Marek Fertsch

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Marek Fertsch

Agenda:
- CV
- didactics
- research

- technical and scientific organizations
- experiences with digital enterprise
  technology

Marek Fertsch

CV
  - born 29 July 1954,
  - graduated from Poznan University of Technology in 1978 specializing in "Industry Organization" field,
  - received PhD degree in 1987 in "construction and exploitation of machines" field,
  - received post-doctoral degree in "construction and exploitation of machines" field in 1995,
  - since 1998 professor of Poznan University of Technology
  - after constitution of Faculty of Management Engineering in 2010 took position of Manager of Production Engineering and Logistics Chair at the Faculty.

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didactics

- significantly contributed to launching "logistics" first level (engineer level) and second level "logistics" studies at the Faculty of Management Engineering
- scientific supervisor of students scientific circle "Logistics" from the moment of its constitution (about 10 years ago) till now. The circle has won numerous scientific competitions in logistics field.
- scientific supervisor of "Poznan Days of Logistics" event organized by students scientific circle "Logistics"
- lectures in academic year 2011/2012:
    - contemporary production systems,
    - computer – aided production plannig and control,
    - design of supply chains,
- author and co-author of seven academic manuals published in 2011/12 by Poznan University of Technology Publishing House

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research

- research and working field during professional career at Poznan University of Technology includes problems of production management and logistics, especially production logistics issues,
- author and co-author of papers published in:

  International Journal of Production Economics,

  International Journal of Production Research,

  Journal of Materials Processing Technology,
- author or editor (in case of monographs) of over 20 books and monographs published in Poland, both in Polish and English
- co-editor of a monograph entitled "Information Technologies in Environmental Engineering. New trends and Challenges„ published in English by Springer Verlag in 2011

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technical and scientific organizations
- in August 2011 nominated to International Foundation for Production Research Council. The Council integrates academics from all over the world and manages work of Foundation, which is focused on integration and coordination of work research on production management,
- editor in chief of a journal "Logforum" – e-journal in English,
- editor in chief of a journal "Research in Logistics and Production" – e-journal in English,
- promoted 25 PhD students in "construction and exploitation of machines" and "management" fields,
- participation in over 30 program boards of domestic and foreign conferences
- organizer and program board chief of internationall
l conference „Efficiency and Productivity. Contemporary solutions   in logistics and production" organized every year,

WYDZIAŁ INŻYNIERII ZARZĄDZANIA

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experiences with digital enterprise technology

Digital factory - case study attempts
to implement innovation

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Problem description.

Analyzed problem appeared in a big-sized engineering company, that produced bulky machines and equipment. The company at some point in its history, found itself in serious problems:
- lost the primary supplier of large-scale items used for
  the manufacturing of their products;
- lost the primary consumers of their products.

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The plant still had unique resources (machines and equipment, staff) and high potential for innovation. The group composed of the representatives of science
and representatives of the company with financial support from the
former Ministry of Science and Computerization
declared the to seek for a solution to the problem through
implementation of innovation.

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According to H. J. Bullinger innovation is today the best way to build competitive advantage. They enable to obtain higher prices and faster growth of the market share.
Their introduction make possible to offer new products or services.
An innovation improves the quality of the products and accelerates product development processes.

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The most effective form of innovation is the development and application of new technologies,
particularly technologies that may be applicable in many areas (cross – sectional technologies),
such as information technology and nanotechnology.
This case study aims to present implementation of innovation
(modern information technology) in order to
increase the efficiency and flexibility of the production
system of engineering companies.

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The basic chosen solution was to implement developed by Fraunhofer Institut fur Arbeitwirtschaft und Organisation (Industrial Engineering) in Stuttgart concept called „digital production" In the concept of a digital production emphasis is placed on the flow of information and communication not only in the system, but also in exchange of information with the surroundings (outside the production system).

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The modification to the concept „digital production" was made according A. Kusiak.
He proposed the use in the information subsystem of production system the techniques called
„data mining". The innovation was focused on implementation of
a specialized information system, which was based one side on the
existing factory solutions and on the other side would enable the
execution of processes in the areas of the "Integrated Product
Development„ and "Production Operations" and would increase
the efficiency and flexibility of the production system.

