

PROCESSING OF INFORMATION

The invention concerns a method for processing information, which information includes content and in which method

- 5 - digital imaging is subjected to information,
- at least part of the imaged information is embedded into at least one target.

In addition, the invention also concerns corresponding electronic equipment and a software product for implementation of
10 the method according to the invention.

The working out of application documents, such as, for example, Office documents, in the known manner, for example, for the end users of portable electronic equipment, is complicated
15 and time-consuming. It is especially difficult to work out Office documents (for example, on Word, Excel or PowerPoint templates) using the small and limited keypads and displays of the equipment.

20 It is also difficult to bring information originally in non-electronic form into electronic form from some alternative physical medium. In practice, it must be done once again from the beginning on the equipment. To the users of portable equipment, these are very frustrating matters, and thus they
25 constitute a very significant usability problem.

It is a known fact that in portable equipment the information supply and display means are very limited, whereby they restrict their use in the bringing about of content, for example,
30 ple, text, tables or drawings. In addition, the choice of the most suitable application for each type of content may be a difficult decision to make for the untrained user.

A basic solution illustrating the state of the art as regards
35 the bringing about of content in portable equipment is to use

various office equipment to bring about a document and to use them to write the finished document. The resulting document can then be transferred to the portable equipment. However, this is not pleasant from the viewpoint of usability, because
5 the user must use two pieces of equipment, which are located separately from each other. The procedure is made even more difficult by the transfer of the document from one piece of equipment to another.

10 Another solution illustrating the state of the art is to write the information in a certain area of the portable equipment, from which it can be converted into electronic form, for example, by using handwriting recognition. An example of this kind of solution is the "drawing pen" known from equipment of the
15 Palm type, which is used to input information into a drawing area recognising movements of the pen.

Another somewhat more advanced state-of-the-art solution is the application of camera equipment arranged in various kinds
20 of portable equipment for converting non-electronic information into electronic form. One such solution is presented in US Patent 6,202,060 B1 (Tran). Even here the user must still carry out selecting, setting and editing steps relating to the concerned application software, which steps at least in the
25 case of an untrained user do not lead to the desired outcome, or at least it is very difficult to reach an outcome of the desired kind.

It is a purpose of the present invention to provide such a
30 manner of processing information for a chosen target, which from the viewpoint of the end user is effortless and is suitable for application in portable equipment in particular. The characteristic features of the method according to the invention are presented in appended claim 1, while the characteristic features of the equipment are presented in claim 9. In ad-
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dition, the invention also concerns a corresponding software product, whose characteristic features are presented in appended claim 19.

- 5 In the method according to the invention
- digital imaging is subjected to information which information includes content,
 - at least part of the imaged information is embedded into at least one target.
- 10 In addition, in the method,
- at least part of the content belonging to the digitally imaged information is recognised, based on which
 - at least one target is defined for the recognised
- 15 content.

In the context of the invention, a target can be understood very largely. According to a first embodiment, it can be, for example, at least one application software. According to another embodiment, the target can be at least one formulation element or an existing document, for example, in some application software. The application software or formulation template may be specialised in a content of an established form, whereby with the aid of the invention it can be chosen based on the recognised content. On the other hand, the certain type of content can be embedded to the application software that is not necessary the default software for that kind of content. Owing to the invention, the user need no longer take so much stand to the choice of the most suitable application software or formulation template, but this can be done by making use of special knowledge arranged in the equipment.

According to a first embodiment, the target may either be suggested by the equipment or it may even be chosen automatically by the equipment based on content recognised in the informa-

tion. Based on the suggestion, the user may decide on the most suitable application, possibly from a pre-screened list of applications, which list may even be arranged by the equipment taking into account the recognised content. Owing to the invention it is now also possible to decide easily on the most suitable storage format for the content. If the equipment does the selection of target automatically by applying the knowledge base arranged therein, the end user need hereby not even make the decision on selection of application. This is very significant in view of usability of the equipment.

If at least some of the possible target applications also include one or more formulation elements, wherein content can be embedded, then according to another embodiment it is possible to define at least one formulation element for the content recognised from the information. On the other hand, the selection or setting of formulation elements may also be used without any selection or setting of the application software.

The feature relating to formulation elements also facilitates the end user's activity for bringing about content. This is so in view of the fact that applications often include tens or even hundreds of pattern bases, styles, graphic elements and editings, wherein content can be embedded, for example, in order to improve its illustrating character or esthetic presentation. If the equipment suggests to the end user formulation elements that are best suitable for the recognised content, the end user will avoid the endless-seeming browsing of elements. Also in the case of formulation elements, an automatic selection performed by the equipment is of course also possible.

In the method according to the invention, the selection of content for the target can be done in several different ways. According to a first embodiment, a selection may be done even

before imaging information. According to another embodiment, content may be selected, besides the above or alternatively, at such a time only, when the content has already been imaged and has already been converted into electronic data. Since it
5 is possible to select the content, any undesired content that may occur in the readable information will not cause any difficulty in the embedding of the desired content into the target.

10 Numerous advantages relating to the bringing about of content are achieved owing to the invention. A first achieved advantage is the utilisation of at least already partly ready-made and prepared material as a formal electronic document. The end user may bring about content by utilising, for example, some
15 natural presentation medium. From this, the content is converted easily and without effort into electronic form for use in the desired manner in the most suitable application.

