Logistics League - Visualization Concept

Principal considerations

- The status board should show information about the most important elements of the game. It should not show unimportant elements or add new elements.
- The purpose of the status board is not to explain the entire game, but to display further information about the game. This should happen in a way that the uninformed spectator gets a better idea of what the game is about.
- The status boards should neither overcharge the uninformed spectator, nor should there be redundant information between the physical game field and status boards.
- Ideally the status boards extend the physical game field with further information, which is not obvious or visible.
- The displayed information should be actualized dynamically during the game.
- The implementation of the status board should not change anything or as few as possible for the teams in terms of communication with the refbox.
- Some features might rely on other technical developments of the Logistics League, like the tracking of products at machines and the report of the current position of each robot.
- Time should be in minutes:seconds or similar. Anyway the time should be displayed not without units!

Team Status Boards

- There are two Team Status Boards, one for each team. Alternatively there is one screen displaying alternating the information for both teams.
- The Team Status board should display information about the three major elements of the game: Products, Machines and Robots.
- All displayed information should be self explaining as far as possible together with the physical game field and the Field Status Board. If one is omitted the concept should be adapted such, that it is still consistent.
- During the exploration phase the focus should be on detecting the machines. During the production phase information about products should be focused, because they are not so obviously visible compared to robots and machines. Though these should not be omitted completely.

Field Status Board

- There is one Field Status Board for both teams. It should be mounted such that it is easy to relate the displayed game field to the physical game field.
- The Field Status Board is more optional than the Team Status Boards. If it is not implemented the containing additional information should be visible in a different way. This concerns specially the team colors and names of the machines and the team colors and numbers of the robots. These information has still to be visible for the spectator to connect the machines and robots of the physical game field to the information of the Team Status Board.
- The Field Status Board should not only display information to the spectators, but also support the referees during the setup of the machines. Additional information used for this should be hidden during the regular gameplay to not to overcharge the spectators (zone names, input/output markings).

Exploration View

STATUS BOARD - CYAN

STATE	PHASE	TIME	SCORE
RUNNING	EXPLORATION	**2min 10s**	7

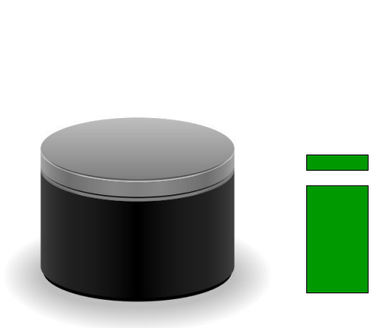
MACHINE DETECTION REPORTS

	Position	Orientation
Base Station (BS)	unreported ?	unreported ?
Delivery Station (DS)	wrong ✗	wrong ✗
Storage Station (SS)	correct ✓	wrong ✗
Cap Station 1 (CS1)	correct ✓	correct ✓
Cap Station 2 (CS2)	wrong ✗	wrong ✗
Ring Station 1 (RS1)	correct ✓	correct ✓
Ring Station 2 (RS2)	correct ✓	unreported ?

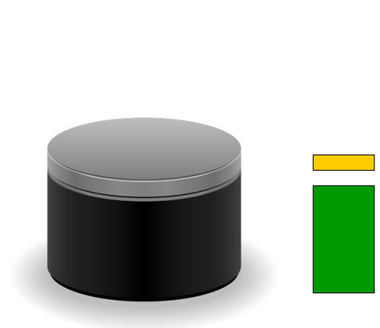
Production View
Version 1

STATUS BOARD - CYAN

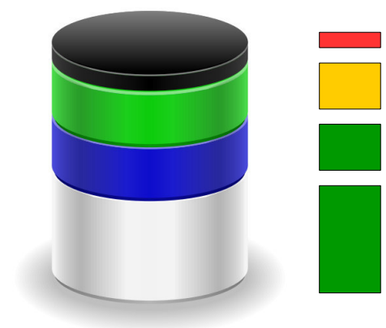
PHASE
PRODUCTION
TIME
10min 23s
SCORE
50