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Overview of the existing information systems. The first step was to analyze the information subsystem of an existing production system. It gave the following results:
- existing information system was based generally on the concept MRP II,
- it showed gaps in the existing system – not all defined in the standard
  MRP II modules and procedures existed and were used in the
  existing system;
- present system consisted of many element (subsystems) which were
  established in different periods of times and developed in different
  technologies;
- there were linkages between individual subsystems-resulting
  from the flow of information, one subsystem used the information
  generated by the other, those links were only partially
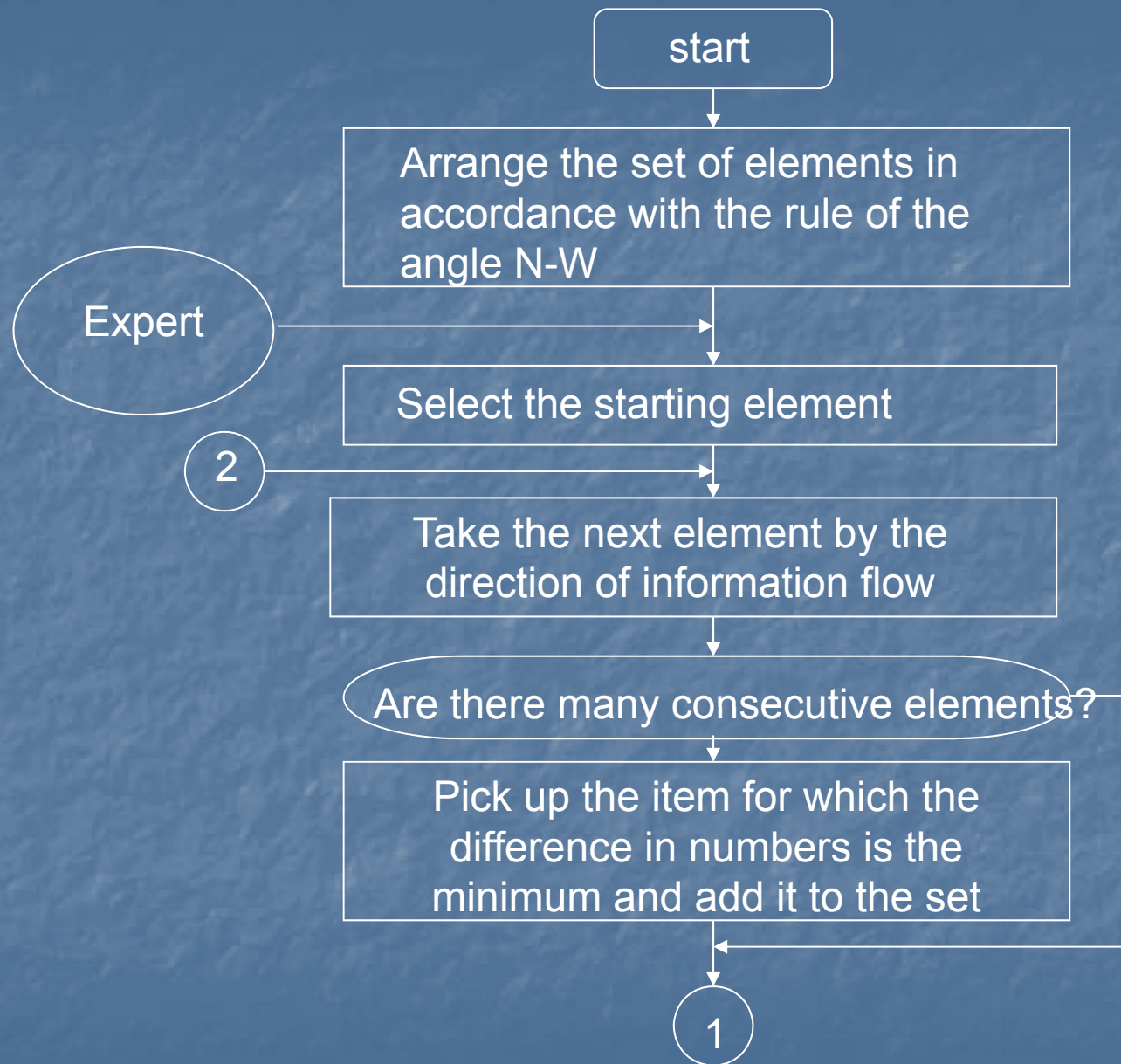covered with automatic information transfers between subsystems.

