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ProM
process mining workbench

Process Mining

Making BPM Intelligent!

Prof.dr.ir. Wil van der Aalst

Eindhoven University of Technology,

P.O. Box 513, 5600 MB Eindhoven, The Netherlands

w.m.p.v.d.aalst@tue.nl

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ProM
process mining workbench

The power of expressiveness

YAWL

Pallas Athena
PROCESS MANAGEMENT

ProM

Futura
TECHNOLOGY

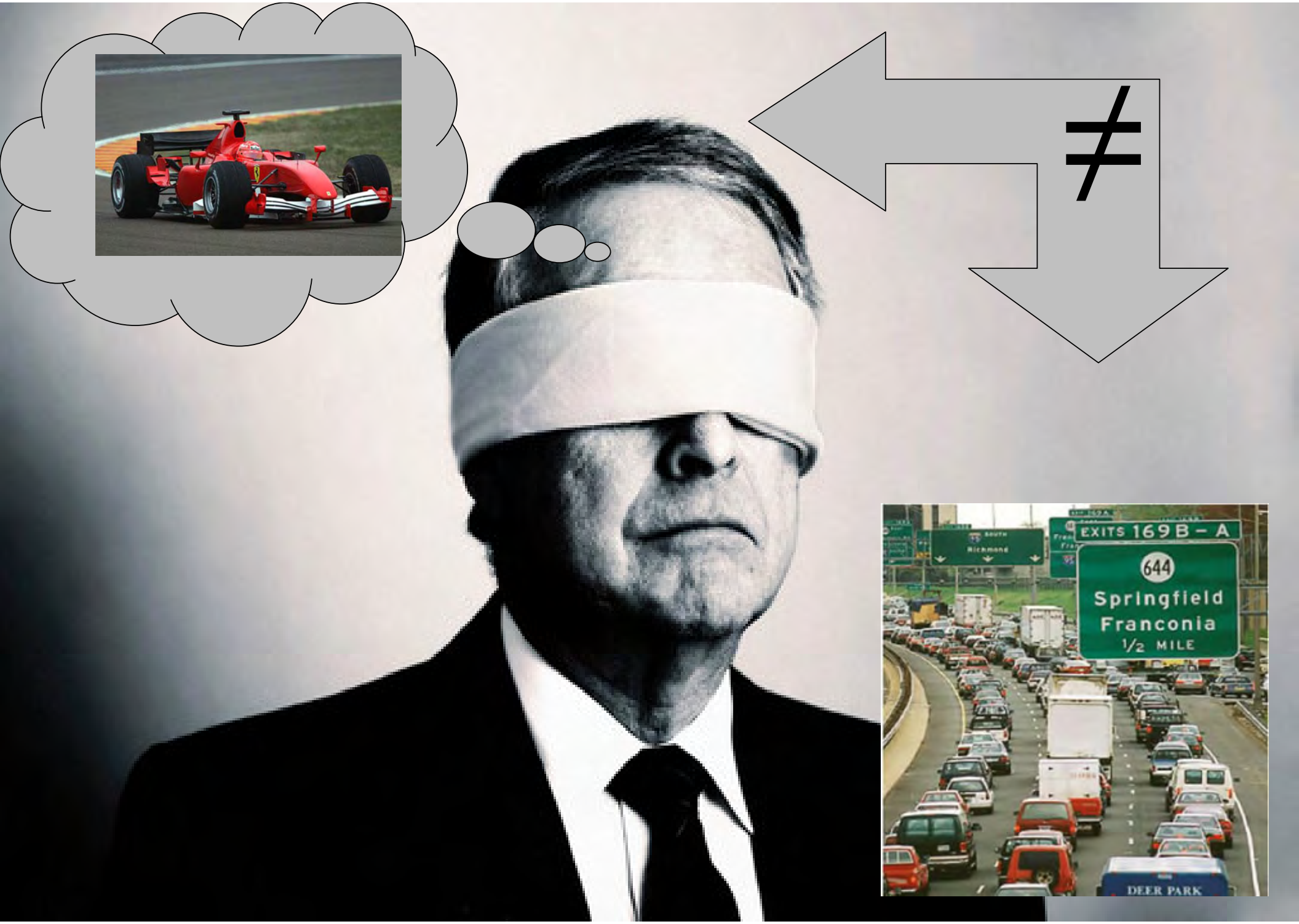
IDS SCHEER
Business Process Excellence

WebSphere. software

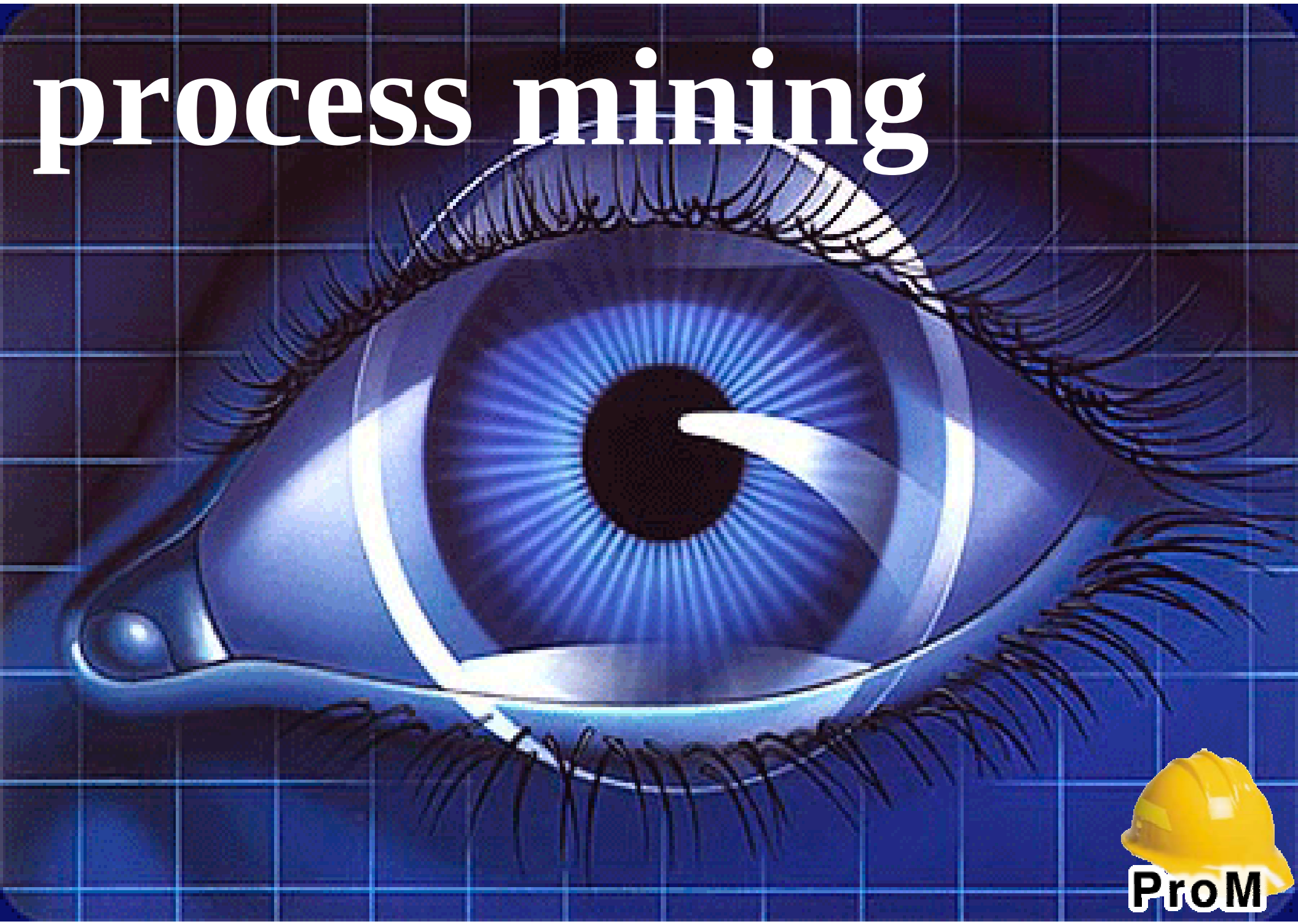
the organization, ...

... and its operational processes

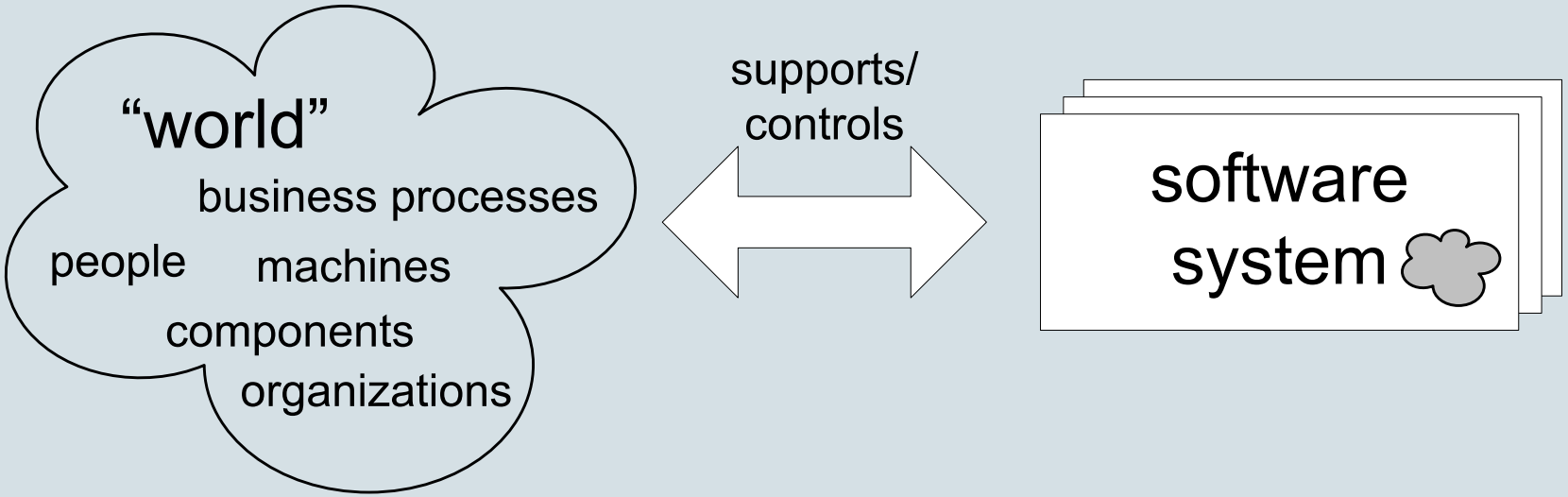

but ...


