations, and complex adaptive systems made famous by the Santa Fe Institute in the US. The last two mainly concern research that could lead to specific applications in the future.

At the end of this chapter, we will look at two other interesting developments for which an application has yet to be found: case-based reasoning for job matching and (together with self-learning algorithms) for occupational disability diagnostics.

Data Mining

Within the present context, data mining stands — generally speaking — for the extraction of information from large quantities of data. Although data mining can be used for numerical data and audio and visual data, within the context of this survey it always means text mining: extracting information from text files that have little or no structure.

The primary aim of text mining is to identify chunks of information in texts (for example job application e-mails, descriptions of vacancies by the relevant companies or as posted on job sites) that characterize the vacancy and/or the job seeker, such as job type, educational level, place of residence, nature of work, number of hours a week. This standardized information can then be manipulated in information systems and used in searches, to determine the fit between a vacancy and a job seeker, and in matching.

> **Limitations of Text Mining**
> Richard Mooney, professor of Computer Science at the University of Texas, believes that, using the current approach to text mining (a combination of linguistic and ICT knowledge) roughly 80% of any text in a specific knowledge domain can be interpreted correctly. With a great deal of work, this can be increased to 82% or 83%. But there is a ceiling to this process — using nothing more than linguistic and ICT knowledge, one will most likely never reach the human level of 95%. It works well when extracting separate bits of information, but discovering the things that link them is a different story entirely. A fundamentally new approach is needed to increase the automatic interpretation of text from about 80% to 95%. Mooney suspects this will take another thirty years.

In addition to ICT, text mining requires linguistic knowledge and a knowledge of language processing. The algorithms used have now reached the point where they can extract the separate chunks of information from a text with a reasonable degree of accuracy (see, for example, Burning Glass). There are now two specific text mining applications for job matching: extraction of résumés and vacancy texts, and job scraping.

Organization[22]	What they do
BBN, Cofax, Monster, Lingway KM, Temis, Koltech	*Extraction*: automated conversion of vacancy and résumé texts into structured information
Flipdog, Workzoo, Indeed, The Ladder, Jobcentre	*Job scraping*: automated collection and standardization of vacancies taken from numerous vacancy sites

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[22] We did not visit the organizations listed in this table. The information is based on desk research.

Extraction

Besides Burning Glass (described in a previous chapter), a number of businesses use text mining operationally (for jobs in the middle to upper segment of the labor market) to help select incoming texts and extract information from them as input for matching job seekers and vacancies:

- Monster (www.monster.com) is a US job site that uses the very latest text mining technology.
- Companies such as BBN (www.bbn.com) and Cofax (www.cofax.com) use text mining for many different applications designed to analyze and extract documents.
- Lingway (www.lingway.com) was set up in 2001 and develops tools to classify and match vacancies and résumés.
- Koltech (www.koltech-group.com) was founded in 2003 and has developed HRM tools based on text mining, including an employment search engine.
- Temis (www.temis.com), founded by IBM in 2000, has also developed HRM tools based on text mining.

Job Scraping

The explosive growth in the number of vacancy sites has not made the lives of job seekers any easier. Wouldn't it be convenient for them if someone were to visit all those websites and gather together all the similar vacancies in one place?

Junglee (acquired by Amazon) was the first company to discover this gap in the market, followed by Flipdog (www.flipdog.com). These and other companies use "job scraping" technology — software that searches websites automatically for new vacancies by scanning web pages (including downloads) and extracting information from them.

> **Flipdog Copycats**
> Flipdog has acquired copycats:
> SimplyHired (www.simplyhired.com),
> WorkZoo (www.workzoo.com),
> Indeed (www.indeed.com),
> The Ladder (www.theladder.com), and
> JobCentral (www.jobcentral.com).
> As far as we were able to tell, all of the organizations focus on standard job seekers. The profitability of this new approach (its first application was in 2005) is not particularly large as yet.

The software collects the harvest in its own vacancy database, which job seekers can then search. Job scraping is really a kind of job search engine with some content-based knowledge of vacancy descriptions. In that sense, it operates in a similar manner as Yahoo and Google, which do a great deal of research into text mining.

In all these cases, text mining is used as a supporting technology. Briefly, it prepares information so that people (and/or a matching program) can search for the best combination of résumé and vacancy. We are unaware of any examples in the field in which text mining is used for actual matching.

Community Tools

In addition to the countless websites that concentrate on searching vacancies and résumés, a number of commercial firms have recently been launched (or are in the start-up phase) with websites and related services that search for people in networks and link them to one another. One of the aims of joining such a network may be to find a job or a candidate for a vacancy. Technology can help to support communities of people — to find one another, to exchange information, or to acquire and share knowledge and experience.