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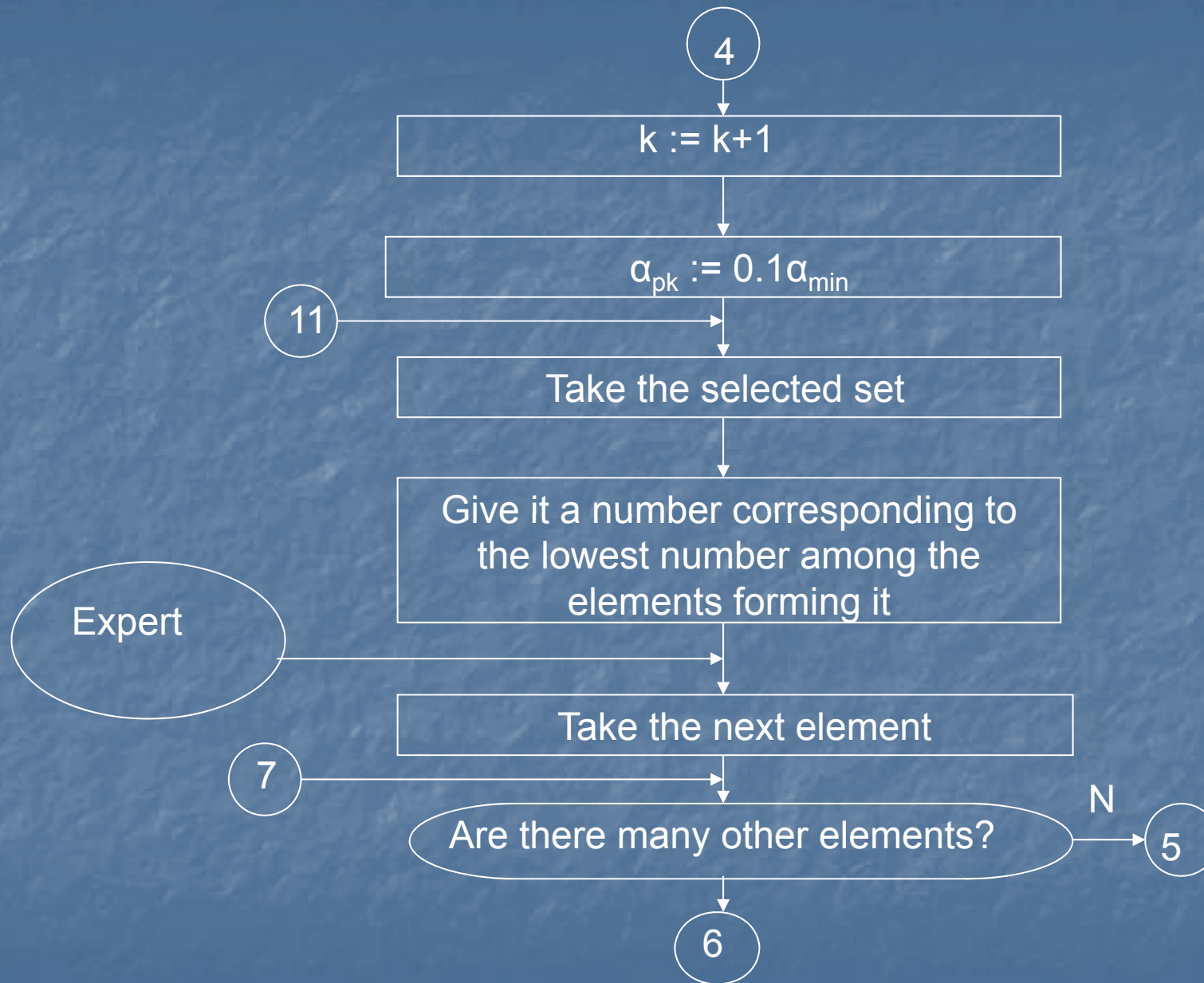Supplement of the information system structure by data warehouse.
Due to the gaps in the information systems, discontinuity and problems associated with
cooperation of subsystems created in different periods it was
agreed that a data warehouse was needed. The problem which
had to be solved was the determination of the content of this data
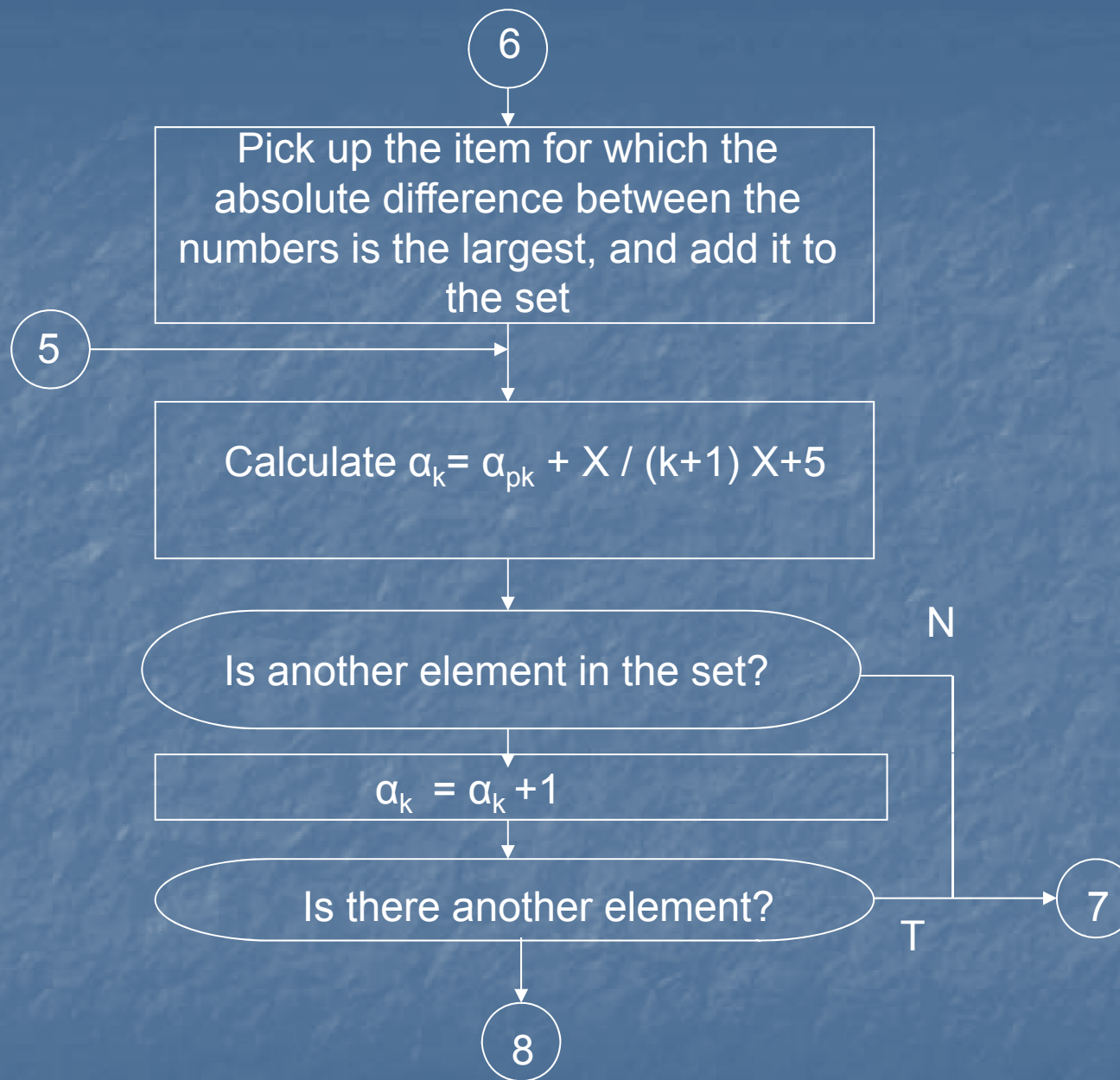warehouse. For its solutions a special procedure was developed

```
                              ┌──────────┐
                              │  start   │
                              └────┬─────┘