≠
EXITS 169 B – A
644
Springfield
Franconia
1/2 MILE
DEER PARK

process mining



Software systems are the mirror image of the “world”



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Role of models

"world"

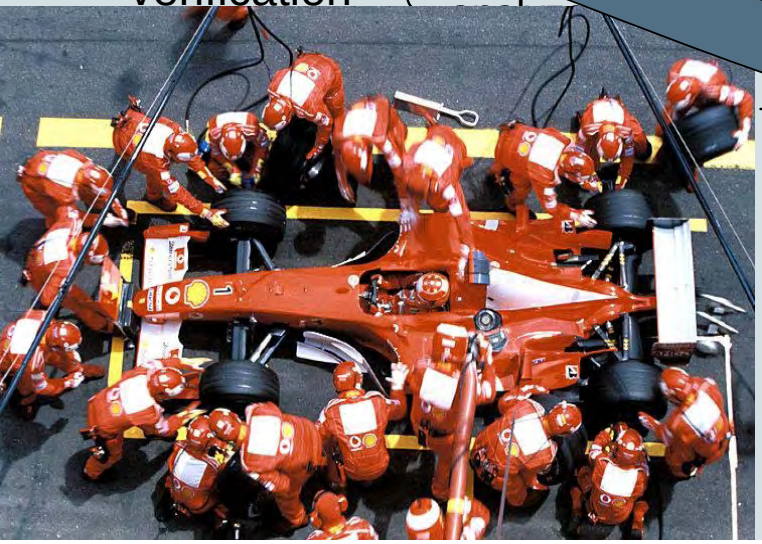
business process

people machines

components

organizations

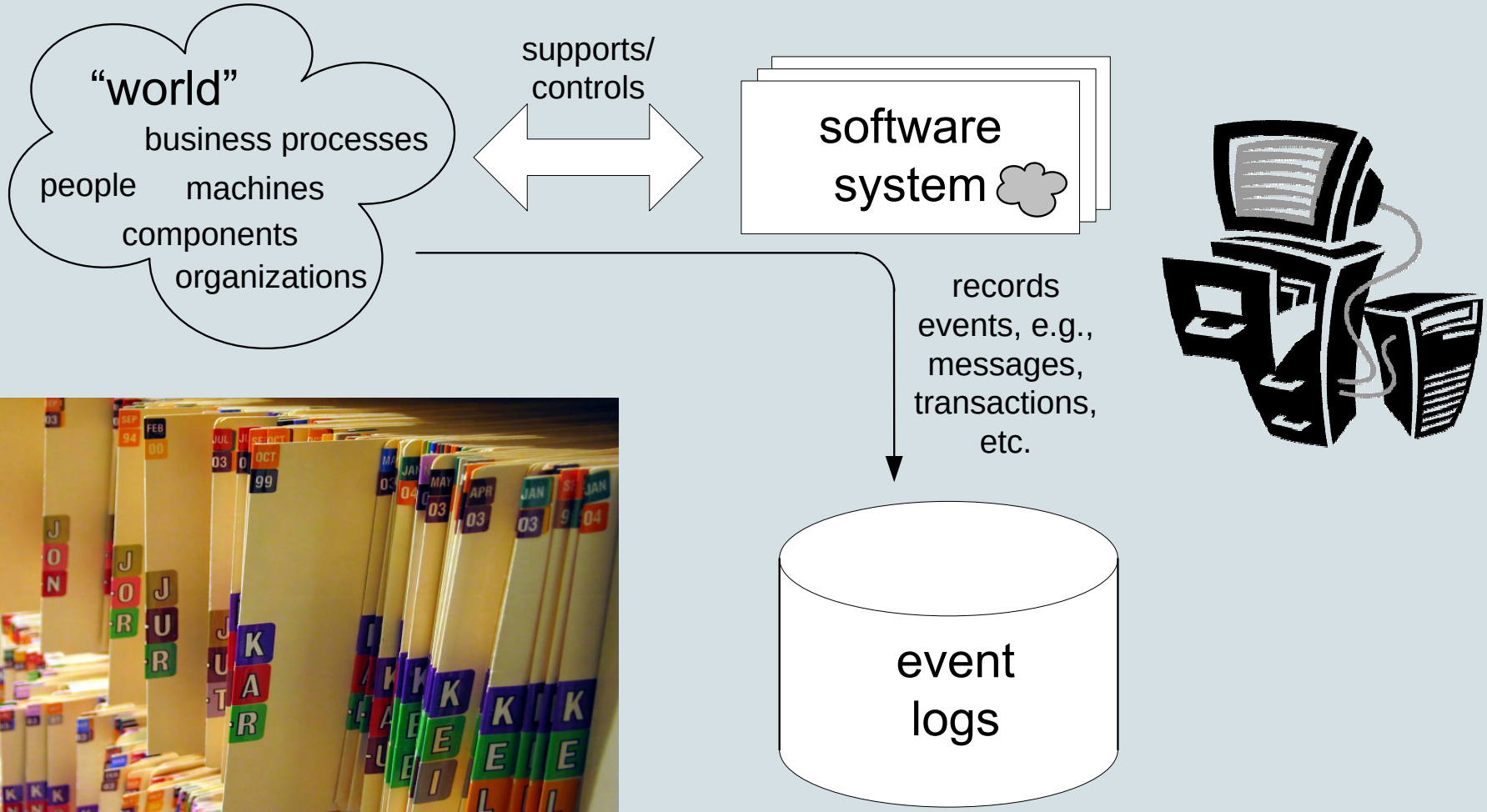
verification



real world

powerpoint reality

Event logs are a reflection of reality



Examples:

