BELGIAN ERGONOMICS SOCIETY

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Date / Datum
17/03/2011

Lieu / Plaats
FOD Werkgelegenheid, Arbeid en Sociaal Overleg
SPF Emploi, Travail et Concertation sociale
Auditorium Storck
rue Ernest Blerotstraat 1
1070 Bruxelles - Brussel

Cette journée est également ouverte
aux personnes non membres de la BES
Deze studiedag is ook toegankelijk voor niet BES-leden

Une traduction simultanée en Français
et en Néerlandais sera assurée
Simultaanvertaling Frans-Nederlands is voorzien

Situation
Le SPF Emploi, Travail et Concertation sociale se situe à 30 mètres de la gare SNCB Bruxelles-midi, en face de la sortie "Place Horta". Parking payant sous le bâtiment.

Ligging
De FOD Werkgelegenheid, Arbeid en Sociaal Oveleg bevindt zich op 30 meter van het NMBS-station Brussel-Zuid recht tegenover de uitgang Hortaplein. Onder het gebouwencomplex is een betaalparking.

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Etudiants (inscription groupée) / Studenten (groepinschrijving):
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* Avec lunch - met lunch
**Sans lunch – zonder lunch

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BELGIAN ERGONOMICS SOCIETY

HUMAN-MACHINE INTERFACE

Evolution pour le futur
25 ans de la BES

Evoluties in de toekomst
25 jaar BES

Journée nationale BES - 17 mars 2011
BES nationale studiedag - 17 maart 2011

BELGIAN ERGONOMICS SOCIETY

FEES federation of european ergonomics societies

SPF Emploi, Travail et Concertation sociale
Met de medewerking van de FOD Werkgelegenheid, Arbeid en Sociaal Oveleg

En cette année où la BES fête son 25e anniversaire, il est logique que pour notre réunion nationale annuelle nous choisissions un thème qui nous offre l'opportunité de nous tourner à la fois vers le passé et vers l'avenir.
Il n'est en effet pas uniquement question d'une évolution rapide des lieux de travail et du contenu des tâches (sur lesquels nous avions mis l'accent l'année passée). Durant ces 25 dernières années, nous avons tous dû ou pu apprendre à travailler avec des systèmes de commande pour réaliser au mieux les tâches visées en ces lieux de travail.
Pendant la journée d'étude d'aujourd'hui, nous nous arrêterons spécifiquement sur ces systèmes de commande qui sont plus connus sous l'appellation de « human-machine interface ». De quelle manière les personnes réussissent-elles à réaliser de façon fluide et sans faute la commande des appareils qu'elles utilisent ? Les concepteurs de hard-ware se penchent sur ces questions et viennent avec des réponses qui ne passent pas toujours le test de la pratique (l'utilisateur) avec brio. Pour les ergonomes – impliqués dans le projet et dans la recherche de solutions des problèmes des utilisateurs – tant des problèmes de nature physique que cognitive se posent ici. Pour par exemple un GPS qui tient dans la poche d'une chemise, quelle est alors encore la taille des touches de commande , quelle taille de texte est possible et à quel point est-ce lisible, quel est le raisonnement derrière la programmation, qu'en est-il du confort de l'utilisateur...
Un certain nombre d'aspects ergonomiques combinés aux évolutions dans le domaine « human-machine interface » seront donc abordés dans la matinée. Dans l'après-midi, nous prendrons un air de fête avec les évolutions dans notre propre domaine professionnel. Les orateurs que nous avons invités aborderont également l'historique, mais surtout jetteront un regard visionnaire et plein d'espoir vers l'avenir.
Comme de tradition, nous conclurons la journée par notre assemblée générale durant laquelle les nouveaux membres élus du conseil d'administration seront présentés.

Avoir 25 ans est pour la plupart des personnes un moment pour regarder en avant avec confiance. La BES vous invite de tout cœur à en faire autant avec nous, avec un programme qui se base sur le passé pour en effet travailler avec confiance à un avenir ergonomique responsable.

In het jaar dat BES zijn 25e verjaardag mag vieren, is het logisch dat we voor onze jaarlijkse nationale bijeenkomst kiezen voor een thema dat ons de kans biedt om een blik in het verleden én in de toekomst te werpen.
Er is immers niet alleen sprake van een snelle evolutie op vlak van werkplekken en taakinhouden (waar we vorig jaar de schijnwerper op gericht hebben). In de vooribje 25 jaar hebben we allemaal – moeten / mogen – leren werken met bedieningsmiddelen om op die werkplekken de bedoelde taakinhouden zo goed mogelijk te realiseren.
In de studiedag van vandaag staan we specifiek stil bij deze bedieningsmiddelen die onder de noemer "human-machine interface" thuishoren. Op welke manier slagen mensen erin de bediening van de toestellen die ze gebruiken vlot en foutloos te realiseren ? Ontwerpers van hardware en van buigen zich over deze vragen en komen met antwoorden die niet altijd de proef van de praktijk (de gebruiker) met even veel glans doorstaan. Voor ergonomen – betrokken bij ontwerp én bij oplossen van knelpunten bij gebruikers – stellen zich hier dus zowel vraagstukken van fysieke aard als op cognitief vlak. Een GPS bijvoorbeeld die in de zak van een hemd past, hoe groot zijn de bedieningstoetsen dan nog, welke tekengrootte is mogelijk en hoe leesbaar is dat dan, welke is de redenering die achter de programmatuur zit, hoe zit het met gebruikerscomfort,...)
Een aantal van de ergonomische aspecten gekoppeld aan de evoluties op vlak van "human-machine interface" zullen in de voormiddag worden behandeld.
In de namiddag staan we feestelijk stil bij evoluties in ons eigen beroepsdomein. De sprekers die we daarvoor uitnodigden, zullen eveneens ingaan op de historiek, maar vooral ook een visionaire en hoopvolle blik op de toekomst werpen.
Omdat goede gewoontes moeten bewaard blijven, sluiten we de dag af met onze algemene vergadering. Bij die zal de nieuw verkozen bestuursploeg worden voorgesteld aan de leden.

Het bereiken van een 25 jarige leeftijd, is voor de meeste mensen een moment om met goede moed vooruit te kijken. De BES nodigt U van harte uit om dat samen met ons te doen, met een programma dat het verleden als basis neemt om inderdaad met goed moed verder aan een ergonomisch verantwoorde toekomst te werken.

Programm(a)(e)

08.30 Accueil / Onthaal

09.00 Bienvenue / Welkom ,
Christian Deneve, directeur général de la DG Humanisation du travail, SPF Emploi, Travail et Concertation sociale

09.15 Introduction de la journée / Inleiding van de dag,
Alain Piette, Ergonome Européen, Président de la BES

Human – machine interface:
verleden als basis voor evoluties in de toekomst !?
Human – machine interface:
le passé comme base pour les évolutions futures !?

09.30 Sigrid vandeweghe (Senior Project Manager, Human Interface Group): Een kwarteeuw mens en computer: een zilveren bruiloft of een verstandshuwelijk?

10.00 Alban Amiel et Cécile van de Leemput (Université libre de Bruxelles ULB, Laboratoire de psychologie du travail et psychologie économique – Lapté): L'acceptation des technologies on-line, une question d'utilisabilité ?

10.30 Pause / Pauze

11.00 Erik Mulder, ErgoS Engineering & Ergonomics: Cognitieve ergonomie in bedrijf

11.30 Pierre Leclercq (Laboratoire LUCID - Faculté des Sciences Appliquées de l'Université de Liège Ulg), Le Studio Digital Collaboratif : un environnement multimodal de collaboration visant à recréer, à distance, les conditions de la coprésence

12.00 Questions / Vragen

12.15 Lunch

25 jaar ergonomie in België
25 ans d'ergonomie en Belgique

14.00 Anne Sophie Nyssen (Université de Liège Ulg), Vers où va l'ergonomie?: vers le bien-être ou le bien faire au travail?"

14.30 Kamiel Vanwonterghem (FEES), Uitdagingen voor de Ergonomie en methodologiche overwegingen

15.00 Roland Gauthy (European Trade Union Institute ETUI), Mise en perspective 'ergonomique' de la législation et de la normalisation européennes

15.30 Roeland Motmans, (BES) Voorstelling nieuwe website BES

16.00 Assemblée générale

17.00 afsluiting studiedag / clôture de la journée

BELGIAN ERGONOMICS SOCIETY

FORMULAIRE D'INSCRIPTION / INSCHRIJVINGSFORMULIER
Voor 10/03/2011 terug te sturen
A renvoyer avant le 10/03/2011

Nom - naam:. . . . . .

Prénom - voornaam:. . . . . .

Date - datum: . . . . . .

Entreprise - bedrijf: . . . . . .

. . . . . .

Adresse - adres: . . . . . .

. . . . . .

E-mail:. . . . . .

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  (incl. lidgeld 2011 - inclus cotisation 2011)
- Etudiants, inscription groupée / Studenten, groepinschrijving: avec/met lunch: 60€; sans/zonder lunch: 30 €

- Je verse ..... € sur le compte BES 775-5926753-74 avec la mention du nom du participant et de son entreprise avant le 10 mars 2011. Au delà de cette date, la somme devra être versée cash à l'accueil par le participant.
  Facture nécessaire: ❑ non ❑ oui

- Ik stort ..... € op het rekeningnummer BES 775-5926753-74 met de melding van de naam van de deelnemer en het bedrijf voor 10 maart 2011. Indien de betaling niet voor deze datum uitgevoerd is, dient de deelnemer aan het onthaal cash te betalen.

Factuur gewenst: ❑ neen ❑ ja

Signature - Handtekening

Een kwarteeuw (en meer) mens en computer

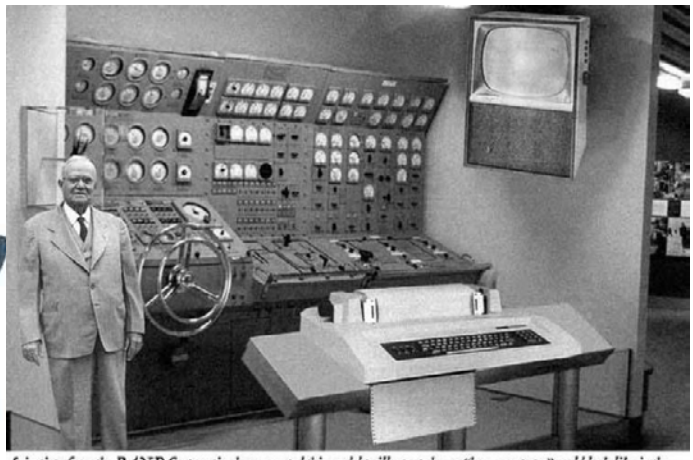
Een zilveren bruiloft of een verstandshuwelijk?

Human Interface Group
GIVING TECHNOLOGY A HUMAN FACE

Human Interface Group

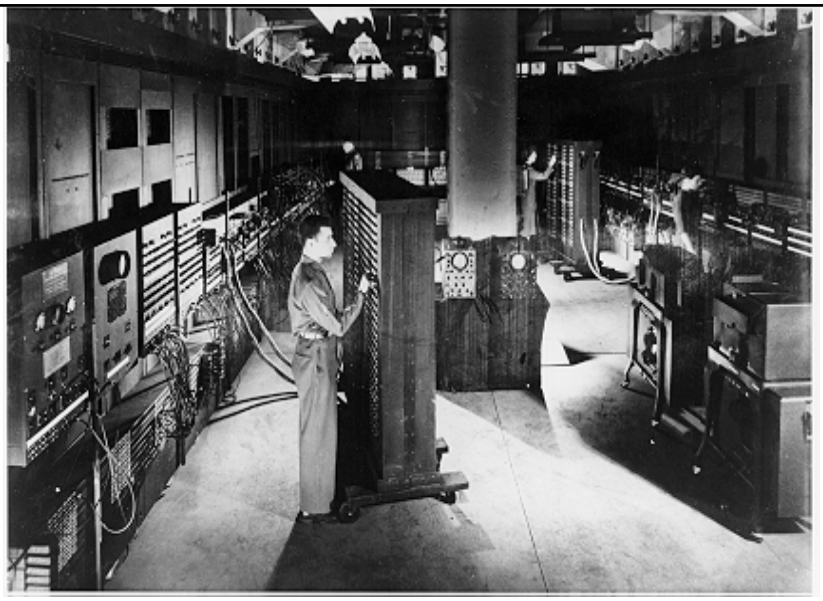
- Europe's specialists in technology ergonomics
- The experts to optimize the user experienceof your technological solutions
- Our expertise
  - Designing the user experience
  - Developing user documentation
  - Training your customers and your employees
- I am a Senior Project Manager with + 15yrs experience in the domain

1942: RAND's visie van de toekomst

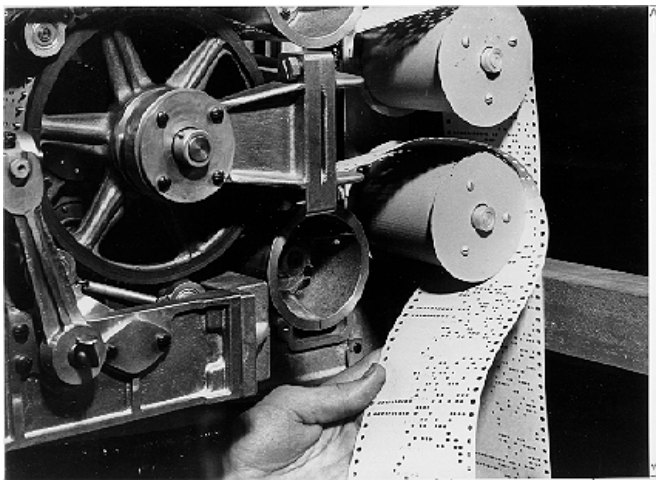


Scientists from the RAND Corporation have created this model to illustrate how a "home computer" could look like in the year 2004. However the needed technology will not be economically feasible for the average home. Also the scientists readily admit that the computer will require not yet invented technology to actually work, but 50 years from now scientific progress is expected to solve these problems. With teletype interface and the Fortran language, the computer will be easy to use.

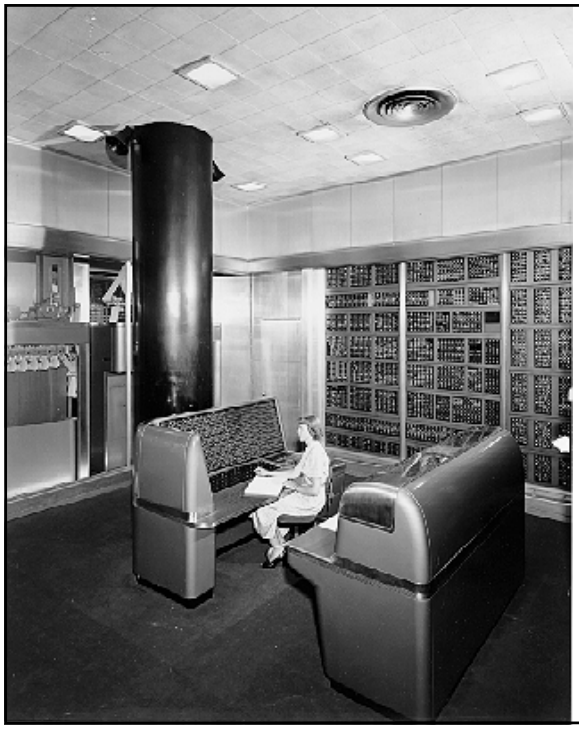
Interface Group



1943: De ENIAC, de eerste computer ter wereld



1944 De Mark I paper tape readers



1948 de IBM SSEC

1952 Douglas Engelbart

- The Vision (Early 50's)

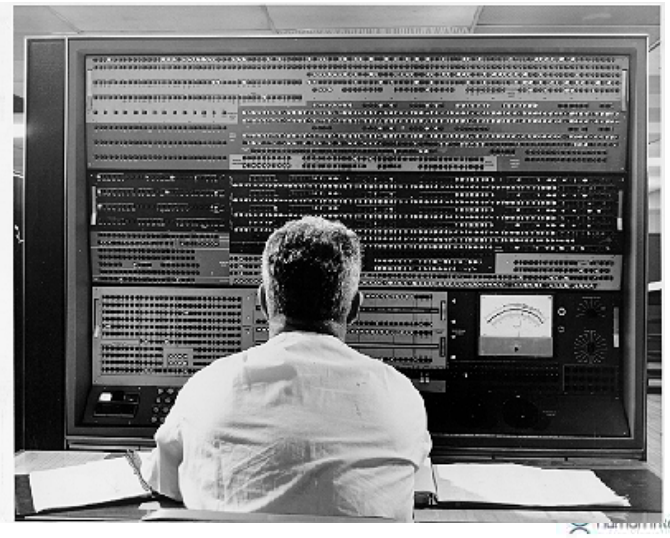
  ...I had the image of sitting at a big CRT screen with all kinds of symbols, new and different symbols, not restricted to our old ones. The computer could be manipulated, and you could be operating all kinds of things to drive the computer

  ... I also had a clear picture that one's colleagues could be sitting in other rooms with similar work stations, tied to the same computer complex, and could be sharing and working and collaborating very closely. And also the assumption that there'd be a lot of new skills, new ways of thinking that would evolve "

  ...Doug Engelbart

Human Interface Group

1961 The Stretch Technical Control Panel

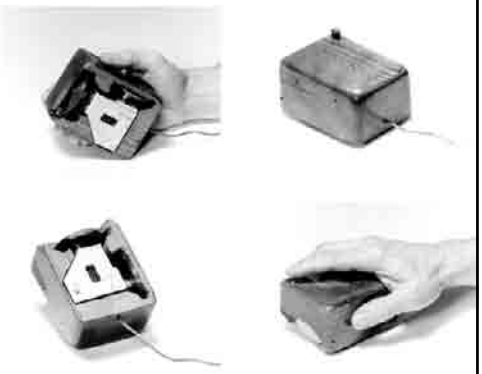


1960: J.C.R. Licklider

- Dacht na over “man-computer symbiose”

“The hope is that, in not too many years, human brains and computing machines will be coupled together very tightly and that the resulting partnership will think as no human brain has ever thought and process data in a way not approached by the information-handling machines we know today.”

1964 De eerste muis



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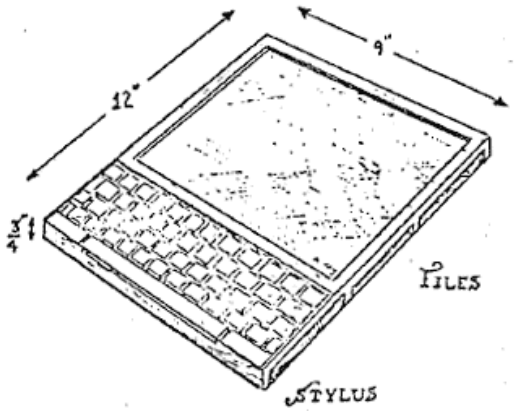
1969 Alan Kay De Personal Computer

- “Dynabook vision” (en kartonnen prototype) van een notebook computer



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70s De Personal Computer

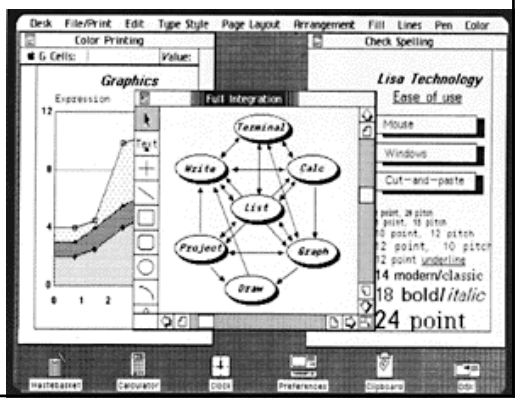
- Xerox PARC, mid-'70s
  - moderne grafische interfaces
    - tekst en tekenen, electronische mail

      windows, menus, scroll bars, muisselectie,…

```
Command Prompt
C:\>dir /?
Displays a list of files and subdirectories in a directory.

DIR [drive:][path][filename] [/A[[:]attributes]] [/B] [/C] [/D] [/
  [/O[[:]sortorder]] [/P] [/Q] [/S] [/T[[:]timefield]] [/W] [/X] [

  [drive:][path][filename]
              Specifies drive, directory, and/or files to list.

  /A          Displays files with specified attributes.
  attributes   D  Directories                R  Read-only files
               H  Hidden files               A  Files ready for ar
               S  System files               -  Prefix meaning not
  /B          Uses bare format (no heading information or summary)
  /C          Display the thousand separator in file sizes.  This
              default.  Use /-C to disable display of separator.
  /D          Same as wide but files are list sorted by column.
  /L          Uses lowercase.
  /N          New long list format where filenames are on the far
  /O          List by files in sorted order.
  sortorder    N  By name (alphabetic)       S  By size (smallest
               E  By extension (alphabetic)  D  By date/time (olde
               G  Group directories first    -  Prefix to reverse
  /P          Pauses after each screenful of information.
  /Q          Display the owner of the file.
  /S          Displays files in specified directory and all subdir
  /T          Controls which time field displayed or used for sort
  timefield   C  Creation
              A  Last Access
              W  Last Written
  /W          Uses wide list format.
Press any key to continue . . .
```

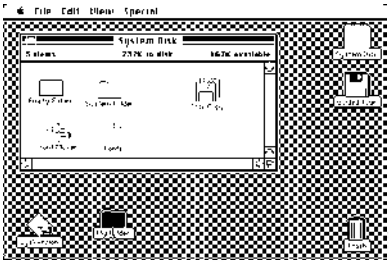
1983 Apple Lisa

- Voorganger van de Macintosh
- WIMP: window, icon, menu, pointing device
- Kostte nog $10,000 -> commerciële ramp

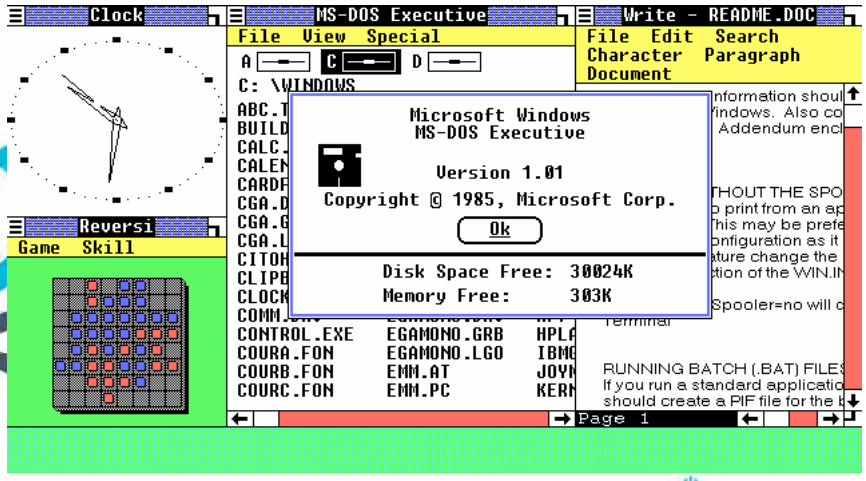


1984 Apple Macintosh

- Een succes door
  - prijs ($2500)
  - geleerd uit fouten van Lisa (!)
  - interface guidelines voor consistentie
  - dominant in desktop publishing door betaalbare laser printer & goede graphics



1985 Windows 1.0



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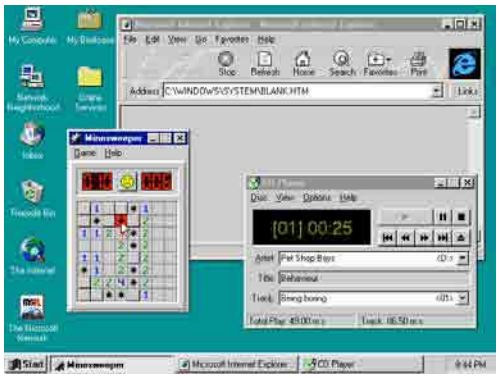
1995 Windows 95

- Een succes door
  - Opkomst Internet
  - Fax/modems & email
  - Had pmug & play
  - 32 bit OS: multimedia
  -



Human Interface Group

2004 Commerciële Touch Screens & Mobile

- Post-WIMP

Human Interface Group

2009: 3D Interfaces

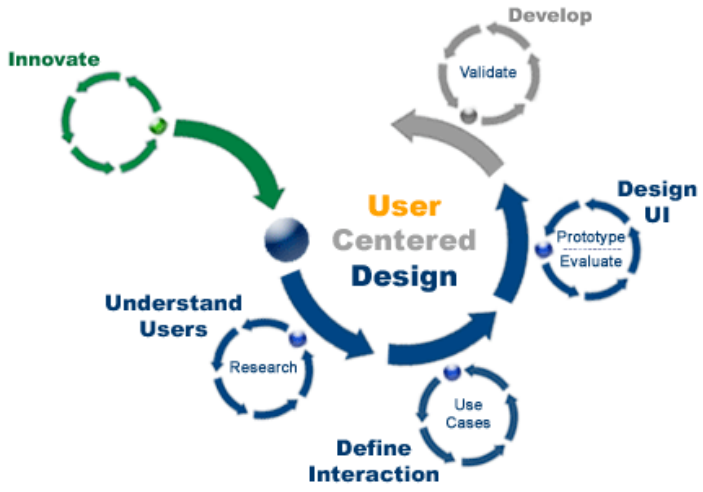

© CG4TV.com


SOMEDAY ROBOTS
WILL RULE THE WORLD

Een gouden bruiloft?

