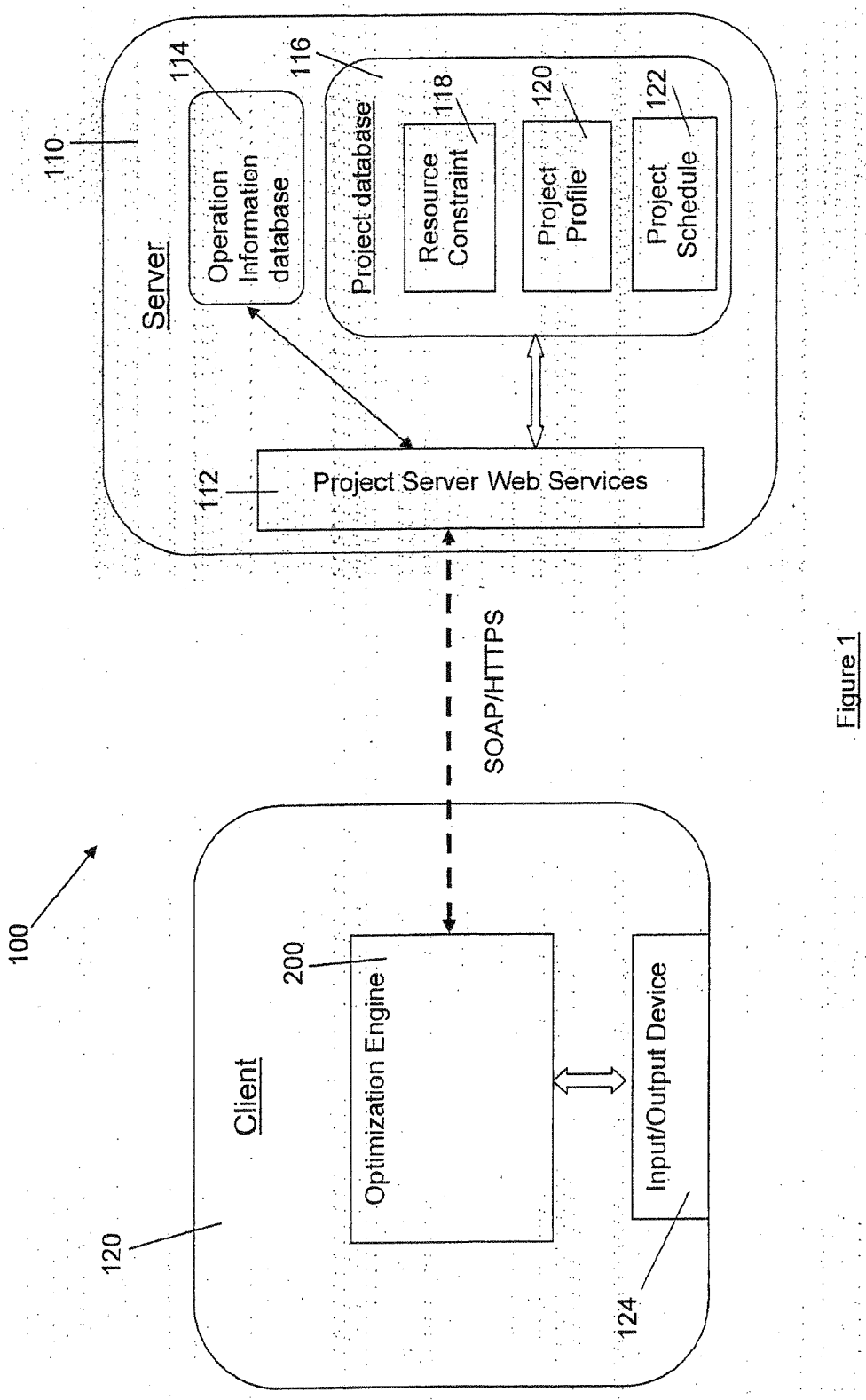

100
110
Server
114
Operation Information database
116
Project database
118
Resource Constraint
120
Project Profile
122
Project Schedule
112
Project Server Web Services
SOAP/HTTPS
120
Client
200
Optimization Engine
Input/Output Device
124