staffware. THE POWER OF PROCESS

IBM

Pallas Athena PROCESS MANAGEMENT

FileNet An IBM Company

océ

SAP

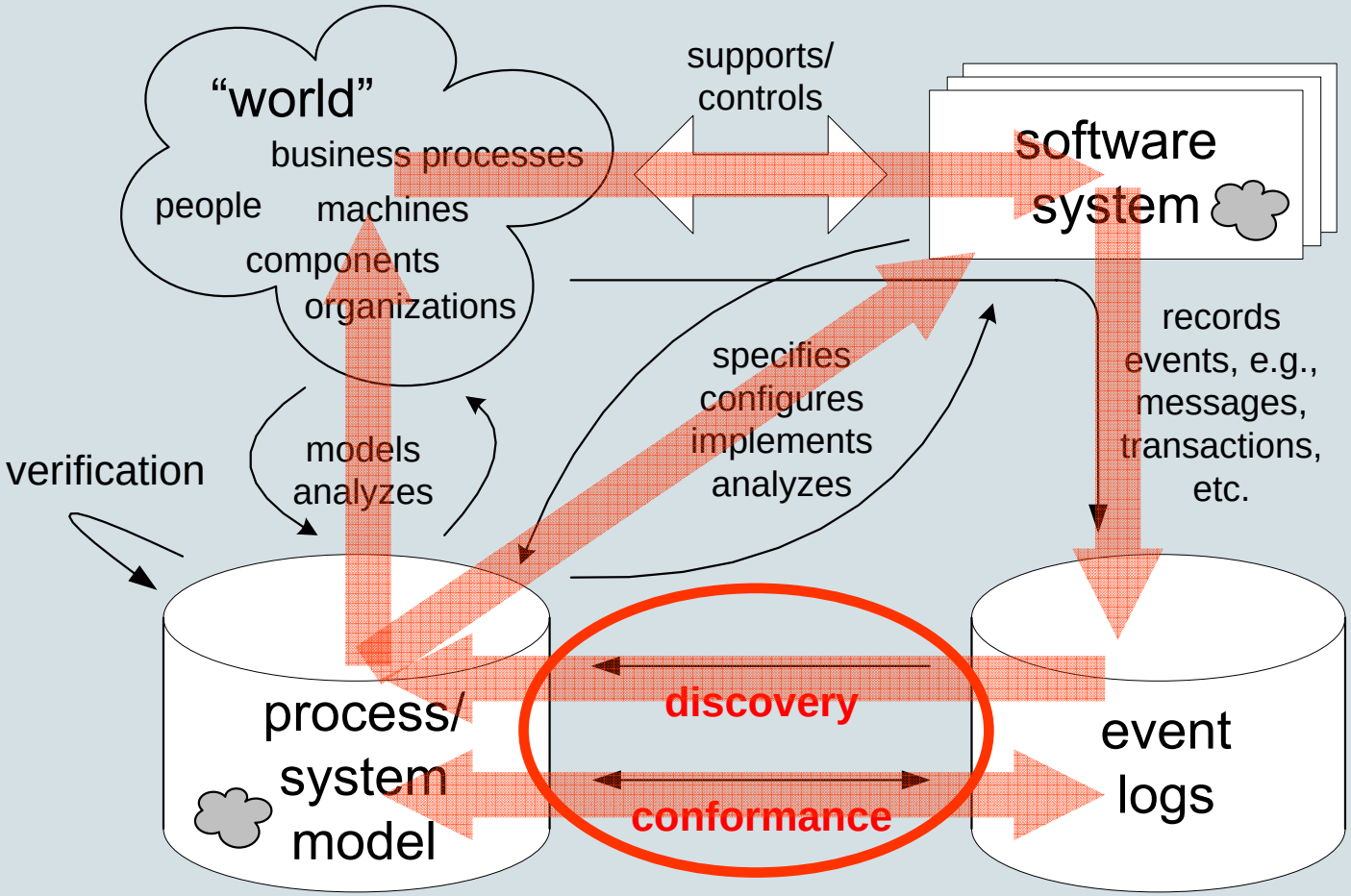
PHILIPS sense and simplicity

ORACLE

ASML

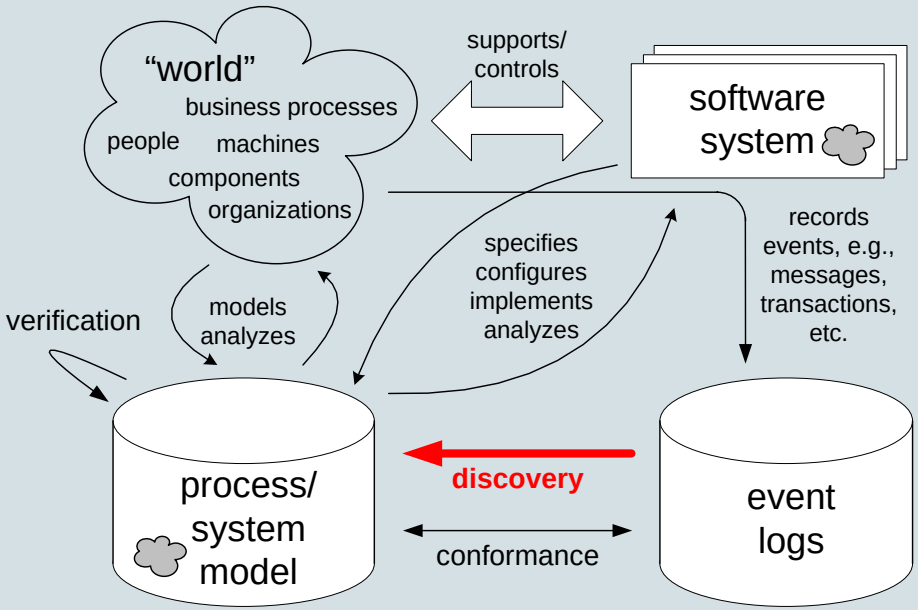
WebSphere. software

Process mining: Linking events to models

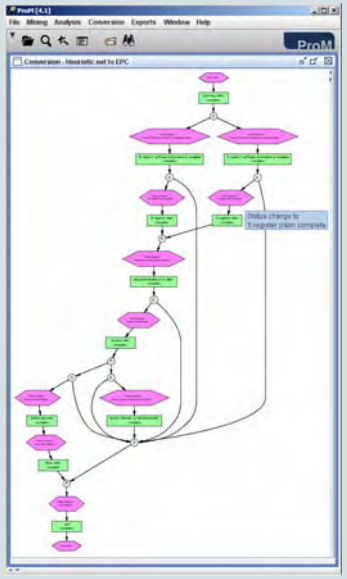


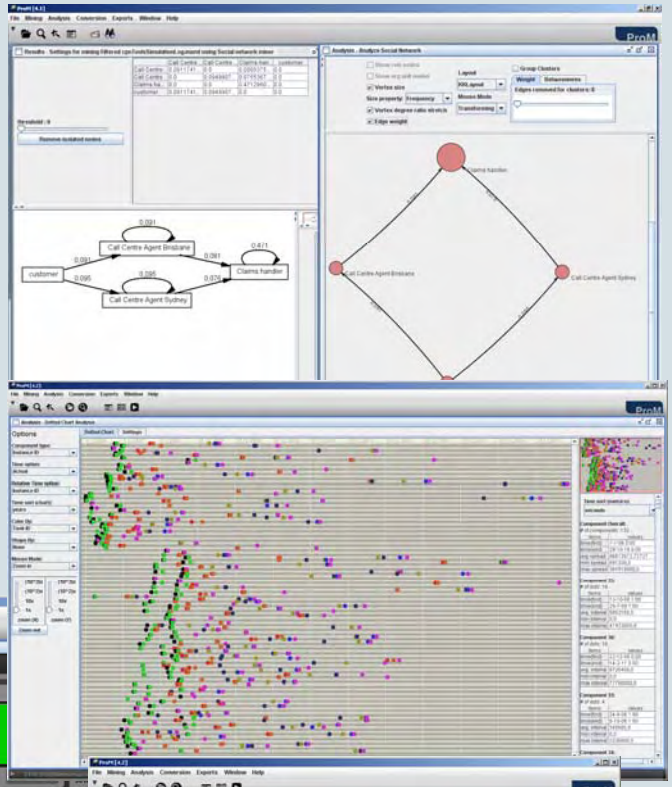
ProM
process mining workbench

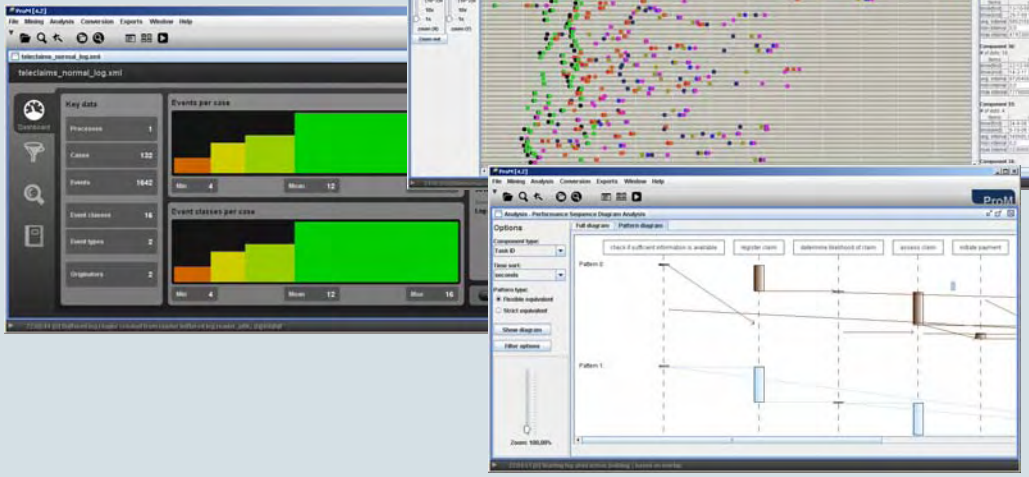
Discovery



MXML Log
- instances: **3512**
- audit trail entries: **46138**

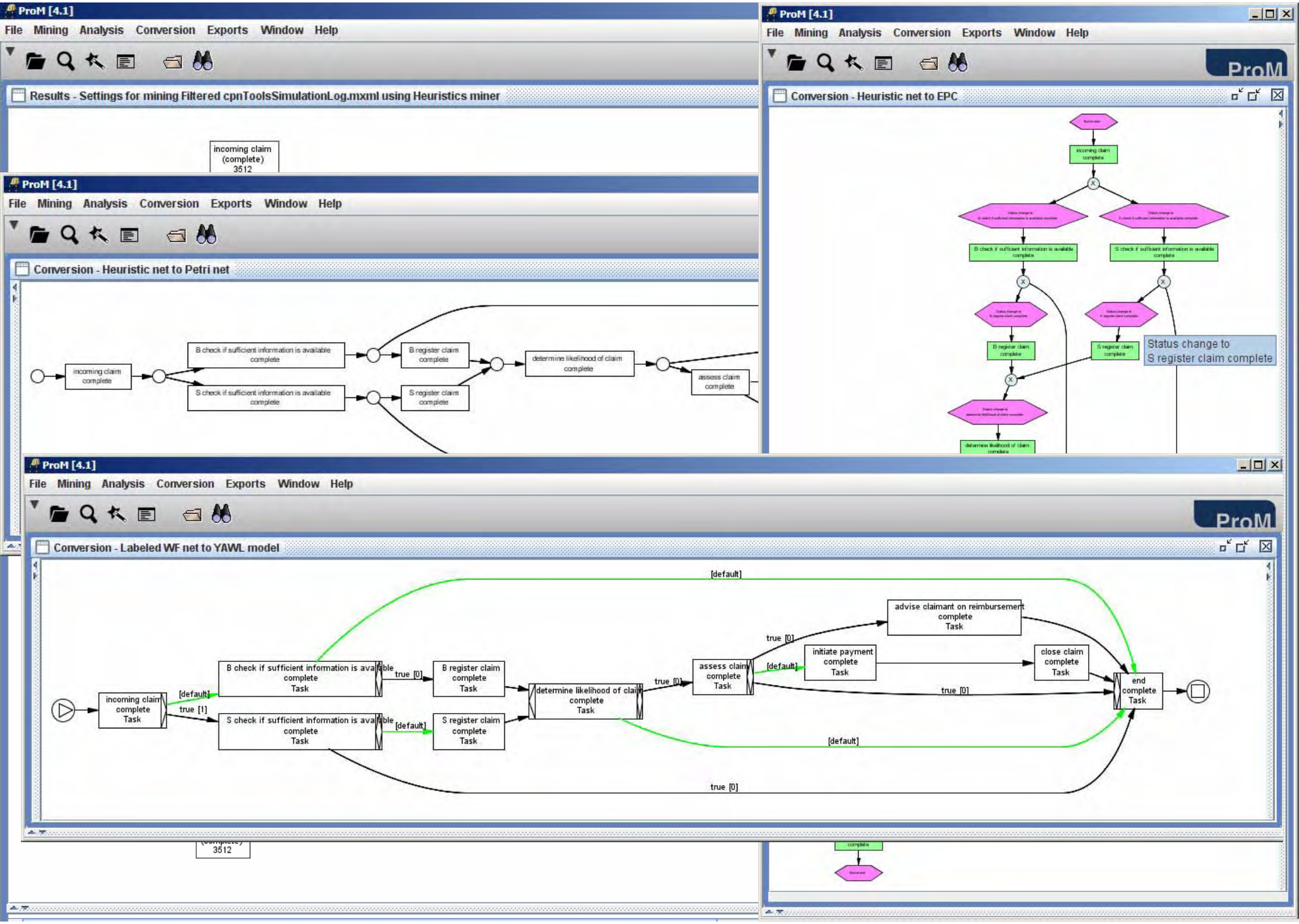






ProM supports +40 types of model discovery!


ProM [4.2]
File Mining Analysis Conversion Exports Window Help
Analysis - Dotted Chart Analysis
Options
Component type:
Instance ID
Time option:
Relative(Time)
Relative Time option:
Instance ID
Time sort (chart):
years
Color By:
Task ID
Shape By:
None
Mouse Mode:
Zoom in
(10^3)x
(10^2)x
10x
1x
zoom (X)
zoom (Y)
Zoom out
Dotted Chart
Settings
0days 0:0:0
365days 0:0:0
730days 0:0:0
1095days 0:0:0
1460days 0:0:0
1825days 0:0:0
2190days 0:0:0
2555days 0:0:0
2920days 0:0:0
3285days 0:0:0
3650days 0:0:0
4015days 0:0:0
4380d
50
49 | initiate payment | Claims handler | Tue Jun 25 01:00:00 CEST 2013 | complete | Position:2.033856E8
49 | close claim | Claims handler | Tue Jun 25 01:00:00 CEST 2013 | start | Position:2.033856E8
49 | close claim | Claims handler | Wed Jul 03 01:00:00 CEST 2013 | complete | Position:2.040768E8
49 | end | Claims handler | Wed Jul 03 01:00:00 CEST 2013 | start | Position:2.040768E8
49 | end | Claims handler | Wed Jul 03 01:00:00 CEST 2013 | complete | Position:2.040768E8
Time sort (metrics):
seconds
Component Overall:
# of components: 132
items values
time(first) 0days:0:0:0
time(end) 4462days:0:0:0
avg spread 96612872,72727
min spread 691200,0
max spread 385516800,0
Component 35:
# of dots: 16
items values
time(first) 0days:0:0:0
time(end) 1016days:0:0:0
avg. interval 5852160,0
min interval 0,0
max interval 47433600,0
Component 36:
# of dots: 16
items values
time(first) 0days:0:0:0
time(end) 1515days:0:0:0
avg. interval 8726400,0
min interval 0,0
max interval 77760000,0
Component 33:
# of dots: 4
items values
time(first) 0days:0:0:0
time(end) 12days:0:0:0
avg. interval 345600,0
min interval 0,0
max interval 1036800,0
Component 34:
# of dots: 16
items values
time(first) 0days:0:0:0
time(end) 2482days:0:0:0
avg. interval 14296320,0
min interval 0,0
max interval 146361600,0
Component 39:
# of dots: 16
items values
time(first) 0days:0:0:0
time(end) 537days:0:0:0
21:59:19 [D] Buffered log reader created from reader buffered log reader, pitk.: [I@b8dfdf


ProM [4.1]
File Mining Analysis Conversion Exports Window Help
Results - Settings for mining Filtered cpnToolsSimulationLog.mxml using Heuristics miner
incoming claim (complete) 3512
ProM [4.1]
File Mining Analysis Conversion Exports Window Help
Conversion - Heuristic net to Petri net
incoming claim complete
B check if sufficient information is available complete
S check if sufficient information is available complete
B register claim complete
S register claim complete
determine likelihood of claim complete
assess claim complete
ProM [4.1]
File Mining Analysis Conversion Exports Window Help
ProM
Conversion - Heuristic net to EPC
Status change to S register claim complete
ProM [4.1]
File Mining Analysis Conversion Exports Window Help
ProM
Conversion - Labeled WF net to YAWL model
incoming claim complete Task
B check if sufficient information is available complete Task
S check if sufficient information is available complete Task
B register claim complete Task
S register claim complete Task
determine likelihood of claim complete Task
assess claim complete Task
advise claimant on reimbursement complete Task
initiate payment complete Task
close claim complete Task
end complete Task
[default]
true [1]
true [0]
3512