- Voorspelbaarheid, consistentie
- Intuïtiviteit, ‘natuurlijk’
- Afgestemd op behoeften
- Houdt rekening met menselijke beperkingen
- Geeft feedback
- Anticipeert op fouten
- Is ‘plezant’ om te gebruiken

Human Interface Group



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ULB Laboratoire de Psychologie du Travail et Psychologie Économique

Alban Amiel & Cécile van de Leemput

L'acceptation des technologies on-line, une question d'utilisabilité ?

Belgian Ergonomics Society

17 mars 2011

Pourquoi s'intéresser à l'acceptation des technologies ?

- Les outils technologiques et plus particulièrement les applications informatiques en réseau sont de plus en plus présentes dans les entreprises pour :
  - Améliorer l'efficacité dans la réalisation des tâches
  - Augmenter l'accessibilité des informations via leur centralisation
  - Accroître la formalisation des process, la qualité des informations…
  - Faciliter le travail par la mise à disposition d'outils partagés
  - Faciliter la gestion pour l'organisation
  - Réduire l'usage du papier, augmenter la rapidité de gestion des informations
  - Augmenter la flexibilité au travail

➔ La mise à disposition de ces outils, censés faciliter la vie de l'entreprise et de ses salariés, est-elle suffisante pour atteindre les objectifs fixés ?

➔ Qu'en est-il de leur facilité d'utilisation, de leur utilité, de leur acceptabilité ?

Des constats

- Dans le domaine du e-learning
  - Engagement des participants peu élevé
  - Taux d'abandon de l'ordre de 70% à 80 %
    (Amiel & al., 2004 ; Gauthier, 2001 ; Tricot, 2007)
- Dans l'usage de certains outils technologiques en entreprise
  - Sous-utilisation des outils
  - Utilisation principalement dépendante de l'obligation d'usage
  - Stratégies d'évitement en utilisant d'autres moyens : subordonnés, usage d'anciens ou autres outils…
  - Manifestations d'insatisfaction chez les utilisateurs
  - Perte de fonctionnalités auparavant disponibles
  - De grandes variabilités inter-individuelles dans les comportements d'usage

➔ **Quels sont les freins à l'acceptabilité ?**

Utilité et utilisabilité d'une technologie

Traditionnellement, l'approche ergonomique a considéré 2 conditions essentielles à l'adoption d'une technologie et sur lesquelles les entreprises sont focalisées :

- il faut que l'application soit « **facile à utiliser** » (concept d'utilisabilité)
- Il faut que l'application soit **utile** ou devienne utile pour les personnels (concept d'utilité)

L'utilisabilité est définie comme « *le degré selon lequel un produit peut être utilisé, par des utilisateurs identifiés, pour atteindre des buts définis avec efficacité, efficience et satisfaction, dans un contexte d'utilisation spécifié* » (Norme ISO 9241-11)

- Nielsen (1994) identifie 5 composantes de l'utilisabilité
  - La facilité d'apprentissage (easy to learn)
  - L'efficience
  - La facilité de mémorisation (easy to remember)
  - La fiabilité (few errors)
  - La satisfaction

L'utilité peut se définir comme le degré selon lequel l'application va répondre aux besoins et attentes des utilisateurs et va apporter une plus-value dans la réalisation de la tâche.

Utilité et utilisabilité d'une technologie

- **Comment évalue-t-on l'utilité ?**

  ➔ Par entretien et questionnaire auprès des commanditaires et des utilisateurs

- **Comment évalue-t-on l'utilisabilité ?**
- Réalisation de tests d'utilisabilité en laboratoire (U-Lab)
- et/ou Analyse par inspection
- et/ou Entretien et questionnaire

➔ Les recommandations fournies visent à améliorer l'adéquation entre les logiques de l'interface et celles de l'utilisateur.

Toutefois, comme la majorité de nos études l'ont démontré, l'utilité et l'utilisabilité sont des conditions essentielles à l'adoption de l'outil mais non suffisantes.

➔ D'autres variables doivent être prises en considération pour favoriser l'adoption de la technologie dans le cadre professionnel.

Quelles autres variables peuvent influencer l'acceptation d'une technologie ?

2 études pour illustrer: étude 1 – PSA + étude 2 – BlackSkin Dermatology Online

Etude de cas 1
Outil de formation à distance techniciens PSA

- **I- Constat des services de formation Peugeot**

  ➔ **Sous-utilisation du service de formation ouverte et à distance** destiné aux techniciens en maintenance automobile

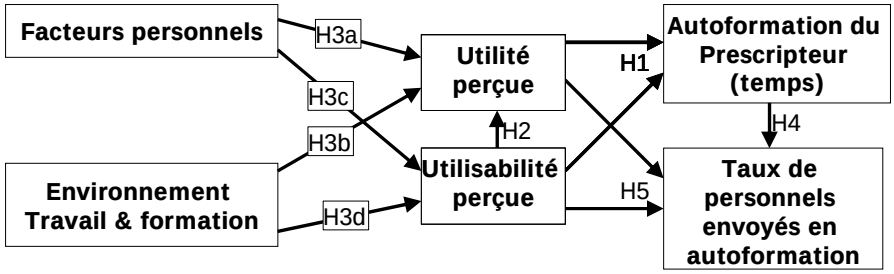
- **II- Proposition de deux études complémentaires :**
  - 1- Etude de l'utilisabilité selon 2 approches :
    - A- **Etude empirique** par observation des comportements d'usage
    - B- **Analyse par inspection** en appliquant des critères ergonomiques et sémiotiques à des modules de formation accessibles
  - 2- Etude de l'adoption de l'outil FOAD
    - A- **Entretiens** auprès des concepteurs et responsable du service de formation
    - B- **Entretiens** auprès des prescripteurs (Conseillers techniques) : super-expert, formateur, manager, mécanicien, technicien expert électronique…

Le prescripteur ou conseiller technique
est la « clé » de l'usage de la formation à distance par les techniciens

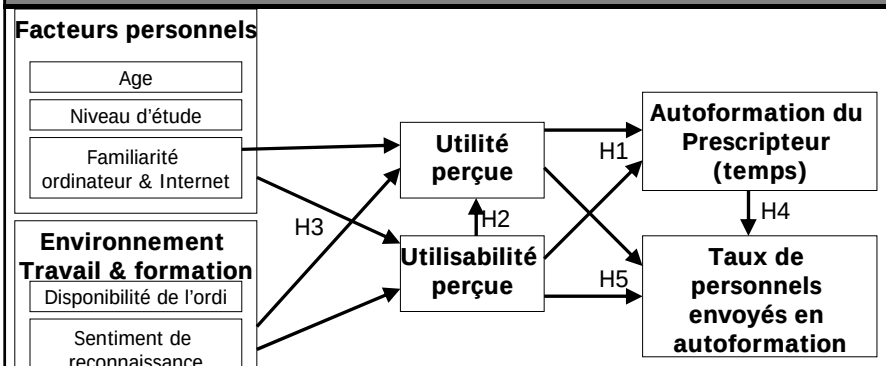
Méthodologie

- **Mesures**
  - **Usage du elearning par le prescripteur et les personnels** (durée 1 an)
    - Temps de formation des prescripteurs
    - Taux de personnel envoyé en formation à distance
  - **Perception de l'outil**
    - Utilité perçue - Ex. : *« les autoformations me permettent d'acquérir de nouvelles connaissances »*
    - Utilisabilité perçue - Ex. : *« J'ai eu du mal à apprendre à utiliser le site d'autoformation »*
  - **Caractéristiques personnelles**
    - Âge
    - Niveau d'étude
    - Usage de l'ordinateur et Internet au domicile
  - **Caractéristiques et perceptions de l'environnement de travail**
    - Disponibilité du matériel pour la formation à distance
    - Sentiment d'autonomie
    - Sentiment de reconnaissance
- **Procédure et population**
  - **Questionnaire proposé à tous les prescripteurs en France (475)**
  - **Taux de participation de 84% (400 réponses)**
  - **Hommes de 21 à 61 ans – M=34,85 ans, E.T.=8,87 – Majorité : moins de 45 ans**

Problématique



Résultats



Mise en évidence :

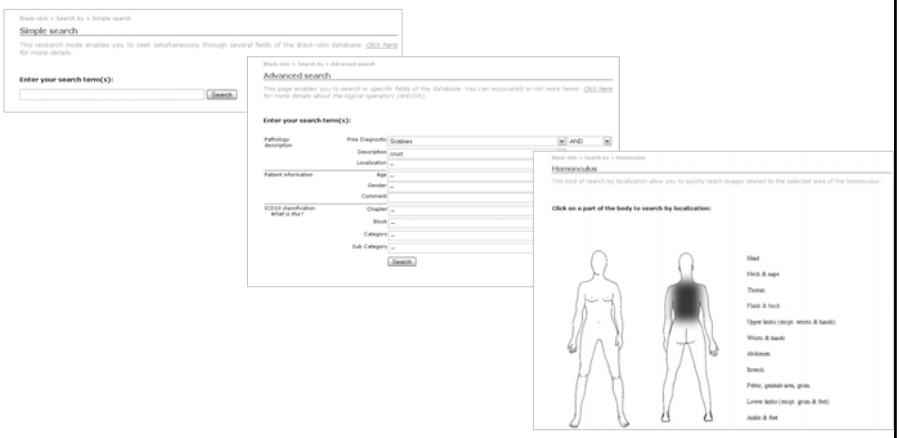
- du rôle clé du prescripteur de la formation dans la FOAD des techniciens en maintenance automobile (**H4**),
- de l'influence des perceptions de l'outil (utilité, utilisabilité) sur l'usage de la FOAD (**H1**) & sur la décision d'envoyer les techniciens en FOAD (**H5**),
- de l'impact de certaines variables personnelles ainsi que de l'environnement de travail et de formation sur les perceptions de l'outil (**H3**)

Etude de cas 2 – Projet BlackSkin

- Projet de création d'une plateforme en dermatologie sur peaux noires : « Black-Skin Dermatology Online » financé par la Politique Scientifique Fédérale Belge
  - Objectif : développer et mettre à disposition de médecins et de praticiens de soins de santé, un outil d'apprentissage et d'aide au diagnostic
  - Originalité du projet : outil centré sur les peaux noires alors qu'il n'existe ni atlas en ligne ni atlas papier à ce sujet malgré la plus grande difficulté de diagnostic sur ce type de population
  - Mission du Laboratoire au sein du projet pluridisciplinaire : réaliser des tests d'utilisabilité du prototype au U-Lab (Laboratoire d'utilisabilité)
  - Etude en parallèle menée par le laboratoire : étude de l'adoption de l'outil d'autoformation par des médecins en formation

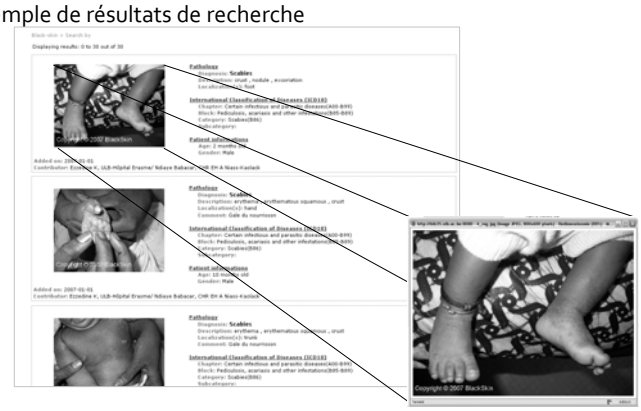
Présentation de l'outil d'autoformation

- Les modes de recherche



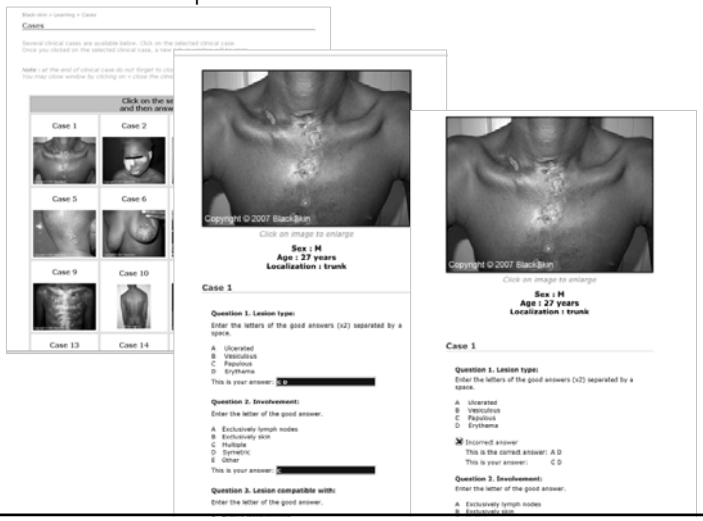
Présentation de l'outil d'autoformation

- Exemple de résultats de recherche



Présentation de l'outil d'autoformation

- Exemple études de cas et quiz



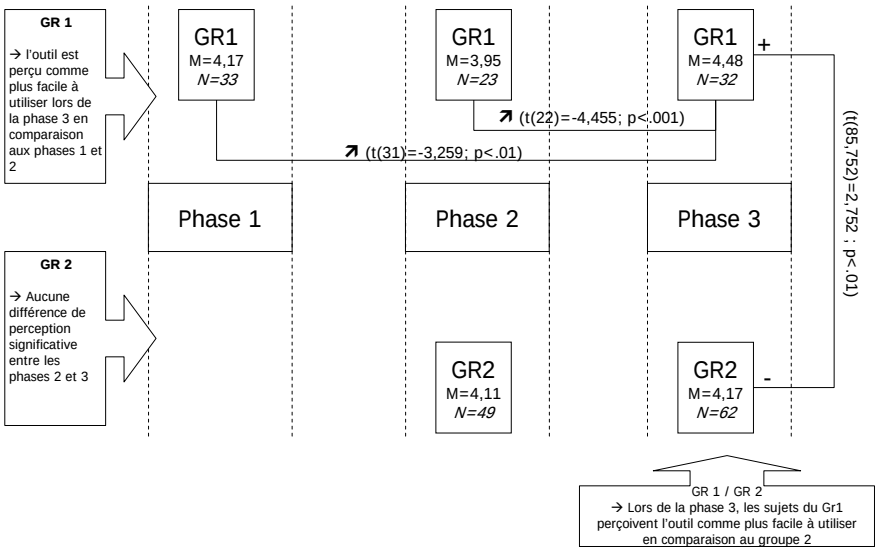
Plan de la recherche

	Phase 1	**Phase 2**	**Phase 3**
	Tests en laboratoire d'utilisabilité	Usage libre	Examen de dermatologie Test de connaissance Black-Skin
Questionnaire	Questionnaire P1	Questionnaire P2	Questionnaire P3
Groupe 1 – 33 médecins	X	X	X
Groupe 2 – 70 médecins		X	X

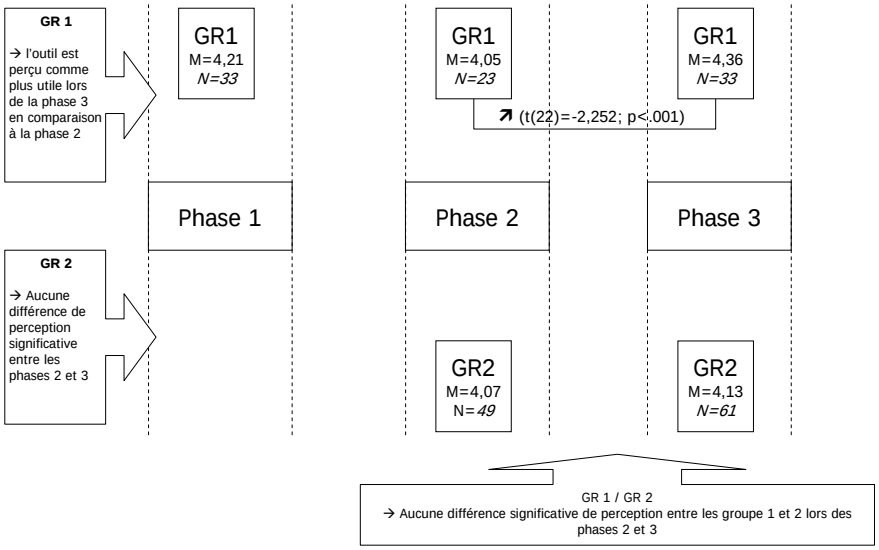
Résultats généraux

- **Utilisabilité perçue**
  - L'outil est perçu comme plutôt facile à utiliser par les médecins en formation
  - **Moyenne >3,95 (**échelle de 1 à 5) quel que soit le groupe et la passation
- **Utilité perçue**
  - L'outil est perçu comme plutôt utile par les médecins en formation
  - **Moyenne >4,05 (**échelle de 1 à 5) quel que soit le groupe et la passation
- **Temps d'utilisation de la plateforme**
  - Phase 1 (Gr 1) : M = 40min (écart-type = 10min)
  - Phase 2 (Gr 1 & 2) : M =1h51min (écart-type = 1h09min)
- **Taux de réussite au test de connaissances**
  - Très bon taux de réussite : 86,13/100 (écart-type = 17,48)

Evolution de la perception d'utilisabilité



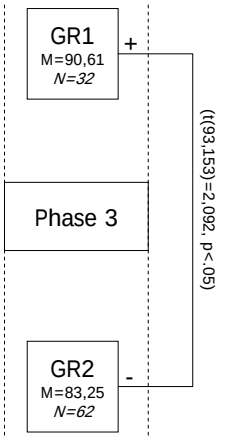
Evolution de la perception d'utilité



Résultats au test de connaissances

Une bonne réussite au test de connaissances par l'ensemble des médecins avec une moyenne de score de 86,13/100

Une meilleure réussite des médecins du groupe 1 ayant réalisé les tests d'utilisabilité



Quelles variables peuvent déterminer l'acceptation des technologies on-line ?

- Les perceptions de l'outil par rapport au travail
- L'intégration de la technologie et les conditions de travail
- Les perceptions de l'outil <u>après usage</u>
- Les caractéristiques personnelles en lien avec l'informatique
- Les motivations personnelles à utiliser la technologie
- Les caractéristiques personnelles « indépendantes de l'outil »

Perceptions de l'outil par rapport au travail

Variables mettant en évidence la perception globale de l'utilité :

- **Utilité perçue ou perception de l'utilité (perceived usefulness) :** le degré avec lequel une personne estime que l'utilisation d'un dispositif particulier améliorera sa performance
- **Pertinence professionnelle (job relevance)** : degré avec lequel l'outil est jugé adapté pour la réalisation des tâches
- **Qualité des résultats obtenus (output quality)** : degré selon lequel l'utilisateur estime que les résultats obtenus avec l'outil seront de bonne qualité
- **Exploitabilité des résultats (result demonstrability)** : degré selon lequel l'utilisateur estime que l'utilisation de l'outil apportera des résultats tangibles

L'intégration de la technologie et conditions de travail

- **Environnement facilitateur/supportif** : degré avec lequel l'utilisateur estime que les infrastructures organisationnelles et techniques existantes lui offrent un support efficace pour l'utilisation de la technologie

➔ L'étude menée auprès de PSA nous a permis d'étudier des conditions qui influencent l'adoption d'un outil e-learning par les conseillers techniques :

	Fréquence d'usage	**Temps d'usage**
•Type de garage		X
•Direction régionale		X
•Qualité du matériel		
•Disponibilité du matériel	X	
•Ordinateur dans l'atelier	X	
•Charge de travail (nombre de techniciens en charge)	X	X
•Travail au rendement (perceptions)	X	X
•Sentiment de reconnaissance par rapport au constructeur	X	X
•Sentiment de reconnaissance par rapport à la hiérarchie	X	

Perceptions de l'outil <u>après usage</u>

- **Facilité d'utilisation** : degré avec lequel une personne estime que l'utilisation d'un dispositif s'est faite sans effort physique ou mental

- **Utilité ou perception de l'utilité (perceived usefulness) :** le degré avec lequel une personne évalue que l'utilisation d'un dispositif particulier améliore sa performance

Les caractéristiques personnelles en lien avec l'informatique

- **Sentiment d'efficacité personnelle informatique (SEP I)** : perception qu'un individu entretient quant à sa capacité à utiliser un ordinateur
- **Sentiment d'efficacité personnelle lié aux TIC (SEP TIC)** : perception qu'un individu entretient quant à sa capacité à utiliser les TIC (Internet)
- **Anxiété informatique** : Degré d'appréhension, de peur de l'utilisation de l'informatique

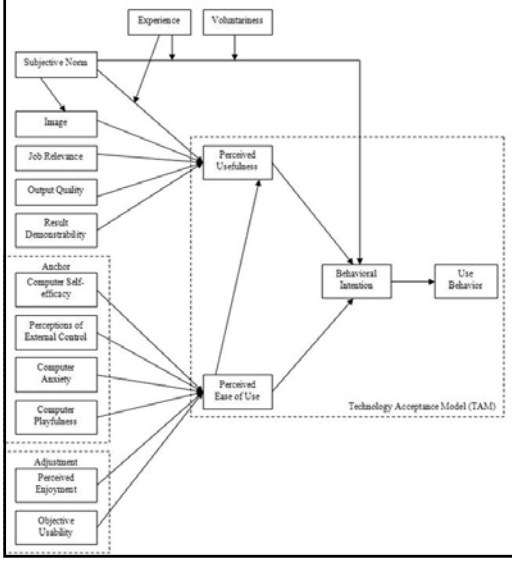
Motivations personnelles à utiliser la technologie

- **Plaisir perçu (Perceived enjoyment) = motivation intrinsèque** : degré avec lequel une activité impliquant l'utilisation de l'outil est perçue comme agréable pour elle-même, indépendamment des résultats potentiels
  - → le plaisir perçu lors de l'usage de l'application influence positivement son adoption
- **Utilisation librement consentie / utilisation non contrainte (Voluntariness)** : degré selon lequel un utilisateur estime que la décision d'utilisation est librement consentie
  - → l'usage contraint de la technologie a une influence négative sur l'adoption de l'outil

Les caractéristiques personnelles « indépendantes de l'outil »

- L'âge
- Le sexe
- Le Niveau d'étude
- La maîtrise de la langue
- La familiarité / le niveau d'expertise / l'habitude d'usage de l'Informatique & d'Internet
- …

Plusieurs modèles de l'acceptation des technologies sont proposés : Exemple TAM 3



Venkatesh, V., & Bala, H. (2008). Technology Acceptance Model 3 and a Research Agenda on Interventions. Decision Sciences, 39(2), 273-315.