Organization	What they do
LinkedIn, Spock, Wink	Software that supports communication between people in networks
Knewco	"Wiki" technology

A brief description of four leading companies, each with a different approach:
- Linkedin (www.linkedin.com) has the qualities of an online network of people (most of them highly trained) who are traceable via each other and for each other, the purpose of which does not necessarily have to do with finding a job. The concept could be useful for communities of hard-to-employ job seekers or for regional networks of companies, employers, and job seekers. Matching is based on a network of contacts — "friends of friends" — and a brief description of the kind of work people do.
- Wink (www.wink.com) focuses more on searching for people, creating links between people and new contacts in the general sense. It does not focus specifically on the job market. However, by creating a "WinkProfile," a job seeker can make his interests known. The concept could be useful for communities of hard-to-employ job seekers or for networks of companies, employers and employers, supporting them in their search and making contacts.
- Spock (www.spock.com) focuses even more strongly on the search for people and extracting information about people. Spock profiles itself by attempting to create better "entity resolution" — distinguishing between and creating profiles of people with the same name. It is not yet clear if Spock also plans to develop a model in which job seekers and employers are able to find each other.
- Knewco (www.knewco.com) is not active in the job placement market, but focuses on an extension of "Wiki" technology, which has no owner or supervisor, but has a community of people who contribute to the content and for which a form of self-regulation arises.
  In the current Wikipedia, the introduction of links takes place between the different subjects according to traditional methods, In contrast, Knewco has developed a concept around "Knowlets". In this concept the collective users build up a distinct database of all possible relations and associations between data introduced by users. The collection of relations is a layer between the contents and the users. The model was developed in the scientific world and is now used to open scientific documents and to find new links and new concepts.
  One could view the texts that describe vacancies and job seekers — wherever they are — as separate pages in a "Work Wikipedia." The Knowlet model would allow for the support of a community of job seekers, or employers, with functions such as learning from each other's search commands. It could help job seekers to draw up résumés using existing résumés. As the amount of information and the number of links grows, the Knowlets can also learn to understand the links. An employer in search of someone who is good at fixing up old cars, will not find anyone who has written down "Beetle maintenance" as competency. Knowlets, however, can draw the link between old cars and Beetles, even if no one has entered that link. What distinguishes this system is that, in this model, the collective users determine the content themselves and the technology makes the links explicit — and usable.

It seems obvious to introduce this kind of community tool together with, or as part of, websites focusing primarily on target groups of job seekers[23]. As far as is known, there are no well-functioning examples of a combination of this kind.

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[23] In The Netherlands for example www.waocafe.nl, www.belangenorganisatie.nl, www.bpv.nl, www.stichtinggaos.nl,http://forum.werk.nl and many others.

Simulations

Research in the Job Market

Many research groups work with agent-based models to describe and analyze economic systems using simulations. A small number of these are interesting as a result of their focus on the workings of the job market and job matching:

- Department of Economics, Iowa State University
- Wissenschaftszentrum für Sozialforschung
- European University Viadrina Frankfurt
- ISPRI, University of Osnabrück
- Department of Economics, Fordham University

Prof. L. Tesfatsion (Department of Economics, Iowa State University, Ames IA, USA) leads a variety of research projects into agent-based models for the behavior of job applicants, employers, adaptive matching. With the help of agent-based models, she performs research into three aspects of matching:

- The influence of the structure of the labor market, the effect of learning and network formation on the ability to find jobs, on matching, on the behavior of employees, and the effectiveness and efficiency of the labor market.
- The degree to which the labor market is sensitive to institutional interventions and changes such as the current amount of the minimum wage, unemployment programs, and the system of collective labor agreement negotiations.
- The effect of cultural norms on processes in the labor market, such as the importance of network-forming to finding work.

Dr. M. Neugart is Senior Research Fellow at the Research Unit for Labor Market Policy and Employment (*Wissenschaftszentrum für Sozialforschung*, Berlin). His research group is carrying out a broad span of study into various aspects of job application and matching, and the workings of the labor market:

- The effect of differing wage mechanisms.
- The effect of adult education and training for job seekers subsidized by the government.
- The effects of competition and replacement as a result of governmental support for specific job seekers (for example, hard-to-employ job seekers).
- The long-term effect of a decline in job opportunities within specific sectors on other sectors and on labor mobility.
- The effect of mismatched skills — that is, that the overall supply of competencies on the part of job seekers does not match the overall demand on the part of vacancies.
- The effect of simultaneous negotiations between multiple employers and job seekers, whether or not under time pressure.

Dr. K. Kurbel and Dr. I. Loutchko (Department of Business Informatics, European University Viadrina Frankfurt, Germany) have developed an agent-based model for multiple negotiations — multiple job seekers and multiple employers — in the labor market. They explored the negotiable subjects and what strategies the agents can use.

Dr. T. Tassier (Assistant Professor, Department of Economics, Fordham University, Bronx, NY, USA) develops models to explain how job seekers can help each other to find work within social networks of ethnic minorities. Moreover, he observes in his model that networks of this kind have a negative effect on pursuing further training and, for this reason, contribute to maintaining inequality in the labor market.

In these and other cases, agent-based models are implemented for scientific research, not for practical application with real job-seeking and matching. The simulations provide an image of what can happen within the oversimplified conditions of the model, generalized out to the labor market as a whole and not focused on individual job seekers.