ProM [4.1]

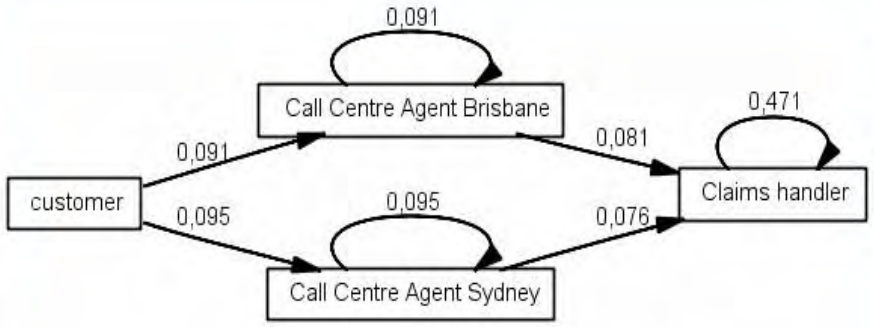
File Mining Analysis Conversion Exports Window Help

Results - Settings for mining Filtered cpnToolsSimulationLog.mxml using Social network miner

	Call Centre ...	Call Centre ...	Claims han...	customer
Call Centre...	0.0911741...	0.0	0.0808375...	0.0
Call Centre...	0.0	0.0949907...	0.0755367...	0.0
Claims ha...	0.0	0.0	0.4712960...	0.0
customer	0.0911741...	0.0949907...	0.0	0.0

threshold : 0

Remove isolated nodes



Zoom

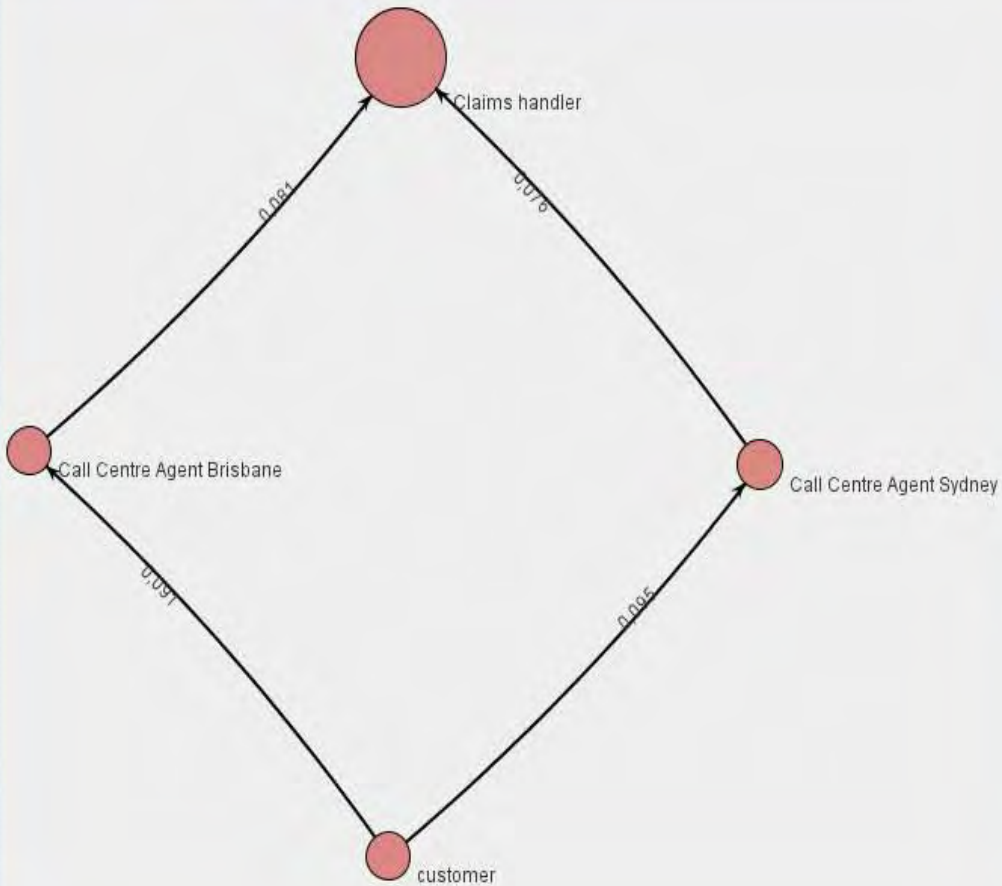
Analysis - Analyze Social Network

Show role nodes
Show org unit nodes
Vertex size
Size property: Frequency
Vertex degree ratio stretch
Edge weight

Layout: KKLayout

Mouse Mode: Transforming

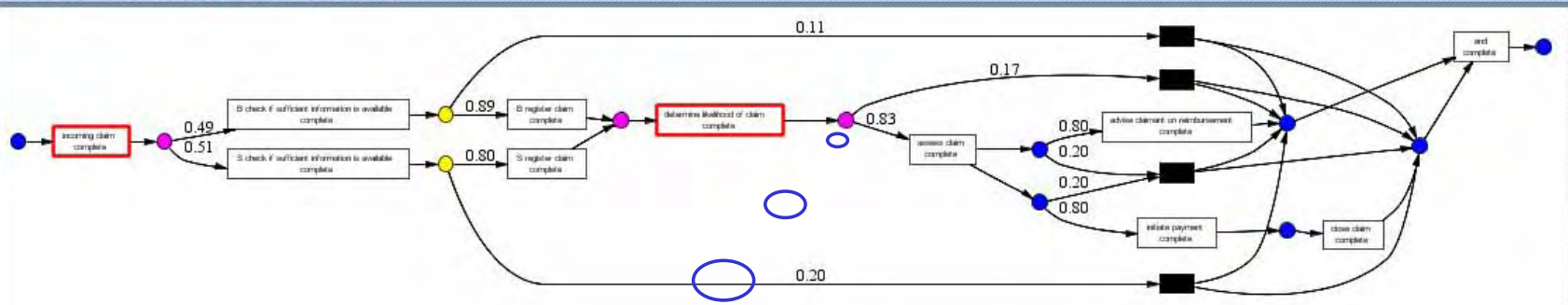
Group Clusters
Weight Betweenness
Edges removed for clusters: 0



ProM [4.1]

File Mining Analysis Conversion Exports Window Help

Analysis - Performance Analysis with Petri net



bottle-necks

throughput time

flow time from A to B

Process information:

Total number selected:

3512 cases

Number fitting:

3512 cases

Arrival rate:

0,12 cases per second

	Throughput time (seconds)
avg	11115,54
min	0,0
max	40704,0
stdev	8906,98
fast 25...	1379,19
slow 2...	23817,24
norma...	9632,87

Change Percentages | Export Time-Metrics

Performance information of the selected transitions:

Frequency: 2950 cases

	Time in between (seconds)
avg	12248,87
min	53,0
max	39706,0
stdev	8381,14

Waiting time:
High
Medium
Low
Settings

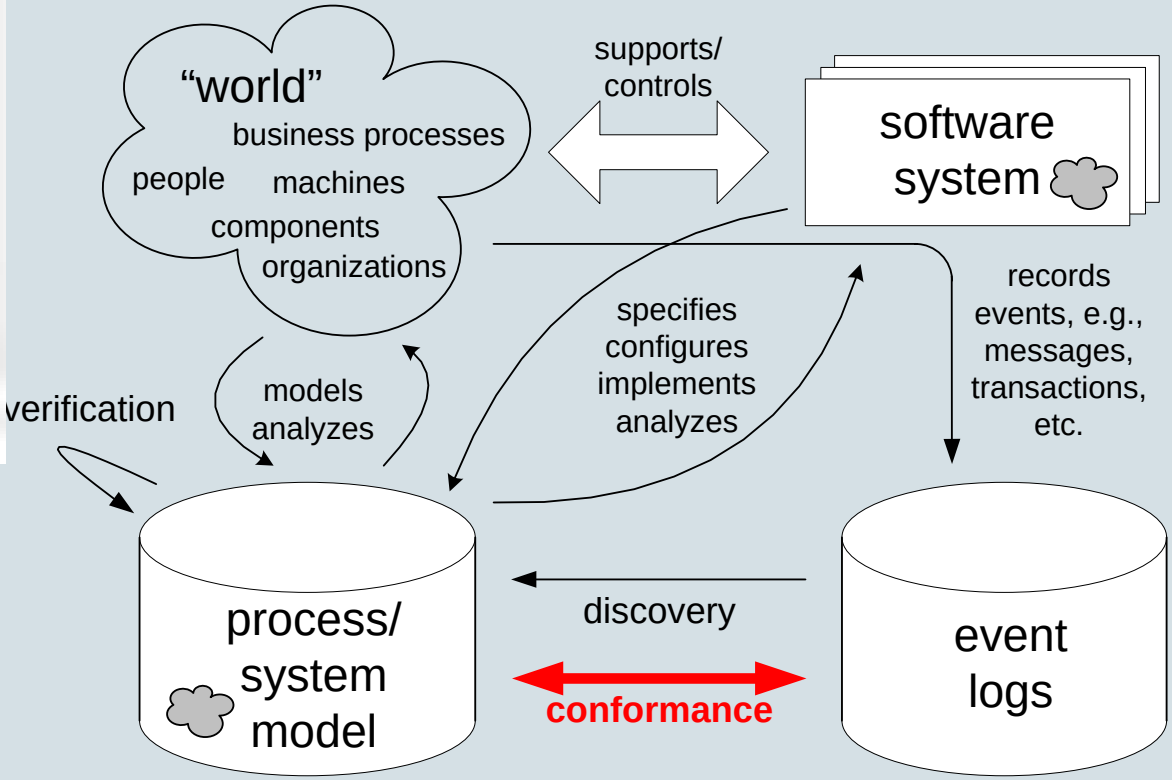
Selected:

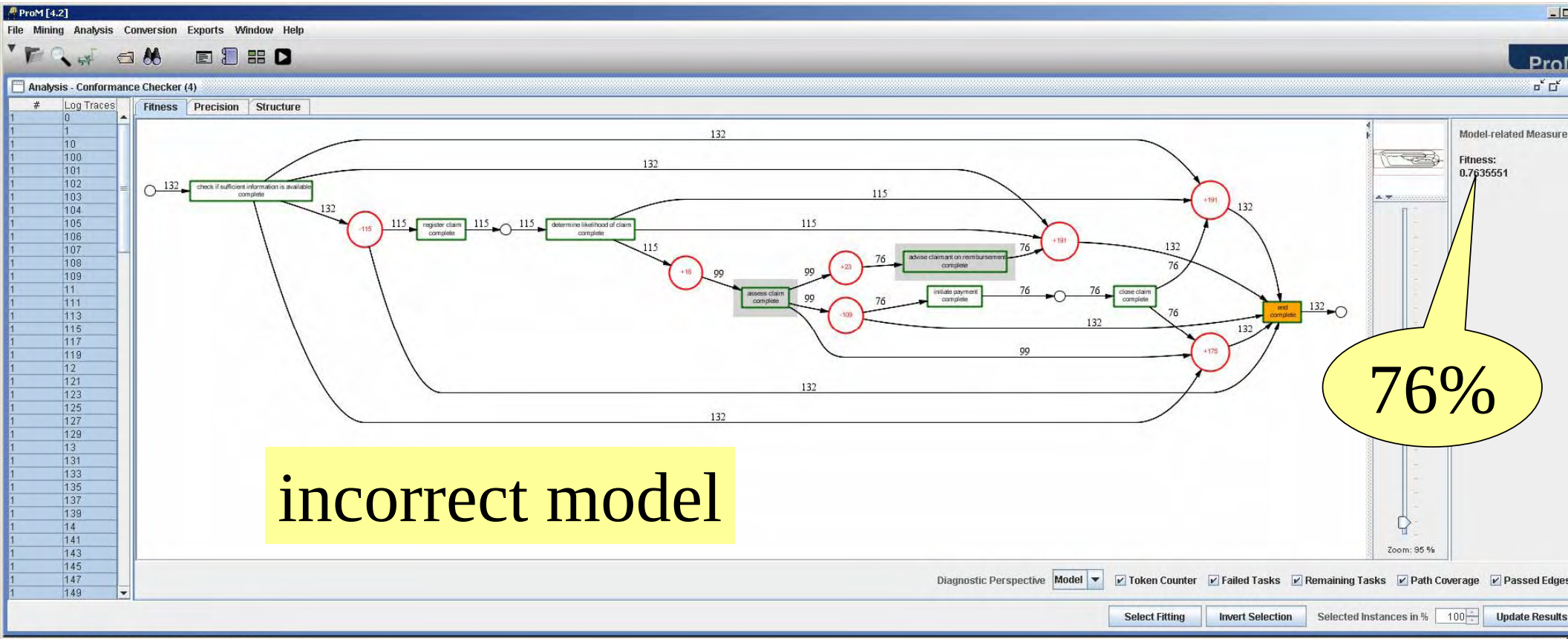
Transition - incoming claim c...

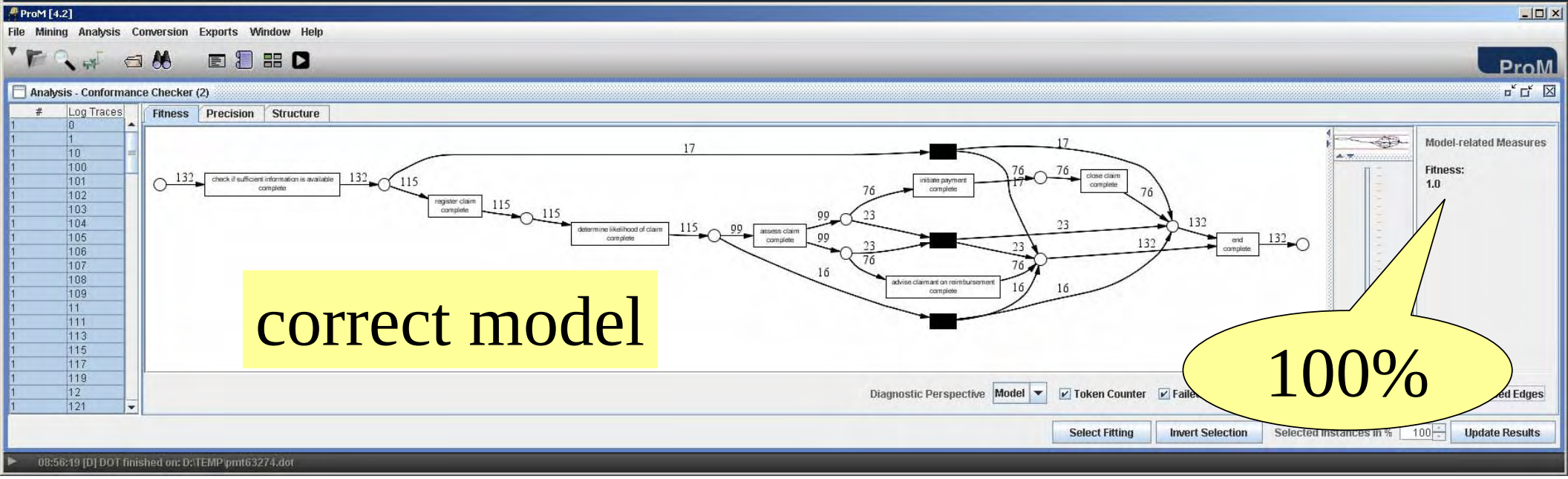
and:

Transition - determine likeliho...

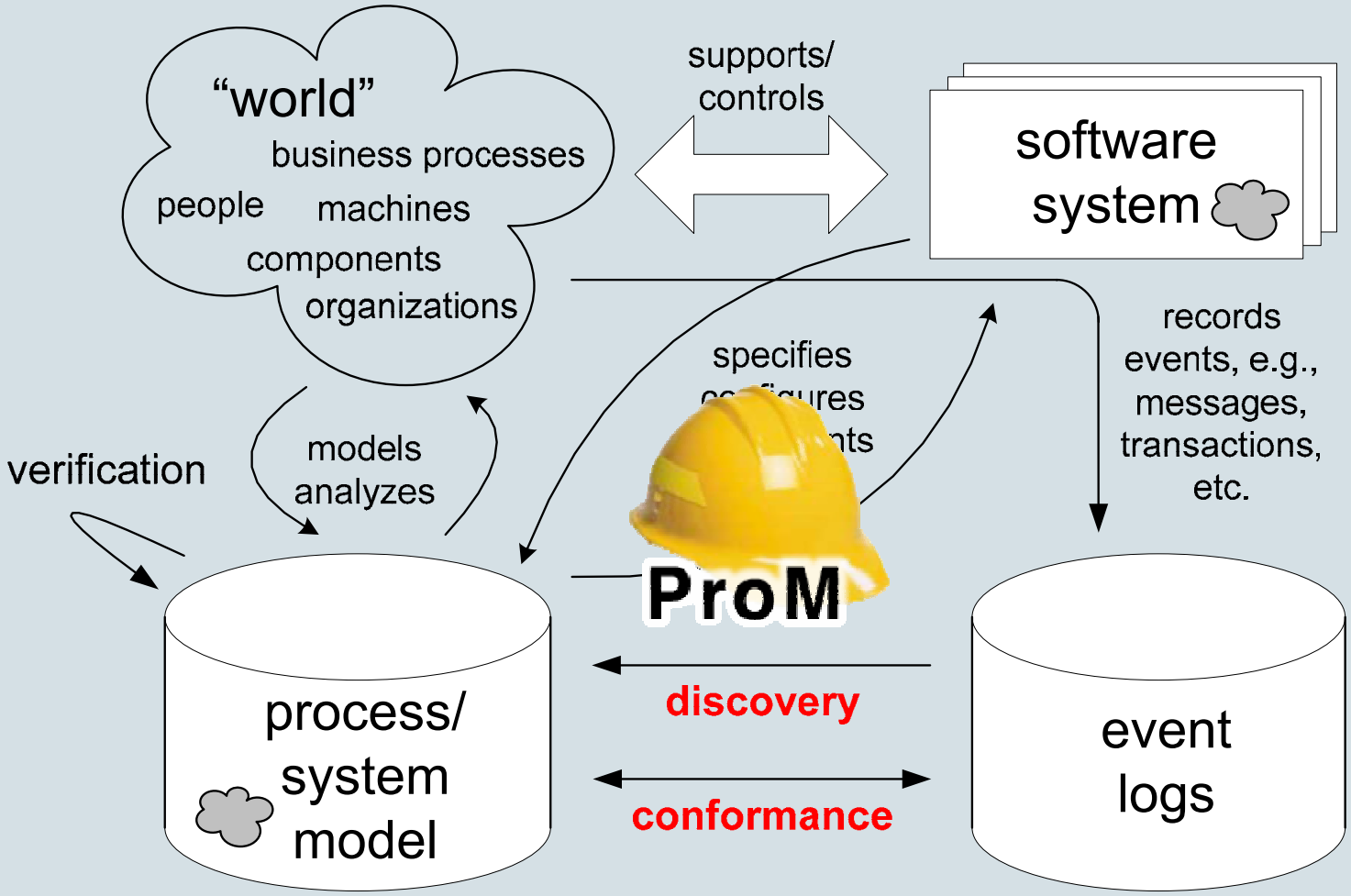
Conformance Checking




ProM [4.2]
File Mining Analysis Conversion Exports Window Help
Analysis - Conformance Checker (4)
Fitness Precision Structure
Model-related Measure
Fitness:
0.7635551
76%
incorrect model
Diagnostic Perspective
Model
Token Counter
Failed Tasks
Remaining Tasks
Path Coverage
Passed Edges
Select Fitting
Invert Selection
Selected Instances in %
Update Results


ProM [4.2]
File Mining Analysis Conversion Exports Window Help
Analysis - Conformance Checker (2)
Fitness Precision Structure
Model-related Measures
Fitness:
1.0
100%
correct model
Diagnostic Perspective
Model
Token Counter
Select Fitting
Invert Selection
Selected Instances in %
Update Results
08:56:19 [D] DOT finished on: D:\TEMP\pmt63274.dot

Goal of ProM: Complete support




ProM [4.2]
Exposé ...select the frame you want to bring forward
Results - Fuzzy Miner on Selected EPC
Fuzzy Miner
Graph
Unary metrics
Binary metrics
Concurrency filter
Edge filter
Node filter
Significance cutoff
Results - Multi-phase Macro Plugin on Selected Petri net
Zoom: 50 %
ProM
+/- 250 plug-ins
Results - Alpha algorithm plugin on Raw reviewslog_with_fewer_errors.xml (unfiltered)
Zoom: 66 %
Edit log relations
reviewslog_with_fewer_errors
Dashboard
Key data
Processes 1
Cases 100
Events 2297
Event classes 20
Event types 2
Originators 10
Events per case
Min 11
Mean 22
Max 50
Event classes per case
Min 11
Mean 14
Max 15
Log info
Source
CPN Tools
Source program
CPN Tools
Start date
2006-01-01 00:00:00
End date
2008-05-05 01:00:00
Description
Log extracted from CPN Tools
start analyzing this log