➔ On voit ici qu'un grand nombre de variables ont un impact plus ou moins direct sur l'intention d'usage et l'usage réel de la technologie

Conclusions

- **L'utilité** et **l'utilisabilité** constituent 2 piliers principaux de l'utilisation d'une technologie
- **L'acceptation d'une technologie** doit prendre en compte également les caractéristiques liées à l'environnement de travail, aux personnes, aux technologies,…
- Lors de tests d'utilisabilité, il est important de sensibiliser les commanditaires sur l'importance de ces variables et réaliser une étude de ces différents axes :
  - Caractéristiques personnelles, conditions de travail et d'usage de la technologie, perceptions concernant l'outil, à la bonne intégration de l'outil dans l'organisation…

➔ Ceci réaffirme la nécessité de s'orienter vers une approche globale lorsque l'on réalise une étude d'utilisabilité.

➔ En complément de l'étude objective de l'utilisabilité (tests d'utilisabilité, analyse par inspection…), l'étude de ces variables peut se faire par une approche quantitative (questionnaire), mais aussi qualitative (entretien), sans oublier, dans certains cas, par des observations sur le terrain pour mettre en évidence les conditions de travail et d'usage de la technologie.

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Erik Mulder

ErgoS Engineering & Ergonomics

- engineering consultancy, 10 ergonomists
- ergonomical expertise and design
- applied science, r&d
- Ergonomie-Opleidingen.nl
- Enschede, NL

Man meets automation

... example in consumer sector ...

ERGOS

Cognition

- perceive
  (information)
- process
- decide
- act
- perceive
  (feedback / altered information)
- and so on

ERGOS

Do you prefer

over

?

Cognitive load?

ERGOS

Some passwords in your memory?

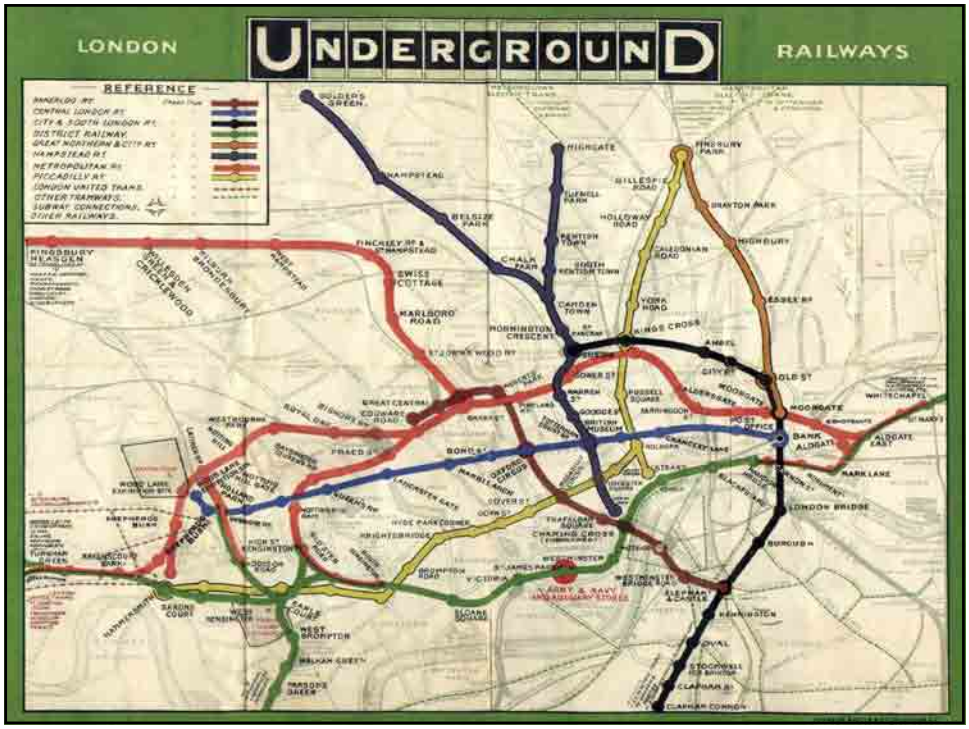
Conclusion

- Lots of space in your mind
- Recognition is easier than
- constructing from memory

ERGOS

Perceive

ERGOS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UNDERGROUND
RAILWAYS
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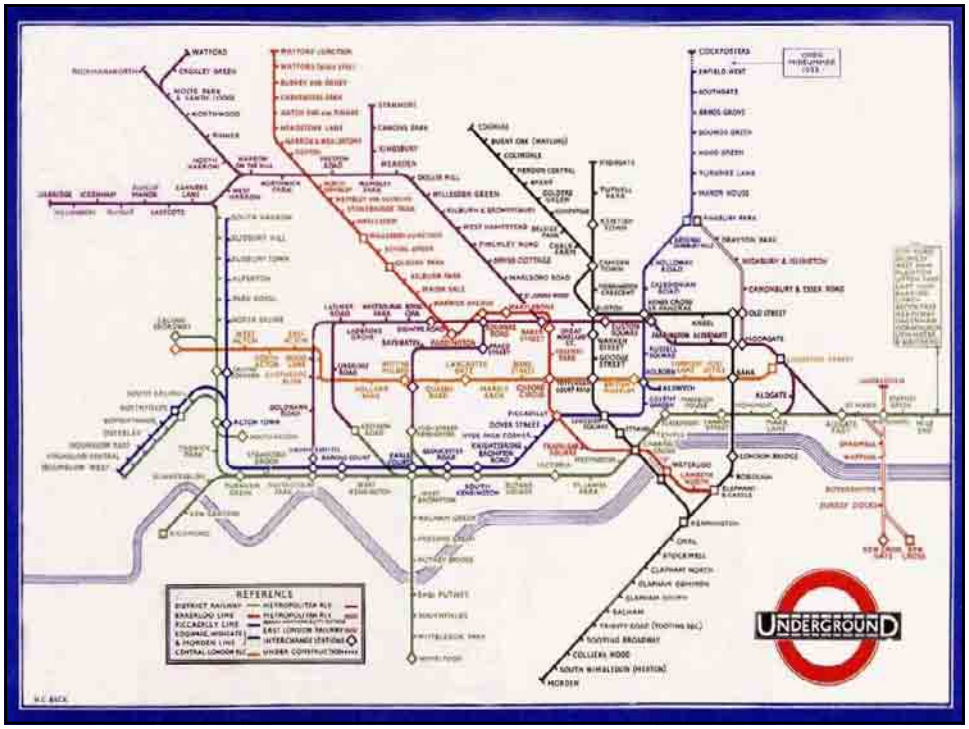
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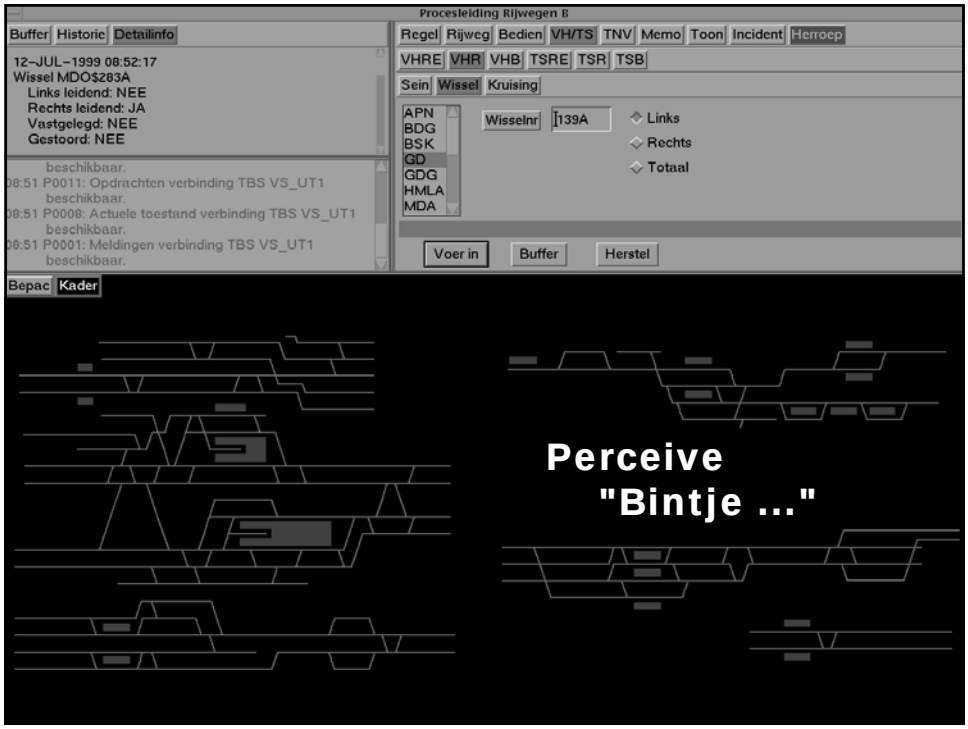
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beschikbaar.
08:51 P0008: Actuele toestand verbinding TBS VS_UT1
beschikbaar.
08:51 P0001: Meldingen verbinding TBS VS_UT1
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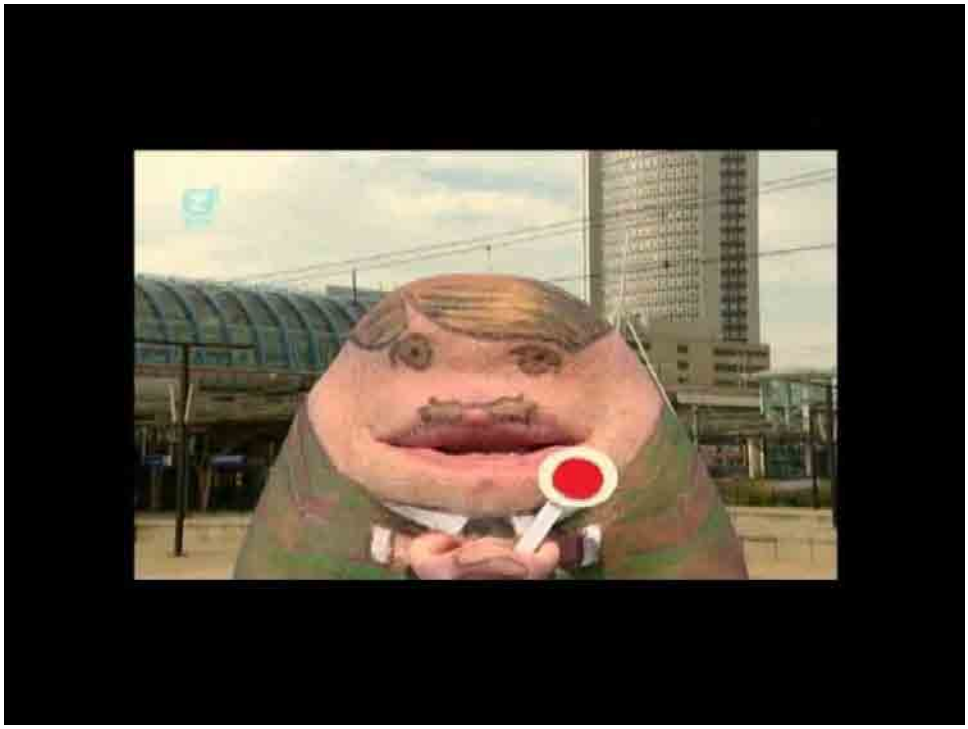

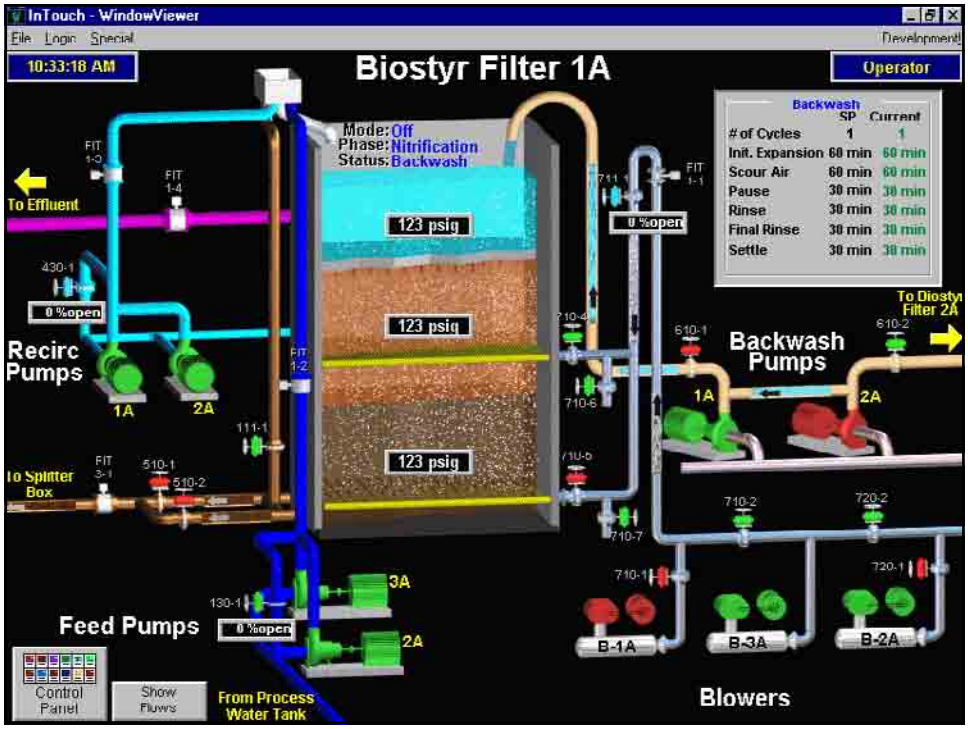
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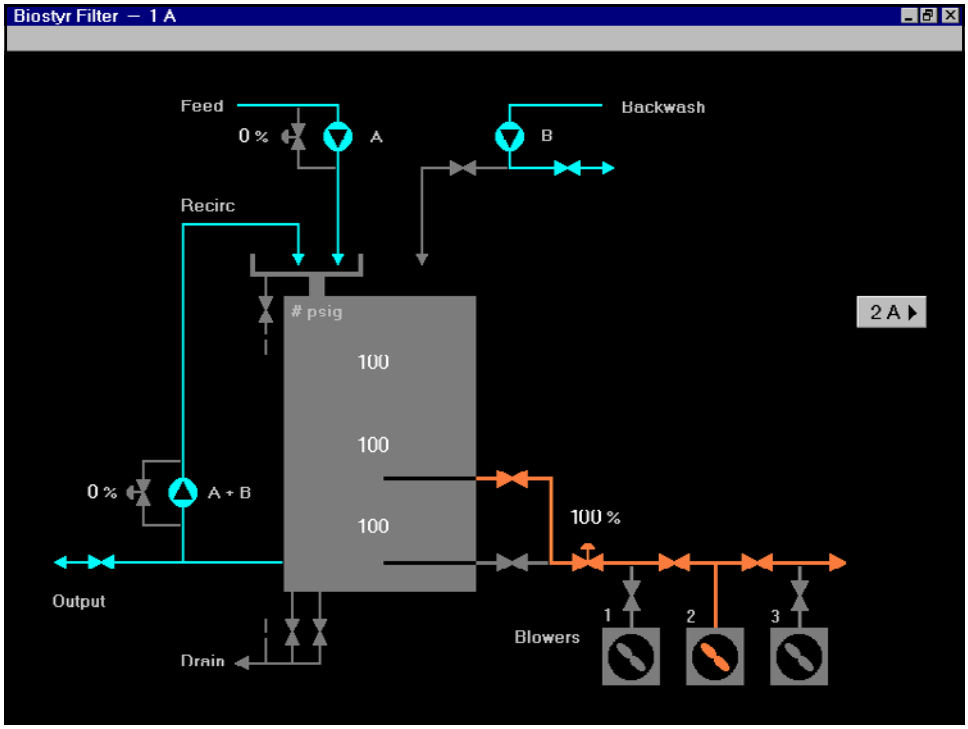
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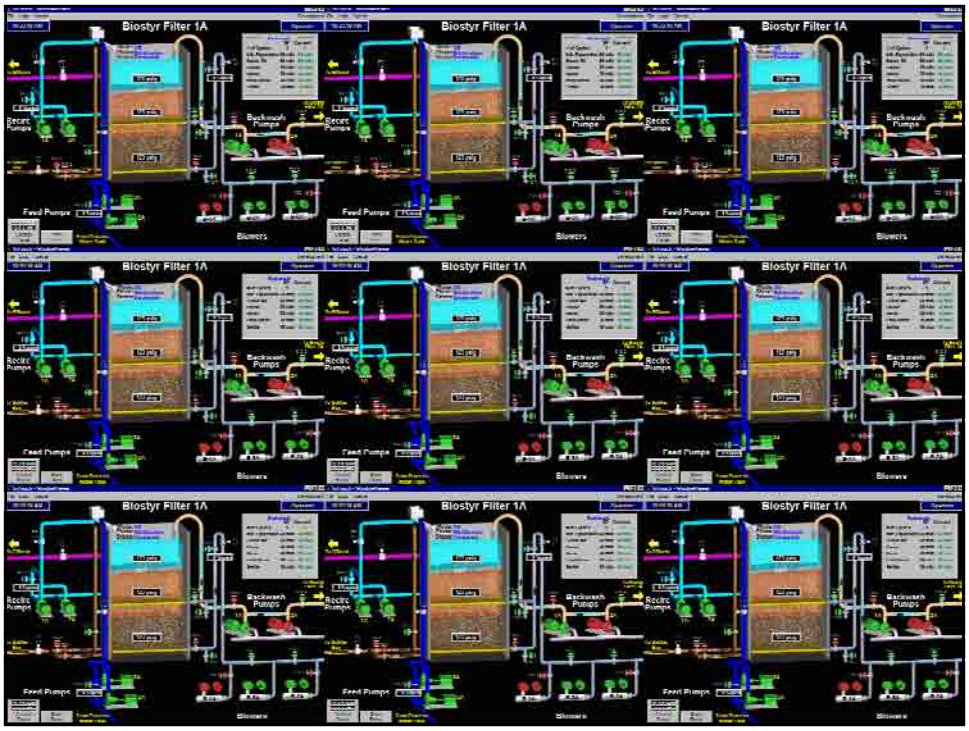
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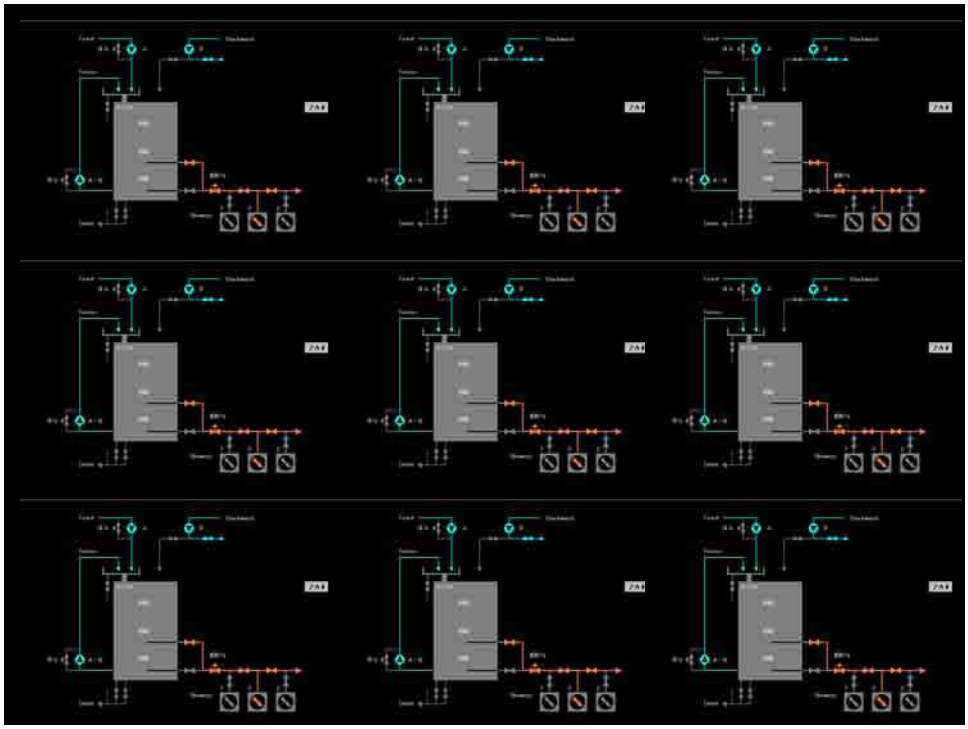