Figure 1

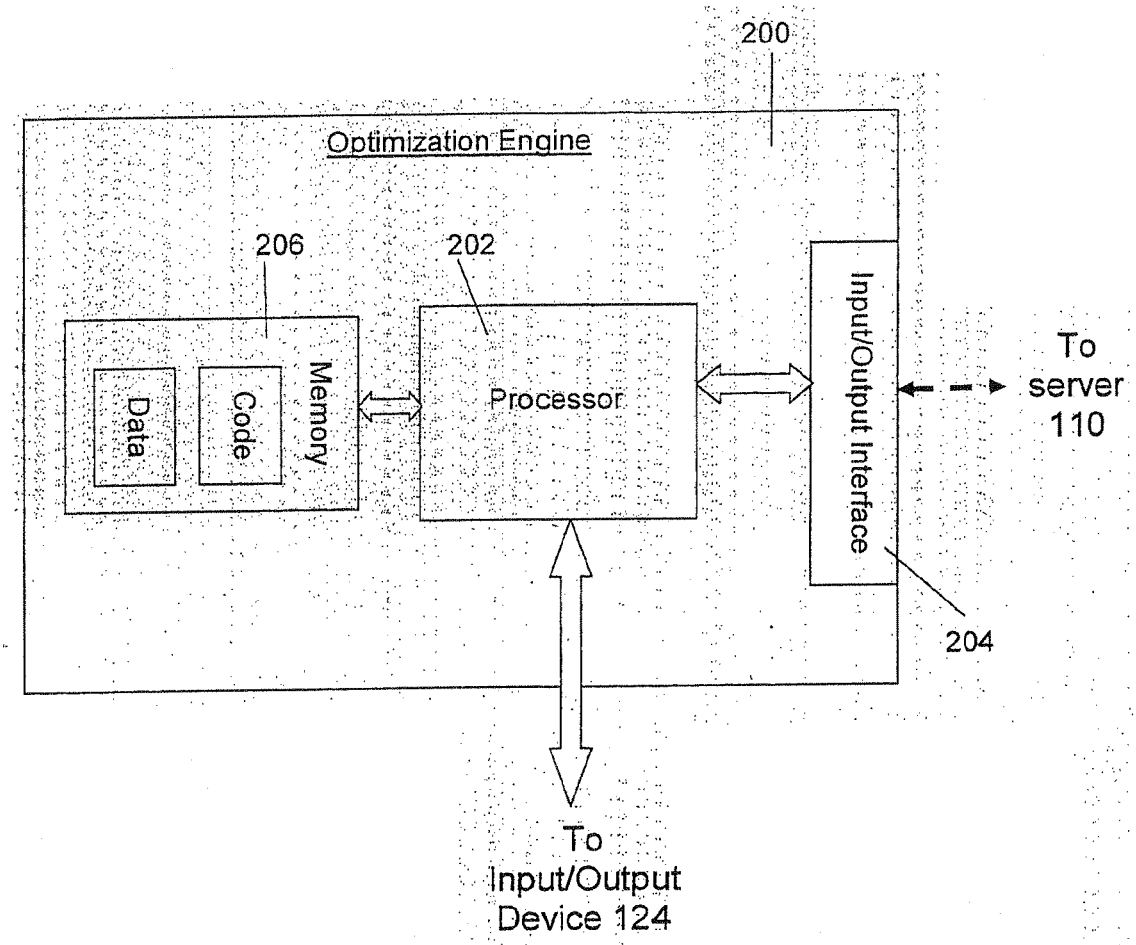

200
Optimization Engine
206
202
Data
Code
Memory
Processor
Input/Output Interface
To server 110
204
To Input/Output Device 124