The invention allows the bringing about of application documents, such as, for example, Office documents, directly from
20 the original, for example, non-electronic media by using imaging and image recognition, more generally by applying digital imaging.

25 One more surprisingly aspect of the invention is to use the camera interface as the data transmission interface between two or more pieces of electronic equipment. The information may be visualised by the first equipment. The visualised information is then imaged by the second equipment having camera
30 means connected to it to which the information is desired to be transmitted for further actions. This aspect of the invention allows in extremely simple way to arrange a data interface between devices. The user may now move documents from one device to another just by taking image from the visualised
35 content of the document without any particular knowledge re-

lating to, for example, possible physical or wireless interfaces between different kind of equipment categories.

Other features characterising the invention will emerge from
5 the appended claims, and more obtainable advantages are listed in the specification.

The invention, which is not limited to the embodiments presented in the following, will be described in greater detail
10 by referring to the appended figures, wherein

Figure 1 is a rough flow chart of a basic example of the method according to the invention,
Figure 2 is a flow chart of a first basic application
15 example of the method according to the invention,
Figure 3 is a flow chart of another basic application example of the method according to the invention,
20 Figure 4 is a rough schematic view of a first basic application example of electronic equipment according to the invention as applied to the method,
Figure 5 shows an application example of a software
25 product according to the invention for converting information into electronic form in electronic equipment, and
Figure 6 shows some application examples of information as it is being converted into electronic form.
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The invention concerns a method and electronic equipment 10 implementing the method for processing information INFO. In the description and figures a reference is made to the term
35 "data". In the connection with the invention the term "data"

and the term "information" is to be understood as synonyms. It is obvious for the professional in the field that information is in a data form when it is processed in connection with the electronic equipment.

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Figure 1 is a rough flow chart presentation of a basic example of the method according to the invention. More precisely, the invention relates to the provision of electronic content, such as, for example, Office documents, for example, from existing
10 sources P, for example, in portable equipment, by using a camera CAM and image, pattern and text recognition 31.2, IMPAREC, TE and metadata META. In the method descriptions shown in Figures 1 - 3, reference is made to a basic application example shown in Figure 4 of the electronic equipment 10 according to
15 the invention, where it is represented as a rough schematic view. In addition, reference is made to a software product 30 shown in Figure 5, which may be used for implementing the method according to the invention in equipment 10.

20 The end user has visualised information INFO in non-electronic form, which he wishes to convert at least partly into electronic form. In the case of the embodiment, the source of information INFO is, for example, a book page or a sheet of paper P as shown in Figure 6. Information INFO includes content
25 CONT1 - CONT4. Content CONT1 - CONT4 can understood very largely in the context of the invention. It can be, for example, text CONT2, numeric data, tables CONT1, drawings, images CONT3, graphic descriptors, diagrams, presentation graphics CONT4, lines 80, patterns etc. The term "content" may also be
30 understood as object(s) in connection with the invention. Furthermore, contents may also include various kinds of style formulations 70 - 73 (templates). Some another examples of possible sources of information are, also generally, physical, tangible printed matter, flip-over pads and even visualising
35 means of electronic communication equipment (for example, the

screen in the case of a video projector or the display of a mobile station or PC computer), etc.

In other embodiment, the information INFO may have been brought about manually at least in part or by using some electronic equipment at least in part, an aspect which is not limited in any way by the invention. Information INFO may have been brought about in electronic equipment, such as, for example, in a portable computer using some very easy-to-use and simple basic application program (for example, a Notepad or Wordpad application in MS Windows environment). After bringing about the information INFO this may have been, for example, printed out on paper, whereby it may possibly have been complemented from the selected portion. On the other hand, the source of information may even be surprisingly the display M of a computer, on which it is visualised for the end user and on which the end user has brought about the information in its entirety.

When the source of the information INFO is, for example, a display M of a computer (Figure 4), the invention makes possible a manner to arrange a data transmission interface between two equipments. The created information is visualised in a display M of an equipment in which it has been created or loaded from Internet. If the information is desired to move to the mobile station 10, for example, it is imaged by the camera means CAM of the equipment 10. After that imaging process actions according to the invention are carried out. One example of an advantage achieved by this interface feature is if the user wants to send a document by email which document is created by the laptop without Internet connection. According to this embodiment only the imaging is need to be performed without any wire or wireless connection setups.

Referring to Figure 1, as the end user activates a software 31 according to the invention from his equipment 10, some setting steps may at first be carried out in connection with the method. In step (i) the user aims at information INFO of his choice with the camera CAM of equipment 10 and takes a image
5 of source P of information INFO by capturing information INFO with camera CAM optically.

In step (ii) the captured information INFO is converted in
10 equipment 10 into electronic data DATA1 - DATA3. The conversion may take place in a manner known as such from camera equipment CAM, for example, in its image processing chain or in corresponding software ICS.

15 In step (iii) content CONT1 - CONT4 belonging to the information INFO is recognised from the electronic data DATA1 - DATA3. For this purpose, equipment 10 includes corresponding functionalities, which will be described in greater detail hereinafter. From data DATA1 - DATA3 it is possible with processor means CPU of the equipment 10 to recognise, for example,
20 matters relating to the type, style and manner of presentation of information INFO. Some examples of such matters are, for example, such as does the data DATA1 - DATA3 contain, for example, text, tables and/or images, patterns etc.