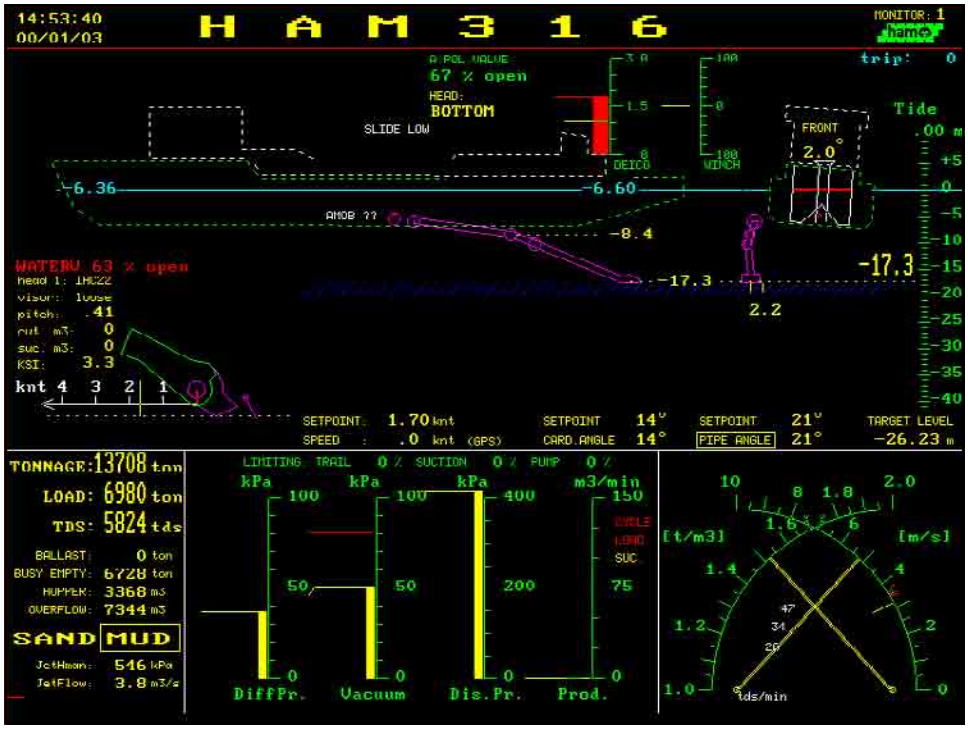
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AMOB ??
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WATERV 63 % open
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visor: loose
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suc. m3: 0
KSI: 3.3
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CARD.ANGLE 14°
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LOAD: 6980 ton
TDS: 5824 tds
BALLAST: 0 ton
BUSY EMPTY: 6728 ton
HOPPER: 3368 m3
OVERFLOW: 7344 m3
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JetHman: 546 kPa
JetFlow: 3.8 m3/s
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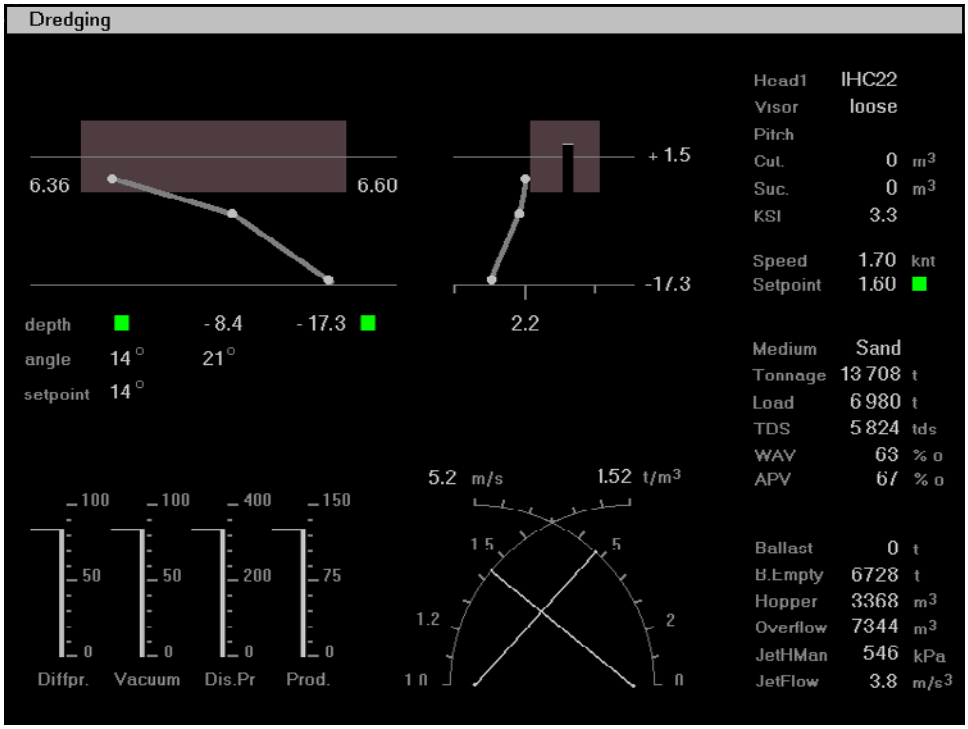
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Pitch
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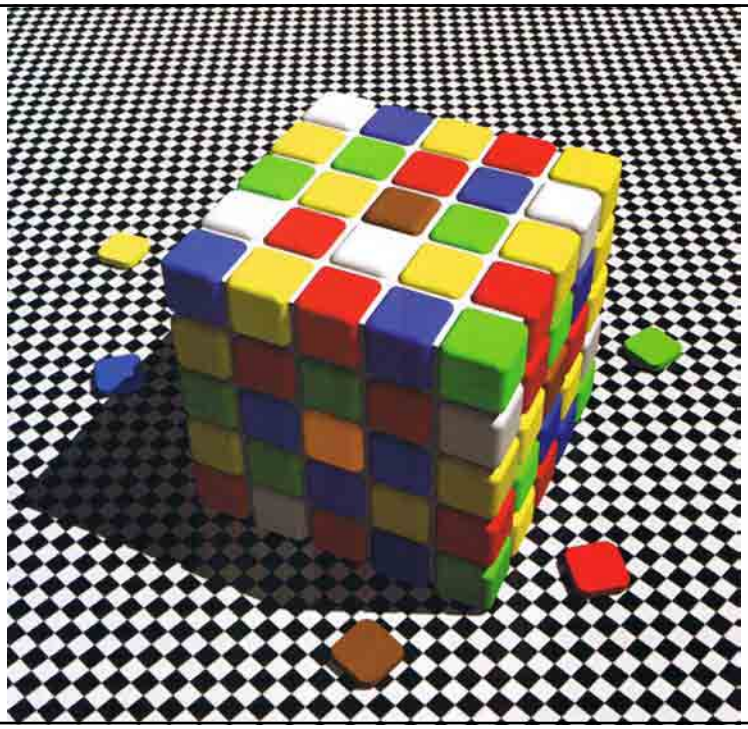
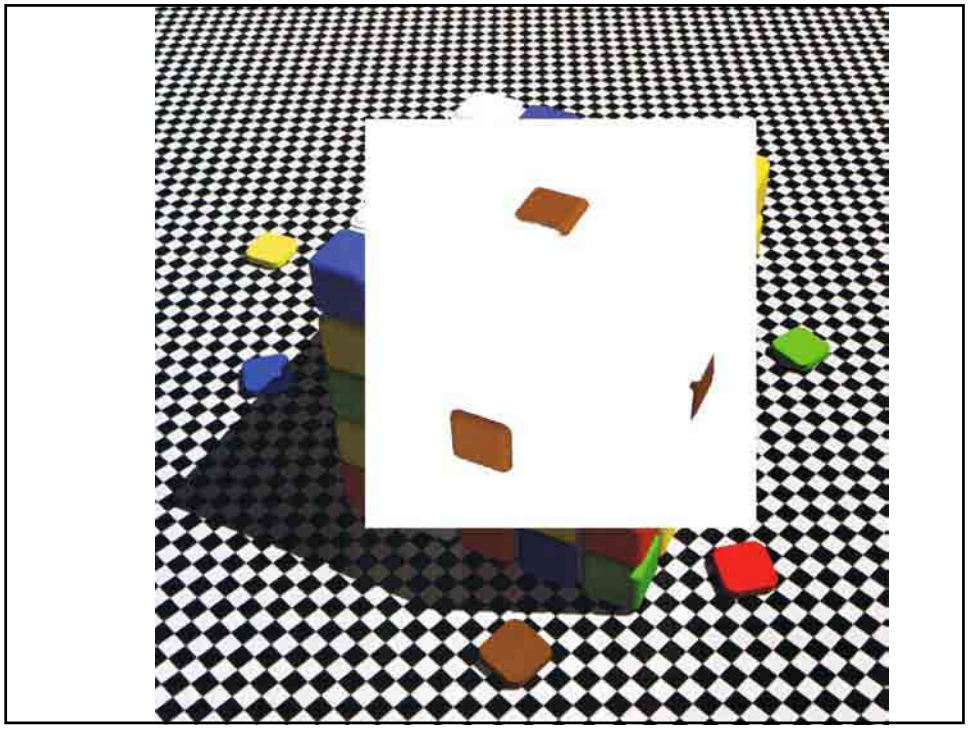
KSI 3.3
Speed 1.70 knt
Setpoint 1.60
Medium Sand
Tonnage 13 708 t
Load 6 980 t
TDS 5 824 tds
WAV 63 % o
APV 67 % o
Ballast 0 t
B.Empty 6728 t
Hopper 3368 m3
Overflow 7344 m3
JetHMan 546 kPa
JetFlow 3.8 m/s3
Diffpr. Vacuum Dis.Pr Prod.
5.2 m/s
1.52 t/m3

Colour is a strong signal

- Dimmed colours are OK for comfort
- But colour as a code ??
  - Beware of strong associations
  - Beware of luminance
  - Do not combine red and blue
  - Use enough colour difference

ERGOS



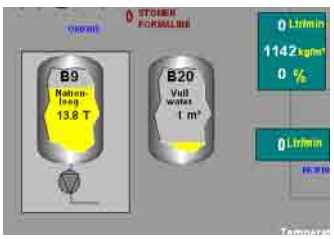


to Ignore = to Select = mental load

even unconsciously

Get rid of
Movement,
Colours, fonts,
Logos, frames, lines

Filter **I**nformation**!**



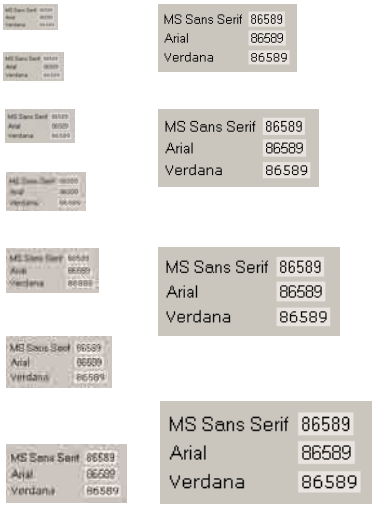
Click Here

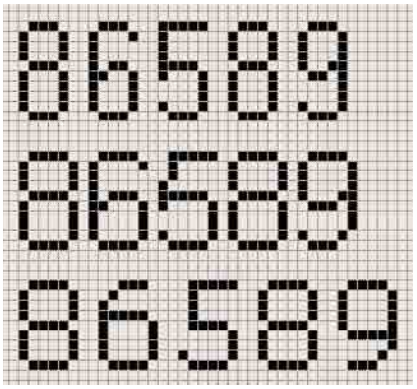
Reading, processing

ERGOS

Present values

size and type of fonts





10, 10 and 9 pixels high

ERGOS

Graphical value presentation

Cognitive load, attention

- Video of 30 seconds,
  in which two teams throw a ball.

- Try to count, as good as possible,
  how many times the ball is passed *in* the white team.

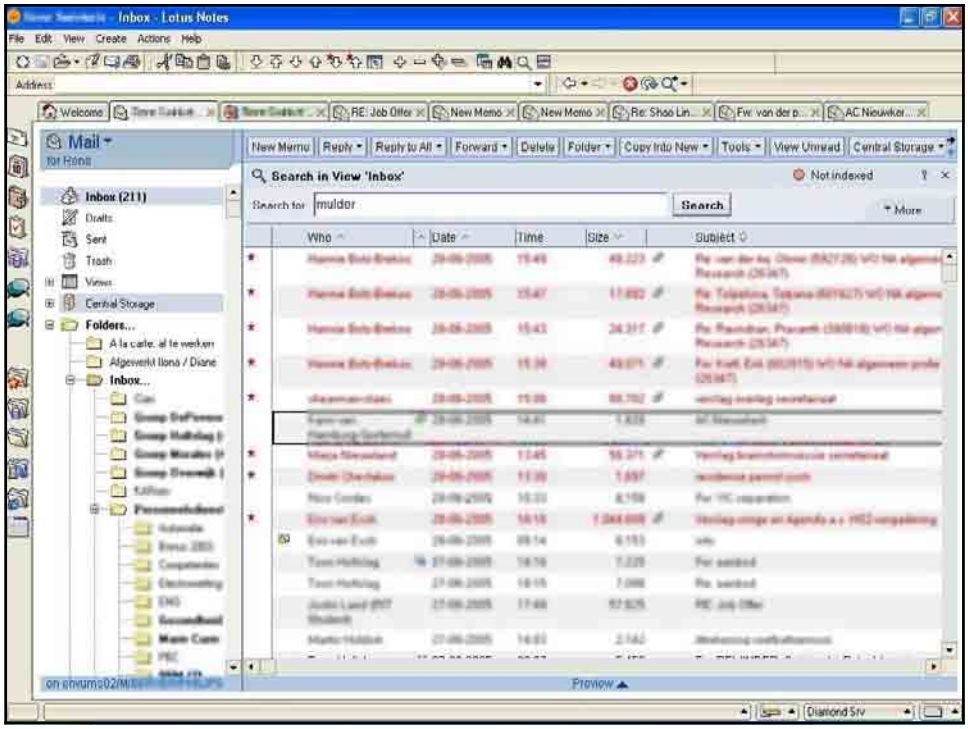
ERGOS

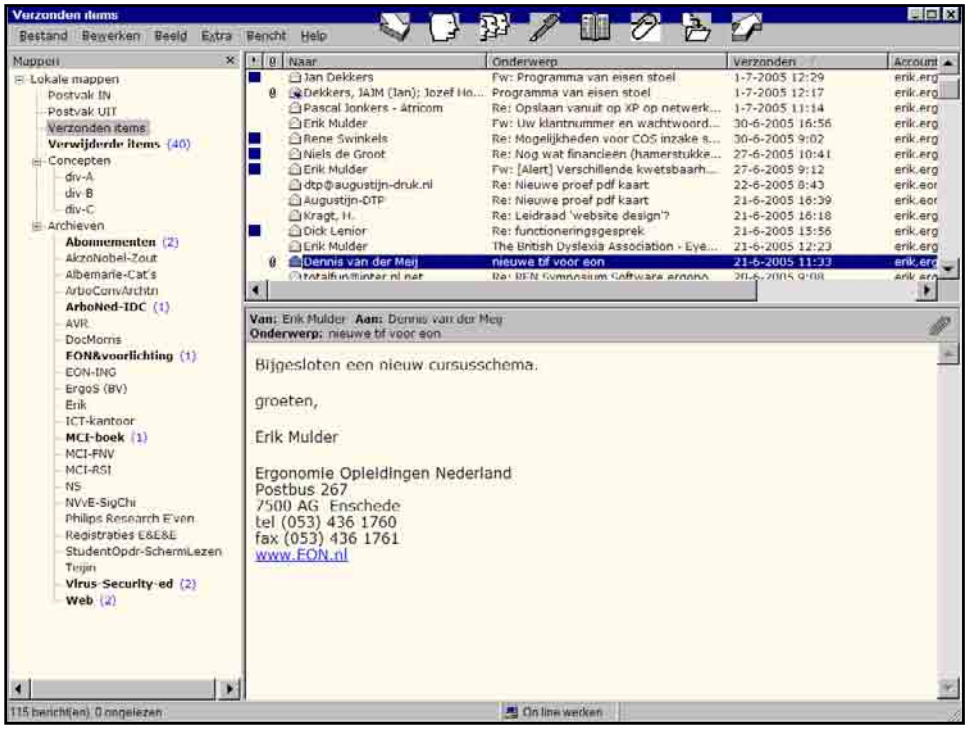
Act: control, dialogues

- However good your design may be:

  less dialogue is better

ERGOS


Inbox - Lotus Notes
File Edit View Create Actions Help
Mail
Inbox (211)
Drafts
Sent
Trash
Views
Central Storage
Folders...
New Memo | Reply | Reply to All | Forward | Delete | Folder | Copy Into New | Tools | View Unread | Central Storage
Search in View 'Inbox'
Not indexed
Search for: mulder
Search
More
Who | Date | Time | Size | Subject
Preview


Verzonden items
Bestand Bewerken Beeld Extra Bericht Help
Mappen
Lokale mappen
Postvak IN
Postvak UIT
Verzonden items
Verwijderde items (40)
Concepten
div-A
div-B
div-C
Archieven
Abonnementen (2)
AkzoNobel-Zout
Albemarle-Cat's
ArboConvArchtn
ArboNed-IDC (1)
AVR
DocMorris
EON&voorlichting (1)
EON-ING
ErgoS (BV)
Erik
ICT-kantoor
MCI-boek (1)
MCI-FNV
MCI-RSI
NS
NVvE-SigChi
Philips Research E'ven
Registraties E&E&E
StudentOpdr-SchermLezen
Tnijn
Virus-Security-ed (2)
Web (2)
Naar | Onderwerp | Verzonden | Account
Jan Dekkers | Fw: Programma van eisen stoel | 1-7-2005 12:29 | erik.erg
Dekkers, JAM (Jan); Jozef Ho... | Programma van eisen stoel | 1-7-2005 12:17 | erik.erg
Pascal Jonkers - Atricom | Re: Opslaan vanuit op XP op netwerk... | 1-7-2005 11:14 | erik.erg
Erik Mulder | Fw: Uw klantnummer en wachtwoord... | 30-6-2005 16:56 | erik.erg
Rene Swinkels | Re: Mogelijkheden voor COS inzake s... | 30-6-2005 9:02 | erik.erg
Niels de Groot | Re: Nog wat financieën (hamerstukke... | 27-6-2005 10:41 | erik.erg
Erik Mulder | Fw: [Alert] Verschillende kwetsbaarh... | 27-6-2005 9:12 | erik.erg
dtp@augustijn-druk.nl | Re: Nieuwe proef pdf kaart | 22-6-2005 8:43 | erik.eor
Augustijn-DTP | Re: Nieuwe proef pdf kaart | 21-6-2005 16:39 | erik.eor
Kragt, H. | Re: Leidraad 'website design'? | 21-6-2005 16:18 | erik.erg
Dick Lenior | Re: functioneringsgesprek | 21-6-2005 15:56 | erik.erg
Erik Mulder | The British Dyslexia Association - Eye... | 21-6-2005 12:23 | erik.erg
Dennis van der Meij | nieuwe tif voor eon | 21-6-2005 11:33 | erik.erg
Van: Erik Mulder Aan: Dennis van der Meij
Onderwerp: nieuwe tif voor eon
Bijgesloten een nieuw cursusschema.
groeten,
Erik Mulder
Ergonomie Opleidingen Nederland
Postbus 267
7500 AG Enschede
tel (053) 436 1760
fax (053) 436 1761
www.EON.nl
115 bericht(en), 0 ongelezen
On line werken

Act: control, dialogues

- User:
  " <Delete> "
- PC:
  " You've just pressed <Delete>,
  I doubt weather you're right doing so. "

ERGOS

What do you prefer?

- A self-willed slave, questioning your decisions all the time

- or assistants operating in the background, protecting you from mistakes and who only show up when you call?

ERGOS

Summary

- Perception
  simplicity, just enough for the task
- Processing information
  beware of associations and mental models
- Acting: control, dialogue
  support and respect the user,
  simplicity
  fit in the mental model
- Feedback at all times

ERGOS

Cognition and task design

- Man meets automation

ERGOS

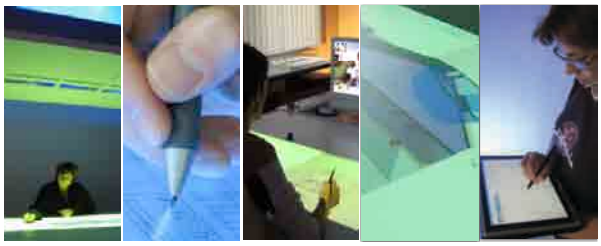
Spookbrug ging ineens open

Een wagen zit klem op de Ketelbrug, gisteren bij het ongeval op de A6 in Lelystad.

ROTTERDAM - Bij het ongeval gisteren op de A6 bij Lelystad meldden diverse ooggetuigen dat de Ketelbrug plotseling omhoog ging zonder dat de slagbomen omlaag gingen of dat de verkeerslichten in werking traden. Bij het ongeval botsten een aantal auto's op elkaar en vielen er vier gewonden.

25 ans/yaar BES - Belgian Society Ergonomics - Brussels - 17 / 03 / 2011

HUMAN MACHINE INTERFACE - Evolution pour le futur / Evoluties in de toekomst



Le Studio Digital Collaboratif

Pierre Leclercq - Prof Dr Ir Architecte - LUCID - Université de Liège

AGENDA

Contributions of ergonomy in design engineering

The LUCID-ULg creative platform 1
- Presentation of the LUCID lab

Projects in design engineering 2
- Technologies et paradigms

The Studio Digital Collaboratif 3
- Ergonomy and innovation

LUCID

Lab for User Cognition & Innovative Design 1

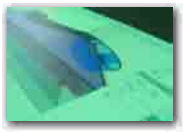
Multidisciplinary research team in design engineering (2001)
- design Engineering / computer sciences / psychology & ergonomics
- 19 people / 10 on going projects / 20 partner-labs / yearly turnover : 665 k€ (µ 5 years)

R&D aims
- Design Computing & Cognition > Human Machine Interactions in design

LUCID

R&D aims

Design support and decision making
- multimodal interactions in design
- cognitive analysis of design tasks



Design computing
- product modeling
- 3D mockups, technological models, augmented sketch
- product performances evaluation

Advanced technologies
- digital tables and electronic pen interfaces
- multimodal interfaces : sketch, annotation, gesture, vocal

LUCID

Networks

COURSES (Bac, Mas, PhD)
- architecture & Building engineering
- cognitive ergonomics

Scientific communities
- more than 20 labs
- Design Computing & Cognition
- CHI for design
- AI in design

Technological support
- Apple Europe (UK)
- Wacom Europe (D)
- France Telecom (F)
- Altran Europe (F)
- See & Touch (B)
- ...

Industrial business
- Art & Build (B, F, L)
- Sami Engineering (B)
- BizzDev (B)
- ...

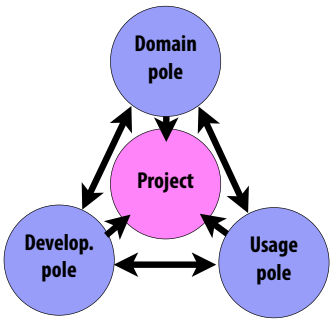
LUCID

Complementary skills

Domain : designers
- practices
- know-how

Development : computer engineers
- instrumentation
- software prototypes

Usages : ergonomists
- knowledge management
- cognitive ergonomy



POSITIONS

User centered approach > Human Machine Interaction

Going over the WIMP interface

- Window Icon Menu Pointer
- Not compatibles with design tasks : can't follow the human thinking flow

POSITIONS

Design support

Product design in 4 step

Creativity >	Design >	Production >	Achievement >
Creative step	Prelimin. project	Projet	Object
Sketch	Modeling	Specification	Optimization

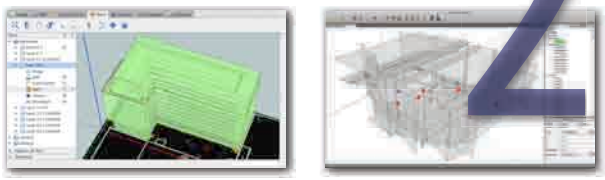
New tools

pen and paper | 3D modeler | CAD | Assessment

MODELING

Modeling tools dedicated to architectural and building design

Architecture and building engineering



ENERGY	ACOUSTICS	WOOD CONSTRUCTION	BUILDING DATA
PEB	AURALIAS	CIMEDE	SpatioData
IBGE - SPW	SPW - WIST 2	Plan Marshall	SPW - WIST 3
2008-2010	2007-2011	2009-2012	2011-2013

TRAGERE

Tracé Générique Réaliste

Mathematical model for digital realistic drawing

- real time stroke rendering system
- modelization of physical interaction between graphite pencils and drawing papers

Partnership : IntelSig - Signal processing Lab - University of Liège (B)

IC&C - INTERACTION PAR CROQUIS

Pen and mobile tool to create/maintain "as built" 2D plans

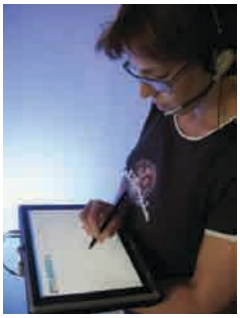
Multi Agent System based (MAS)

Multi-modal interface :

- graphics
- alphanumeric annotations
- vocal interactions

Geometrical constraints engine

- real time solution calculation

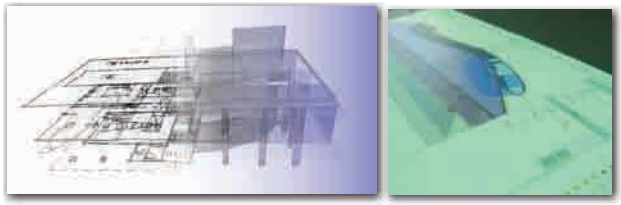


Partnership : ULg Signal processing Lab + FPMs (B)

ESQUISE

Architectural sketch interpreter

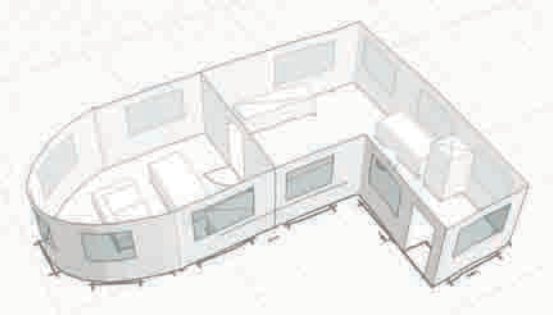
Multi Agent System based (MAS)



Partnership : ULg

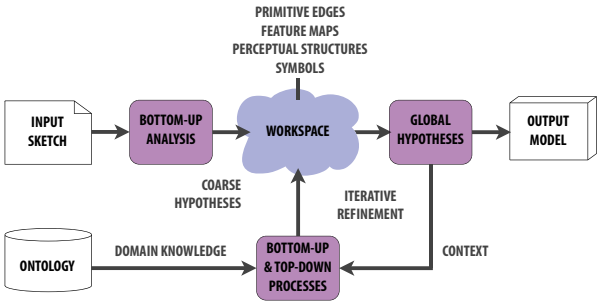
NEMO

Advanced architectural sketch interpreter



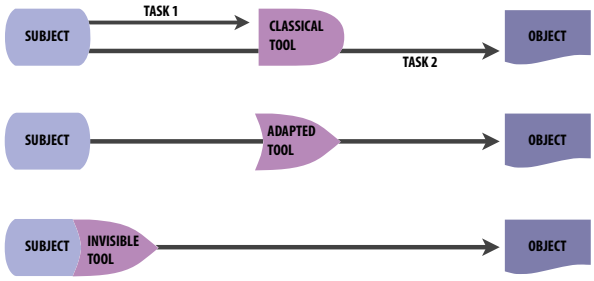
NEMO

Advanced architectural sketch interpreter



INVISIBLE TOOL

The ubiquitous computer paradigm



VIRTUAL DESKTOP FOR DESIGN

To support the ubiquitous / invisible computer paradigm

Work space metaphor

- pen based interaction
- wide work surface available
- allowing long work sessions