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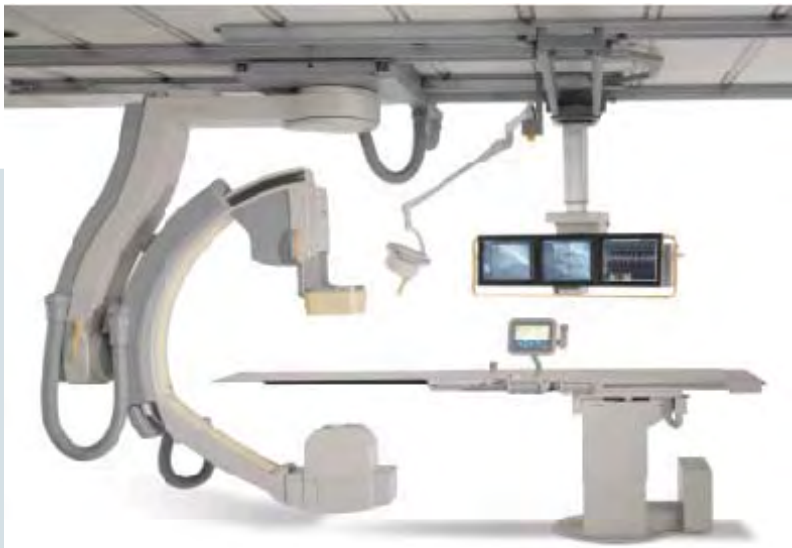
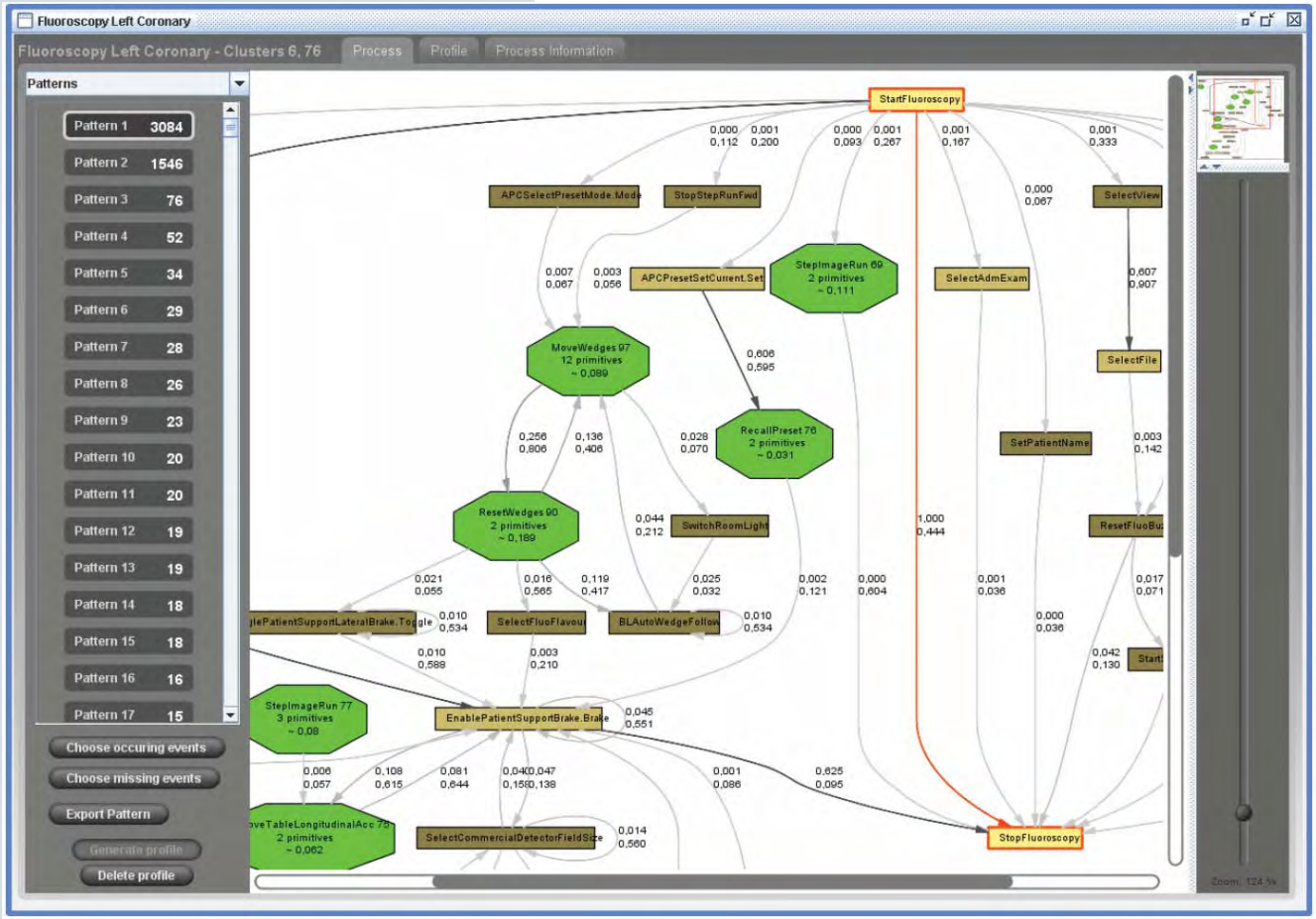
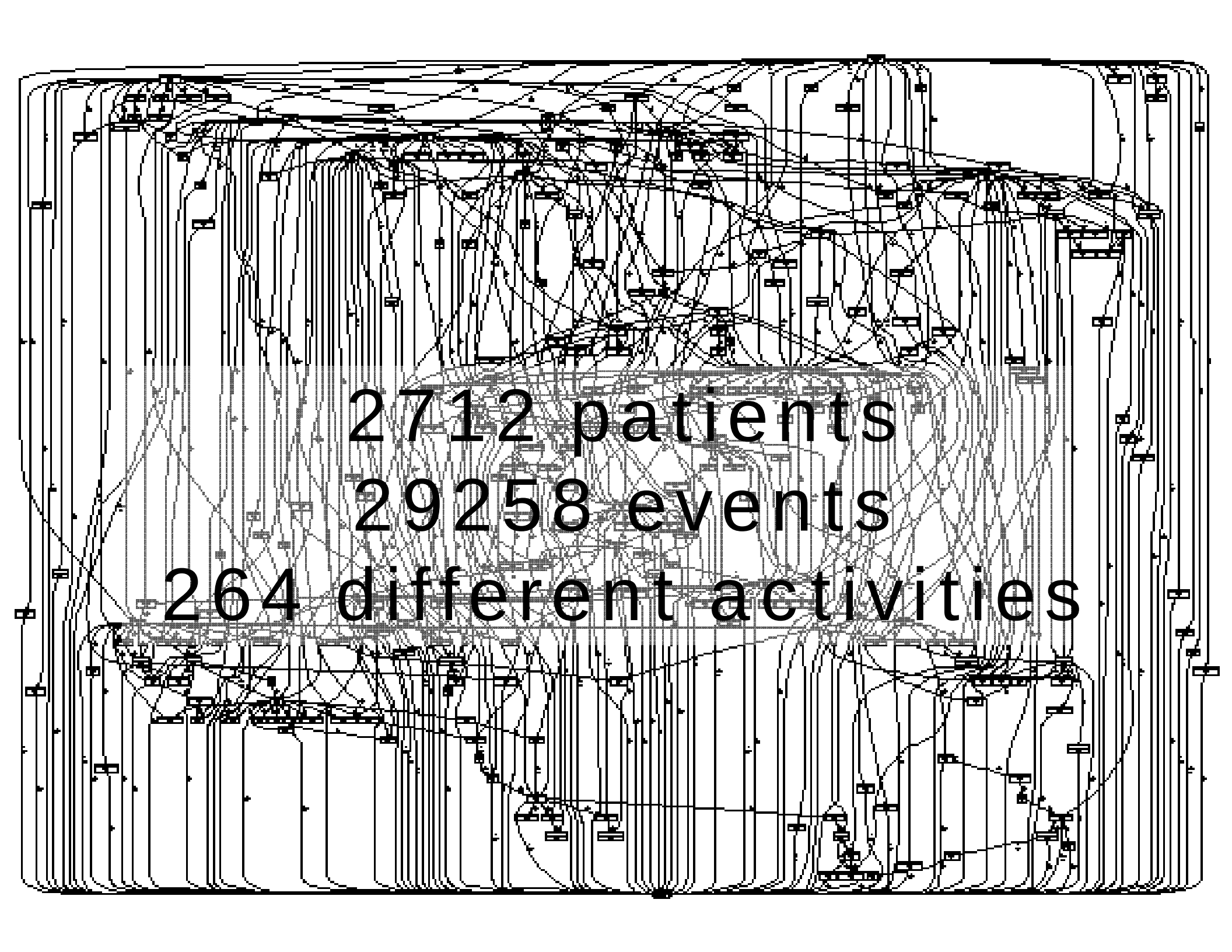
PHILIPS sense and simplicity