Nevertheless, these simulations can reveal mechanisms and developments that arise when conditions in the labor market change. In this way, they shed light on the question of why some interventions do not work, or could shed light on the possible effects of proposed policy measures.

In the field of research and application, there is the work of Dr. F. Teuteberg (Research Center for Information Systems in Project and Innovation Networks, University of Osnabrück, Germany). He has focused on the development of architectures, software, and interfaces for agent-based negotiations in labor markets supported by ICT facilities such as telephone (or mobile phone) and working under time pressure. This gave rise to the experimental implementation of the FuzzyMAN (Fuzzy Multi-Agent Negotiations) system.

Santa Fe Institute

All the examples listed previously target the labor market directly. Santa Fe Institute (SFI, www.santafe.edu in Santa Fe, NM, USA) works at a higher level. SFI is a small yet fully independent institute, a refuge for top scientists interested in looking far outside the limits of their own disciplines. Research into complex adaptive systems (CAS) started at SFI, a phenomenon now on the agenda of universities around the world. The development of agent-based modeling is just one result of this process.

A complex adaptive system — for instance, a social service system — is populated by a wide variety of agents performing transactions with each other, exchanging resources (such as money) and, if they are successful, surviving and becoming more powerful.

A system of this kind is adaptive because it consists of agents capable of learning. They have tactics at their disposal and learn from experience. An essential characteristic of a CAS is that it is in a state of constant change; it never achieves a state of balance. Innovation, an agent who changes strategy, a limit in the amount of money in the system — all of these are examples of changes that flow through the system. SFI studies complex systems at a generic level and searches for phenomena and general mechanisms that apply to very different systems. Network models and simulations are used to describe, analyze, and explain the behavior of complex systems.

SFI's research does not give rise to ready-made applications. However, they do serve as the kernel for new, interdisciplinary knowledge. This was the case in the development of cybernetics and genetic algorithms. These arose, not directed by any practical questions, as a result of the scientific curiosity of leading scientists from a variety of disciplines. Now, cybernetics and genetic algorithms are a generally accepted part of many research disciplines and a wide variety of practical applications.

Three examples of possible subjects that can be approached through complex adaptive systems (CAS) and can be relevant to social services, whether local or nationwide:

- How do subsystems arise within a CAS. For instance, a group of job seekers can form a community and try to help each other to find work. What causes groups of agents to split and form a subsystem? How do subsystems such as these behave? What makes them stable? What determines their success? Do they create problems for other job seekers?
- What is the effect of different wage mechanisms? Within a CAS, agents must perform well to survive. In a system in which private and public organizations collaborate, each

with its own goals and reward systems, a wide variety of wage mechanisms can evolve, including the criteria for which reintegration agencies are assessed for their performance and receive money for their efforts. Agent-based models are used a great deal to study economic considerations of this kind — including the labor market, trade fairs, and auctions — since they provide good predictions of human behavior. Which wage mechanisms give rise to stable systems? Which ones stimulate undesirable behavior or are otherwise ineffective? Is it possible to predict what the consequences are of more individual budgets?

- What is the effect of location? Many economic models do not take distances into account. Nevertheless, physical distance is an important factor in the decision-making process. How strongly does distance factor in — for instance, when deciding to apply, to accept a job, or to take on a new applicant? Does it play a role when taking training courses, or in the choice of a job consultancy agency?

Case-Based Reasoning

Case-based reasoning (CBR) is one of the many areas within what used to be referred to as Artificial Intelligence. This is a way of approaching problems in which a set of paradigms (for instance, concrete cases of successful matches) serve as the starting point with which to handle subsequent cases — new matching requests. CBR systems attempt to discover automatically which paradigms most resemble the new case, which aspects of the paradigms are relevant to the solution of the new case. and which characteristics of the paradigm lead to conclusions which apply to the new case. Many CBR systems have built-in self-learning capabilities, for example, by expanding the set of paradigms.

> **MindBox**
> MindBox (www.mindbox.com) was founded in 2000 and is a world leader in commercializing CBR technology. According to the best information, their applications target primarily the financial sector — banks and insurance agencies, which use it for credit assessment, mortgage applications, risk assessment, etc. They have done no development in applications for HRM or job acquisition.

- The TREE project is an interesting example of job matching. This multilingual, Internet-based system was set up within the context of the EU's Fourth Framework Programme to link job seekers and vacancies. Employers report their vacancies by e-mail.
  TREE consists of a language module (with text mining and translation functions) that converts the vacancies into language-independent descriptions (standardized HTML texts in a database). Job seekers register by e-mail and the language module produces a language-independent description of them. TREE has a "matcher", that is, a second module grounded in case-based reasoning that compares the vacancy with the description of the job seeker, sentence by sentence. The matcher module searches the "strong" and "weak" matches between the two texts and determines the degree of fit. The job seeker is then provided with summaries (in his own language) of the best-fit vacancies and can get in touch with the potential employer.
  As far as we are aware, this project has not led to any commercial spin-offs; neither has the combination of CBR-based matching and multilingualism been developed elsewhere in this form.