25 In step (iv) at least one target 50 is defined for the data DATA1 - DATA3. The definition takes place based on the content CONT1 - CONT4 recognised in data DATA1 - DATA3. To this end, corresponding knowledge is adapted in equipment 10, such as,
30 for example, a (pattern recognition) knowledge base PAT.

In the definition, it is possible, for example, to recognise from data DATA1 - DATA3 whether it is a drawing or data in text form/numeric data. Based on this, the most suitable application software for the content CONT1 may be, for example,
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a spreadsheet application 51. Furthermore, it is also possible to define whether a drawing is recognisable as, for example, a graphic descriptor or a diagram. At the same time, features typical of spreadsheet data can be recognised from data in text form/numeric data. Examples of such are vertical and/or horizontal line elements 80 located in between the text/numbers, whereby the content CONT1 is even clearly in spreadsheet form.

10 If the content CONT2 is only text and/or numeric information, the established application software may be, for example, a text processing software 50 or a corresponding office application. For example, to recognise a document in text form, it is possible as a possible extra value also to apply editings generally occurring in documents. As a few examples of such can be mentioned the standing out of headings from the body text proper (bold text and other such editings), encapsulation, captions or division into paragraphs. These provide the extra confidence required of recognition for suggesting/establishing the most suitable application software 50 - 53 in the manner according to the invention.

In step (v) it is possible, for example, based on the steps of conclusion performed above to embed the content CONT1 - CONT4 converted into data DATA1 - DATA3 into at least one target application 50 or existing document. Then the process according to the invention is complete in its basic form.

Figure 2 is a flow chart showing a first basic application example of the method according to the invention. In the embodiment shown in Figure 2, the focus is especially on the possible steps of performing a selection of content. As regards the basic sub-steps (i - v) constituting the method, between which possible extra sub-steps of the method are arranged, reference

is made to Figure 1 without referring to this unnecessarily any further.

According to one embodiment, the selection of content CONT1 -
5 CONT4 intended for guidance to at least one or more targets 50
- 53, 70 - 73 can be done even before capturing the informa-
tion INFO. To this end, the equipment 10 includes, for exam-
ple, a functionality implemented as a software module 31 and
including code means 31.6 configured to select the content
10 CONT3.

In step 201, the user aims his camera CAM at the information
INFO he desires. As a result of this aiming, information INFO
is visualised in a manner known as such on the display DISP of
15 equipment 10, which display now functions as a viewfinder
(step 202).

In step 203, the user uses the display DISP of equipment 10 to
perform masking actions even in several different ways on the
20 content CONT1 - CONT4 detected by the camera CAM. In this way
such an advantage is achieved, among others, that the content
CONT1 - CONT4, which the user wishes to convert into elec-
tronic data DATA1 - DATA3, can be selected even before carry-
ing out the actual recording imaging. This is important be-
25 cause the user may not in some cases like to convert all the
presented content into electronic data DATA for the selected
target 50 - 53, 70 - 73, which is presented, for example, in
printed matter P or in some other source. Before the actual
imaging, the masking of content performed with the viewfinder
30 will thus facilitate the operation of equipment 10 to convert
information INFO into electronic form.

A first surprising way of masking and selecting the content
CONT1 - CONT4 is to zoom it with the camera CAM. Another way
35 is to perform the selection of content CONT1 - CONT4 on the

display part DISP of equipment 10. The user can there, for example, mask the content CONT1 - CONT4 he wishes, which is converted further into electronic data DATA1 - DATA3 for one or more targets 50 - 53, 70 - 73. In masking, some known manner
5 may be used, such as, for example, traditional masking at right angles or lassoing. Hereby the masking may be performed by using the keypad of equipment 10, whereby the keypad is used to control the graphic element selecting the content CONT1 - CONT4 on display DISP.

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In general, masking process gives a significant advantage when the imaging is performed, for example, from a medium in which a non-relevant information is also expressed. Owing to this masking feature only the desired information is possible to be
15 subjected to the imaging process and non-relevant information which possible is in the neighbourhood of this relevant information can be left out.

Upon performance of the masking, it is possible in step (i) to
20 use the camera equipment CAM to capture only this masked content CONT3 for processing. This is possible in such a case, for example, where the desired content CONT3 constitutes one comprehensive area only.

25 Alternatively or also besides the steps 201 - 203 to be performed before the actual storing imaging, it is also possible to capture the whole view detected by the camera CAM, as was done in the case of the application shown in Figure 1. Masking / selection of content CONT1- CONT4 can then be carried out
30 only from the captured DATA, which has been converted into electronic form and stored. This embodiment is a possibility in such a case in particular, where the desired content CONT1 - CONT4 forms several areas in the view detected and captured by camera CAM. The areas may be, for example, separate from
35 one another. Selecting them by using the viewfinder may hereby

be difficult, due to, for example, instability of the equipment 10 when performing viewfinder imaging.

According to this second embodiment, content CONT1 - CONT3 for
5 target 50 - 53, 70 - 73 may be selected, besides the foregoing
or alternatively, only from this electronic data DATA1 - DATA3
captured by the camera means CAM and stored by the equipment
10. For this purpose, the program code 31 of the software product
10 means 31.5 configured to define the content CONT1 - CONT3 to
be selected from the captured electronic data DATA1 - DATA3.