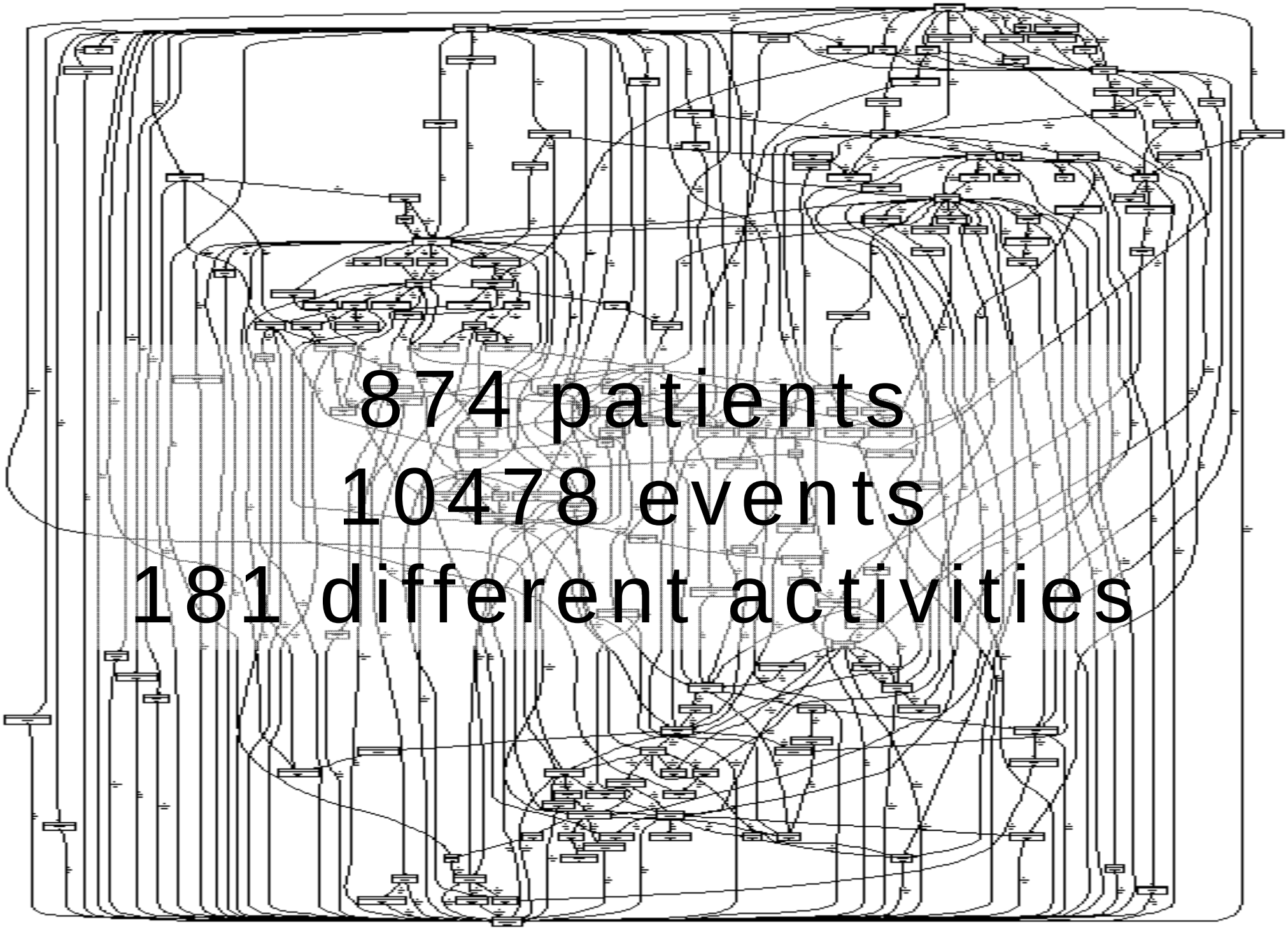


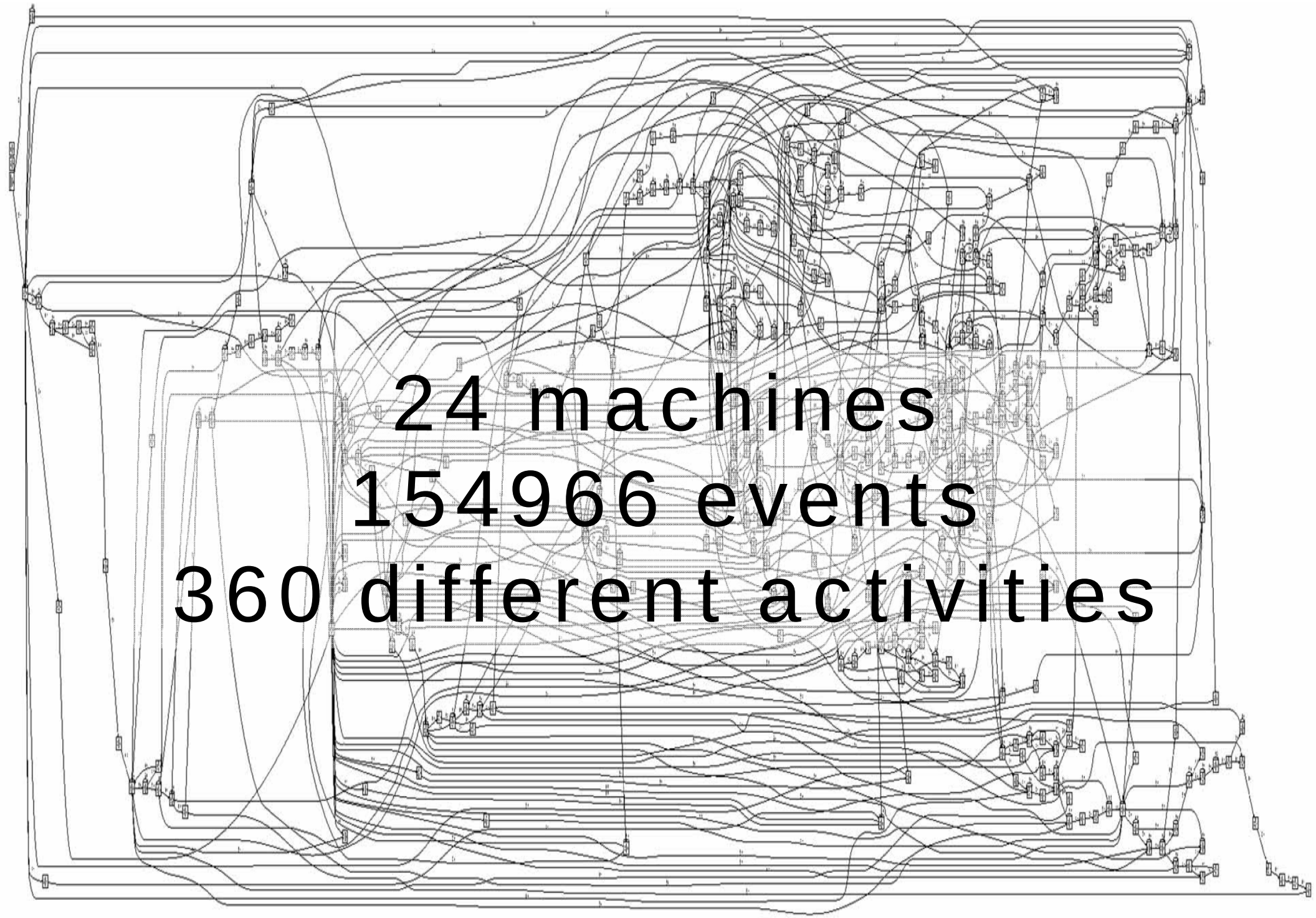
Example application (PMS/PH)

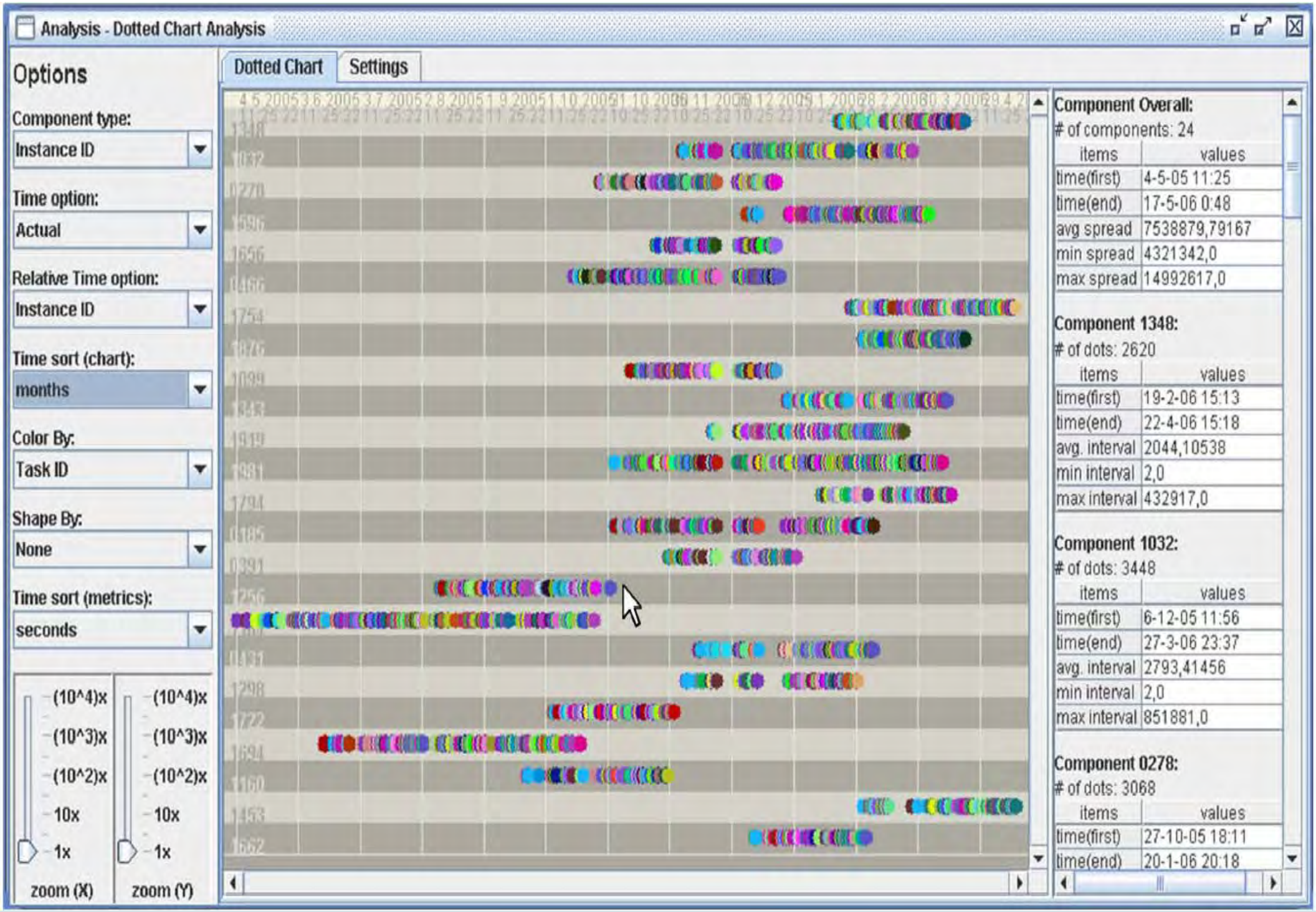
- Usage profiling
- Reliability improvement
- Usability improvement
- Remote diagnostics and servicing