Figure 2

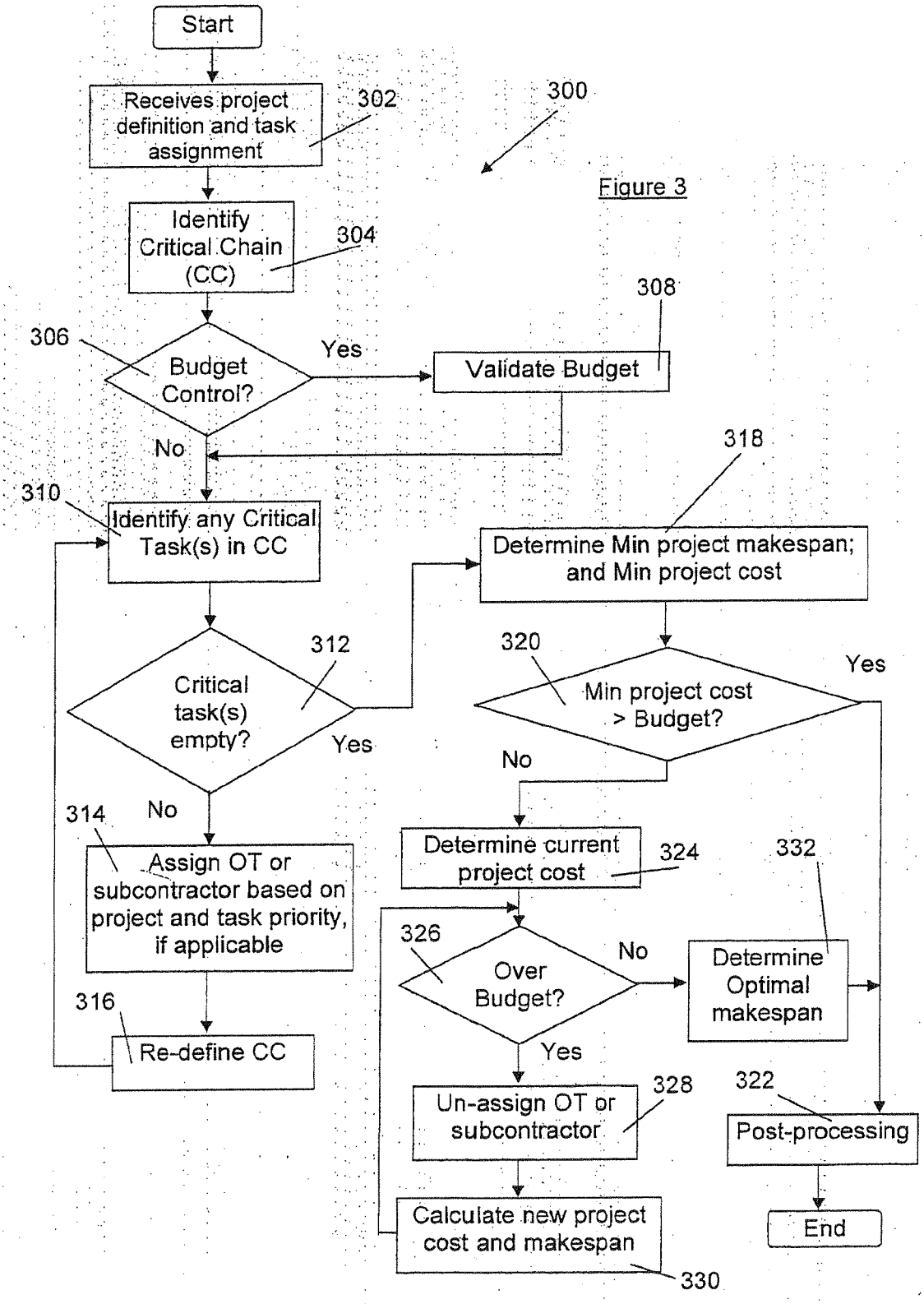

Start
Receives project definition and task assignment
302
300
Identify Critical Chain (CC)
304
308
306
Budget Control?
Yes
Validate Budget
No
318
310
Identify any Critical Task(s) in CC
Determine Min project makespan; and Min project cost
312
320
Yes
Critical task(s) empty?
Min project cost > Budget?
Yes
No
No
314
Determine current project cost
324
332
Assign OT or subcontractor based on project and task priority, if applicable
326
No
Over Budget?
Determine Optimal makespan
316
Re-define CC
Yes
328
322
Un-assign OT or subcontractor
Post-processing
Calculate new project cost and makespan
End
330

Figure 3

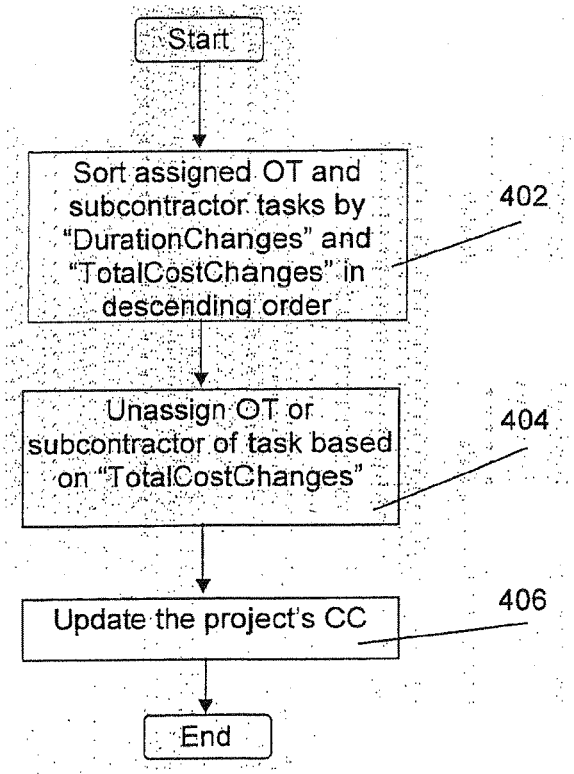

Start
Sort assigned OT and subcontractor tasks by "DurationChanges" and "TotalCostChanges" in descending order
402
Unassign OT or subcontractor of task based on "TotalCostChanges"
404
Update the project's CC
406
End