In step 204, the captured content CONT1 - CONT3 is presented
on the display DISP of equipment 10. From the display the user
15 may perform selection of the one or more contents CONT1 -
CONT3 he likes (step 205). Hereby even a possible instability
of the equipment 10 will no longer affect the steps of selection
of content CONT1 - CONT3, nor is it any longer necessary
to aim the equipment 10 at the source P of information INFO.

20 Steps (iii - v) may proceed further from this, as was already
presented above. These are followed by a step 206 of possible
actions to be taken in regard to content CONT1 - CONT3 in the
selected / established one or more targets 50 - 53, 70 - 73.

25 Figure 3 is a flow chart showing another basic application example
of the method according to the invention. By way of crystallizing,
the target there may be an application software 50 - 53, of which
there may also be several possible ones. On
30 the other hand, the target may be, besides an application
software 50 - 53, also a formulation element 70 - 73, of
which there may also be several possible ones. Applying the
invention also to formulation elements 70 - 73 only is of
course possible. Hereby the application 50 - 53 can be
35 selected, for example, by the user.

Steps (i - iii) can be carried out in a corresponding manner by and large as was presented, for example, in Figure 1 or 2. In step 301, the recognised content CONT1 - CONT4 is used to
5 determine whether the content CONT1 - CONT4 is suitable for embedding into one or possibly even into several application softwares 50 - 53. If it is found in step 302, that the content CONT1 - CONT4 is suitable for one application software or existing document only, the action may proceed directly to
10 step 304. But if it is found in step 302, that there are several possible application softwares 50 - 53 or existing documents, then the action moves on to step 303.

There are numerous cases where there may be several application
15 softwares 50 - 53 suitable for the content CONT1 - CONT4. A first example of such is a tabulated numeric content CONT1. Its default application may be, for example, a spreadsheet software 51. On the other hand, a text-processing software 50 may also have resources for processing content CONT1 in
20 spreadsheet form. Another example is image information CONT3, CONT4. Applications suitable for this may be, for example, an image-processing software 53, a presentation graphics software 52 or even a text-processing software 50. Hereby the problem of selecting the most suitable application 50 - 53 is very
25 difficult from the end user's point of view, but the invention provides a surprising solution to this problem.

According to first embodiment, it is possible in step 303 to suggest an application software 50 - 53 based on the content
30 CONT1 - CONT4 recognised from data DATA1 - DATA3. To this end, equipment 10 can be equipped, for example, with a functionality implemented as a software module 31, which includes code means 31.3 configured to suggest at least one application software 50 - 53 based on the content CONT1 - CONT4 recognised
35 from data DATA1 - DATA3.

In the embodiment, such possible application software alternatives may be presented to the end user on the display DISP of equipment 10, which are recommended by the equipment 10. For each recognised content CONT1 - CONT4 it is also possible to present several applications 50 - 53, depending, for example, on the recognition ability of the knowledge base PAT. With each content CONT1 - CONT4 the end user may carry out selection of an application software 50 - 53 from the possible alternatives. On the other hand, the end user may also select such an application software, which the equipment 10 does not even suggest as regards the content CONT1 - CONT4 in question. Thus, there are numerous alternatives also for the implementation of this step.

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According to another embodiment, the target application 50 - 53 can be selected automatically in the equipment 10 based on the content CONT1 - CONT4 recognised from data DATA1 - DATA3. To do this, the equipment 10 may be provided with a software product 30, whose program code 31 includes code means 31.4 configured to select a target application 50 - 53 based on the content CONT1 - CONT4 recognised from data DATA1 - DATA3.

After the selection of application software 50 - 53 performed in step 303, either following a suggestion or the independent setting of an application software 50 - 53 by equipment 10, the action may proceed to the application embodiment step 304.

At least some target applications 50 - 53 may include formulation elements 70 - 73 known as such from the application softwares. In this case, they can be understood as, for example, different application-specific templates, wherein data DATA1 - DATA3 can be embedded or also an existing document. Some in no way exclusive examples of such are various documents that are pre-formed by the user, document templates, manners of presen-

tation for spreadsheet, presentation/transparency bases, graphic effects, which may be static or animated, styles, editings etc.

5 Based on the content CONT1 - CONT4 recognised from data DATA1 - DATA3 or the selected / established application software 50 - 53, it is possible to define at least one formulation element 70 - 73 for the data DATA1 - DATA3, provided that such is found in step 304. To this end, the equipment 10 has, for ex-
10 ample, a functionality implemented as a software product 30, whose program code 31 includes code means 31.2 - 31.4 configured to define based on the content CONT1 - CONT4 recognised from data DATA1 - DATA3 at least one such formulation element 70 - 73 for the data DATA1 - DATA3.

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If no formulation element 70 - 73 relates to the established application software 50 or to the content CONT1 linked up therewith, the action may proceed to step 306. A corresponding transfer may also be performed directly from step 303. If
20 there are relating formulation elements 70 - 73, the action may then proceed to step 305. Possible actions relating to the formulation elements 70 - 73 are carried out in this step. According to the step 303 of application software selection / establishment, formulation elements 70 - 73 suitable for the
25 content CONT1 - CONT4 may also be suggested to the end user in step 305, and the end user then selects the formulation element 70 - 73 he likes for use in connection with each content CONT1 - CONT4 and/or application software 50 - 53. On the other hand, also in the case of formulation elements 70 - 73
30 the equipment 10 may carry out the selection concerning formulation elements 70 - 73 according to its own knowledge base PAT.