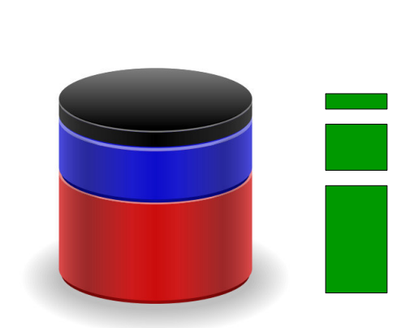
Product P1
Progress: finished
Deadline at 6min 40s
Points: 20 / 20



Product P2
Progress: 30%
Deadline at 13min 20s
Points: 0 / 20



Product P3
Progress: 40%
Deadline at 15min 0s
Points: 5 / 70



Product P4
Progress: 90%
Deadline at 3min 20s
Points: 25 / 45

MACHINES

Base Station (BS)	**Idle**
Delivery Station (DS)	**Broken**
Storage Station (SS)	**Processing**

Cap Station 1 (CS1)	**Prepared**
Cap Station 2 (CS2)	**Down**
Ring Station 1 (RS1)	**Finished**
Ring Station 2 (RS2)	**Offline**

ROBOTS

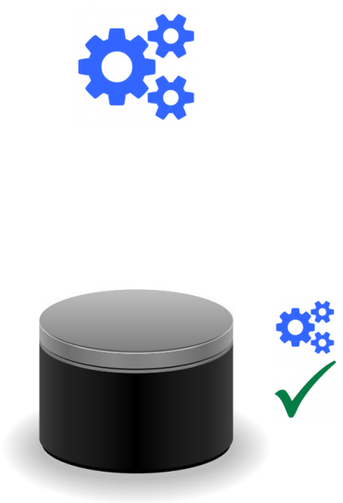
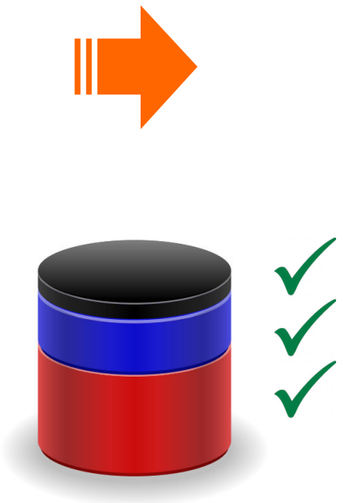
Robot 1
Activity: Get ring 2 at machine RS1 for product P3
Active Time: 98%
Maintenance: 0 / 1

Robot 2
Activity: Get cap at machine CS1 for product P2
Active Time: 55%
Maintenance: 1 / 1

Robot 3
Activity: Offline
Active Time: 0%
Maintenance: 0 / 1

Production View
Version 2

STATUS BOARD - MAGENTA

PHASE	Product P1	Product P2	Product P3	Product P4
PRODUCTION				
TIME	10min 23s			
SCORE	50			
	Progress: finished	Progress: 30%	Progress: 40%	Progress: 95%
	Deadline at 6min 40s	Deadline at 13min 20s	Deadline at 15min 0s	Deadline at 3min 20s
	Points: 20 / 20	Points: 0 / 20	Points: 5 / 70	Points: 25 / 45

MACHINES

Base Station (BS)	Free For Production	Cap Station 1 (CS1)	Prepared For Product
Delivery Station (DS)	Incorrect Instruction	Cap Station 2 (CS2)	Scheduled Down
Storage Station (SS)	Processing Product	Ring Station 1 (RS1)	Finished Product
		Ring Station 2 (RS2)	Offline

ROBOTS

Robot 1	Robot 2	Robot 3
Activity: Get ring 2 at machine RS1 for product P3	Activity: Get cap at machine CS1 for product P2	Activity: Offline
Active Time: 98%	Active Time: 55%	Active Time: 0%
Maintenance: 0 / 1	Maintenance: 1 / 1	Maintenance: 0 / 1