Figure 4

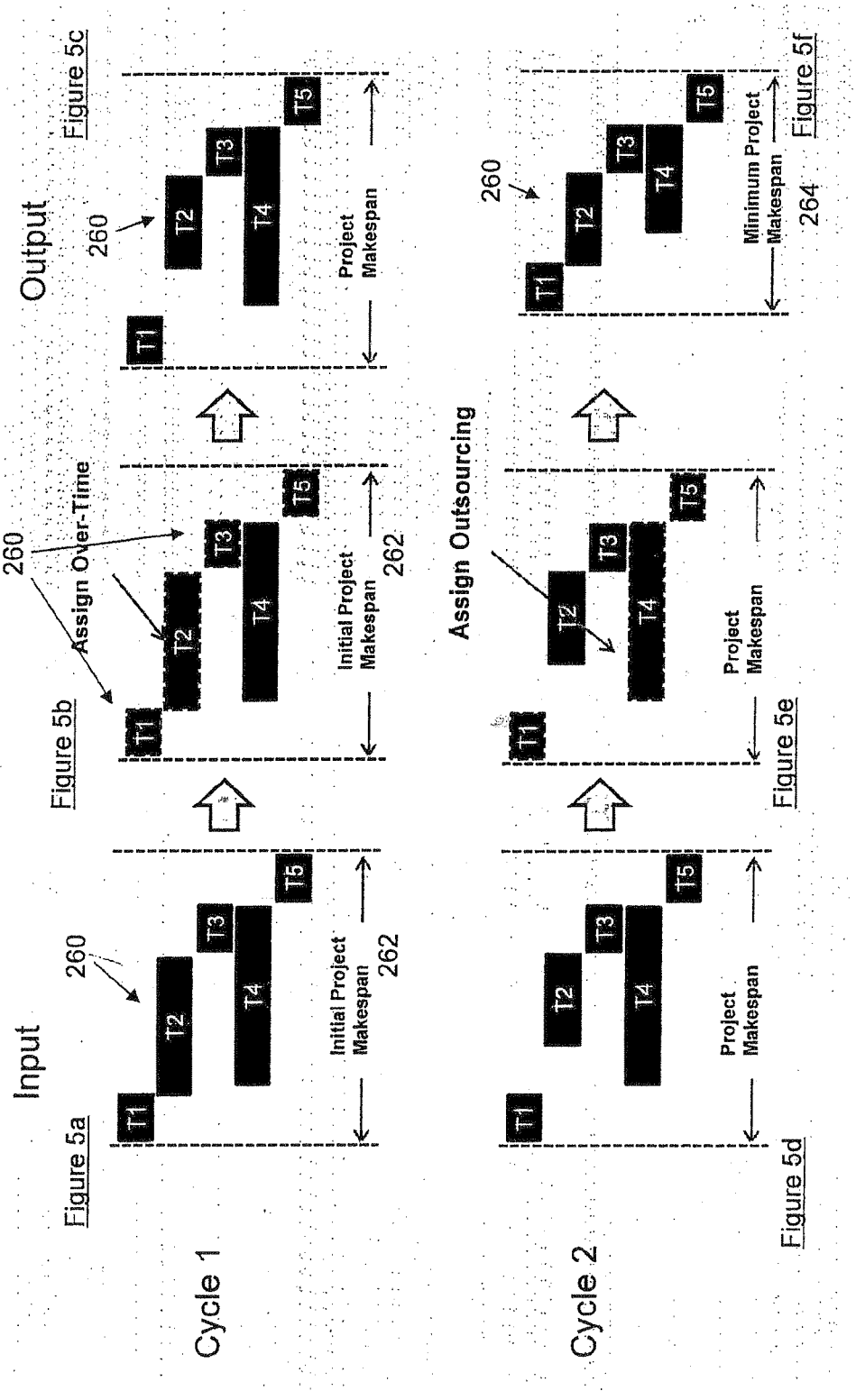

Input
Figure 5a
260
T1
T2
T3
T4
T5
Initial Project Makespan
262
Cycle 1
Figure 5b
Assign Over-Time
Output
Figure 5c
Project Makespan
Assign Outsourcing
Figure 5d
Cycle 2
Figure 5e
Minimum Project Makespan
264
Figure 5f

Figure 5

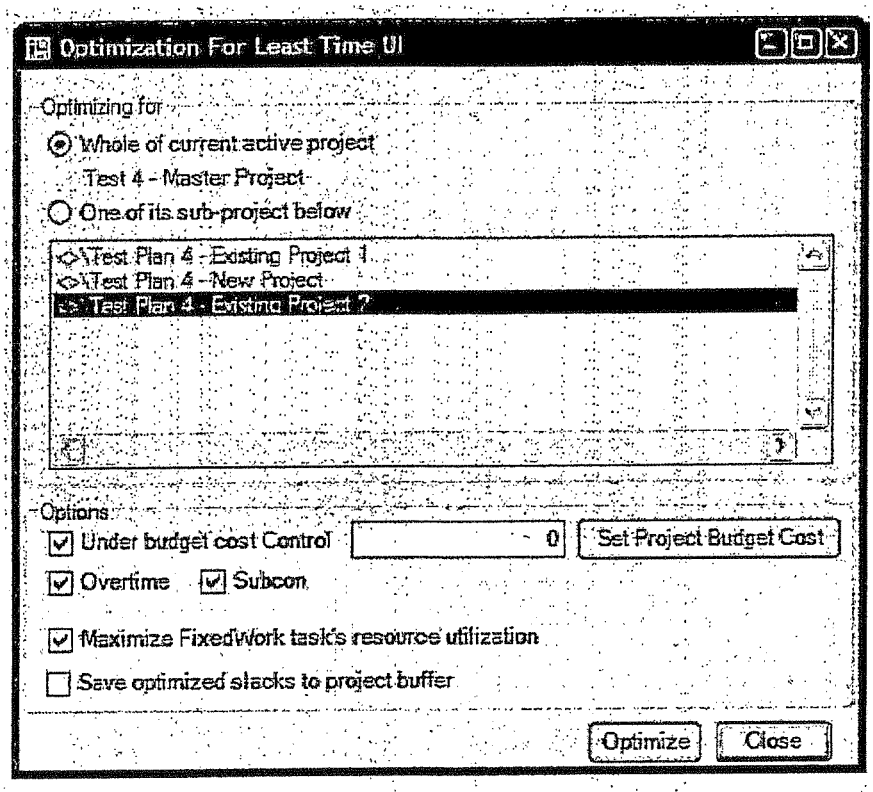

Optimization For Least Time UI
Optimizing for
Whole of current active project
Test 4 - Master Project
One of its sub-project below
\Test Plan 4 - Existing Project 1
\Test Plan 4 - New Project
\Test Plan 4 - Existing Project 2
Options
Under budget cost Control
0
Set Project Budget Cost
Overtime
Subcon
Maximize FixedWork task's resource utilization
Save optimized slacks to project buffer
Optimize
Close