Disability Diagnostics and Matching

The medical world is increasingly making use of two technologies — case-based reasoning and neural networks — to support physicians in making diagnoses and in selecting treatment plans (sometimes in combination with text mining in medical files). These technologies are sometimes also used to select the most cost-effective treatment.

We did not find any examples in our survey in which these technologies are deployed to use medical or medical examination data or to link them to the process of matching for the partially disabled. There appears to be a strict division between the medical file (to the extent that one is generated) and the process in which the job consultant helps the job seeker find a suitable job. The job consultant naturally has his or her own opinion of what the client can and cannot do.

There are two basic reasons why it is difficult to assess a disabled job seeker's medical situation in terms of his suitability for certain jobs; indeed, these reasons may even mean missing a suitable match:

- The examining physician assesses job seekers' in his consultation room. He examines their physical and mental capabilities (broken down into separate cognitive and physical tasks) to determine what they are capable of. The job consultant, on the other hand, does not assess job seekers according to their medical potential (see the examples in Chapter 3), but instead looks at the employer's specific requirements. The physical and mental strain that goes along with a particular job title may vary considerably from one organization to the next. There may be micro-differences between companies, or even within organizations. It is therefore difficult to say in advance whether a job seeker and his abilities represent a good fit with a job described in general terms.

- Second, the requirements of a vacancy are often not set in stone, but can be negotiated and are subject to change. Once again, it is the job consultant (or a more assertive job seeker) who will investigate the extent to which the vacancy requirements can be altered. It may be possible to organize the work differently; if one particular aspect of the job is too much for the job seeker but rarely needs to be carried out, it might be possible for a co-worker to do it instead. The job consultant and the potential employer can consult on how to organize the work differently.

We are still a long way from being able to use IT to determine someone's suitability for a vacancy on the basis of his medical data.

Notable Points about a Glimpse to the Future

- There are thousands of different formats for describing the traits of job seekers and vacancies; Chapter 4 offers just a few examples. There is a down side to such variety, as it makes the matching process less accurate. If, for example, method A is used to describe the vacancy and method B to describe the job seeker, the best candidate may not be found because a different set of competencies may be used to describe his skills. We are not optimistic about efforts to achieve some degree of standardization in this respect (on a national or international level). The data mining approaches described in this chapter (including the method used by Burning Glass) offer a huge advantage in that respect.

- Data mining in non-standardized databases is more effective than individual matching. Data mining offers a better way of preparing data in different formats for comparison purposes; for example for policy-making, labor market analyses and labor supply forecasts. Data mining can also be useful when attempting to give a large group of job seekers extra attention. Instead of re-testing large numbers of job seekers, data mining can help to regroup the existing data and link up information on various organizations. As far as we are aware, data mining is not yet used in this manner.

- Community tools and agents that represent a job seeker or employer are replacing job consultants in terms of their role as encouragers, initiators and coordinators. In communities, it is the job seekers (and employers) themselves who provide and search the information, establish links and define jobs, competencies and skills.

9 The Dutch Labor Market

Introduction
In the previous chapters we described the findings of our survey in terms of four "lines" because it allowed us to highlight four basic principles according to which the various organizations develop and use their working processes and methods. This chapter links our findings to the aim of improving the employment participation rate in the Netherlands.

Challenges Facing the Dutch Labor Market
In June 2007, the Dutch government and the national employers' associations and trade unions defined three strategic challenges for the Dutch labor market:
- *Increase the effective labor supply,* to reduce the risk associated with market fluctuations and long-term labor market shortages and improve the foundations for prosperity.
- *Create opportunities for vulnerable groups*, to improve their participation in the economy and social cohesion.
- *Make the labor market more flexible,* to respond to new requirements arising from the ageing labor force, globalization and technological advances.

A key component of the government's plans is to increase the employment participation rate, based on the EU's Lisbon targets for 2010, which the Netherlands has committed itself to achieving:
- average general participation rate of 70%
- average participation rate by women of 60% (65% for the Netherlands)
- average participation rate for older people of 50%.

If we calculate the three participation rates for the Netherlands, leaving out jobs of less than 12 hours a week, we see that all three are below the 2010 targets (64.5%, 55.8% and 41.7% respectively).

In the summer of 2007, the Netherlands Bureau of Economic Policy Analysis (CPB) forecasted a 1½% rise in the employment rate in 2007 and a 1¼% rise in 2008. The demand for labor will continue to increase, according to provisional medium to long-term forecasts (with all their uncertainties).

The CPB has, however, also observed an imbalance between the supply of labor and the demand for labor. Some sectors continue to have a shortage of qualified employees, while other sectors have too many. That means that economic growth and the associated rise in the number of jobs will not be enough to improve the employment participation rates.

The groups specifically targeted to improve the utilization of the potential labor force in the Netherlands are:
- Unemployed women
- Older people
- Non-Western ethnic minorities
- Young people
- Partly disabled

The government has also set a target of helping 200,000 people on benefits find a job in the next four years, as part of a special employment project.