                                   │
                         ┌─────────▼──────────────────────┐
                         │ Arrange the set of elements in  │
                         │ accordance with the rule of the │
                         │ angle N-W                       │
   ┌─────────┐           └─────────┬──────────────────────┘
   │         │                     │
   │ Expert  ├─────────────────────▶
   │         │           ┌─────────▼──────────────────────┐
   └─────────┘           │ Select the starting element     │
                         └─────────┬──────────────────────┘
      ╭───╮                        │
      │ 2 ├────────────────────────▶
      ╰───╯            ┌───────────▼────────────────────┐
                       │ Take the next element by the    │
                       │ direction of information flow   │
                       └───────────┬────────────────────┘
                                   │
               ╭───────────────────▼──────────────────────╮
               │ Are there many consecutive elements?      │
               ╰───────────────────┬──────────────────────╯
                       ┌───────────▼────────────────────┐
                       │ Pick up the item for which the  │
                       │ difference in numbers is the    │
                       │ minimum and add it to the set   │
                       └───────────┬────────────────────┘
                                   │
                                 ╭─▼─╮
                                 │ 1 │
                                 ╰───╯
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8
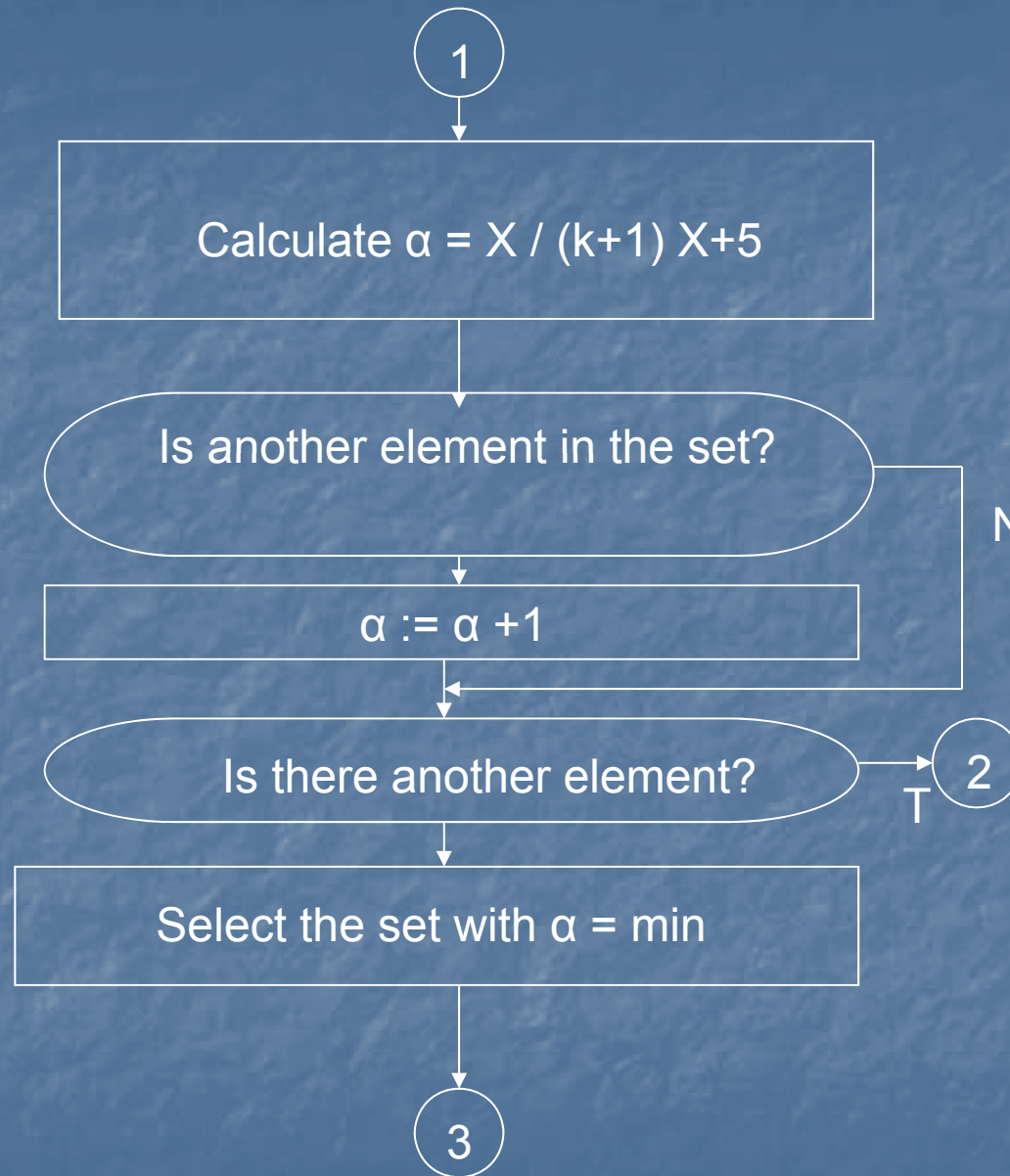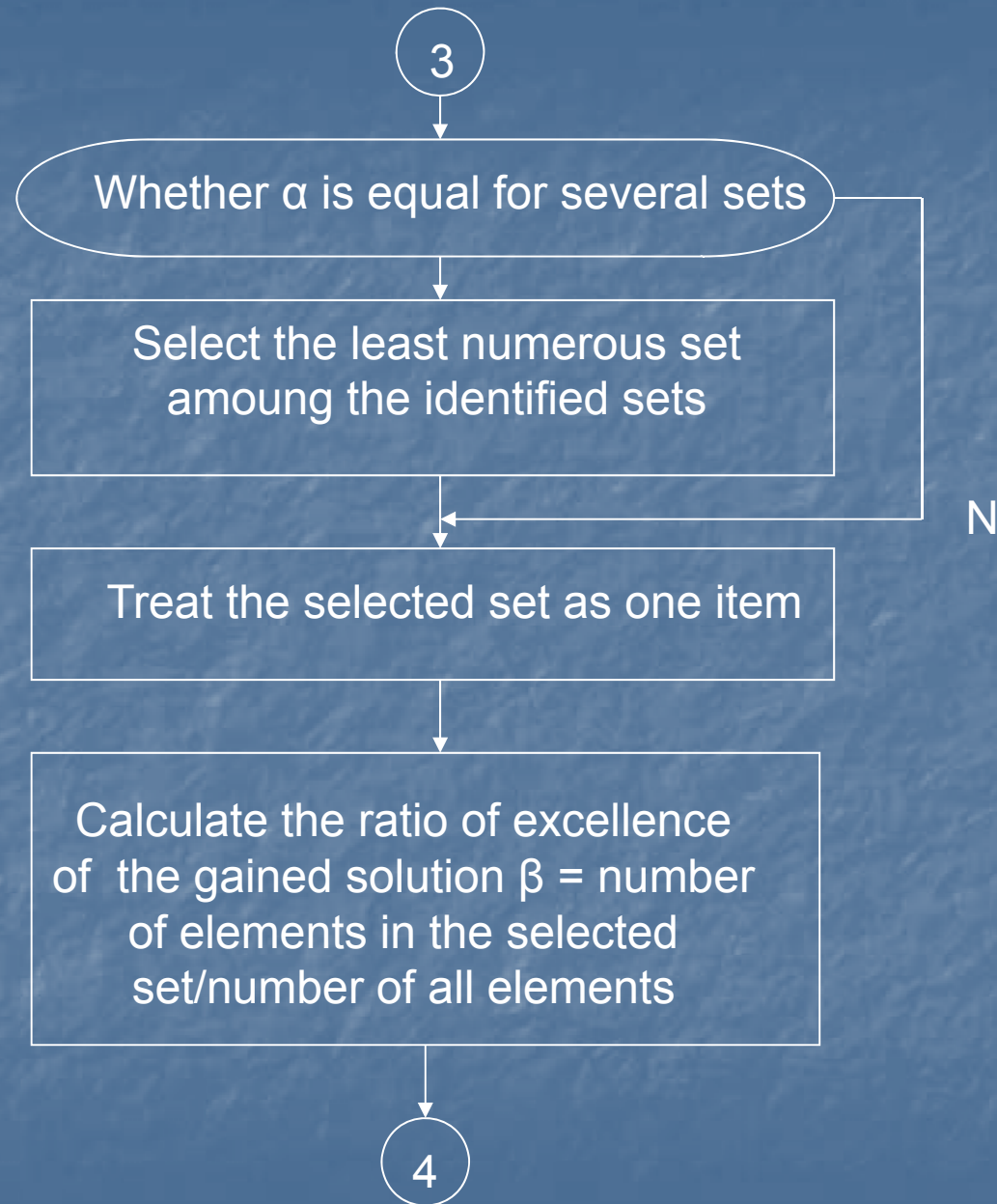
Select set with α_k = min
or the most numerous

Add the size of the set of extracted in
the previous step to the number of
elements in the selected set

Locate data warehouse between
k-1 and k step or change the
process here

Calculate the ratio of excellence for
the gained solution βk = number of
elements from the previous