Figure 6

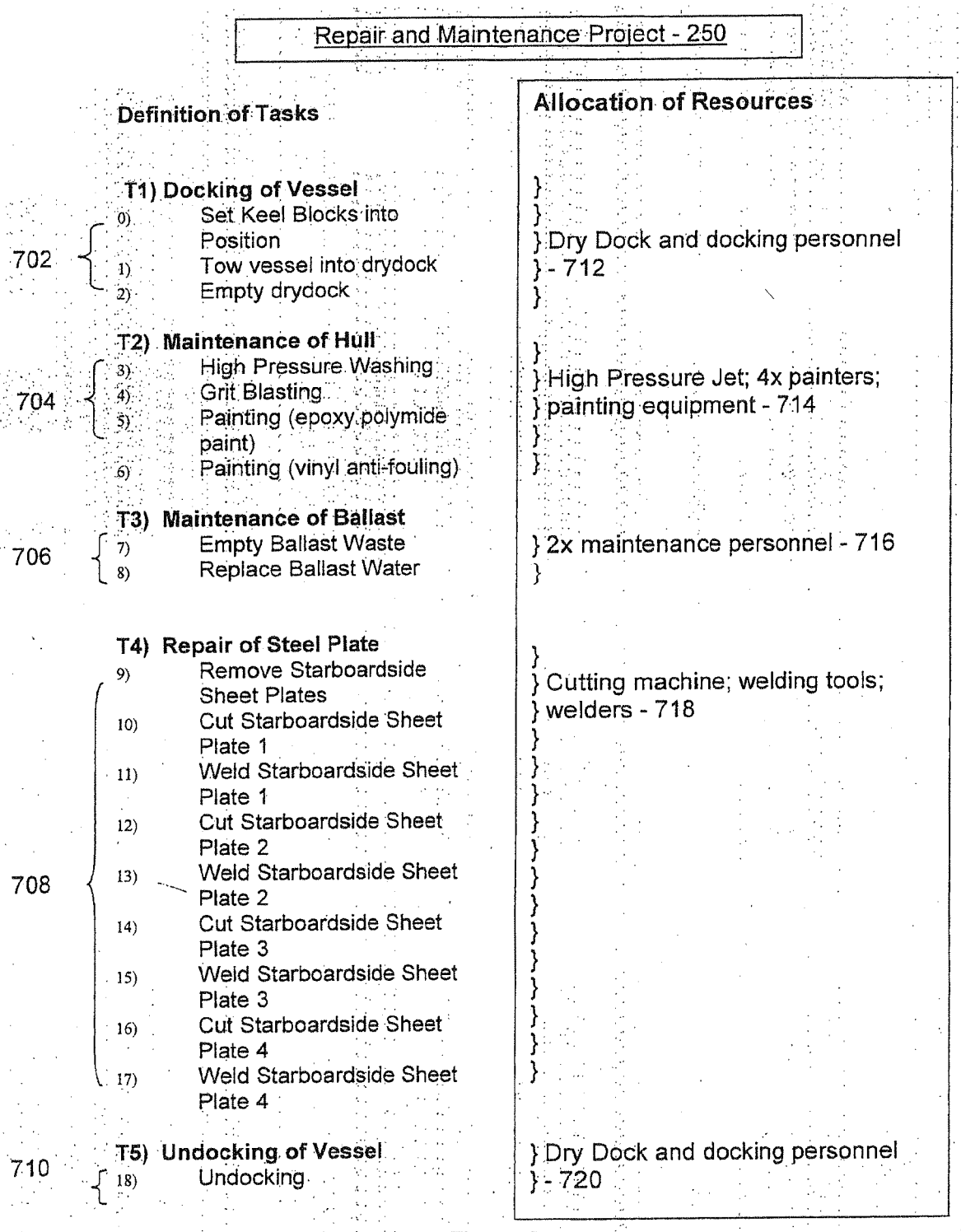

Repair and Maintenance Project - 250
Definition of Tasks
Allocation of Resources
T1) Docking of Vessel
0) Set Keel Blocks into Position
1) Tow vessel into drydock
2) Empty drydock
702
} Dry Dock and docking personnel - 712
T2) Maintenance of Hull
3) High Pressure Washing
4) Grit Blasting
5) Painting (epoxy polymide paint)
6) Painting (vinyl anti-fouling)
704
} High Pressure Jet; 4x painters; painting equipment - 714
T3) Maintenance of Ballast
7) Empty Ballast Waste
8) Replace Ballast Water
706
} 2x maintenance personnel - 716
T4) Repair of Steel Plate
9) Remove Starboardside Sheet Plates
10) Cut Starboardside Sheet Plate 1
11) Weld Starboardside Sheet Plate 1
12) Cut Starboardside Sheet Plate 2
13) Weld Starboardside Sheet Plate 2
14) Cut Starboardside Sheet Plate 3
15) Weld Starboardside Sheet Plate 3
16) Cut Starboardside Sheet Plate 4
17) Weld Starboardside Sheet Plate 4
708
} Cutting machine; welding tools; welders - 718
T5) Undocking of Vessel
18) Undocking
710
} Dry Dock and docking personnel - 720