A similar problem has arisen in the countries covered in this survey. Their economies are flourishing to a greater or lesser extent, the supply of labor is not in step with the demand, and there are specific groups for which it is difficult to find work. All these countries are

making an extra effort — in the form of specific policy and funding — to improve the employment participation rate of people at the lower end of the labor market.

To link the results of the survey to the aim of improving the employment participation rate in the Netherlands, we have identified a number of secondary targets and the experiences (regardless of the "line" to which they belong) which, in our opinion, represent an approach — broadly speaking, the underlying concept, the matching method, the software, etc. — that could help to achieve that secondary target.

Specifying Employment Participation Targets

Figure 3 shows possible secondary targets to improve the employment participation rate. The overall target "a higher employment participation rate" is broken down into more specific approaches ("improving …",) that can help to achieve the overall target, either partially or in combination with other approaches. The secondary targets are as follow:

- Provide a more accurate description of the vacancy and job seeker
- Improve the scope of the search and matching speed
- Improve matching quality
- Get job seekers to take action
- Get employers to take action

The following sections of this chapter will discuss the various secondary targets one by one.

Figure 3: Breakdown of Target: Improving Employment Participation Rate
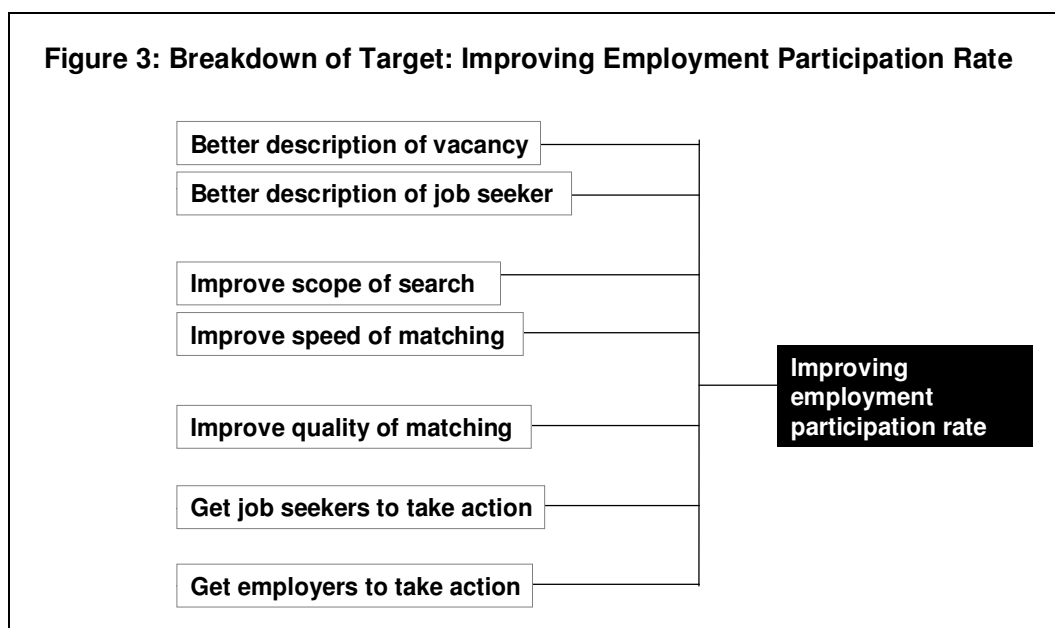
More Accurate Description of Vacancy and Job Seeker

When a more accurate description of the vacancy is provided, the employer is more likely to find the most suitable candidate and less likely to have unsuitable candidates applying — something that only costs time and money. The employer can therefore make a more accurate selection. It may also mean that a job seeker with a lower level of education still qualifies for a particular job, for example because any job requirements that are too demanding or irrelevant can be modified.

Providing a more accurate description of the job seeker mainly involves making the job seeker's hidden or underexposed qualities apparent. This makes it more likely that the job seeker will find a suitable job and less likely that he will go to a pointless interview. It also

makes it more likely that the new employee will stay with the job longer and perform better, with a better return on the investment in employment participation.

The following working methods, products and/or concepts described in the practical examples of the previous chapters are interesting for the Netherlands:

- Profiling job seekers purely on the basis of what they themselves enjoy doing (QuietAgent) and free-format profiling, including the job seeker's non-work or non-educational traits (The Regeneration). Both of these are good ways to reveal someone's "hidden" sides, especially when a job seeker makes a poor showing on a standard list of competencies.
- Letting employers' assessment of existing employees determine which assessments and testing tools are used to assess job seekers (HRVision).
- Using career patterns to describe the profile of a job seeker and a vacancy (Burning Glass).
- Taking the degree of match between a job seeker and the relevant employer's corporate culture, the characteristics of the job seeker's new boss and co-workers, and generational differences (Omnia, Synques, De Witte & Morel).
- Providing tailor-made assessment and testing tools and simulations to predict performance in the workplace (De Witte & Morel).
- Turning HRM tools into tools to help hard-to-employ job seekers (Chandler Macleod, with Matchworks as user), and setting these tools as a national standard (Australia).
- Setting a national standard for intakes, based on what job seekers themselves enjoy doing (New Zealand: QuietAgent).