In step 306, each content CONT1 - CONT4 can be embedded into
35 the established application software 50 - 53 together with the

selected formulation templates 70 - 73. In step 307, it is possible to perform actions in the application softwares 50 - 53, which need not be described in any greater detail as far as the invention is concerned. The actions may include at least storing the content into a selected file format. The procedure according to the invention is completed in step 308.

Figure 4 is a rough schematic view of a basic application example of the electronic equipment 10 according to the invention. Equipment 10 includes camera means CAM for capturing information INFO including content CONT1 - CONT3. The captured information INFO is processed into digital form by processor means CPU. In addition to these, the equipment 10 may also be provided with image capturing software ICS (imaging chain) of a kind known as such, with which image data DATA formed by sensor CAM is processed in the desired manner. The digitalising of information INFO may also take place already in the image capturing software ICS.

Furthermore, equipment 10 also includes a memory MEM, wherein one or more targets 50 - 53, 70 - 73 may be adapted for the information INFO. Memory MEM may be a solid-state memory known as such, such as, for example, an EEPROM memory or a memory card. Of course, it is also possible to apply memory means including movable parts (CD, hard disk). The equipment also includes processor means CPU for converting the captured information INFO into electronic data DATA1 - DATA3 and for embedding it into at least one target 50, 70 for the desired use. The processor means can also be understood as image capturing software ICS connected to the camera means CAM. The image capturing software ICS provides for the processor means CPU, REC, 31.1 the data DATA formed by the camera means CAM.

The processor means CPU, REC of equipment 10 is adapted to recognise from the electronic data DATA1 - DATA3 content CONT1 -

CONT4 belonging to the information INFO. Based on this, the equipment 10 is adapted to define at least one target 50, 70 for the data DATA1 - DATA3.

5 For recognition of the content CONT1 - CONT4, the equipment 10 includes pattern knowledge data or a corresponding functionality PAT. By providing this knowledge data PAT for use by the processor unit CPU, where the image recognition function REC is run, it is possible to find out the type of each content
10 CONT1 - CONT4 captured by the camera means CAM and also at least one target 50 - 53, 70 - 73 most suitable for each content CONT1- CONT4. In pattern knowledge data PAT every type of content is linked to at least one target. The pattern knowledge data PAT may be arranged according to one embodiment to
15 be learning system that is updated as method is applied in the equipment 10. As a consequence of this feature the equipment 10 learns the most favourite templates of the end user and the suggestion or selection of templates may be carry out even user-friendly.

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From the image recognition function REC, the recognised data DATA1 - DATA3 may be directed either to a text recognition functionality TE, 31.2 or to an image/pattern recognition IMPAREC, 31.2 depending on which type the content CONT1 - CONT4
25 is recognised as being in the image recognition function REC, 31.1.

Furthermore, the text recognition functionality TE, 31.2 and the image/pattern recognition IMPAREC, 31.2 may suggest and/or
30 select (31.3, 31.4) an application software 50 - 53 or also provide more exact information on the contents CONT1 - CONT4 for the application adapter APPAD, 31.3, 31.4 proper. On the other hand, this may also attend or take part in to the selection of application software 50 - 53 and/or formulation ele-
35 ment 70 - 73.

The metadata META that is also provided with the equipment 10 contains information about the patterns and how they are mapped to the particular mobile office application 50 - 53. 5 Some examples of these patterns are, for example, special graphic effects or elements, which may be located in, for example, the presentation documents. Metadata META information is utilised to communicate and invoke through mobile office application adapter APPAD. The metadata META is the store of 10 information mapping the content to all different mobile office applications 50 - 53. The pattern recognition IMPAREC is responsible, for example, for identifying the patterns in general from the images. However, it doesn't necessary have the knowledge on how the patterns have to be inserted to the specific office documents patterns or templates. The metadata 15 META has in view of this more application specific information and, in general, the mapping strategy of the content CONT1 - CONT4 and patterns.

20 The application adapter APPAD, 31.3, 31.4 directs the data DATA1 - DATA3 corresponding with the content CONT1 - CONT4 to the established application software 50 - 53 and it also gives information on the possibly selected formulation template 70 - 73. The content CONT1 - CONT4 is opened in the application 25 software 50 - 53 and there it may be edited and stored by the user, like any content brought about by the actual application software 50 - 53.

In general, the application adapter APPAD may be a set of generic 30 interfaces. These interfaces may be used for the purpose of, for example, creating an office document (in decided / selected application software 50 - 53), inserting the identified office object (i.e. the content) into the document, and more specifically to the specific part of the office document.

In more detailed, the some examples of the duties of the application adapter APPAD may be, for example, create an excel-sheet 51, insert objects CONT1, CONT2, 80, 81.1, 81.3 into the sheet at section number so and so locations. As another embodiment the application adapter APPAD may help to invoke proprietary calls on a specific office application 50 - 53 (sheet/work/etc). Due to this feature the solution according to the invention is independent from the proprietary solutions and enables embedding such data into different applications.