Figure 7

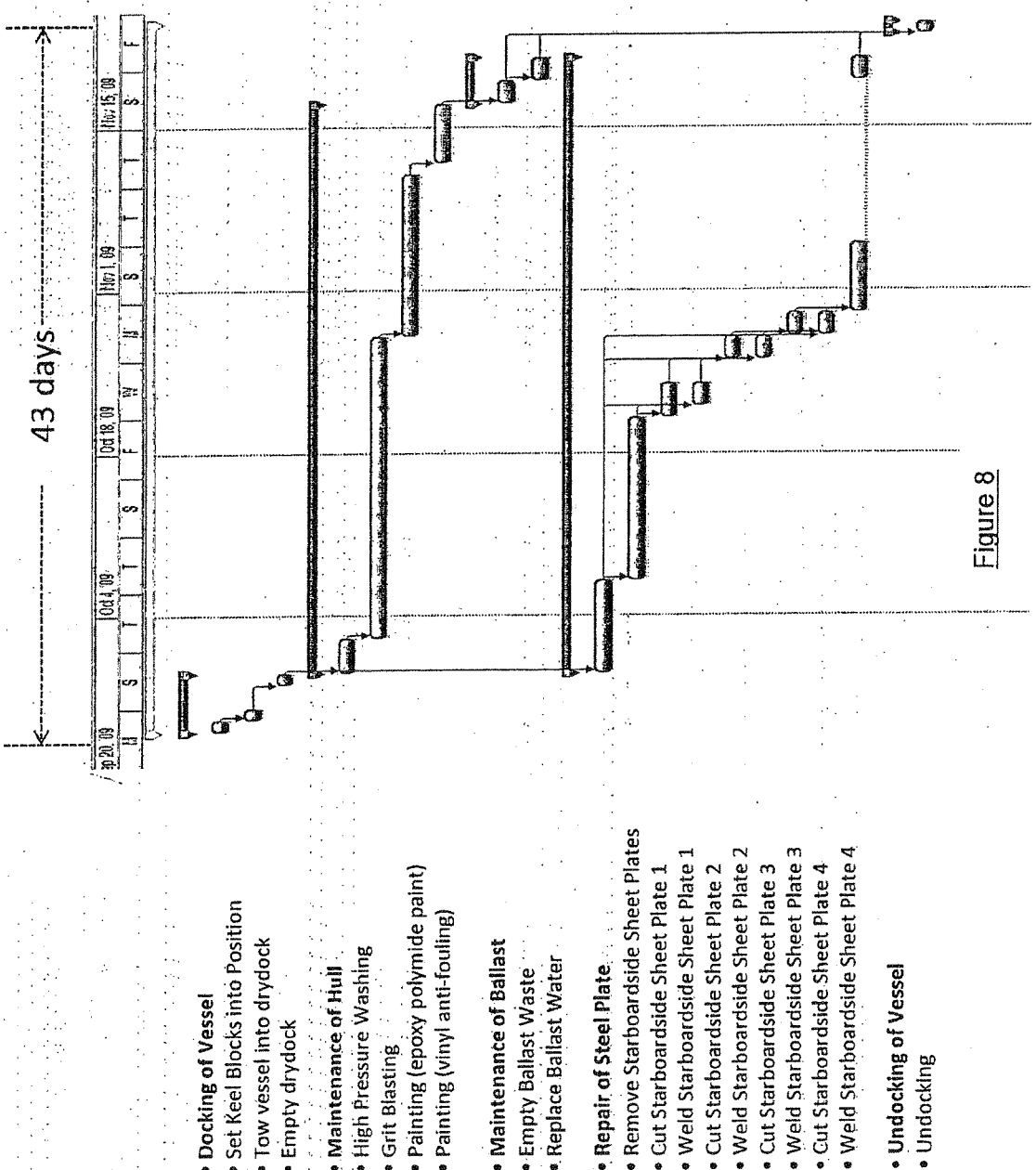

43 days
Sep 20, '09
Oct 4, '09
Oct 18, '09
Nov 1, '09
Nov 15, '09
• Docking of Vessel
• Set Keel Blocks into Position
• Tow vessel into drydock
• Empty drydock
• Maintenance of Hull
• High Pressure Washing
• Grit Blasting
• Painting (epoxy polymide paint)
• Painting (vinyl anti-fouling)
• Maintenance of Ballast
• Empty Ballast Waste
• Replace Ballast Water
• Repair of Steel Plate
• Remove Starboardside Sheet Plates
• Cut Starboardside Sheet Plate 1
• Weld Starboardside Sheet Plate 1
• Cut Starboardside Sheet Plate 2
• Weld Starboardside Sheet Plate 2
• Cut Starboardside Sheet Plate 3
• Weld Starboardside Sheet Plate 3
• Cut Starboardside Sheet Plate 4
• Weld Starboardside Sheet Plate 4
• Undocking of Vessel
• Undocking