It should be noted that when job seekers have a better idea of their own capacities and the requirements of the labor market, they are more likely to consider jobs that they would otherwise not apply for, or realize that they need more training. In terms of employment participation, this means that the job seeker is motivated to take action and work specifically on improving his capacities. Reports on the results of matching job seeker capacities and vacancy requirements (for example by WCC Group, Chandler Macleod, Omnia, Profiles International, Synques, De Witte & Morel and, with respect to résumés, Burning Glass) may encourage the job seeker to broaden his search, increasing his opportunities in the job market. The output also offers job consultants information that they can use to encourage job seekers or motivate them during interviews.

Increase Search Scope and the Matching Speed
The more vacancies falling within the job seekers' scope, and the more job seekers falling within the employers' scope (in the sense that the job seeker comes across more vacancies and the employer comes across more job seekers), the greater the likelihood of an ideal match or of a hard-to-employ job seeker finding a suitable job, and the less chance of vacancies going unfilled or being filled only after a delay.

The following working methods, products and/or concepts described in the practical examples are interesting for the Netherlands in terms of increasing the scope of searches:

- The search scope can be increased technologically by linking databases to vacancies (already a widespread practice), by setting up "national" and freely accessible vacancy sites (Employment Services Centre Taiwan, Job Centre Hong Kong, National Employment Service Israel), or by job scraping (job sites such as Flipdog and others that collect vacancies from other job sites).

- The scope can also be increased by contacting job seekers directly with vacancies; one example is the job ladies in Taiwan, who take vacancies to job seekers in remote areas on their PDAs, or by convincing local Bedouin chiefs or Orthodox rabbis that it is good for women to work (Israel National Employment Service).
- Another way of increasing the scope is by providing free job sites, thereby lowering the threshold to placing vacancies for employers (in particular private clients and small businesses). Some examples are the job sites of the Taiwanese government (used by the Employment Services Centers), the National Employment Service (Israel) and the Virtual Employment Services Centre in Hong Kong. The Regeneration's concept is a variation on this idea; job seekers pay to place their profiles on the site, but employers can search the site for free.

It is important to carry out rapid searches and matches for short-term, temporary jobs (in the formal and, more specifically, the informal labor market) that must be filled at short notice. It makes it possible to support a small segment of the labor market.

The following working methods, products and/or concepts described in the practical examples are interesting for the Netherlands in terms of increasing the speed of matching:

- Daywork focuses exclusively on jobs with irregular schedules.
- The Virtual Employment Services Centre concept in Hong Kong is a good example of low-threshold support for job-seekers. It is available 24/7 and is designed to put job seekers in touch with employers as quickly as possible.
- Agent-based approaches such as Almende's and group-based matching based constraints such as at IBM make it possible to conduct multiple negotiations en mass and at high speed.

Improving the Quality of Matching

The aim is to find the best person for the vacancy. The accuracy of matching can be increased by improving the profiles, matching adaptively (with job seekers modifying their requirements online), and by using self-learning matching algorithms.

Assuming that all the information about the job seeker and vacancy traits is known, improving the quality of matching means a better fit between the employer and the job seeker and less chance of their engaging in an unnecessary interview.

It is important to the target group of this survey (job seekers encountering barriers to finding work) to improve the accuracy of matching for three further reasons. To begin with, a job interview that follows on from a less-than-perfect match can be demotivating for the job seeker ("they don't want to hire me anyway"); second, it may convince the employer that it would have been better to invite a normal job seeker for an interview; and third, a better match makes it more likely that the job seeker will remain in the labor market for longer, will become more used to the rhythm of working life, and will be less likely to become unemployed again.

The following working methods, products and/or concepts described in the practical examples are interesting for the Netherlands:

- In the "Warm connections" approaches described in Chapter 3 (Link Up, Employment Services Centre, North Carolina Vocational Rehabilitation Services and Canadian Mental Health Association), the quality of matching is determined largely by the job consultant. The consultant uses vacancies databases, but does most of the matching in his head. Improving the quality here means turning the job consultant into more of a professional, a

process that depends on two important factors: being positive about his client's opportunities and understanding the world of the employer.

- Where tests and assessments play a major role in the preparatory phase (Chapter 4), matching can be made more effective by improving the assessments, through periodic validation and, in some cases, by having the employer and employee provide feedback (Chandler Macleod, QuietAgent, Omnia, Profiles International, Synques, De Witte & Morel).

- HRVision links the employee's quality (his performance, for example as assessed by the employer) and the method used to assess job seekers. In other words, the nature of the assessment is determined by the tests that have the highest correlation with the employees' actual performance.