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Some examples of the typical interfaces may be (add/update/insert/create) data (properties, identified object). The properties can have details such as location where to create the object in the document, the location might, for example, in the case of Word 50, have details such as section number/header/footer, etc. Corresponding, in the case of spreadsheet application software 51, properties may be, for example, some specific details relating to the spreadsheet properties in general, such as worksheet number and cell coordinates, etc.

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The application adapter APPAD may actually form like a wrapper around the existing proprietary solutions and provide a bridge functionality with the rest of the invented systems (loose coupling to other proprietary solutions).

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At least some code means 31.1 - 31.6 forming the program code 31 may be integrated in connection with the application 50 - 53 or the application suite 60. On the other hand, the program code 31 may also constitute an entity essentially separate from the applications 50 - 53 or application suites 60. Hereby data transmission may be carried out between them by way of software interfaces (API).

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Figure 6 shows two applications for converting content CONT4, CONT1, CONT2 into electronic form. In the application shown in the top part of the figure 6, a diagram visualised in a book P is converted into PowerPoint format. Here a formulation template 70 is also added to the content CONT4.

In the application located in the bottom part of Figure 6, content CONT1 in table form is read from the book B. A spreadsheet software 51 is selected as the target application. From the table content CONT1 it is possible also to recognise formula 81.1, as is done here. From the lowest lines of two columns the program code according to the invention detects (SUM) terms 81.1, which the spreadsheet application 51 understands as sum terms concerning the columns in question. The corresponding sums 81.2 are computed into the spreadsheet diagram. Also content CONT1 in text form is transferred in the spreadsheet application 51 to a heading position, that is, in this case above the table CONT1.

In the embodiments above the situation is mainly that there exists not at all document before creation. The new document is created from the scratch.

The invention may be applied in the case too, in which the recognised pattern is converted into the target document objects and embedded into an already existing document that may be, for example, the office document. The document objects and the office documents can be totally different type of documents. To make an embedding properly in such a case the equipment 10 includes also the embedder module 31.7 implemented by, for example, as a program code 31.7 or a corresponding functionality. The embedder may be used to embed, for example, a spreadsheet objects into, for example, a presentation document that, for example, already exists. The function of the embedder is to identify the right location and format of this

spreadsheet and make the appropriate calls on the presentation document relating to these location and format features, for example.

5 The embedder module 31.7 of this embodiment may apply the office document handler module and embed the analysed and recognised document format. The embodiment of this embedder based on system could be built, for example, on top of the system, which has been described above. The office document analyser
10 takes care out the duties described embodiments above and it also could be based on the elements/system components of the embodiment above, such as, for example, text recognition TE, image pattern recognition IMPAREC, image recognizer REC, meta-data META, etc. The office document handler can also utilise
15 parts of the mobile office application adapter APPAD. The main functionality of this embodiment is to embed recognised parts of the existing office document into the one or several target office document(s).

20 Some examples of the utilisation actions of the application adapter APPAD by the embedder 31.7 are to insert the recognised object into already existing document. The embedder in addition may have additional functionality, such as adjusting the presentation and control the UI of the existing objects in
25 the document already that they are accordingly re-adjusted. The embedder 31.7 can utilise all the functionality of the adapter APPAD. One detailed example of the using of application adapter APPAD is to identify where to insert the document object in another document. Embedder may also contain the in-
30 formation how to handle existing objects and/or how to re-adjust the existing document parts.

One duty that may be take care with the functionalities according to the invention is, for example, in the embodiment of
35 top part of Figure 6, to recognise different data types and

possible properties that they may have in connection with the presentation software 52, for example. There may be, for example, text objects, graphic objects, such as rectangles 81.3, arrow objects 81.3 etc. The functionality differs the objects
5 from each other and owing to this separation the objects may be subjected to different kind of actions, such as, for example, formulations or moving them on the presentation sheet.

The invention also concerns a camera element CAM, which can be
10 adapted for use not only with electronic equipment 10 but also in connection with the method according to the invention.

The method and electronic equipment 10 according to the invention may be used for forming electronic information. In this
15 case, electronic information may be understood as a very large concept. It may be, for example, content CONT1 - CONT4, which can be examined with individual application softwares 50 - 53 known as such. On the other hand, the application softwares 50 - 53 may also form various application suites 60, the purpose
20 of which is to provide a possibility of processing contents CONT1 - CONT4 of several types. Hereby each individual application 50 - 53 may be specialised in processing content of its own certain type. A special advantage is in fact achieved with the invention, for example, in connection with application
25 suites 60, because embedding content CONT1 - CONT4 in the application 50 - 53 best suitable for it is a real usability problem in electronic equipment 10.

As an example of the above-mentioned applications and application
30 suites the MS Office suite 60 may be mentioned, which includes specialised applications 50 - 53 that are specialized to process structured documents. These are, for example, for text-processing 50 (Word), for spreadsheet 51 (Excel), for presentation graphics 52 (PowerPoint) etc. Still other, but in
35 no way limiting examples of content types are HTML content,

image data, music note collections etc. As can be noted from this multitude of content types, the number of possibilities is really high.