Hardware

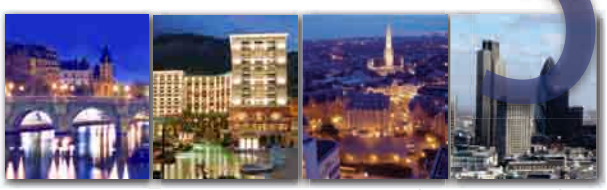
- digital table and pencil
- HD projection ceiling
- active area 150 x 70 cm^2

Partnership : ULg Work psychology (B)

COLLABORATIVE DIGITAL STUDIO

Integrated device supporting graphic based and distant collaboration

Persistent problem for companies in many fields



Customer Paris | Building site Monaco | Architecture office Bruxelles | Engineers office London

COLLABORATIVE DIGITAL STUDIO

Integrated device supporting graphic based and distant collaboration

Persistent problem for companies in many fields

Design collaboration	Same time	Different time
Same place	co-attendance meeting	post-it, mail box, file server, PLM
Different places	Collaborative Studio	mail, file server, wiki, PLM

COLLABORATIVE DIGITAL STUDIO

Based on current uses in information exchange : co-attendance meeting

Explicit contents
- static knowledge
- through existing documents

Implicit behavioral information
- transmitting intentions
- through corporal and gestural attitudes

New and creative contributions
- produced together
- through spontaneous annotations and sketches

Concurrent design = linked to Human Interaction

COLLABORATIVE DIGITAL STUDIO

Integrated device supporting graphic based and distant collaboration

Virtual co-attendance metaphor

Virtual desktop for design

SketSha sketch sharing

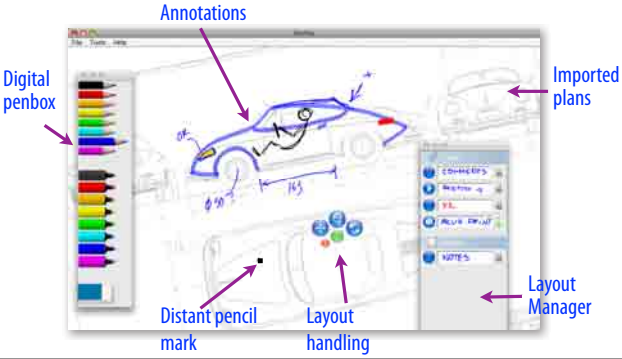
Visioconference supporting social exchange

COLLABORATIVE DIGITAL STUDIO

Integrated device supporting graphic based and distant collaboration

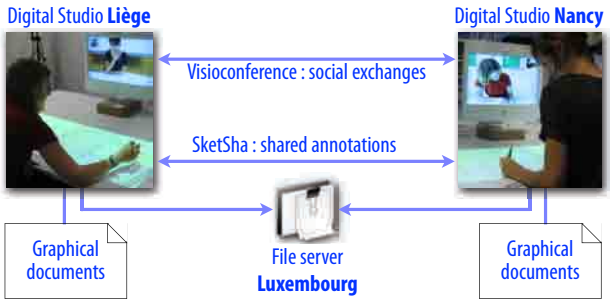
COLLABORATIVE DIGITAL STUDIO

Integrated device supporting graphic based and distant collaboration



FROM LAB TO CLASS-ROOM

Studio Digital Collaboratif : architectural studio Liège-Nancy : 2007-2011



FROM LAB TO LAB

International network

CDS diffusion in the academic network
- universities, R&D centers, polytechnic institutes, schools of architecture, ...
- permanent and temporary stands

FROM LAB TO OFFICE

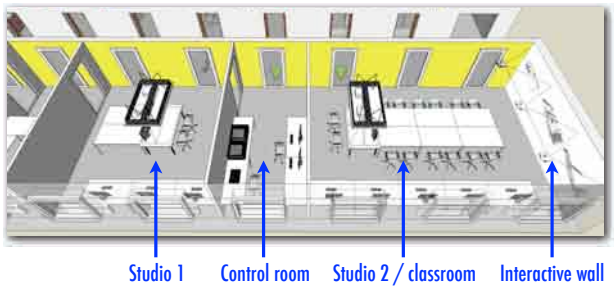
Interreg Innovatic - SDC assessment in professional contexts

Real meetings support

- architecture and building design - partnership : Art & Build SA
- mechanical design - partnership : SAMI Engineering SA

COLLABORATIVE PLATFORM

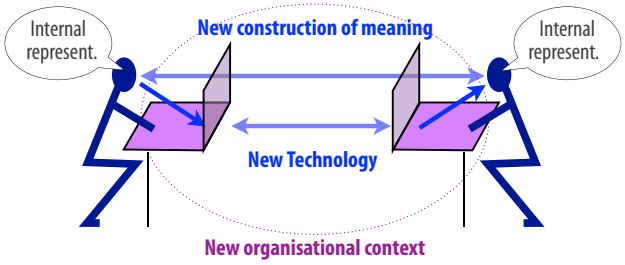
120 m² : experimentation / teaching platform @ LUCID-ULg



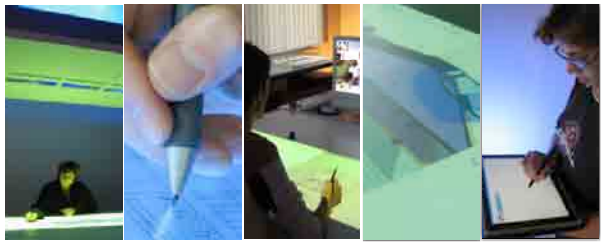
FUTURE WORKS

Next challenges : ULg ARC COMMON PROJECT

Research units : LUCID, work psychology, semiotics + complex activities



Thank you



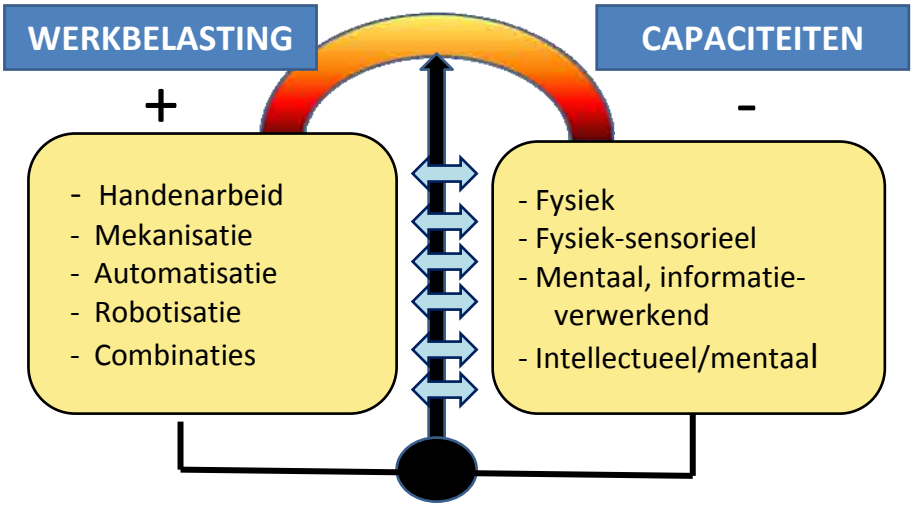
LUCID - University of Liège www.lucid.ulg.ac.be pierre.leclercq @ ulg.ac.be

Uitdagingen voor de ERGONOMIE

Methodologische overwegingen

Kamiel VANWONTERGHEM
Cergo International, Mensana, Rangsit University

ERGONOMIE
OBJECTIEF: verzekeren van het evenwicht tussen



PROBLEMEN = gevallen van onevenwicht

Individu	Management/authoriteiten
. Gezondheid (Ziekte) . Veiligheid (Kwetsuren) . Welbevinden . Economie (Financieel) . Social (Werkloosheid)	. Productiviteit . Quantiteit . Kwaliteit . Afwezigheden (dagen) . Compensatie - werkloosheid, - arbeidsongeschikt tijdelijk/permanent

Vooral GEZONDHEID en VEILIGHEID zijn sterk ontwikkeld

WET – WELZIJN OP HET WERK en het PREVENTIEBELEID

Goed georganiseerd op internationaal & nationaal vlak:

- WHO
- Agency (Bilbao)
- FOD Werk
- Research instituten
- Externe preventie
- ILO
- Foundation (Dublin)
- Fonds Beroepsziekten
- Verzekeringen
- …. enz ….

TOCH BLIJVEN ER NOG ERNSTIGE PROBLEMEN

PROBLEMEN: **NIET OF ONVOLDOENDE GEKENDE RISICO'S EN IMPACT op INDIVIDU**

* arbeidsongevallen
* beroepsziekten

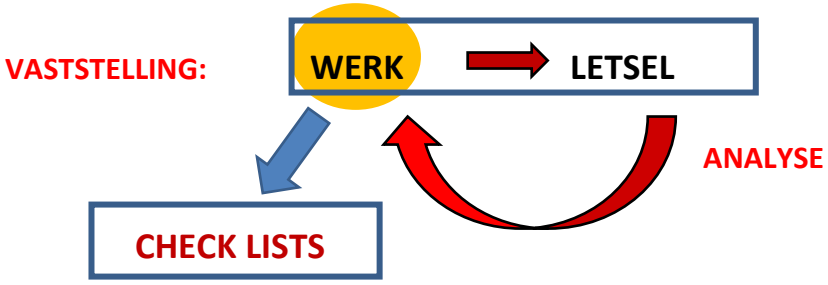
Nieuwe arbeidssystemen
Nieuwe risico's

* economische crisis
* afwezigheden & personeel rotatie
* veroudering personeel
* revalidatie & loon & invaliditeit compensaties

"KLASSIEKE" AANPAK heeft haar NUT bewezen en bewijst, MAAR schiet te kort in sommige problemen

Risico-analyse methodes ongevallen ….

Klassieke 'retro-actieve' methode

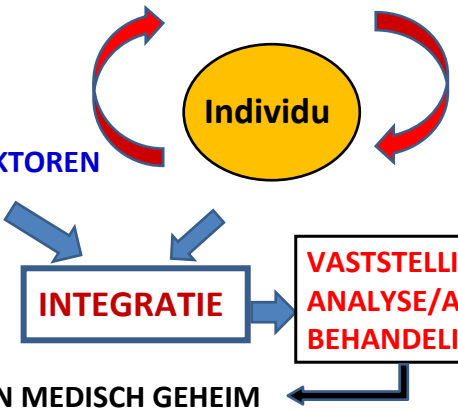


OORZAKEN = TECHNISCHE FAKTOREN
ORGANISATORISCHE FAKTOREN
OMGEVINGSFAKTOREN
INDIVIDUELE FAKTOREN

Risico-analyse methodes beroepsziekten

WERK Faktoren **ZIEKTE**

OORZAKEN =
- **TECHNISCHE FAKTOREN**
- **ORGANISATORISCHE FAKTOREN**
- **OMGEVINGSFAKTOREN**
- **INDIVIDUELE FAKTOR**



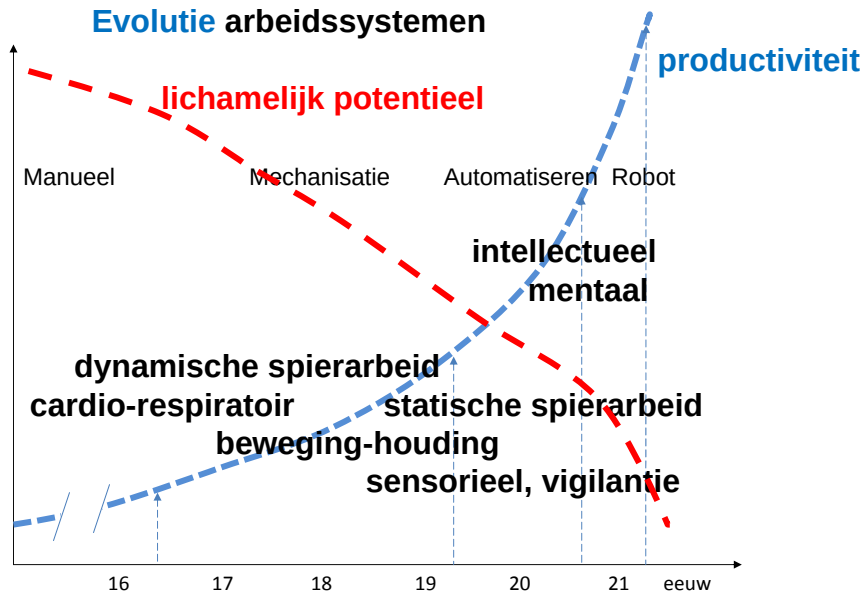
GEBONDEN AAN MEDISCH GEHEIM

PREVENTIE = KENNIS VAN DE "OORZAKEN"

	ONGEVAL	BEROEPSZIEKTE
Oorzaak-gevolg	DIRECT KORTE TERMIJN	CUMULATIEF LANGE TERMIJN
Analyse:	ONSITE ANALYSE	KABINET, Later onsite (EXTERNE FAKTOREN)
Techniek	CHECK-LISTS	ONDERZOEK in combinatie check list
Gebruikt voor	RISIKO-SCREENING - STATISTISCHE VERWERKING - VASTLEGGEN PRIORITEITEN	BEHANDELING
Oplossingen ?	Afhankelijk van aard, middelen, return on investment, duur onderzoek en Implementatie	
Toepassing	JOB, WERKPOST	INDIVIDU
Beperking		Medisch geheim

Werk methodes : veelal variabele combinaties met (in aard, in type en in tijd)

- **Manueel werk**: vnl cardio-respiratoire belasting en zware dynamische spier-arbeid
  Aantal operatoren: aanzienlijk
- **Mechanisatie**: vnl. Statische & dynamische spier-arbeid, kleinere spiergroepen en houdingbelasting. Omgeving + zintuiglijke belasting
  Aantal individuen : beduidend minder
- **Automatisatie**: lichte fysieke inspanningen, repetitief
  Robotiseren kleine spiergroepen + grote spier-groepen (aan- & afvoer); houding, Intellectueel, mentaal, stress, fysiek, laden/lossen robot



Actueel PROBLEEM waar de betrokken disciplines falen

SPIER-PEES BOTAANDOENINGEN
CUMULATIVE TRAUMATA

MSD - MUSCULOSKELETAL DISORDERS
OOS - OCCUPATIONAL OVERUSE SYNDROME
TOS - THORACIC OUTLET SYNDROME
CTS - CARPAL TUNNEL SYNDROME
LBP - LOW BACK PAIN
WRULD - WORK RELATED UPPER LIMB DISORDERS
enz… enz …

BENADERING = klassiek via CHECK-LISTS

- Check-lists met J/N antwoorden (rudimentair)
  - NIOSH Job Risk Factors – (US) (1986)
  - Instrument for assessing repetitive motions at work - NIA , NL (1995)
- Assessment of physical load of the upper extremities - (FI) Ketola, et.al (2001)
- Check-lists al dan niet met toekennen belastingswaarden
  - SOBANE (BE), Malchaire et al. (2004)
  - AET – (DE) Rohmert, Landau (1979)
  - RULA - (UK) Mc Atamney, Corlett (1993)
  - REBA - (UK) Mc Atamney, Hignett (1995)
  - KIM - (DU) BAA Steinberg, (1994) MAC (UK), (1992) =(OSHA)
  - OCRA, (IT), (2005) Occipinti, Colombini als basis voor EN1005 (Machine Safety) en ISO/CD 11228 (ergonomics) … (+ >100)

Voordelen:

- snelle screening
- eventueel voor- en na screening (checking evolutie)
- voor de 2de reeks (met waarde toekenning): prioriteit-zetting

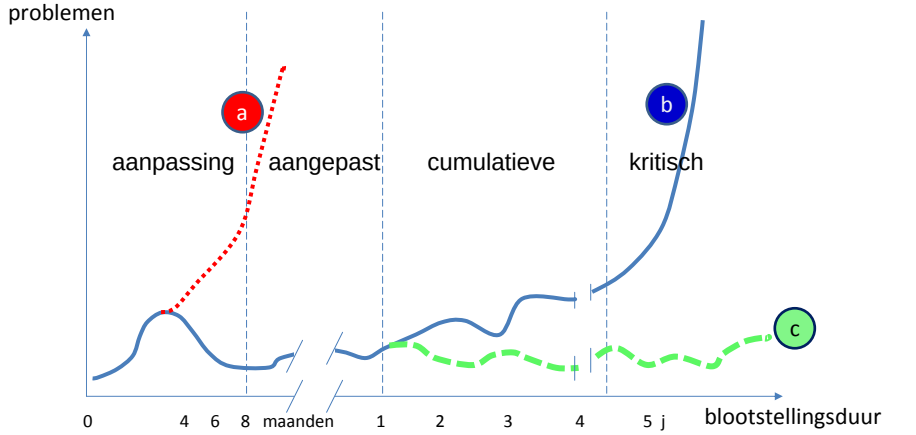
Nadelen:

- houdt GEEN rekening met 'cumulatieve' aspekten en derhalve NIET RELEVANT SPB/MSD
- is een moment opname, geen rekening met veranderende werk uitvoering, GEEN afwegen "belasting-capaciteit"
- is een sekwentiele opsomming van eventuele problemen
- toegekende waarden via 'waarnemer'- expert
- indien gegeven door individu: er is geen controle op de subjectieve beoordeling (? Integratie ?)
- uitslagen contesteerbaar door operatoren en manager

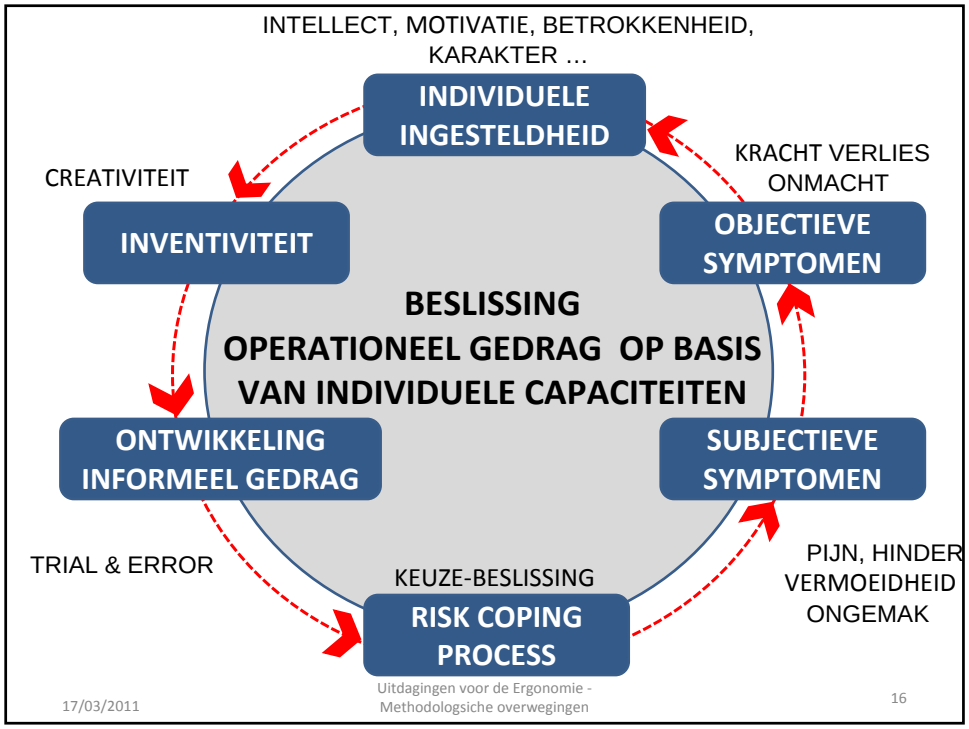
EVOLUTIE van aanpassingsfazes en CTD's (Seleye)

EVOLUTIE van CTD's - INDIVIDUELE VERSCHILLEN:

a. overgemotiveerd persoon
b. klassieke evolutie MSD
c. kan werk aan over meerdere jaren



a = +/- 18 % MSD cases, b = +/- 70% MSD cases c 12% toch nog MSD na > 5 j



Evolutie MSD in tijd

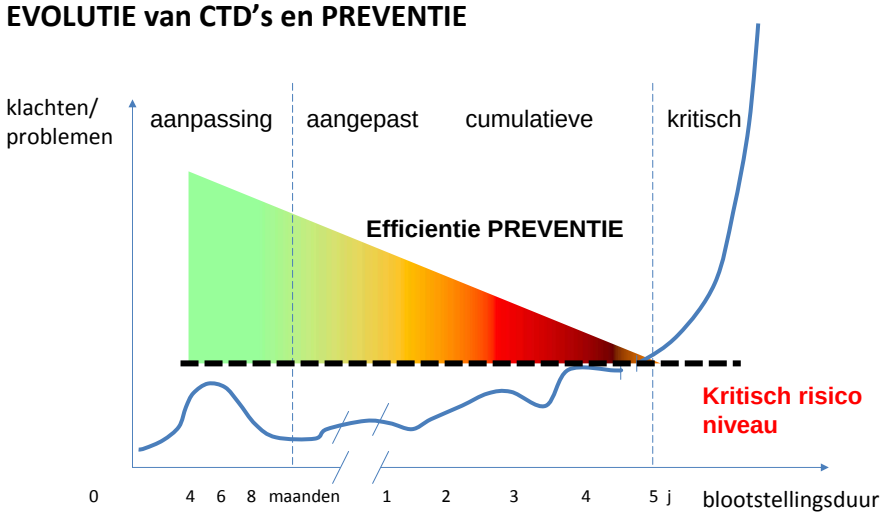
Een "aanpassingsfaze" is altijd aanwezig en geldig voor iedereen. Geeft een eerste aanduiding van mogelijke problemen.

a **gevallen (diegenen die op korte tijd evolueren naar een letsel) ONDERDRUKKEN meestal hun hinder en pijn (over motivatie) – NEFAST voor TEWERKSTELLING**

c **categorie (die jarenlang hetzelfde werk kunnen doen) LUISTEREN luisteren naar hun lichaam en lassen kortstondige recuperatie periodes in (tijdens de shift, vb. toilet bezoek, rookpauzes,…) en tijdens buiten job tijd)** (soms gekatalogeerd als plantrekkers…)

- meestal GEEN PRODUCTIVITEITS VERLIES en BEHOUD van ERVARING en personeels-STABILITEIT

EVOLUTIE van CTD's en PREVENTIE



Preventie: kristisch niveau = bvb 30% MVC (Maximale Vrijwillige Contractie van belangrijkste spieren)