Figure 8

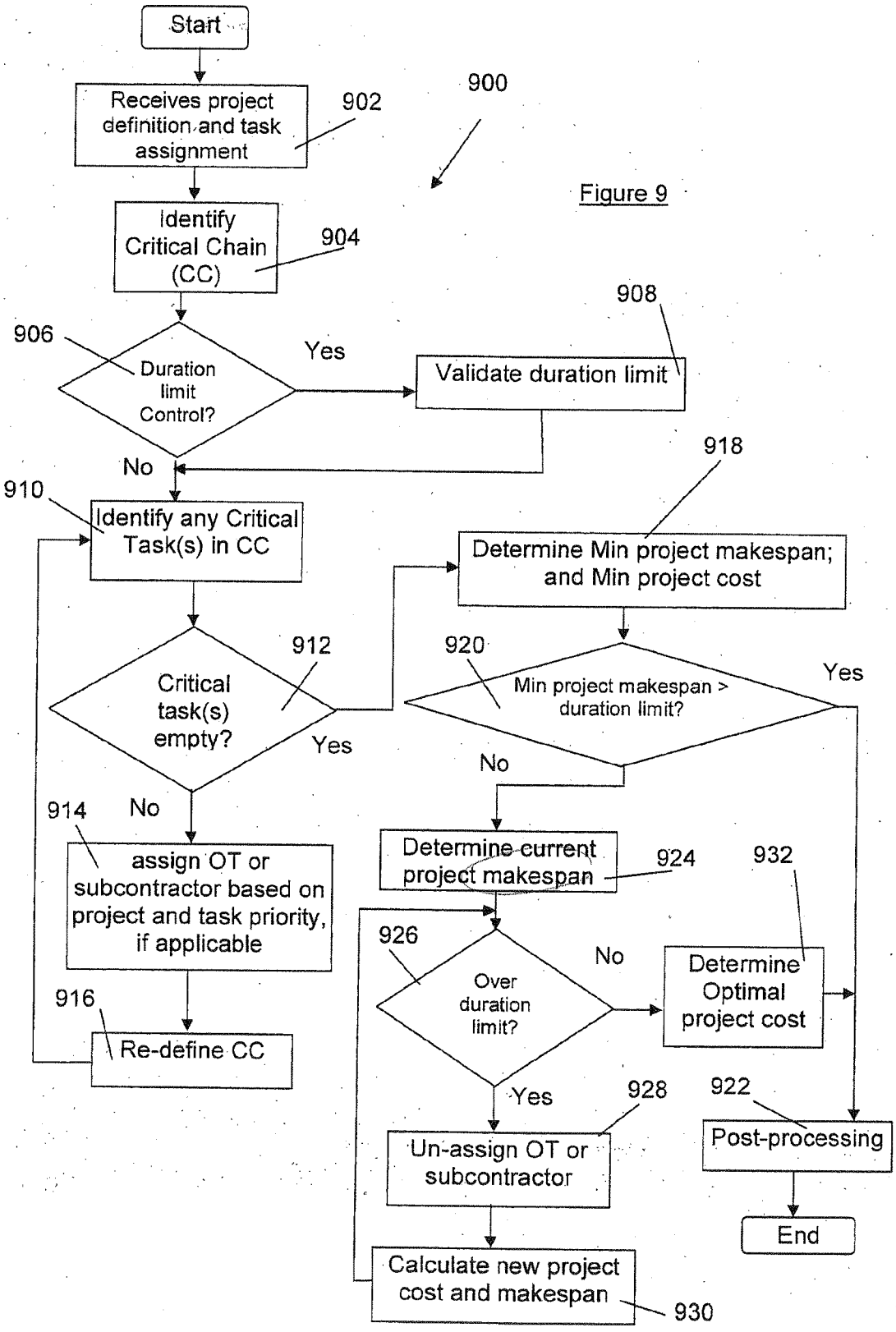

Start
Receives project definition and task assignment
902
900
Identify Critical Chain (CC)
904
906
Duration limit Control?
Yes
908
Validate duration limit
No
910
Identify any Critical Task(s) in CC
Critical task(s) empty?
912
Yes
No
914
assign OT or subcontractor based on project and task priority, if applicable
916
Re-define CC
918
Determine Min project makespan; and Min project cost
920
Min project makespan > duration limit?
Yes
No
Determine current project makespan
924
926
Over duration limit?
No
Yes
928
Un-assign OT or subcontractor
Calculate new project cost and makespan
930
932
Determine Optimal project cost
922
Post-processing
End

Figure 9

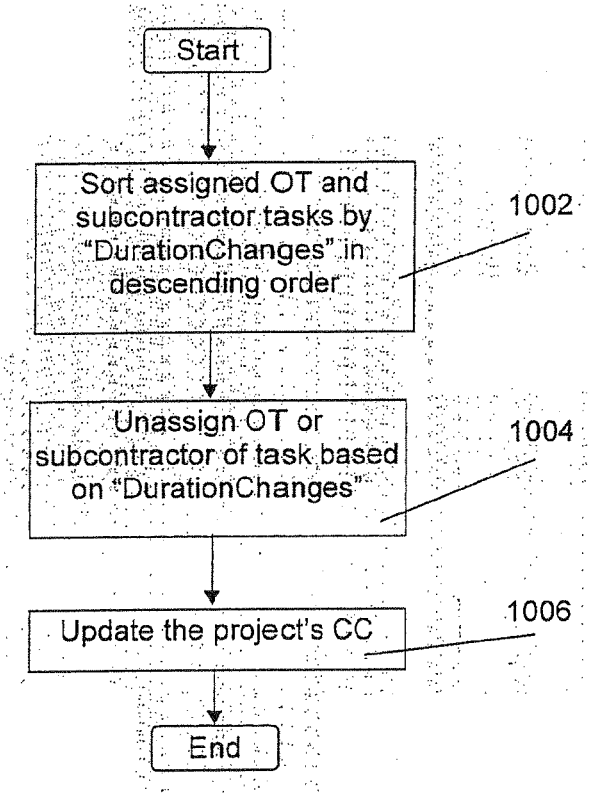

Start
Sort assigned OT and subcontractor tasks by "DurationChanges" in descending order
1002
Unassign OT or subcontractor of task based on "DurationChanges"
1004
Update the project's CC
1006
End