5 Figure 5 is a rough schematic view showing an application example of the software product 30 according to the invention. Software product 30 may include storage means MEM and a program code 31 which can be executed by processor unit CPU of equipment 10 and which is written on the storage means MEM for
10 converting information into electronic form in accordance with the method of the invention, which information INFO includes content CONT1 - CONT4. The storage means MEM for the program code 31 may be, for example, a memory card adaptable in connection with portable equipment, CD media adaptable in a PC
15 environment or also a static or dynamic application memory of the equipment 10, wherein it can be integrated directly.

Program code 31 may include several code means 31.1 - 31.6 executable by processor means CPU, REC, and the action of the
20 code means can be adapted to the method descriptions just presented above. Code means 31.1 - 31.6 may form a set of processor commands executable one after the other, which are used to bring about the functionalities desired for the invention in the equipment 10 according to the invention.

25 The program code 31 according to the invention is adapted to receive as input optically captured information INFO and to convert it into electronic data DATA1 - DATA3 for at least one target 50 - 53, 70 - 73 and to embed the data DATA1 - DATA3
30 into at least one target 50, 70.

In the software product 30 according to the invention there may hereby be a first code means 31.1 configured to recognise from electronic data DATA1 - DATA3 such content CONT1 - CONT4,
35 which belongs to information INFO.

Furthermore, the program code 31 may also include another code means 31.2. This may be configured to define at least one target 50, 70 for the data DATA1 - DATA3.

5

The program code 31 may be adapted for execution mainly at the same time in connection with the forming of data DATA. In the context of the invention, forming can be understood as a very large concept. It may be, for example, digital imaging.

10

It is obvious to the professional in the art that program codes 31 can be implemented in the established manner either as independent applications or they may also form modules, which may be integrated or linked up with other applications, such as, for example, the above-mentioned application softwares 50 - 53 or application suites 60. The functionalities according to the invention or at least some of them, such as, for example, the pattern knowledge PAT may be distributed over the network from which they are loaded with the equipment 10 when needed, for example. Owing to this it is easy to maintain and update the functionalities and the resources of equipment 10 are also saved.

20

It should be understood that the above specification and the figures relating to it are only intended to illustrate the present invention. Thus, the invention is not limited only to the embodiments presented above or to those defined in the claims, but many such various variations and modifications of the invention will be obvious to the professional in the art, which are possible within the scope of the inventive idea defined in the appended claims.

30

CLAIMS

1. Method for processing information (INFO), which information (INFO) includes content (CONT1 - CONT3) and in which method

- 5 - digital imaging is subjected to information (INFO),
- at least part of the imaged information (INFO) is embedded into at least one target (50),

10 characterized in that

- at least part of the content (CONT1 - CONT3) belonging to the digitally imaged information (INFO) is recognised, based on which
- at least one target (50) is defined for the
- 15 recognised content (CONT1 - CONT3).

2. Method according to claim 1, characterized in that the said target is at least one application software (50 - 53), of which at least some belong to the same application suite (60).

20

3. Method according to claim 1 or 2, wherein at least some application softwares (50 - 53) include formulation elements (70 - 73), such as, for example, templates, wherein information (INFO) can be embedded, characterized in that the said target

25 is at least one formulation element (70 - 73).

25

4. Method according to any of claims 1 - 3, characterized in that a target (50 - 53, 70 - 73) is suggested based on the content (CONT1 - CONT3) recognised from the information (INFO)

30 (step 303).

30

5. Method according to any of claims 1 - 3, characterized in that a target (50 - 53, 70 - 73) is established based on the content (CONT1 - CONT3) recognised from the information (INFO)

35 (step 303).

35

6. Method according to any of claims 1 - 5, characterized in that the content (CONT1 - CONT3) is subjected to selection actions before imaging the information (INFO) (step 203).

5

7. Method according to any of claims 1 - 6, characterized in that the selection of content (CONT1 - CONT3) is carried out from the imaged information (INFO) (step 205).

10 8. Method according to any of claims 1 - 7, characterized in that pattern recognition knowledge (PAT, META) is applied in the recognition of content (CONT1 - CONT3) from the information (INFO) and/or in the definition of a target (50 - 53, 70 - 73) for the content (CONT1 - CONT3) or/and mapping the content (CONT1 - CONT3) to the target (50 - 53, 70 - 73).

15

9. Electronic equipment (10), including

- first means (CAM) for imaging information (INFO) including content (CONT1 - CONT3),
- 20 - memory (MEM), wherein one or more targets (50 - 53, 70 - 73) are arranged for the information (INFO), and
- second means (CPU) for embedding at least part of the imaged information (INFO) into at least one target (50, 70) for the desired use,

25 characterized in that at least part of the content (CONT1 - CONT3) belonging to the digitally imaged information (INFO) is adapted for recognition by the second means (CPU), based on which content (CONT1 - CONT3) at least one target (50, 70) is adapted to be defined for the recognised content (CONT1 -

30

CONT3).

10. Equipment (10) according to claim 9, characterized in that the said target is at least one application software (50 - 53), which is adapted to process content (CONT1 - CONT3) of an

35

established form.

11. Equipment (10) according to claim 9 or 10, characterized in that at least some application softwares (50 - 53) preferably belong to the same application suite (60).

5

12. Equipment (10) according to any of claims 9 - 11, wherein at least some application softwares (50 - 53) include formulation elements (70 - 73), such as, for example, templates, wherein information (INFO) can be embedded, characterized in
10 that the said target is at least one formulation element (70 - 73).