- Another, more technology-driven approach to improve the quality of matching is to look at how the employer arrives at the decision to hire someone. Some examples are the general matching software developed by the WCC Group, Burning Glass's learning career profiles, and the constraint-based tool Optimatch being developed at IBM. These approaches use a variety of methods to simulate the fuzzy nature of human decision-making.

- IBM, the Naval Post Graduate School and Almende are all examples that involve the matching groups of jobs and groups of job seekers and that accelerate and automate that process. The underlying idea is that job-by-job matching underutilizes the job seekers' qualities as input. What these approaches mean for the employment participation rate is not yet clear, but it may be valuable as a new concept when large groups of job seekers (for example, a group identified as a policy priority, mass lay-offs at a large company) flood the labor market all at once.

Getting Job Seekers to Take Action

Some job seekers need more help finding a job. They are hard-to-employ job seekers who need comprehensive assistance aimed at getting them to take action and providing them with support. In other words, they need help finding better housing, kicking their drug or alcohol addiction, or coping with physical, mental health, or social problems. Such forms of help and mediation may take the form of broader social assistance, with employment being an important component of the overall package.

The following working methods, products and/or concepts described in the practical examples are interesting for the Netherlands:

- The Brotherhood of St. Lawrence does this in its Individual Placement Support Program, which surveys a person's barriers to resuming work and draws up an individual plan to remove those barriers.

- The Canadian Mental Health Association focuses on people with psychological problems, in accordance with its aims, but links the process of finding and keeping a job to other forms of support and is therefore able to offer a single, comprehensive package.

- The Hong Kong Social Welfare Department runs the Support For Self reliance — (SFS) program as part of its Comprehensive Social Security Assistance Scheme. The program covers job placement, addiction, housing, improving the job seeker's confidence and similar matters.

- Another approach to getting job seekers to take more action — one that taps into the potential labor force — is Israel's National Employment Service. The Service targets minorities (ultra-orthodox Jewish and Bedouin women, for example), based on the idea that they have unusual and specific qualities (which are respected). The aim is to build support among these groups and encourage members of minorities to participate (or

participate more intensively) in working life. One key factor is to get the backing of local leaders. For example, it turned out that ultra-orthodox Jewish women unexpectedly perform above average in the ICT sector.

<u>Getting Employers to Take Action</u>
The aim here is to increase the number of potential employers and their willingness to hire hard-to-employ job seekers.

The following working methods, products and/or concepts described in the practical examples given in the previous chapters are interesting for the Netherlands:

- <u>Daywork</u> accesses the informal labor market by linking labor supply and demand in the "time slot niche" of jobs that involve unusual hours. Its approach makes a very interesting group of job seekers available to employers, consisting of women (who are often not registered as job seekers) with an average or higher educational level who cannot or do not wish to work full time.
- The <u>Regeneration</u> uses a job seeker "skill signature" (profiling method) and a business model that makes it attractive for private clients and small businesses to hire people (temporarily).
- The <u>Canadian Mental Health Association</u>, <u>Link Up</u> and <u>Vocational Rehabilitation Services</u> use a non-technology-driven approach in which job consultants pro-actively and systematically build up good relationships with employers and persuade them of their client's abilities ("warm" lines of communication). The employers are "spurred on to take action" in this way by taking on hard-to-employ job seekers on a trial basis. The job consultant also discusses with the employer whether the job requirements really need be as strict as initially assumed, and whether the job could be filled by someone less capable or with other competencies. In terms of the employment participation rate, this creates more opportunities for job seekers with disadvantages, for example the partly disabled, people with a handicap, and the long-term unemployed.
- <u>Link Up</u> and the <u>Canadian Mental Health Association</u> employ the principle of "place first, then train" to get job seekers into a job as quickly as possible (perhaps in the form of a short trial placement), so that the employer sees what the candidates can do.
- The <u>Employee Retraining Board</u> in Hong Kong turns jobs in the "gray area" between the informal and formal labor markets into formal jobs, combining this with strict quality requirements.

Employers are also encouraged to take action indirectly by giving them a prominent role in developing training requirements (like the <u>Employee Retraining Board</u> in Hong Kong) and assessments (like the <u>Chandler MacLeod</u> Employment Skills Profiler).

Appendix: Overview of Organizations

Organization	Country	Type	Interview(s) with	Function
QuietAgent	New Zealand / Australia	Private company; Exploitation of jobsite; services	Jason Kerr	CEO
The Regeneration	Australia	Private company; Exploitation of jobsite; services	Peter Landis Noel Jones	Founder Founder
ChandlerMacLeod	Australia	Private company; HRM consultancy, development of assessments and tests	Kevin Chandler Joris Luijke	Executive Director Manager Operations
Department of Employment and Workplace Relations	Australia	National governement agency; Policy making for labor market / unemployment	Madeleine Moss Greg Lemmon Ian More	Senior Policy Officer Business Development Manager Staff
Brotherhood of St. Lawrence	Australia	NGO; active in programs for supporting job seekers	Daniel Perkins	Project Manager Social Action and Research
Department of Political Science, University of Melbourne	Australia	University; Research on functioning of social security systems	Mark Considine	Head of Centre for Public Policy