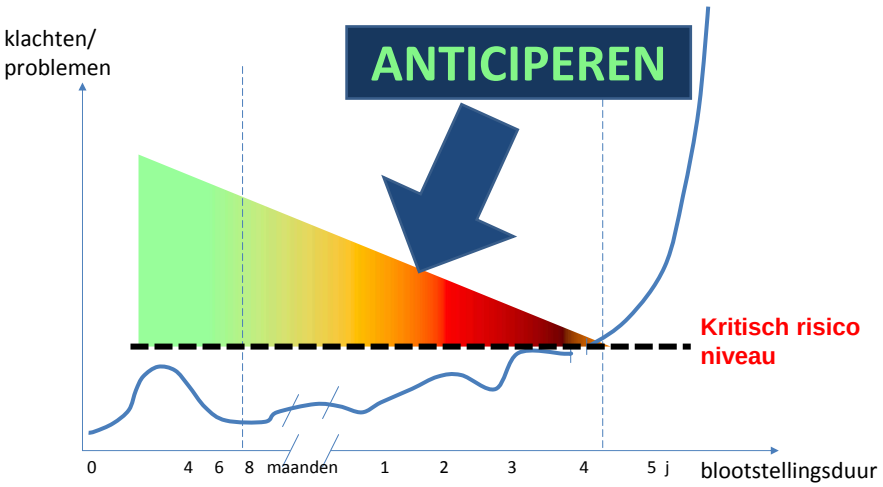
OPLOSSINGEN – UITDAGINGEN

PARTICIPATIEVE ERGONOMIE

actieve samenwerking tussen WERKNEMERS en MANAGEMENT
Vereist WEDERZIJDS BEGRIP over WERKBELASTING en PROBLEMEN

- WERK GERELATEERDE PROBLEMEN
  - OBJECTIEVE belasting: Taak, Organisatie, Omgeving …
    Eventueel checklist maar vooral METINGEN
- INDIVIDUELE PROBLEMEN
  - SUBJECTIEVE reacties van individuen: klachten van hinder, ongemak, vermoeidheid, pijn
    Vragenlijsten/interviews/klachten banken
  - OBJECTIEVE reacties : METINGEN (fysiologisch, psychisch-mentaal, functioneel, …)

UITDAGINGEN? Principe = anticiperen in de critische fazes



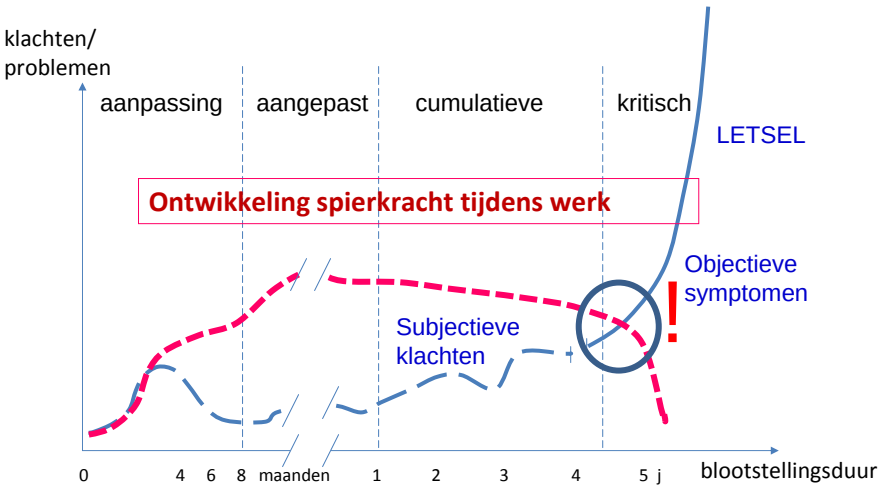
PARTICIPATIEVE ERGONOMIE

- Bespreking van OPLOSSINGEN (taak inhoud, technisch, organizatie, omgeving) op JOB-NIVEAU (in bedrijf) en met ONDERSTEUNING van experten (intern-extern)

Vereist SAMENWERKING in ACADEMISCH en TOEGEPAST onderzoek betreffende de INTEGRATIE mens-werk
VOORAL GERICHT OP DE MENSELIJKE FAKTOR

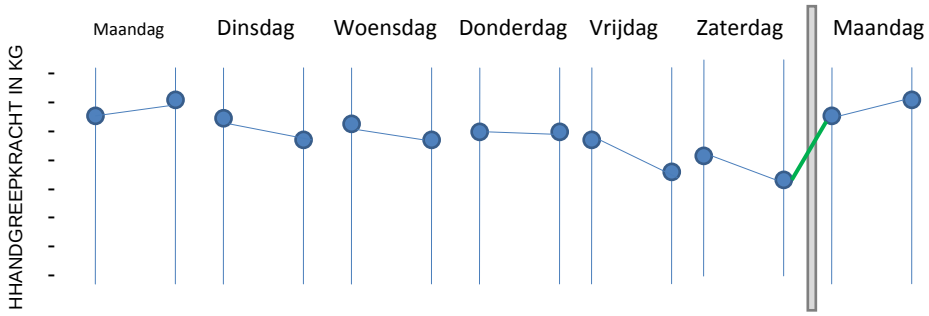
VB. - eenvoudige en correcte MEETMETHODES waarvan de RESULTATEN zowel WERKNEMERS als WERKGEVERS aanspreken
- LIMIETEN EN THRESHOLDS
- VELD-ONDERZOEK: belasting-capaciteit

EVOLUTIE van CTD's en effecten op de spierontwikkeling

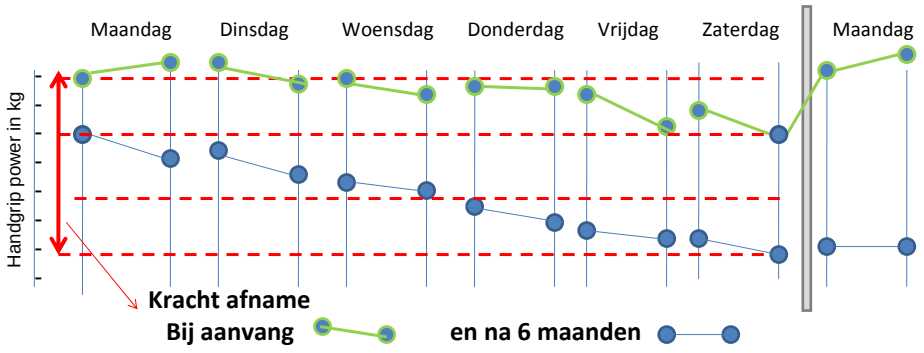


VOORBEELD Experiment: hand gripkracht (in Kg)

- gemeten met handdynamometer begin en einde shift
- zelf-registratie (notas verwijderd door preventiedienst
- Gevolgd over een periode van 6 maanden



VOORBEELD: Experiment handgrip evolutie



Limiet voor job verandering = verlies van 30%. Vanaf 10% evolutie volgen per maand, bij aanhoudend .Vanaf 15% maatregelen in werkpost (technisch & omgeving) Vanaf 30%: organisatorisch: job verandering

BESLUITEN:

- **KLASSIEKE ANALYSE METHODES (ONGEVALLEN) REFEREREN NAAR HET ONMIDDELLIJK GEBEUREN EN ZIJN NIET ALTIJD REALISTISCH VOOR CUMULATIEVE PROBLEMEN.**
  - **Geven wel de faktoren die meespelen MAAR NIET hun IMPACT op het individu**
  - **Arbeidsomstandigheden - TERUG TE KOPPELEN IN TIJD: CONDITIES zijn wellicht veranderd….**
  - **Houden geen rekening met de GELUKS/tegenslag faktor**
  - **Conclusies zijn meestal VOORBIJ GESTREEFD**

BESLUITEN:

- **Check-lists missen daardoor RELEVANTIE en ARGUMENTEN om maatregelen door te drukken met zwakke "RETURN-ON-INVEST" aanduiding**

  Zijn nuttig als indicatie en als hulpmiddel en mogelijk een LEIDDRAAD in het verzamelen van de SUBJECTIEVE klachten

- **Gebruik van CHECK-LISTS geven leemtes aan in het ontwerp van arbeidssystemen …. Maar kan refereren naar VERANTWOORDELIJKHEID van**
  - **management**
  - **operator (human error)**

  en een barriere vormen in de 'participatieve' oplossing.

BESLUITEN:

- **SOMMIGE CUMULATIEVE TRAUMA DISORDERS kunnen een ACCIDENTEEL karakter hebben (vb. Hernia) en komen tot uiting in periodes die NIETS met de CUMULATIEVE OPBOUW te maken hebben**
  - **Oorzakelijke faktoren opgebouwd tijdens het werk (privé als professioneel) treden op tijdens:**
    - **Beroepsactiviteiten (arbeidsongeval?)**
    - **Prive-activiteiten (? ? ? Afwezigheid)**
    - **Of omgekeerd**

    Kan onderling vertrouwen schaden

BESLUITEN:

- **INTEGRATIE door OBJECTIVEREN van de SUBJECTIEVE klachten geeft:**
  - **ARGUMENTEN aan BEIDE partijen**
  - **Relativeert en verklaart INDIVIDUELE verschillen in het onevenwicht in de RISIKO-CAPACITEIT balans**
  - **en wordt ANTICIPATIEF toegepast**

- **Al kan de methode als OMSLACHTIG en TIJDROVEND overkomen [gestandardiseerde interviews, metingen van job- en omgevings gebonden faktoren EN lichamelijke reacties (fysiologisch, functioneel)] ze GARANDEERT een succesvolle toepassing tegen MSD**

De uitdaging voor de ERGONOMIE ligt in

1. het benadrukken en prioritair stellen van de MENSELIJKE FAKTOR als essentieel participatief element (als bron en als voorwerp) in het oplossen van de cumulatieve traumata
2. In het gebruiken en promoten van een EIGEN originele gemeenschappelijke en wetenschappelijk onderbouwde METHODE
3. Promoten en implementeren van anticiperende methode op GROTE SCHAAL

Mise en perspective « ergonomique » de la législation et de la normalisation européennes

Roland GAUTHY
Ergonome - chargé de recherches
ETUI – Health & Safety Dept

Législation (EU transposée…)

Directive cadre

- The Framework Directive contains basic obligations for employers and workers.
- It is the employer's obligation to ensure the safety and health of workers in every aspect related to work and he may not impose financial costs to the workers to achieve this aim. Alike, where an employer enlists competent external services or persons, this shall not discharge him from his responsibilities in this area.

- Directive Machines***Objective***
- This Directive aims at the free market circulation on machinery and at the protection of workers and consumers using such machinery. It defines essential health and safety requirements of general application, supplemented by a number of more specific requirements for certain categories of machinery.
- Where, for machinery, the hazards referred to in Annex I of the Directive are wholly or partly covered more specifically by other Community Directives, this Directive shall not apply, or shall cease to apply, to that machinery in respect of such hazards from the date of implementation of those other directives.
- ***Definitions***
- This Directive applies to machinery, interchangeable equipment, safety components, lifting accessories, chains, ropes and webbing, removable mechanical transmission devices and partly completed machinery as defined in Art. 2 of the Directive.

Directive 89/391 - OSH "Framework Directive"

Contents

- The Framework Directive contains basic obligations for employers and workers. Nevertheless, the workers' obligations shall not affect ***the principle of the responsibility of the employer***.
- It is the employer's obligation to ensure the safety and health of workers in every aspect related to work and he may not impose financial costs to the workers to achieve this aim. Alike, where an employer enlists competent external services or persons, this shall not discharge him from his responsibilities in this area.

The general principles of prevention listed in the directive are the following:

- avoiding risks
- evaluating the risks
- combating the risks at source
- adapting the work to the individual
- adapting to technical progress
- replacing the dangerous by the non- or the less dangerous
- developing a coherent overall prevention policy
- prioritizing collective protective measures (over individual protective measures)
- giving appropriate instructions to the workers

1. <u>The Machinery Directive</u>

→ applic 01 January 2010

→ its chapter on Ergonomics (addition)

L 157/24 EN Official Journal of the European Union 9.6.2006

DIRECTIVE 2006/42/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

of 17 May 2006

on machinery, and amending Directive 95/16/EC (recast)

(Text with EEA relevance)

Directive 2006/42/EC
“New Machinery Directive”

Content

•Member States shall take all appropriate measures to ensure that partly completed machinery can be placed on the market only if it satisfies the relevant provisions of this Directive.

•Essential health and safety requirements relating to the design and construction of machinery are defined in Annex I of the Directive.

•Member States should ensure their capacity to carry out effective market surveillance, taking account of guidelines developed by the Commission, in order to achieve the proper and uniform application of this Directive.

•Member States shall institute or appoint the competent authorities to monitor the conformity of machinery and partly completed machinery and define tasks, organisation and powers.

•The manufacturers should retain full responsibility for certifying the conformity of their machinery to the provisions of this Directive. The CE marking should be fully recognised as being the only marking which guarantees that machinery conforms to the requirements of this Directive.

•The manufacturer or his authorised representative should also ensure that a risk assessment is carried out for the machinery which he wishes to place on the market. For this purpose, he should determine which are the essential health and safety requirements applicable to his machinery and in respect of which he must take measures.

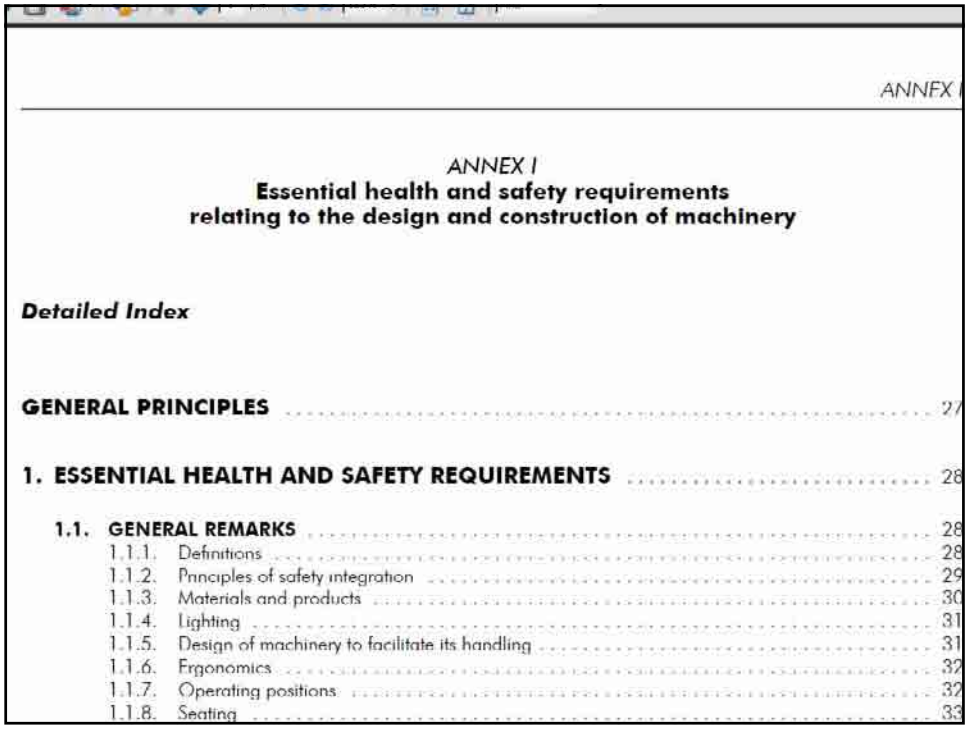
•The machinery must then be designed and constructed taking into account the results of the risk assessment.

•Machinery must be designed and constructed so that it is fitted for its function, and can be operated, adjusted and maintained without putting persons at risk when these operations are carried out under the conditions foreseen but also taking into account any reasonably foreseeable misuse thereof.

•The manufacturer or his authorised representative should prepare a technical construction file which must be available on request and which demonstrates conformity of the machinery with the essential health and safety requirements.

•Member States should provide for penalties applicable to infringements of the provisions of this Directive. Those penalties should be effective, proportionate and dissuasive.

•The Directive repeals Directive 98/37 EC on the approximation of the laws of the Member States relating to machinery as of 29th December 2009.



ANNEX I

ANNEX I
Essential health and safety requirements relating to the design and construction of machinery

Detailed Index

1.1.6 Ergonomics

Under the intended conditions of use,

- *the discomfort,*
- *fatigue and*
- *physical and*
- *psychological stress*

faced by the operator must be reduced to the minimum possible, taking into account ergonomic principles such as:

- *allowing for the variability of the operator's physical dimensions, strength and stamina,*
- *providing enough space for movements of the parts of the operator's body,*
- *avoiding a machine-determined work rate,*
- *avoiding monitoring that requires lengthy concentration,*
- *adapting the man/machinery interface to the foreseeable characteristics of the operator*

European Conference

The new Machinery Directive

The expectations of prevention experts regarding standardization

Munich, 27/28 May 2008

KAN Kommission Arbeitsschutz und Normung | Deutsche Gesetzliche Unfallversicherung

There is no attendance fee

Venue:
Holiday Inn Munich Schwabing
Leopoldstrasse 194
80804 Munich, Germany
Tel: +49 89 38179-0
Fax: +49 89 38179-888

Conference secretariat:
KAN Secretariat
Alte Heerstrasse 111
53757 Sankt Augustin, Germany
Tel: +49 2241 23134-49, -66 or -61
Fax: +49 2241 231464

Registration and hotel information:
http://www.kan.de

How to get there

Programme

Working languages: German/English

27 May 2008

12 noon	Start of registration
2 pm	Welcome address — KAN Executive Board
	Papers: "What are the benefits of the new Machinery Directive?" Moderation: Federal Ministry of Labour and Social Affairs
	The objectives of the revised directive — Jan Fraser, European Commission
2.15 pm	Market surveillance under the new Machinery Directive — Dirk van Longueglise, Representative of the Lands
3.15 pm	Expectations on the part of employees — Stefano Bay, ETUI-REHS
	Expectations on the part of employers — Franck Cambelli, BUSINESSEUROPE
5.30 pm	Are committees and standards organisations liable for their standards? — Christian Löhn, DIN - Deutsches Institut für Normung
6.30 pm	What role do standards play in product liability? — Thomas Klindt, NOMOS STEFFENHOFER LUTZ
7 pm	Joint evening event

28 May 2008

9 am	Organisational information and formation of groups — Joachim Lambert, KAN Secretariat
	3 parallel workshops "The need for action in standardization" Background: the changes to the directive, case examples
9.15 am – 12 noon	A) Controls and protective devices — Chairs: M. Schaefer, BGIA; R. Reilly, BGPrüfCert
	B) Ergonomic requirements — Chairs: F. Strambi (I), Labour Inspect.; Th. Kohlinger, DGUV
	C) Reducing and measuring emissions — Chairs: P. Kurtz, BAuA; Th. v. d. Heyden, BGIA
12 noon	Joint lunch
	Plenary session
1.15 pm	Presentation of the results of the workshops — Chair/Co-chair teams
3.00 pm	Panel discussion on strategy, with representatives of authorities, social partners, standardisation, CEN — Moderation: Walter Eichendorf, VFR Executive Board
	Summary and closing words — KAN Executive Board

SPECIAL

Greater consideration for ergonomics in standards and in practical application

"Ergonomic requirements must cease to be regarded as optional extras." At the workshop on ergonomic requirements, representatives of the European Commission, CEN, the social partners, researchers and specialists from the sphere of standardization were in agreement that ergonomic issues must be regarded by engineers as a natural part of the machine design process.

Dr. Fabio Strambi

Servizio di Prevenzione nei Luoghi di Lavoro

Azienda USL Siena, Italy

Besides this generic objective, the workshop participants formulated a whole series of proposals which are beneficial and well suited to implementation:

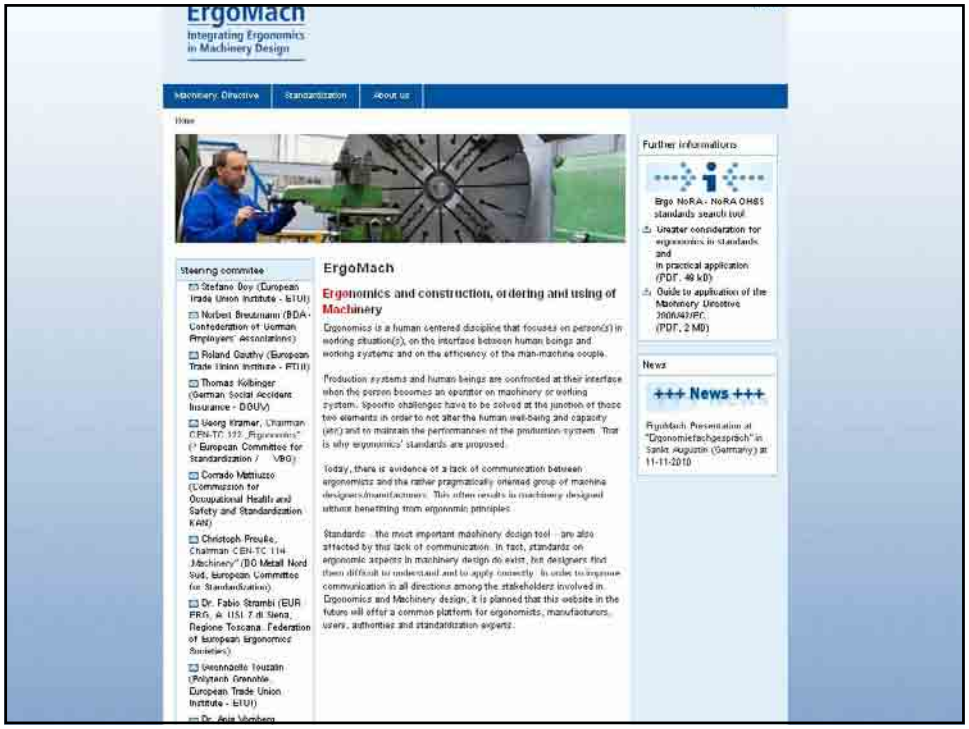
Practitioners on the ground require a new **guide** to supplement the text of the new Machinery Directive itself, preferably before application of the latter becomes mandatory. Since the European Commission has only limited resources at its disposal for production of the guide, it was agreed that a small working group would be created which will support the Commission in formulation of the ergonomic part.

In turn, this part of the guide could form the core of an **ergonomic guidance paper** for members of the standards committees. In this latter guide, CEN could compile all ergonomic requirements of the directive, not only those occurring in Point 1.1.6, "Ergonomics" of Annex I. Although specialists for the corresponding machine types are active in the standards committees, it is not uncommon for no committee

In addition to the measures taken at CEN, a systematic procedure should be put in place by which **practical experience** gained by users can be made available to the standards committees. The European Trade Union Institute (ETUI) presented the "FEEDBACK" method, by which this could be attained with little effort.

The workshop also proposed that, following a launch event, a permanent **discussion platform** should be created on which users, manufacturers, ergonomics experts (for example from the FEES[1] and relevant research institutes), standards developers and the European Commission could pool their knowledge. A proposal with a similar aim is that for a **helpdesk** to be created under the umbrella of the EUROSHNET network[2] in which experts throughout Europe could answer questions concerning ergonomics on machinery within a specified timeframe. A similar model already exists in the area of the Pressure Equipment Directive.