Figure 10

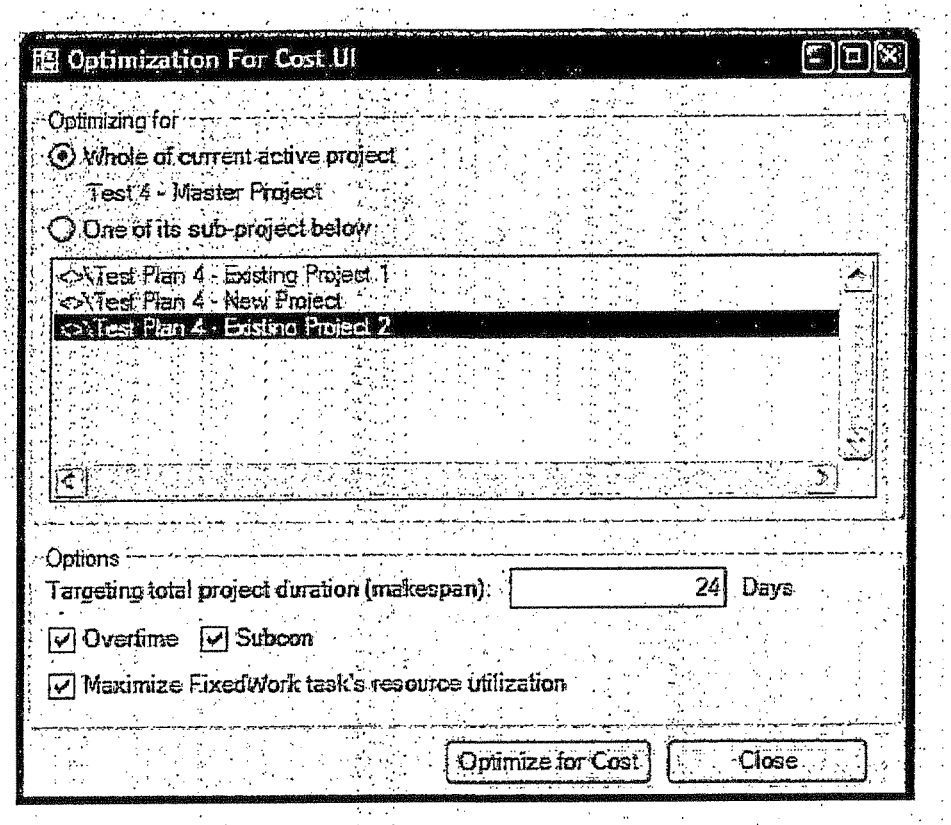

Optimization For Cost UI
Optimizing for
Whole of current active project
Test 4 - Master Project
One of its sub-project below
<>\Test Plan 4 - Existing Project 1
<>\Test Plan 4 - New Project
<>\Test Plan 4 - Existing Project 2
Options
Targeting total project duration (makespan):
24
Days
Overtime
Subcon
Maximize FixedWork task's resource utilization
Optimize for Cost
Close

Figure 11

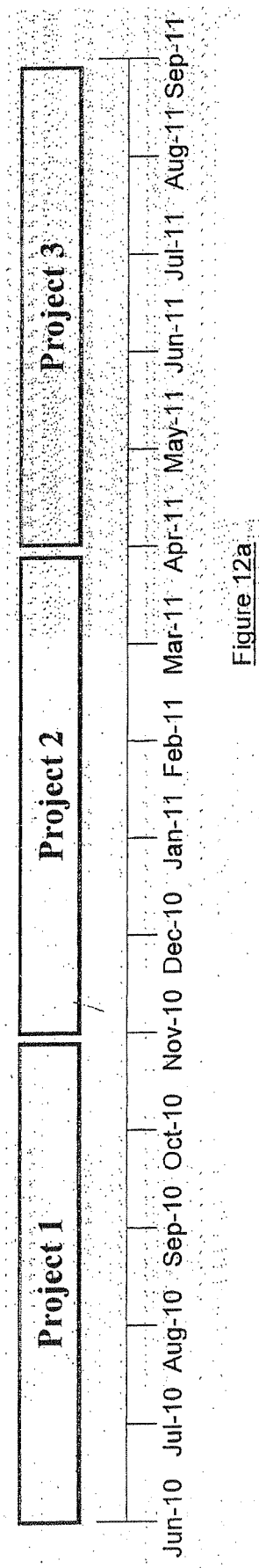
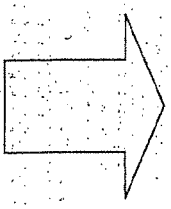


Figure 12a



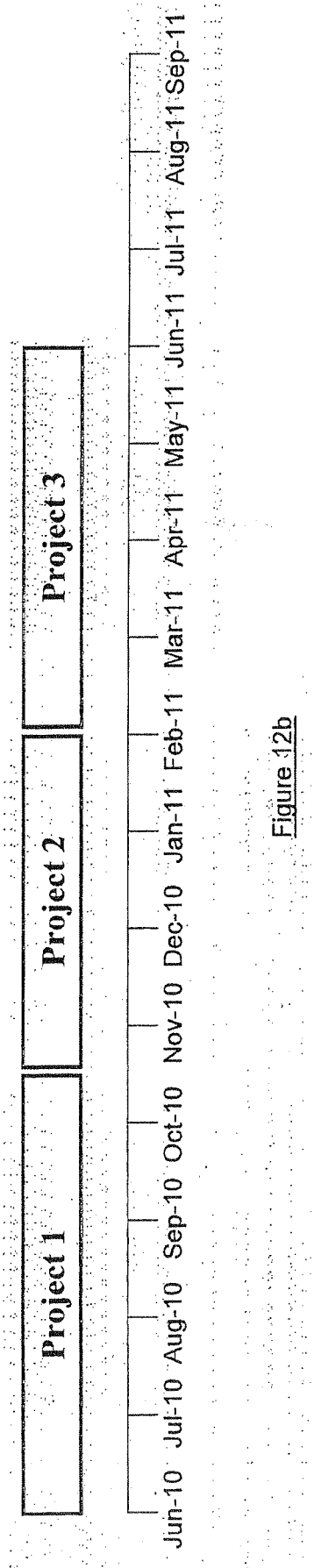


Figure 12b