Organization	Country	Type	Interview(s) with	Function
Matchworks	Australia	Private company; Services for job placing and reintegration	Karilyn Prats David Zerafa Arthur Wright Michael Whitmore Bernadette Rees	Site Manager Employment Officer Employment Officer Section Manager DEWR Project consultant Chandler MacLeod
Daywork	Australia	Private company; Exploitation of job site	Caroline Taylor	Founder
Ministry of Manpower Singapore	Singapore	National government agency; Policy making for labor market and employment	Kheng-Hwa Chua Raymond Choon Guan Tan Wee Lim Bay Jerina Chiang Kok Wee Goh Shirley Lim Ee Hong Ho	Divisional Director Assistant Manpower division Senior Manager International Branch Manager Industry Branch Assistant Director Industry Branch Senior Manager Industry Branch Senior Manager
Singapore Workforce Development Agency	Singapore	National government agency; Runs programs for improvement of national labor force	Mohd Latiff	Deputy Director Corporate and Marketing Communications Division
Hong Kong Social Welfare Department, Section Support for Self Reliance	China / Hong Kong Special Administrative Region	National government agency; Active in programs for social support and employment	Avis Liu Yuch-lan Rita Lau Choi-ha Fong Li-keung	Social security Officer Social security Officer Social security Officer
Hong Kong Employees Retraining Board	China / Hong Kong Special Administrative Region	National government agency; Runs programs for vocational retraining of employees	Patrick Pang Rita Ching Steven Ng	Deputy Executive Director Manager Placement Services Senior Manager Business Development

Organization	Country	Type	Interview(s) with	Function
Job Centre Hong Kong East	China / Hong Kong Special Administrative Region	National government agency; Runs programs for job placing	Wai-man Book Henry Leung Kwok-kui Wong	Deputy Manager Assistant Labour Officer Senior Labour Officer
Taiwan Council for Economic Planning and Development	Taiwan	National government agency; Policy making for labor market and employment	Yun-hsian Hsu Hsieh Chia-yi Gloria G.M. Lin Wei-Feng Kao Ming-sheng Wang Chiao-ting Huang	Analist Specialist Senior Specialist Technician Staff Officer Employment Services Division
Virtual Employment Services Centre	Taiwan	National government agency; Runs programs for job placing	Jason Tseng Andy Ke	Manager Customer Service Department Project Director
Employment Services Centre Taipei-Keelung	Taiwan	National government agency; Runs programs for job placing	Yuh-shan Wang Maria Liu	Director Employment Services Centre Staff Employment Services Centre
WCC Group	The Netherlands	Private company; Development of generic matching software	Gamliel Khan Josef Piri	Account manager Consulting
Knewco	The Netherlands	Private company; Development of webbased search systems	Barend Mons Albert Mons	Director Director
The Canadian Mental Health Association - Toronto Branch	Canada	Not-for-profit organization; Support activities for people with mental health problems	Jennifer Robinson	Program Manager Employment and Social Support Services

Organization	Country	Type	Interview(s) with	Function
Link Up Employment Services	Canada	Private company; Job placement for disabled long term job seekers	Bob Santos	CEO
University of Wisconsin	USA	University; Research on program evaluation	J. Rogers Hollingsworth	Professor Department of History
Naval Postgraduate School	USA	US Navy education institute; Development of job matching systems	Bill Gates Mark E. Nissen	Associate Professor, Associate Dean of Research Professor of Information Sciences and Management
Stanford University	USA	University; Research on economics and complex adaptive systems	W. Brian Arthur	Professor of Population Studies and Economics. Department of Economics; External Faculty, Santa Fe Institute
Profiles International	USA	Private company; Development of HRM assessments and tests	Chuck Wilson Joe Kistner	Senior Vice President, International Division CIO
University of Texas Department of Computer Sciences	USA	University; Research on natural language processing and text mining	Raymond J. Mooney	Professor of Computer Science
The Omnia Group	USA	Private company; Development of HRM assessments and tests	Julie A. Studer	Senior Vice President Operations and Business Development

Organization	Country	Type	Interview(s) with	Function
Vocational Rehabilitation Services - North Carolina Division	USA	National government agency; Employment Program for individuals with disabilities	Stephanie T. Vinson	Program Specialist for Employer Services
Synques	The Netherlands	Private company; Development of HRM assessments and tests	Ron Ramdjanamsingh Erwin Kruk	General Manager Developer
Hudson / De Witte & Morel	België	Private company; Consultancy, development of HRM assessments and tests	Etienne van Keer	Executive Director R&D
IBM Research Haifa / Tel Aviv facility	Israel	Private company; Development of job matching systems	Yossi Richter	Research Staff
National Employment Service	Israel	National government agency; Runs programs for job placing	Geula Havilio	Director External Relations & Projects
HRVision	Israel	Private company; Development of tests and job matching software	Emmanuel Cohen Sandy Erez	Vice-President Research Director of Marketing
Burning Glass	USA	Private company; Development of job matching software	Max Sigelman	CEO