13. Equipment (10) according to any of claims 9 - 12, characterized in that the target (50 - 53, 70 - 73) is adapted to be
15 suggested based on the content (CONT1 - CONT3) recognised from the information (INFO).

14. Equipment (10) according to any of claims 9 - 12, characterized in that the target (50 - 53, 70 - 73) is adapted to be
20 established based on the content (CONT1 - CONT3) recognised from the information (INFO).

15. Equipment (10) according to any of claims 9 - 14, characterized in that the content (CONT1 - CONT3) is adapted to be
25 selected before imaging of the information (INFO).

16. Equipment (10) according to any of claims 9 - 15, which includes display means (DISP), characterized in that content (CONT1 - CONT3) is adapted to be selected from the imaged information (INFO) visualised by the display means (DISP).
30

17. Equipment (10) according to any of claims 9 - 16, characterized in that the equipment (10) is provided with pattern recognition knowledge (PAT, META) for recognition of the content (CONT1 - CONT3) from the information (INFO) and/or for
35

definition of the target (50 - 53, 70 - 73) for the content (CONT1 - CONT3) and/or mapping the (CONT1 - CONT3) to the target (50 - 53, 70 - 73).

5 18. Equipment (10) according to any of claims 9 - 17, characterized in that the equipment (10) is provided with adapter (APPAD) for managing the target (50 - 53, 70 - 73) according to the content (CONT1 - CONT3).

10 19. Software product (30) for processing information (INFO), which information (INFO) includes content (CONT1 - CONT3), while the software product (30) includes a storage medium (MEM) and a program code (31), which can be executed by the processor means (CPU) and which is written in the storage
15 means (MEM), which is adapted to receive as input digitally imaged information (INFO) and to process it for at least one target (50 - 53, 70 - 73) and to embed at least part of the information (INFO) into at least one target (50, 70), characterized in that the program code (31) includes

20 - a first code means (31.1) configured to recognise at least part of the content (CONT1 - CONT3) belonging to the digitally imaged information (INFO), and, in addition
- a second code means (31.2) configured to define at
25 least one target (50, 70) for the recognised content (CONT1 - CONT3).

20. Software product (30) according to claim 19, characterized in that the said target is an application software (50 - 53).

30

21. Software product (30) according to claim 19 or 20, wherein at least some application softwares (50 - 53) include formulation elements (70 - 73), such as, for example, templates, wherein information (INFO) can be embedded, characterized in

that the said target is at least one formulation element (70 - 73)

22. Software product (30) according to any of claims 19 - 21,
5 characterized in that the program code (31) is adapted to be executed mainly at the same time in connection with the digital imaging.

23. Software product (30) according to any of claims 19 - 22,
10 characterized in that the program code (31) also includes a third code means (31.3) configured to suggest a target (50 - 53, 70 - 73) based on the content (CON1 - CONT3) recognised from the information (INFO).

15 24. Software product (30) according to any of claims 19 - 23, characterized in that the program code (31) also includes a fourth code means (31.4) configured to establish a target (50 - 53, 70 - 73) based on the content (CONT1 - CONT3) recognised from the information (INFO).

20 25. Software product (30) according to any of claims 19 - 24, characterized in that the program code (31) also includes a fifth code means (31.5) configured to define content (CONT3) to be selected from the imaged information (INFO).

25 26. Software product (30) according to any of claims 19 - 25, characterized in that the program code (31) also includes a sixth code means (31.6) configured to define content (CONT3) to be selected before imaging of the information (INFO).

30 27. Software product (30) according to any of claims 19 - 26, characterized in that the program code (31) also includes a seventh code means (31.7) configured to embed the content (CONT1, CONT2, 80, 81.1) to the target (52) and take care out,

for example, the conversion of the content (CONT1, CONT2, 80, 81.1) suitable for the target (52).

28. Software product (30) according to any of claims 19 - 28,
5 characterized in that at least a part of the program code's
(31) code means (31.1 - 31.6) is integrated in connection with
the application software (50 - 53).

29. Software product (30) according to any of claims 19 - 28,
10 characterized in that pattern recognition knowledge (PAT,
META) is arranged in connection with the program code (31) for
recognising content (CONT1 - CONT3) from the information
(INFO) and/or for defining a target (50 - 53, 70 - 73) for the
content (CONT1 - CONT3) and/or mapping the (CONT1 - CONT3) to
15 the target (50 - 53, 70 - 73).

30. Method for arranging a data transmission interface between
electronic devices in which data is transmitted between two
devices using a selected interface arranged between them,
20 characterised in that the method is performed in next phases
- the data is visualized as an information (INFO) in
a first device having the information (INFO),
- the information (INFO) is digitally imaged by a
second device and
25 - the imaged information (INFO) is converted to be
the data subjected to be transmitted and
in which method the said data transmission interface is a cam-
era interface.

30 31. A camera element (CAM), which can be adapted for use in
connection with the method according to any of claims 1 - 8.

32. A camera element (CAM), which can be adapted for use in
electronic equipment (10) according to any of claims 9 - 18.

33. Use of the method according to any of claims 1 - 8 for forming electronic information.

34. Use of the electronic equipment (10) according to any of
5 claims 9 - 18 for forming electronic information.