step/number of elements in the
current step

9
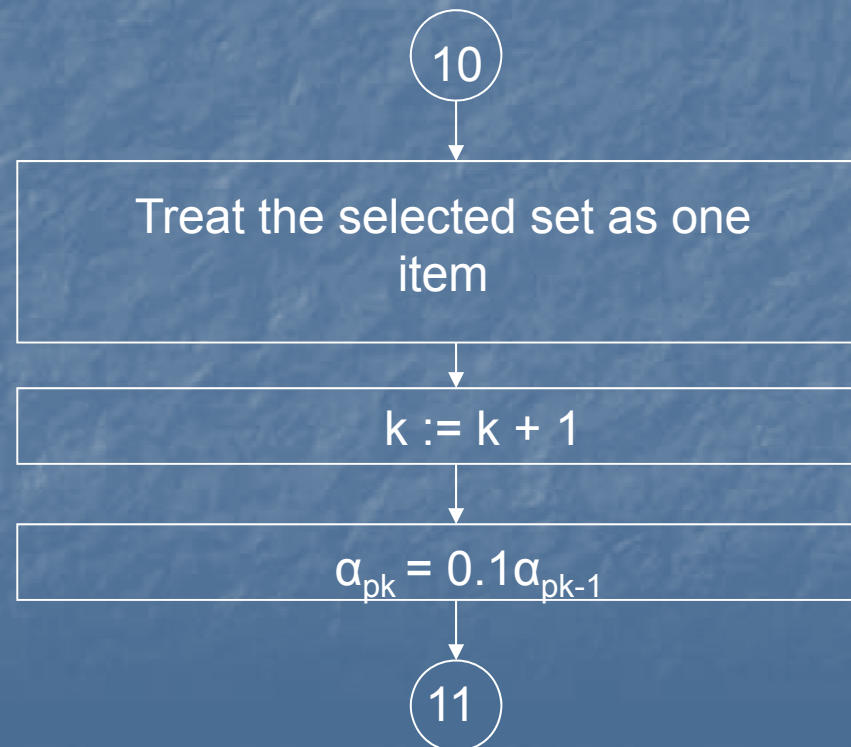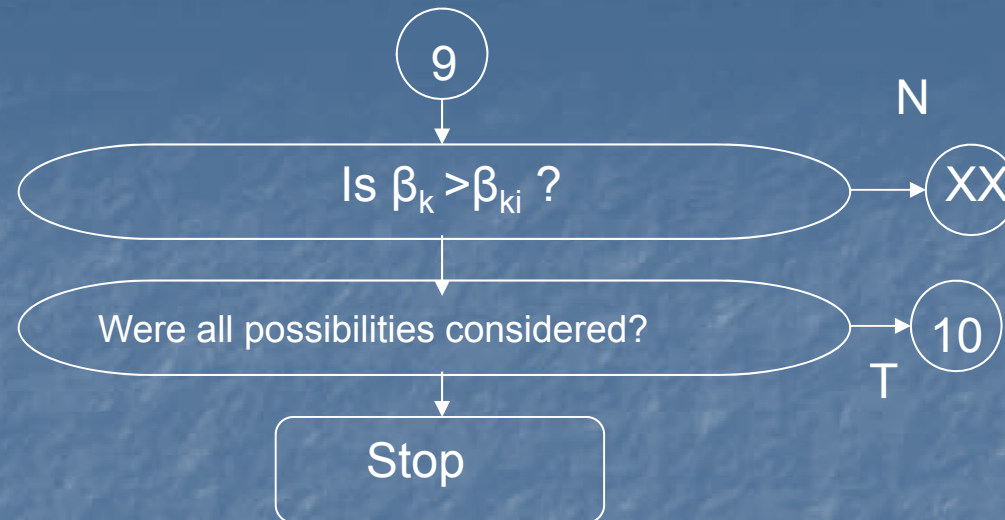
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 The current state of the project.
  An overview of the existing IT system has been carried out. The concept of a data warehouse was elaborated. This concept has been deployed. Due to the growing economic difficulties of the Company further implementation of the project has been suspended.
  There are ongoing study on the development of agent-based procedures in the areas of "Integrated Product Development" and "Production Operations".

Thank you for your attention..

.. any questions?