Claims

1. A method (100) for generating a process model modeling a manual mode procedure instance of a plant process, the procedure instance comprising a sequence of operational actions, including the steps of:

Providing a plurality of log events (S1) of a plurality of operational actions (110) of the plant process;

Selecting a plurality of sequences of manual mode operational actions (S2) from the plurality of log events;

Filtering the plurality of sequences of manual mode operational actions according to an individual plant section (S3);

Identifying a sequential order (S4) from the plurality of filtered sequences of the manual mode operational actions;

Determining statistical properties of values of related process variables and/or statistical properties of values of related set point changes (S5) to each sequential ordered manual mode operational action from the plurality of filtered sequences of the manual mode operational actions;

Generating the process model (S6) of the manual mode procedure instance by arranging the manual mode operational actions with the sequential order of each operational action assigned with the statistical properties of the values of related process variables and/or assigned with the statistical properties of the values of the related set point changes.

2. The method (100) according to claim 1, wherein the filtering of the plurality of sequences of manual mode operational actions is performed according to an individual plant condition.

3. The method (100) according to claim 2, wherein the individual plant condition is determined by at least a threshold value of a process variable at the beginning of the manual mode procedure instance.

4. The method (100) according to claim 3, wherein the individual plant condition is determined by threshold values of a subset of the process variables at the beginning of the manual mode procedure instance.

5. The method (100) according to claim 2 to 4, wherein the individual plant condition is determined by at least one time series of values of process variables of the plant section within a time period before the start of the manual mode procedure instance.

6. The method (100) according to claim 2 to 5, wherein the individual plant condition is determined by a clustered number of time series of values of process variables of the plant section within a time period before the start of the manual mode procedure instance, wherein the cluster is build by scoring similarities of time series of values of related process variables.

7. The method (100) according to one of the preceding claims, wherein annotations related to a manual mode operational action is assigned to the respective manual mode operational action.

8. The method (100) according to one of the preceding claims, wherein a manual mode operational action with an assigned statistical property of the values of the related process variables is above a limit value is omitted from the process model.

9. The method (100) according to one of the preceding claims, wherein a specific manual mode operational action of the plurality of related sequences of manual mode operational actions, which rarely occurs within the plurality of related sequences of manual mode operational actions, is omitted from the process model.

10. A method according to one of the preceding claims to generate a recommended set point for a manual mode operational action of a manual mode procedure instance, wherein the recommended set point is determined using a machine learning model by means of the plurality of related set points related to an individual plant condition, to be assigned to the related manual mode operational action in respect to the individual plant condition.

11. A method for generation of a warning signal related to a plant process, including the steps of:
Providing continuously log events of the plant process;

Determining an individual plant condition by means of log events of the plant process according to claims 3 to 7;

Generating the warning signal based on the individual plant condition fitting the process model according to the preceding claims.

12. A support system comprising a controller, which is configured to support an operator performing the manual mode operational actions according a process model generated according to claim 1 to 11, by displaying process values and/or recommending set point changes to the operator according to the manual mode operational action sequences as resulting from the process model.

13. Use of the process model generated according to claim 1 to 10 to support an operator performing the manual mode operational actions of a manual mode procedure instance.

14. A computer program comprising instructions, which, when the program is executed by a computer, cause the computer to carry out the method according to claims 1 to 11.

15 A computer readable storage medium on which the computer program according to claim 14 is stored.