A further suggestion was that new **research**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Integrating Ergonomics in Machinery Design
Machinery Directive
Standardization
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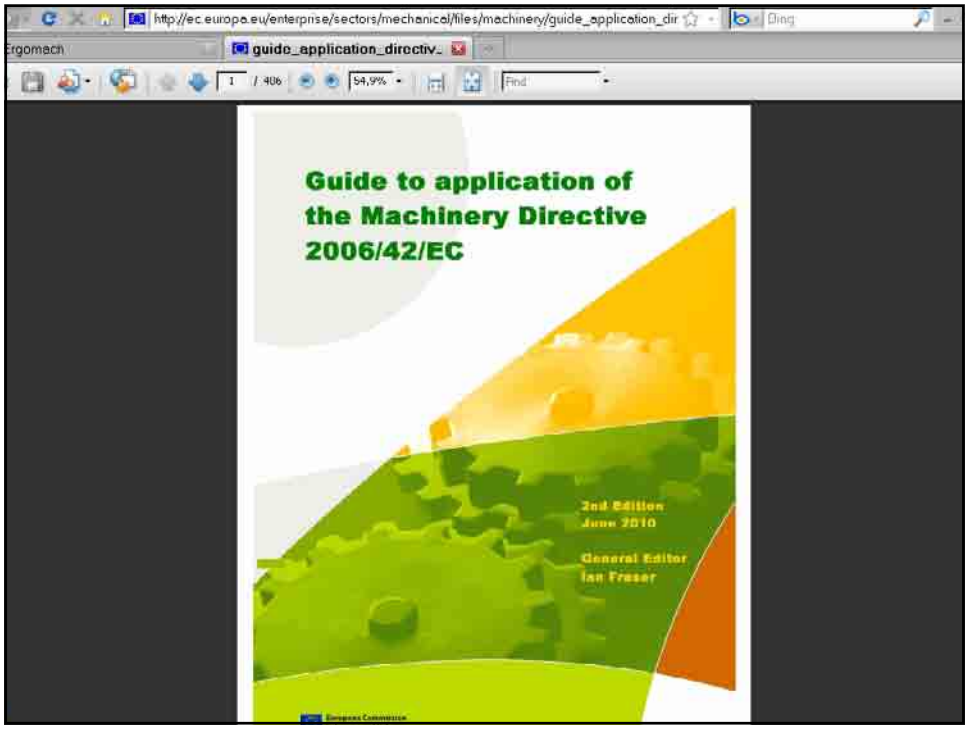
Ergo NoRA - NoRA OHSS standards search tool
Greater consideration for ergonomics in standards and in practical application (PDF, 49 kB)
Guide to application of the Machinery Directive 2006/42/EC (PDF, 2 MB)
News
+++ News +++
ErgoMach Presentation at "Ergonomiefachgespräch" in Sankt Augustin (Germany) at 11-11-2010
Steering committee
Stefano Boy (European Trade Union Institute - ETUI)
Norbert Breutmann (BDA - Confederation of German Employers' Associations)
Roland Gauthy (European Trade Union Institute - ETUI)
Thomas Kolbinger (German Social Accident Insurance - DGUV)
Georg Kramer, Chairman CEN-TC 122 „Ergonomics" (+ European Committee for Standardization / VBG)
Corrado Mattiuzzo (Commission for Occupational Health and Safety and Standardization KAN)
Christoph Preuße, Chairman CEN-TC 114 „Machinery" (BG Metall Nord Süd, European Committee for Standardization)
Dr. Fabio Strambi (EUR PRO, A. USL 7 di Siena, Regione Toscana, Federation of European Ergonomics Societies)
Veronnique Tousaint (Polytech Grenoble, European Trade Union Institute - ETUI)
ErgoMach
Ergonomics and construction, ordering and using of Machinery
Ergonomics is a human centered discipline that focuses on person(s) in working situation(s), on the interface between human beings and working systems and on the efficiency of the man-machine couple.
Production systems and human beings are confronted at their interface when the person becomes an operator on machinery or working system. Specific challenges have to be solved at the junction of those two elements in order to not alter the human well-being and capacity (etc) and to maintain the performances of the production system. That is why ergonomics' standards are proposed.
Today, there is evidence of a lack of communication between ergonomists and the rather pragmatically oriented group of machine designers/manufacturers. This often results in machinery designed without benefitting from ergonomic principles.
Standards - the most important machinery design tool - are also affected by this lack of communication. In fact, standards on ergonomic aspects in machinery design do exist, but designers find them difficult to understand and to apply correctly. In order to improve communication in all directions among the stakeholders involved in Ergonomics and Machinery design, it is planned that this website in the future will offer a common platform for ergonomists, manufacturers, users, authorities and standardization experts.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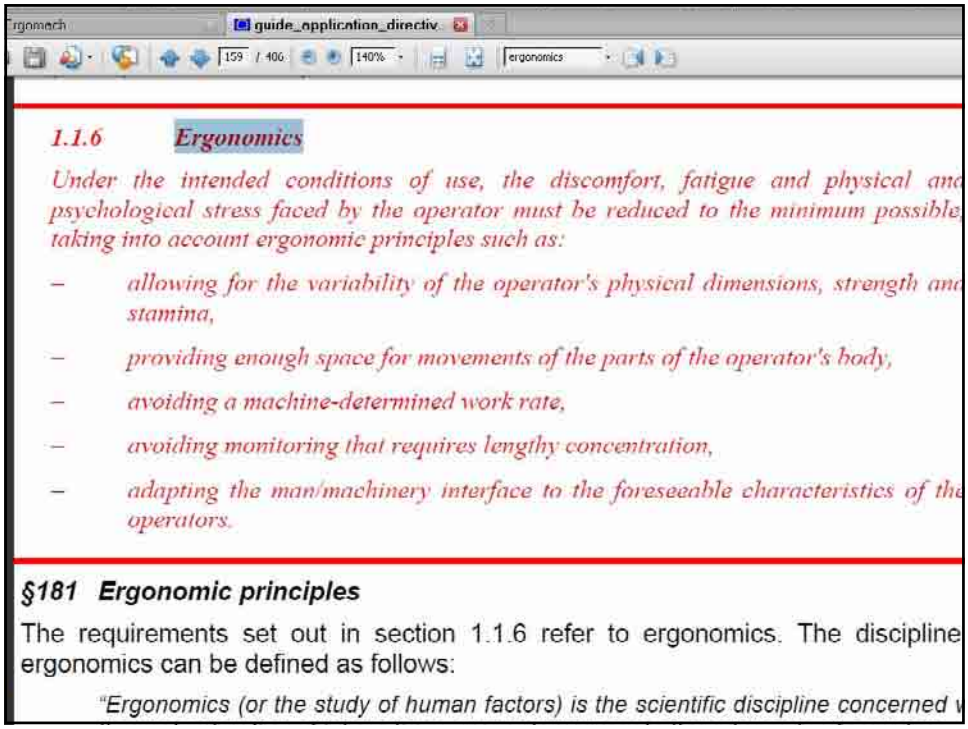
2nd Edition
June 2010
General Editor
Ian Fraser



1.1.6 ***Ergonomics***

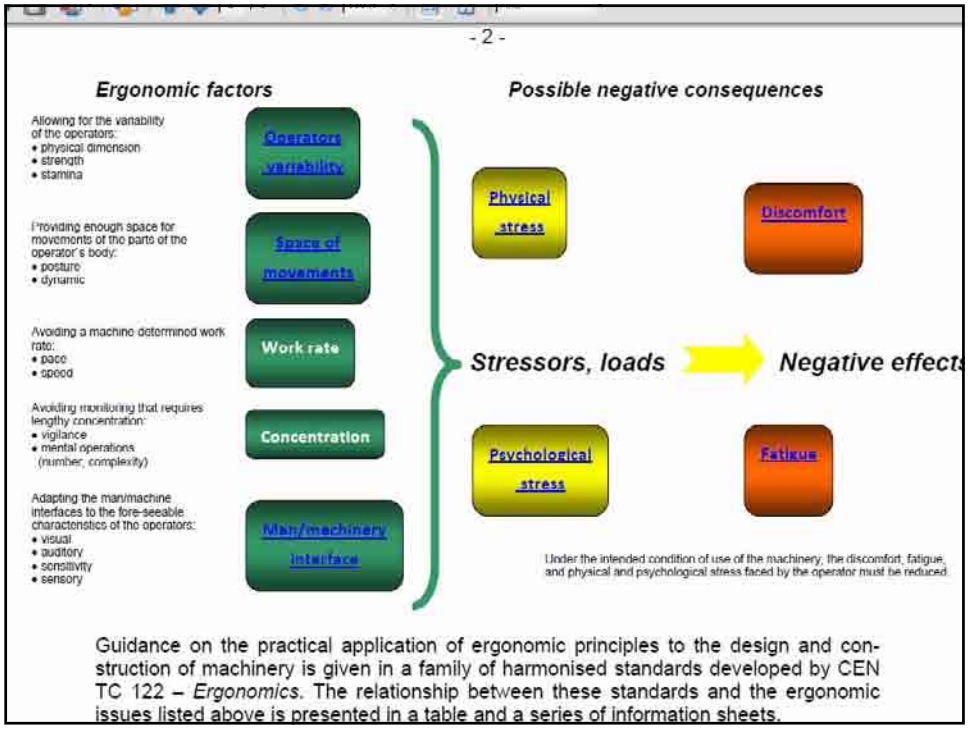
Under the intended conditions of use, the discomfort, fatigue and physical and psychological stress faced by the operator must be reduced to the minimum possible, taking into account ergonomic principles such as:

- *allowing for the variability of the operator's physical dimensions, strength and stamina,*
- *providing enough space for movements of the parts of the operator's body,*
- *avoiding a machine-determined work rate,*
- *avoiding monitoring that requires lengthy concentration,*
- *adapting the man/machinery interface to the foreseeable characteristics of the operators.*

§181 Ergonomic principles

The requirements set out in section 1.1.6 refer to ergonomics. The discipline ergonomics can be defined as follows:

"Ergonomics (or the study of human factors) is the scientific discipline concerned w



Ergonomic factors ***Possible negative consequences***

Allowing for the variability of the operators:
• physical dimension
• strength
• stamina

Operators variability

Providing enough space for movements of the parts of the operator's body:
• posture
• dynamic

Space of movements

Avoiding a machine determined work rate:
• pace
• speed

Work rate

Avoiding monitoring that requires lengthy concentration:
• vigilance
• mental operations (number, complexity)

Concentration

Adapting the man/machine interfaces to the fore-seeable characteristics of the operators:
• visual
• auditory
• sensitivity
• sensory

Man/machinery interface

Physical stress

Discomfort

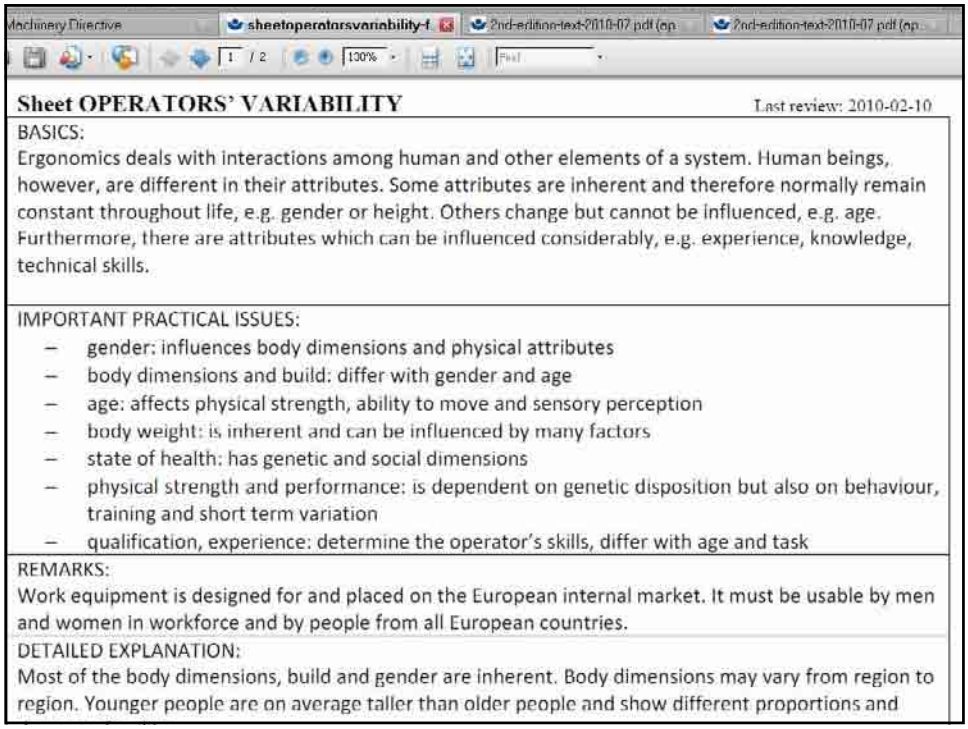
Stressors, loads ***Negative effects***

Psychological stress

Fatigue

Under the intended condition of use of the machinery, the discomfort, fatigue, and physical and psychological stress faced by the operator must be reduced.

Guidance on the practical application of ergonomic principles to the design and construction of machinery is given in a family of harmonised standards developed by CEN TC 122 – *Ergonomics*. The relationship between these standards and the ergonomic issues listed above is presented in a table and a series of information sheets.



Sheet OPERATORS' VARIABILITY

Last review: 2010-02-10

BASICS:

Ergonomics deals with interactions among human and other elements of a system. Human beings, however, are different in their attributes. Some attributes are inherent and therefore normally remain constant throughout life, e.g. gender or height. Others change but cannot be influenced, e.g. age. Furthermore, there are attributes which can be influenced considerably, e.g. experience, knowledge, technical skills.

IMPORTANT PRACTICAL ISSUES:

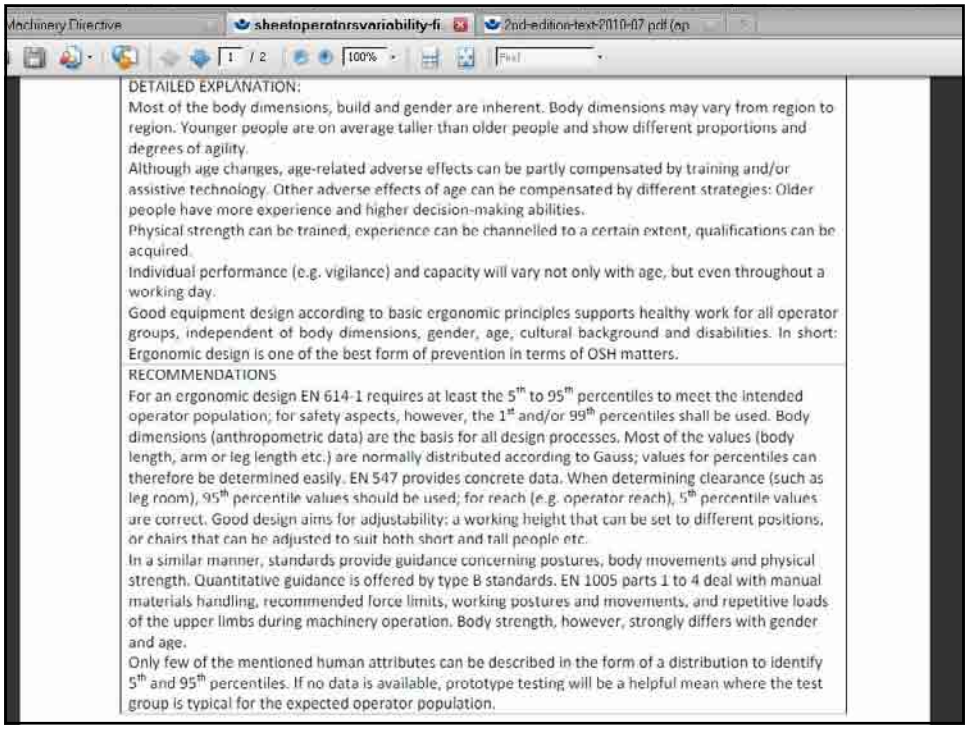
- gender: influences body dimensions and physical attributes
- body dimensions and build: differ with gender and age
- age: affects physical strength, ability to move and sensory perception
- body weight: is inherent and can be influenced by many factors
- state of health: has genetic and social dimensions
- physical strength and performance: is dependent on genetic disposition but also on behaviour, training and short term variation
- qualification, experience: determine the operator's skills, differ with age and task

REMARKS:

Work equipment is designed for and placed on the European internal market. It must be usable by men and women in workforce and by people from all European countries.

DETAILED EXPLANATION:

Most of the body dimensions, build and gender are inherent. Body dimensions may vary from region to region. Younger people are on average taller than older people and show different proportions and



DETAILED EXPLANATION:

Most of the body dimensions, build and gender are inherent. Body dimensions may vary from region to region. Younger people are on average taller than older people and show different proportions and degrees of agility.

Although age changes, age-related adverse effects can be partly compensated by training and/or assistive technology. Other adverse effects of age can be compensated by different strategies: Older people have more experience and higher decision-making abilities.

Physical strength can be trained, experience can be channelled to a certain extent, qualifications can be acquired.

Individual performance (e.g. vigilance) and capacity will vary not only with age, but even throughout a working day.

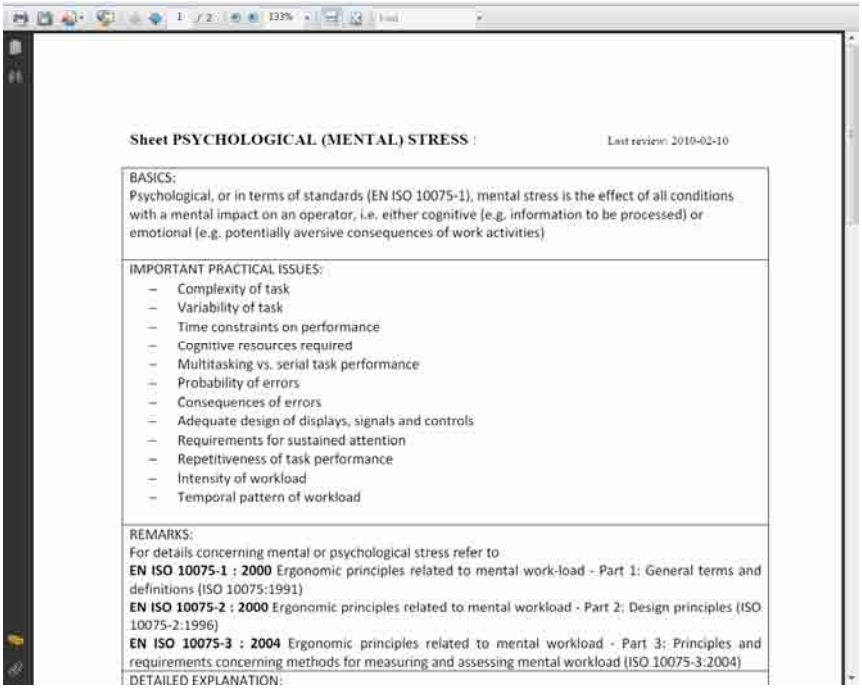
Good equipment design according to basic ergonomic principles supports healthy work for all operator groups, independent of body dimensions, gender, age, cultural background and disabilities. In short: Ergonomic design is one of the best form of prevention in terms of OSH matters.

RECOMMENDATIONS

For an ergonomic design EN 614-1 requires at least the 5th to 95th percentiles to meet the intended operator population; for safety aspects, however, the 1st and/or 99th percentiles shall be used. Body dimensions (anthropometric data) are the basis for all design processes. Most of the values (body length, arm or leg length etc.) are normally distributed according to Gauss; values for percentiles can therefore be determined easily. EN 547 provides concrete data. When determining clearance (such as leg room), 95th percentile values should be used; for reach (e.g. operator reach), 5th percentile values are correct. Good design aims for adjustability: a working height that can be set to different positions, or chairs that can be adjusted to suit both short and tall people etc.

In a similar manner, standards provide guidance concerning postures, body movements and physical strength. Quantitative guidance is offered by type B standards. EN 1005 parts 1 to 4 deal with manual materials handling, recommended force limits, working postures and movements, and repetitive loads of the upper limbs during machinery operation. Body strength, however, strongly differs with gender and age.

Only few of the mentioned human attributes can be described in the form of a distribution to identify 5th and 95th percentiles. If no data is available, prototype testing will be a helpful mean where the test group is typical for the expected operator population.



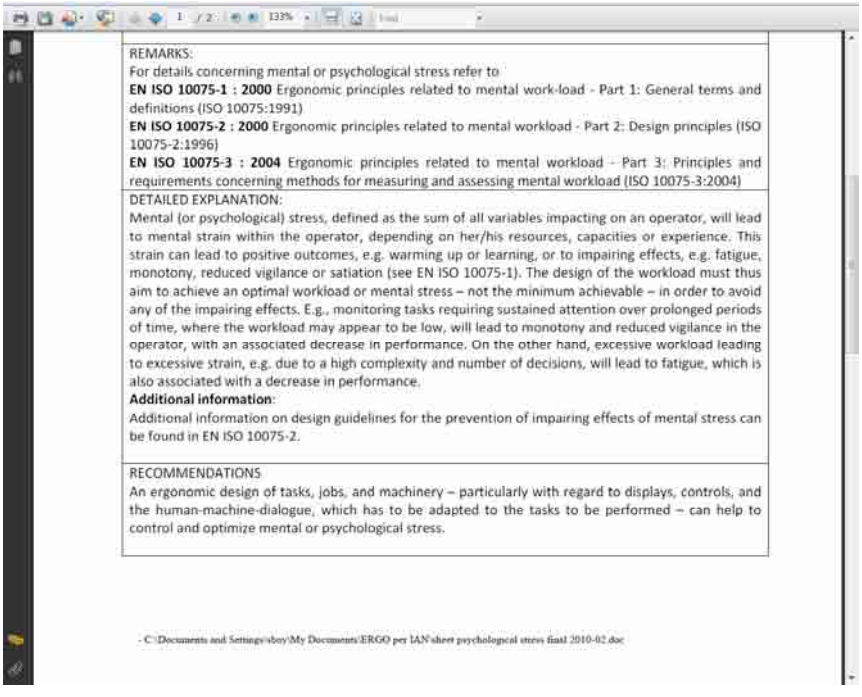
Sheet PSYCHOLOGICAL (MENTAL) STRESS : Last review: 2010-02-10

BASICS:
Psychological, or in terms of standards (EN ISO 10075-1), mental stress is the effect of all conditions with a mental impact on an operator, i.e. either cognitive (e.g. information to be processed) or emotional (e.g. potentially aversive consequences of work activities)

IMPORTANT PRACTICAL ISSUES:
- Complexity of task
- Variability of task
- Time constraints on performance
- Cognitive resources required
- Multitasking vs. serial task performance
- Probability of errors
- Consequences of errors
- Adequate design of displays, signals and controls
- Requirements for sustained attention
- Repetitiveness of task performance
- Intensity of workload
- Temporal pattern of workload

REMARKS:
For details concerning mental or psychological stress refer to
EN ISO 10075-1 : 2000 Ergonomic principles related to mental work-load - Part 1: General terms and definitions (ISO 10075:1991)
EN ISO 10075-2 : 2000 Ergonomic principles related to mental workload - Part 2: Design principles (ISO 10075-2:1996)
EN ISO 10075-3 : 2004 Ergonomic principles related to mental workload - Part 3: Principles and requirements concerning methods for measuring and assessing mental workload (ISO 10075-3:2004)

DETAILED EXPLANATION:



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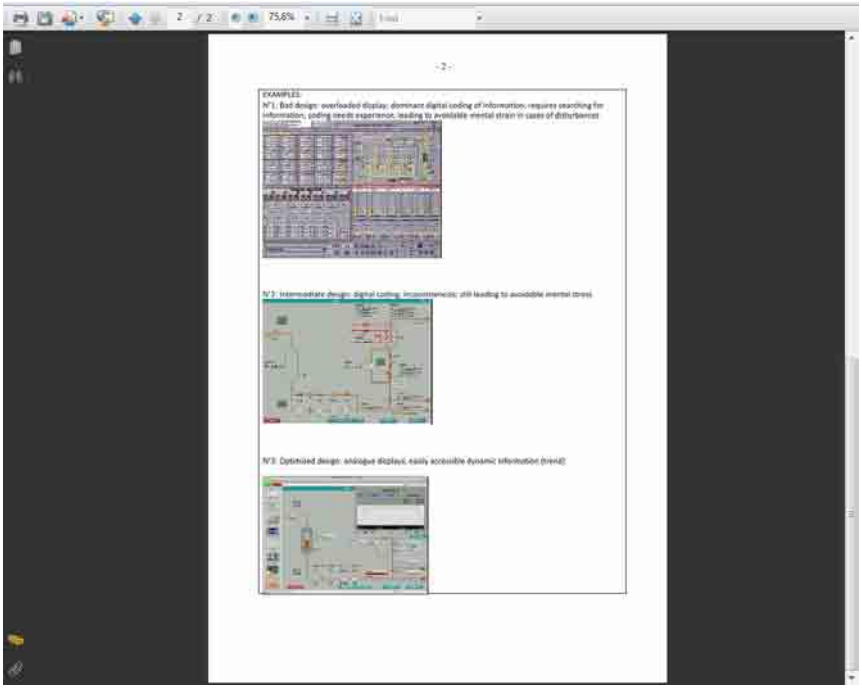
EN ISO 10075-3 : 2004 Ergonomic principles related to mental workload - Part 3: Principles and requirements concerning methods for measuring and assessing mental workload (ISO 10075-3:2004)

DETAILED EXPLANATION:
Mental (or psychological) stress, defined as the sum of all variables impacting on an operator, will lead to mental strain within the operator, depending on her/his resources, capacities or experience. This strain can lead to positive outcomes, e.g. warming up or learning, or to impairing effects, e.g. fatigue, monotony, reduced vigilance or satiation (see EN ISO 10075-1). The design of the workload must thus aim to achieve an optimal workload or mental stress – not the minimum achievable – in order to avoid any of the impairing effects. E.g., monitoring tasks requiring sustained attention over prolonged periods of time, where the workload may appear to be low, will lead to monotony and reduced vigilance in the operator, with an associated decrease in performance. On the other hand, excessive workload leading to excessive strain, e.g. due to a high complexity and number of decisions, will lead to fatigue, which is also associated with a decrease in performance.
Additional information:
Additional information on design guidelines for the prevention of impairing effects of mental stress can be found in EN ISO 10075-2.