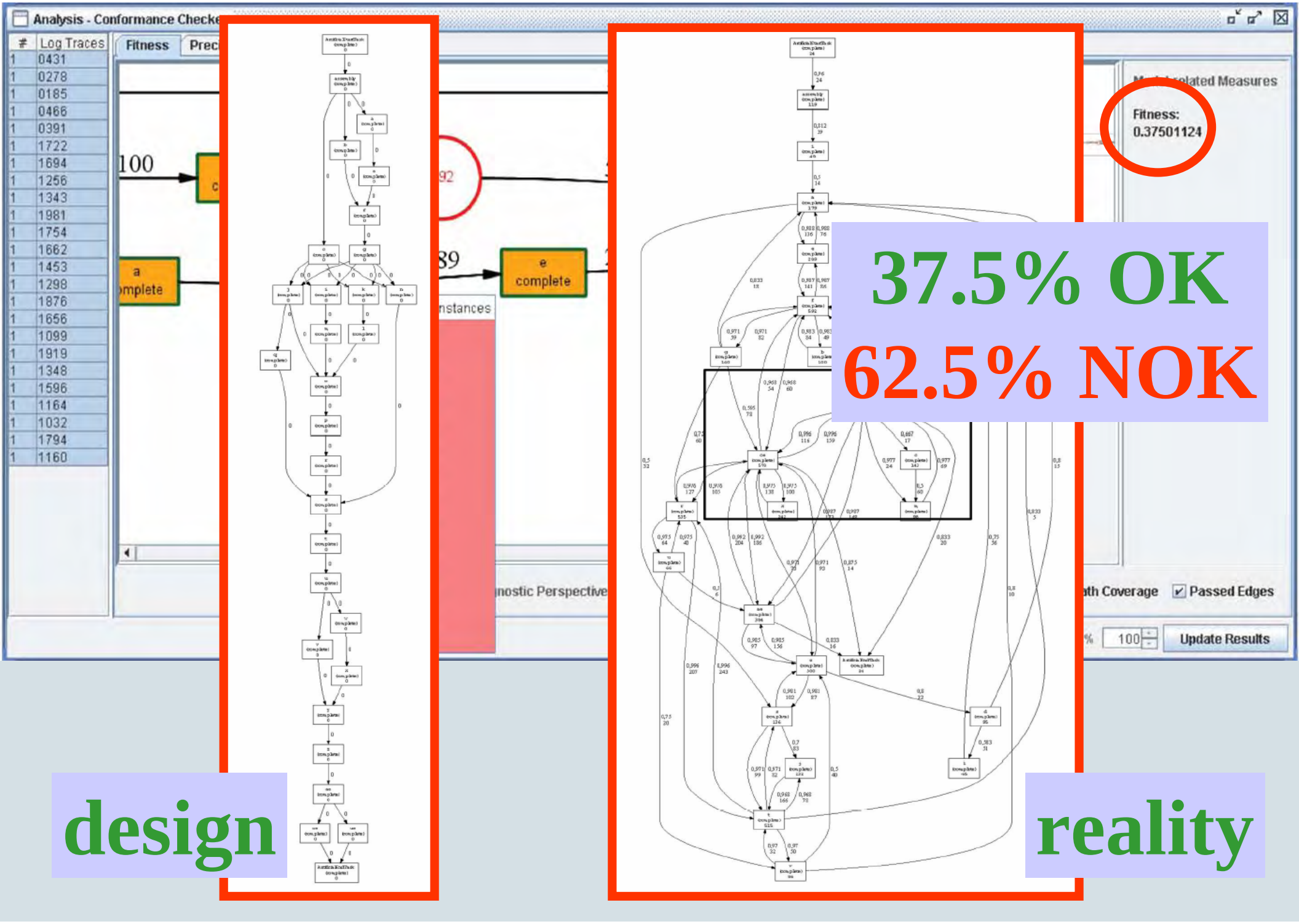



2712 patients
29258 events
264 different activities


874 patients
10478 events
181 different activities


24 machines
154966 events
360 different activities


Analysis - Dotted Chart Analysis
Options
Component type:
Instance ID
Time option:
Actual
Relative Time option:
Instance ID
Time sort (chart):
months
Color By:
Task ID
Shape By:
None
Time sort (metrics):
seconds
(10^4)x
(10^3)x
(10^2)x
10x
1x
zoom (X)
zoom (Y)
Dotted Chart
Settings
Component Overall:
# of components: 24
items values
time(first) 4-5-05 11:25
time(end) 17-5-06 0:48
avg spread 7538879,79167
min spread 4321342,0
max spread 14992617,0
Component 1348:
# of dots: 2620
items values
time(first) 19-2-06 15:13
time(end) 22-4-06 15:18
avg. interval 2044,10538
min interval 2,0
max interval 432917,0
Component 1032:
# of dots: 3448
items values
time(first) 6-12-05 11:56
time(end) 27-3-06 23:37
avg. interval 2793,41456
min interval 2,0
max interval 851881,0
Component 0278:
# of dots: 3068
items values
time(first) 27-10-05 18:11
time(end) 20-1-06 20:18


Analysis - Conformance Checke
Log Traces
Fitness
Prec
Fitness:
0.37501124
37.5% OK
62.5% NOK
design
reality
Update Results
Passed Edges

Lessons learned ...

- Business Intelligence (BI) tools are NOT intelligent!
- Logs are everywhere!
- Process mining is possible and provides valuable insights.
- Process mining triggers process improvement.
- Most processes do not conform.
- Reality is much more complicated than people like to believe!

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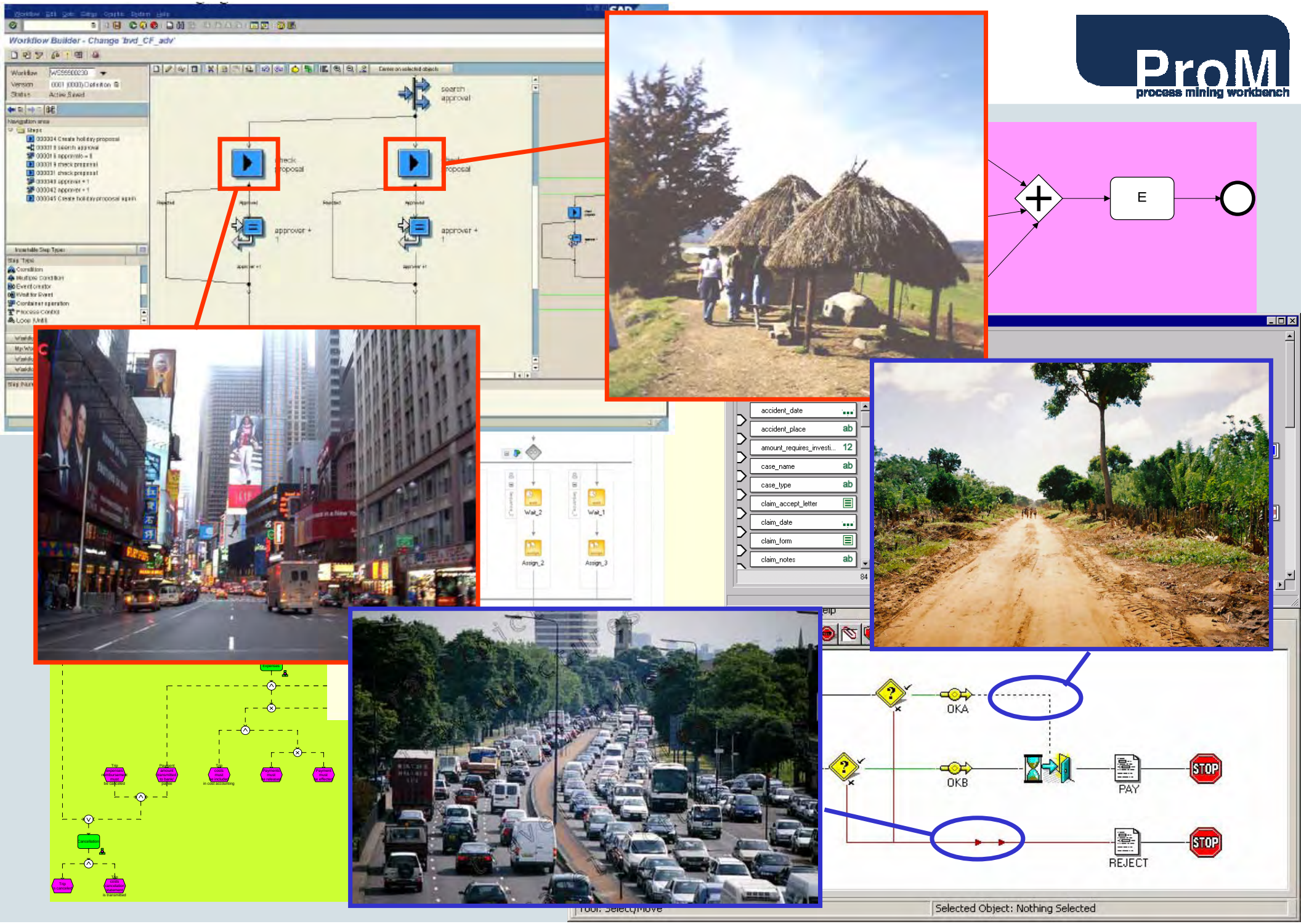
Towards Business Process Maps

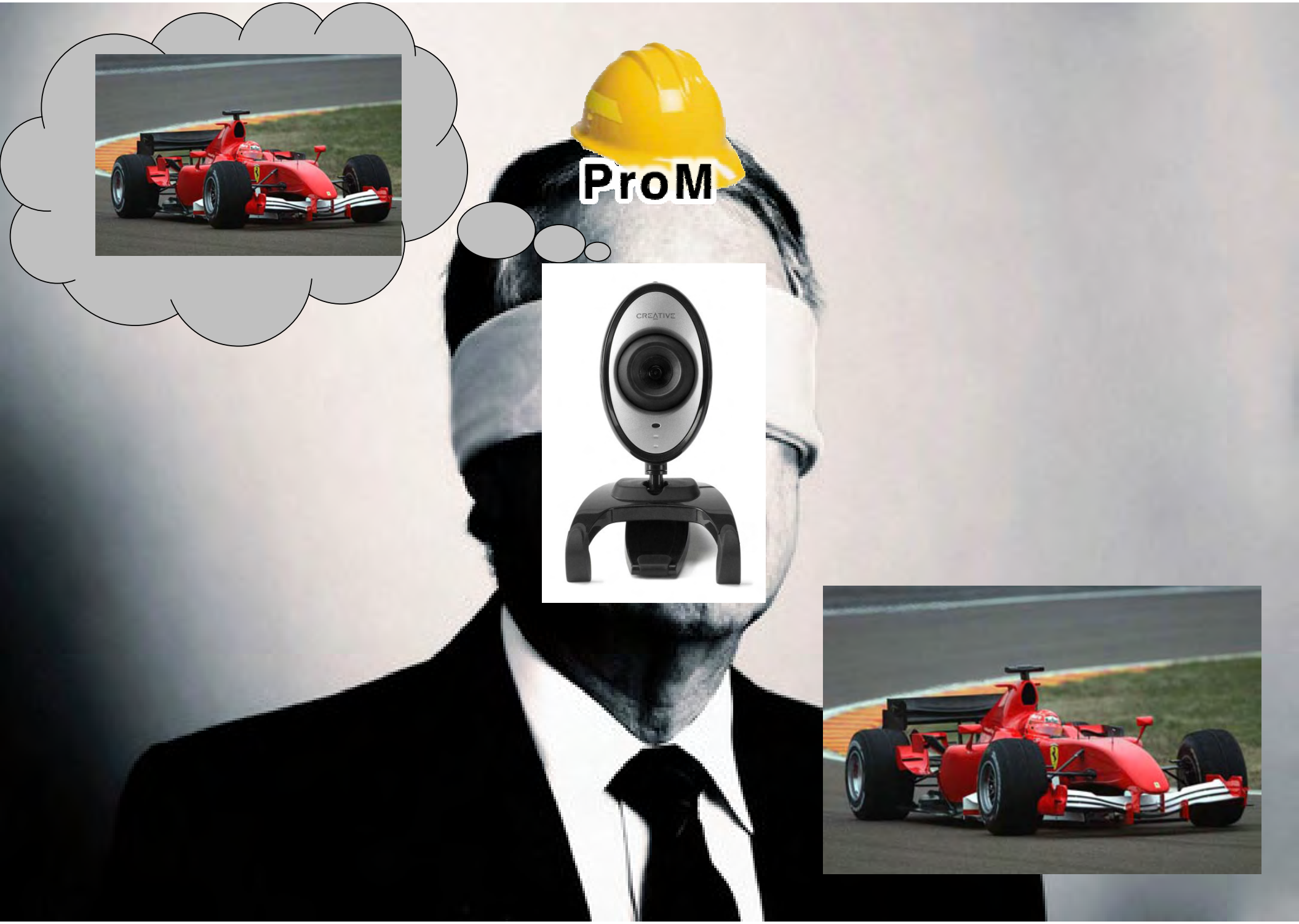

ProM
process mining workbench
Workflow Builder - Change 'bvd_CF_adv'
search approval
check proposal
approver +
E
accident_date
accident_place
amount_requires_investi...
case_name
case_type
claim_accept_letter
claim_date
claim_form
claim_notes
Wait_2
Wait_1
Assign_2
Assign_3
OKA
OKB
PAY
REJECT
STOP
STOP
Selected Object: Nothing Selected

TOMTOM®

for BPM

process mining inside


EXITS 169 B – A
644
Springfield
Franconia
1/2 MILE
DEER PARK
ProM
CREATIVE
"actionable
information"
EXITS 169 B – A
644
Springfield
Franconia
1/2 MILE
DEER PARK


ProM
CREATIVE

ProM
process mining workbench

stw

super

NWO

TU/e
technische universiteit eindhoven

LaQuSo
Laboratory for Quality Software

EIT
informatica onderwijs

For more information

- **http://www.processmining.org**
- http://promimport.sourceforge.net
- http://prom.sourceforge.net