RECOMMENDATIONS
An ergonomic design of tasks, jobs, and machinery – particularly with regard to displays, controls, and the human-machine-dialogue, which has to be adapted to the tasks to be performed – can help to control and optimize mental or psychological stress.



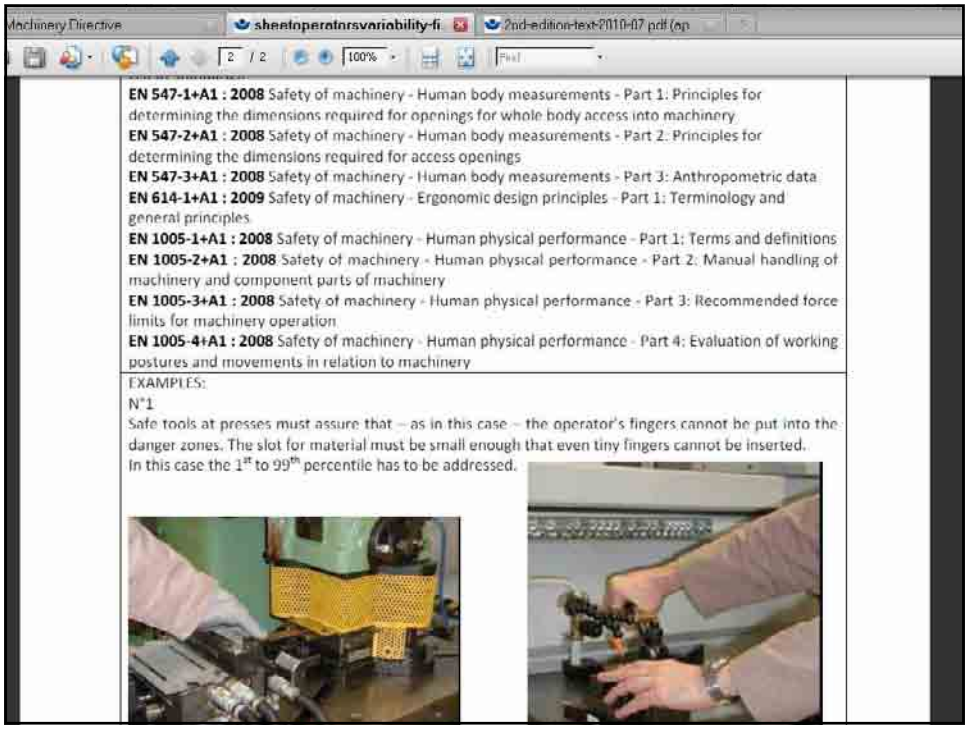
- 2 -

EXAMPLES:

N°1: Bad design: overloaded display; dominant digital coding of information; requires searching for information; coding needs experience; leading to avoidable mental strain in cases of disturbances

N°2: Intermediate design: digital coding; inconsistencies; still leading to avoidable mental stress

N°3: Optimised design: analogue displays; easily accessible dynamic information (trend)



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EN 547-1+A1 : 2008 Safety of machinery - Human body measurements - Part 1: Principles for determining the dimensions required for openings for whole body access into machinery

EN 547-2+A1 : 2008 Safety of machinery - Human body measurements - Part 2: Principles for determining the dimensions required for access openings

EN 547-3+A1 : 2008 Safety of machinery - Human body measurements - Part 3: Anthropometric data

EN 614-1+A1 : 2009 Safety of machinery - Ergonomic design principles - Part 1: Terminology and general principles

EN 1005-1+A1 : 2008 Safety of machinery - Human physical performance - Part 1: Terms and definitions

EN 1005-2+A1 : 2008 Safety of machinery - Human physical performance - Part 2: Manual handling of machinery and component parts of machinery

EN 1005-3+A1 : 2008 Safety of machinery - Human physical performance - Part 3: Recommended force limits for machinery operation

EN 1005-4+A1 : 2008 Safety of machinery - Human physical performance - Part 4: Evaluation of working postures and movements in relation to machinery

EXAMPLES:

N°1

Safe tools at presses must assure that – as in this case – the operator's fingers cannot be put into the danger zones. The slot for material must be small enough that even tiny fingers cannot be inserted.

In this case the 1st to 99th percentile has to be addressed.


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ErgoNoRA, the NoRA ergonomics tool, offers:
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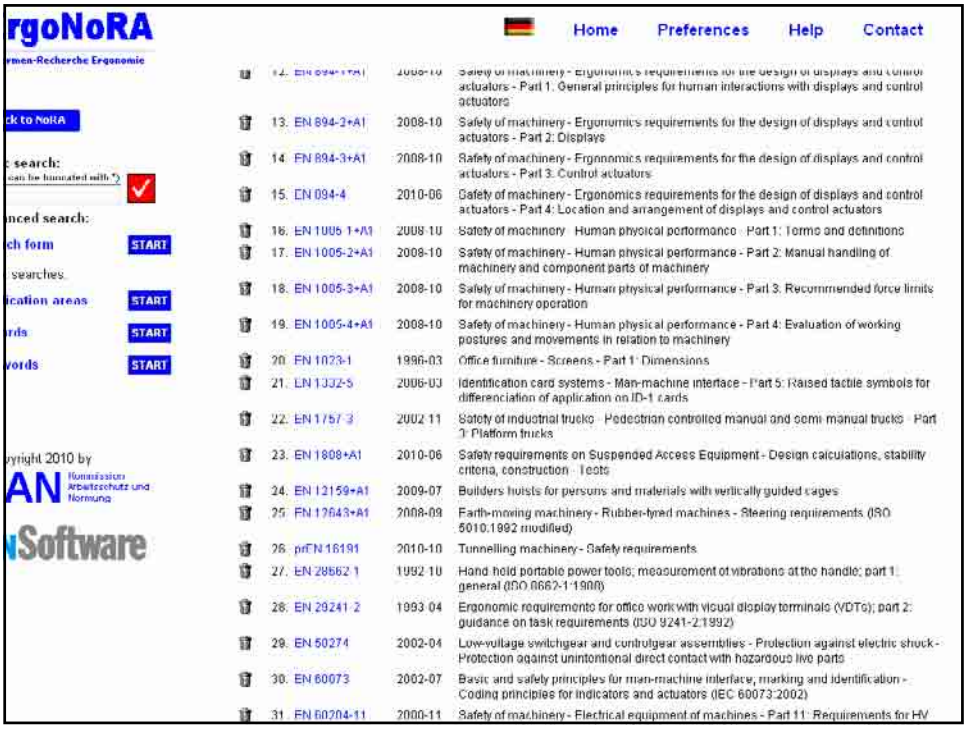
Indication of generic standards
ErgoNoRA contains standards dealing with the following areas:
Working conditions, human characteristics (anthropometrics, biomechanics, sensory performance, mental performance, physiology), man-machine interface, and man-environment interface. The last two of these classes also deal with the areas of vibration, acoustics/noise, lighting, climate, and dimensional design of work equipment.
Standards dealing primarily with radiation, toxic substances, safety marking and protective equipment are not contained in ErgoNoRA, but only in the general NoRA database.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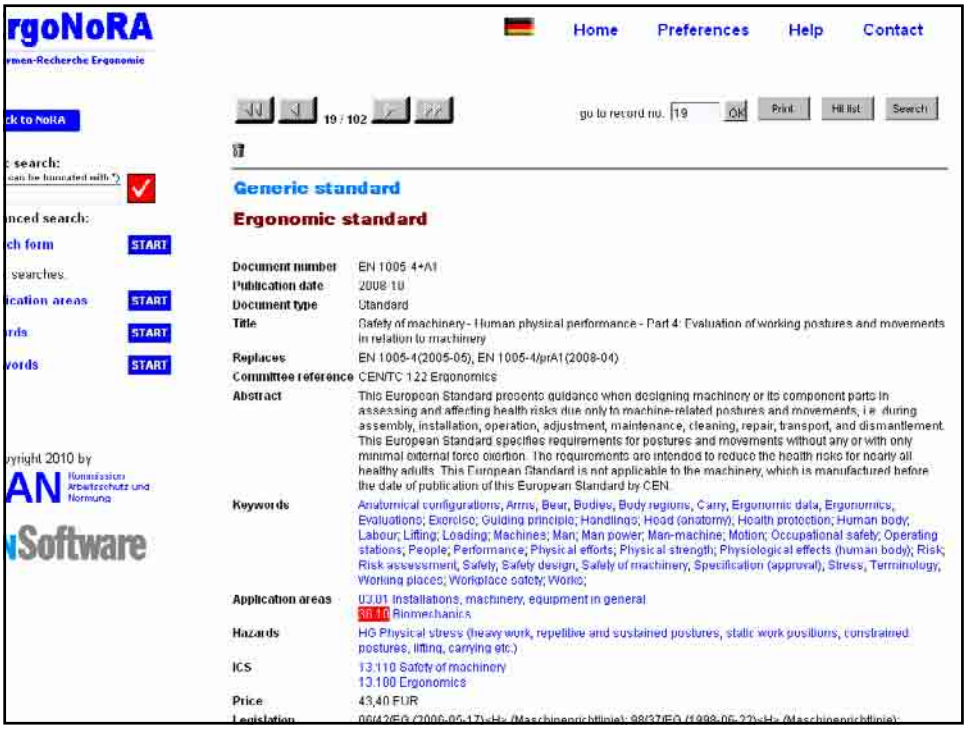
13. EN 894-2+A1 2008-10 Safety of machinery - Ergonomics requirements for the design of displays and control actuators - Part 2: Displays
14. EN 894-3+A1 2008-10 Safety of machinery - Ergonomics requirements for the design of displays and control actuators - Part 3: Control actuators
15. EN 894-4 2010-06 Safety of machinery - Ergonomics requirements for the design of displays and control actuators - Part 4: Location and arrangement of displays and control actuators
16. EN 1005-1+A1 2008-10 Safety of machinery - Human physical performance - Part 1: Terms and definitions
17. EN 1005-2+A1 2008-10 Safety of machinery - Human physical performance - Part 2: Manual handling of machinery and component parts of machinery
18. EN 1005-3+A1 2008-10 Safety of machinery - Human physical performance - Part 3: Recommended force limits for machinery operation
19. EN 1005-4+A1 2008-10 Safety of machinery - Human physical performance - Part 4: Evaluation of working postures and movements in relation to machinery
20. EN 1023-1 1996-03 Office furniture - Screens - Part 1: Dimensions
21. EN 1332-5 2006-03 Identification card systems - Man-machine interface - Part 5: Raised tactile symbols for differenciation of application on ID-1 cards
22. EN 1757-3 2002-11 Safety of industrial trucks - Pedestrian controlled manual and semi manual trucks - Part 3: Platform trucks
23. EN 1808+A1 2010-06 Safety requirements on Suspended Access Equipment - Design calculations, stability criteria, construction - Tests
24. EN 12159+A1 2009-07 Builders hoists for persons and materials with vertically guided cages
25. EN 12643+A1 2008-09 Earth-moving machinery - Rubber-tyred machines - Steering requirements (ISO 5010:1992 modified)
26. prEN 16191 2010-10 Tunnelling machinery - Safety requirements
27. EN 28662-1 1992-10 Hand-held portable power tools; measurement of vibrations at the handle; part 1: general (ISO 8662-1:1988)
28. EN 29241-2 1993-04 Ergonomic requirements for office work with visual display terminals (VDTs); part 2: guidance on task requirements (ISO 9241-2:1992)
29. EN 50274 2002-04 Low-voltage switchgear and controlgear assemblies - Protection against electric shock - Protection against unintentional direct contact with hazardous live parts
30. EN 60073 2002-07 Basic and safety principles for man-machine interface, marking and identification - Coding principles for indicators and actuators (IEC 60073:2002)
31. EN 60204-11 2000-11 Safety of machinery - Electrical equipment of machines - Part 11: Requirements for HV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Generic standard
Ergonomic standard
Document number EN 1005-4+A1
Publication date 2008-10
Document type Standard
Title Safety of machinery - Human physical performance - Part 4: Evaluation of working postures and movements in relation to machinery
Replaces EN 1005-4(2005-05), EN 1005-4/prA1(2008-04)
Committee reference CEN/TC 122 Ergonomics
Abstract This European Standard presents guidance when designing machinery or its component parts in assessing and affecting health risks due only to machine-related postures and movements, i.e. during assembly, installation, operation, adjustment, maintenance, cleaning, repair, transport, and dismantlement. This European Standard specifies requirements for postures and movements without any or with only minimal external force exertion. The requirements are intended to reduce the health risks for nearly all healthy adults. This European Standard is not applicable to the machinery, which is manufactured before the date of publication of this European Standard by CEN.
Keywords Anatomical configurations; Arms; Bear; Bodies; Body regions; Carry; Ergonomic data; Ergonomics; Evaluations; Exercise; Guiding principle; Handlings; Head (anatomy); Health protection; Human body; Labour; Lifting; Loading; Machines; Man; Man power; Man-machine; Motion; Occupational safety; Operating stations; People; Performance; Physical efforts; Physical strength; Physiological effects (human body); Risk; Risk assessment; Safety; Safety design; Safety of machinery; Specification (approval); Stress; Terminology; Working places; Workplace safety; Works;
Application areas 03.01 Installations, machinery, equipment in general
38.10 Biomechanics
Hazards HG Physical stress (heavy work, repetitive and sustained postures, static work positions, constrained postures, lifting, carrying etc.)
ICS 13.110 Safety of machinery
13.100 Ergonomics
Price 43,40 EUR
Legislation

Suggestions, pour aller plus loin

- www.ergomach.eu
- http://www.eurogip.fr/fr/docs/Kan_nouvelle_directive_machines_FR_2008.pdf
- http://hesa.etui-rehs.org/fr/dossiers/dossier.asp?dos_pk=23
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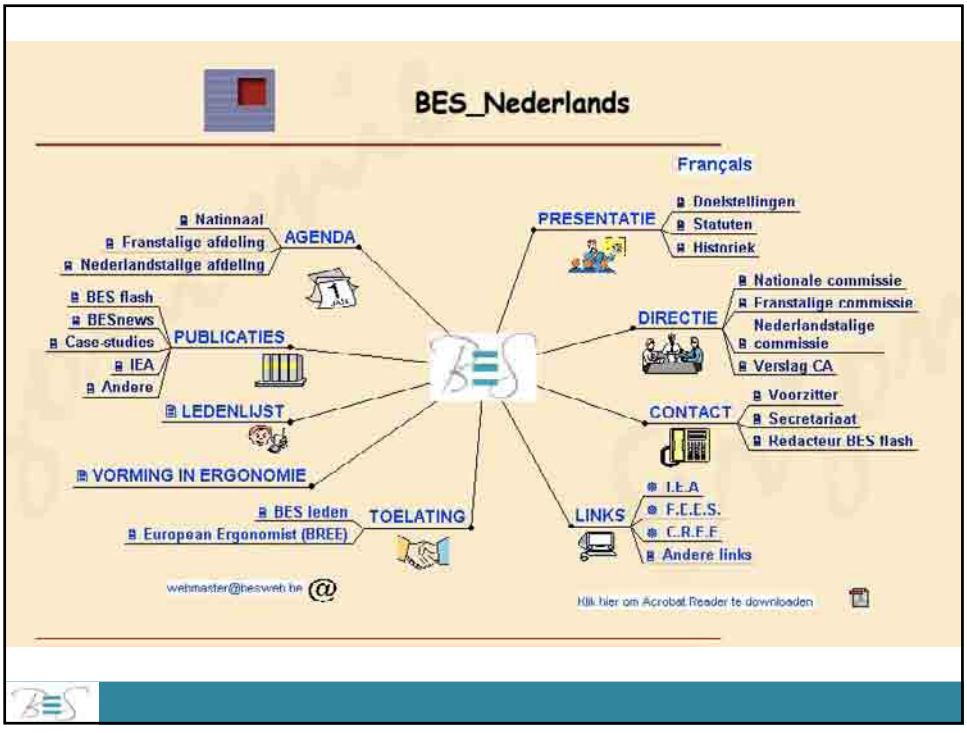
RoelandMotmans, Eur Erg



Doelstellingen

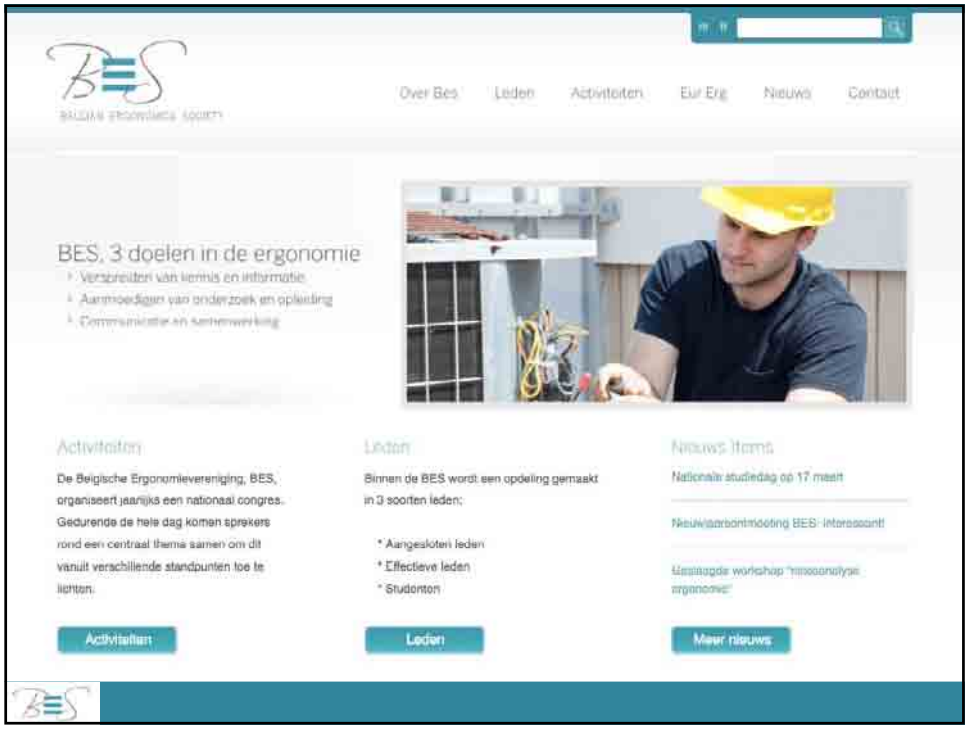
- Nieuw design
- Info up to date

April 2009

- Professioneel design
- Content management system

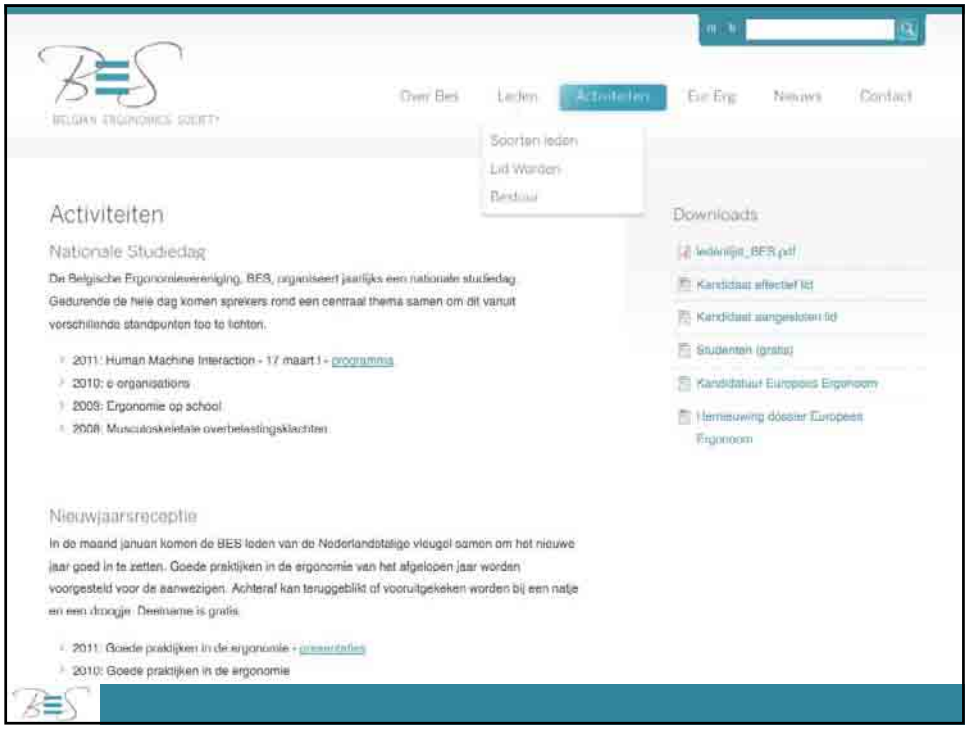
Juni 2010

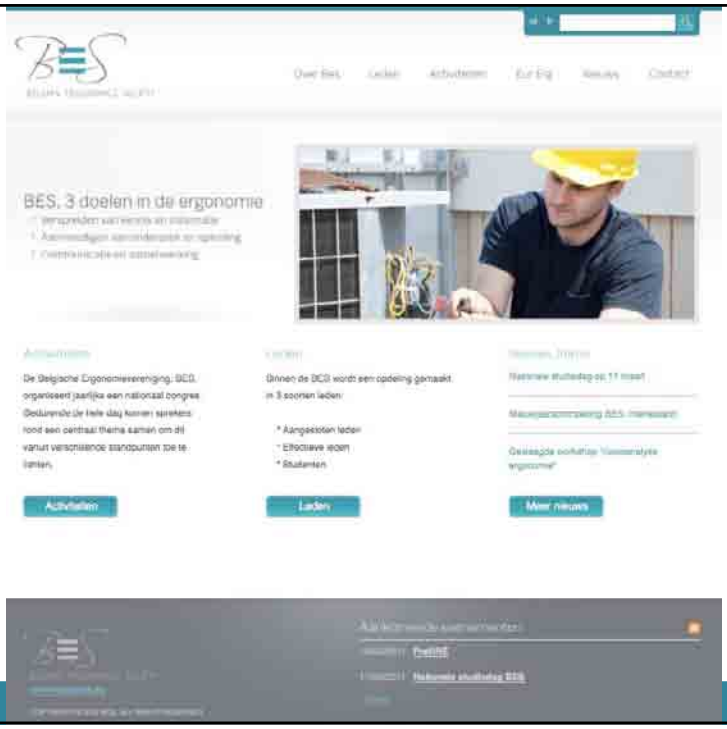
- Tweetalig
- Weinigonderhoud



Kerntaken

- Evenementenpromoten
- Ledenaansluiten
- Informerenleden

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De Belgische Ergonomievereniging, BEG, organiseert jaarlijks een nationaal congres. Gedurende de hele dag komen sprekers rond een centraal thema samen om dit vanuit verschillende standpunten zoe te lichten.
Activiteiten
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