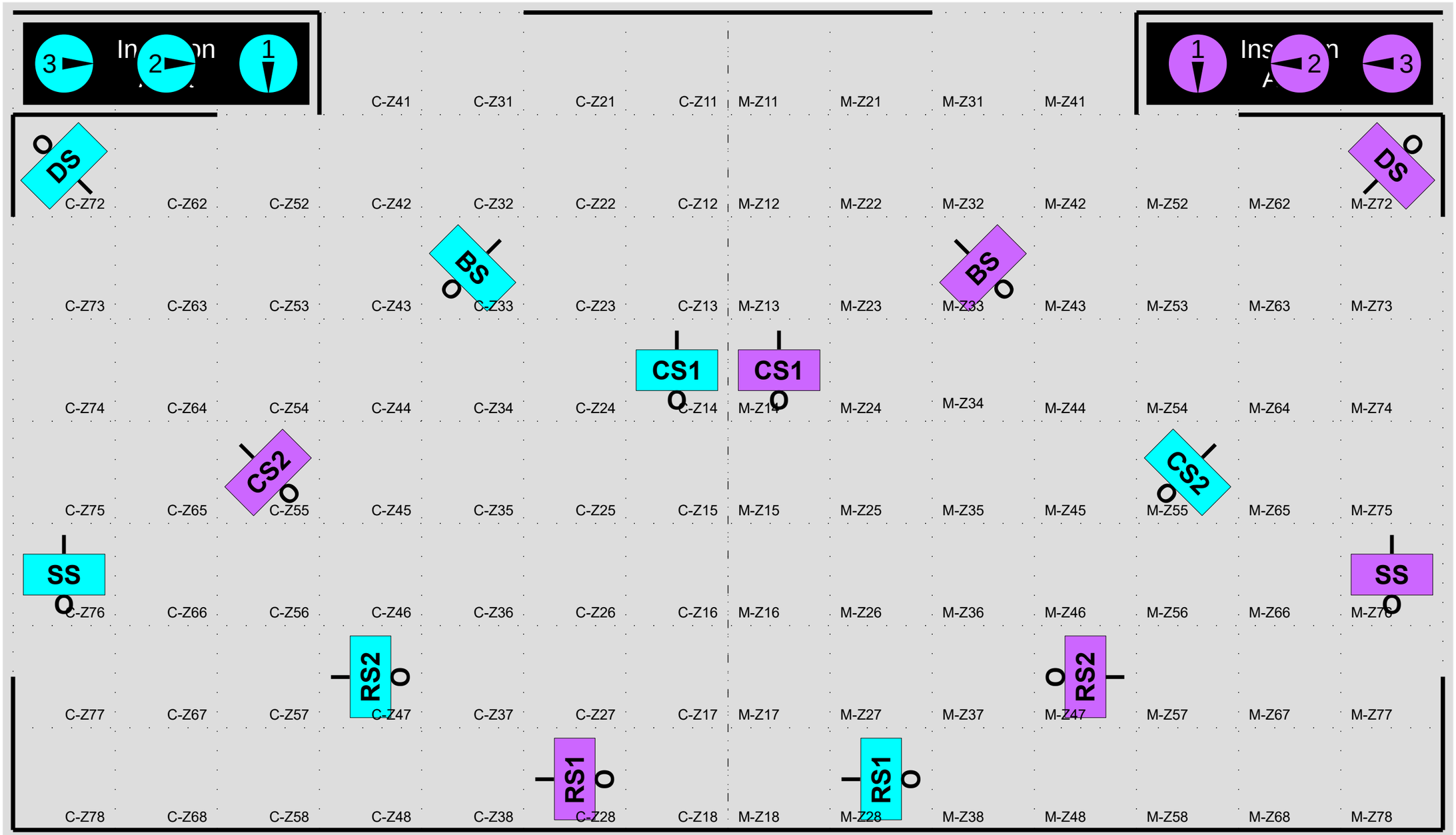
Setup View

FIELD STATUS BOARD

STATE	PHASE	TIME	SCORE
PAUSED	SETUP	10min 23s	50 / 50

CYAN
Carologistics

MAGENTA
GRIPS



Exploration View

FIELD STATUS BOARD

STATE	PHASE	TIME	SCORE
RUNNING	EXPLORATION	10min 23s	50 / 50

CYAN
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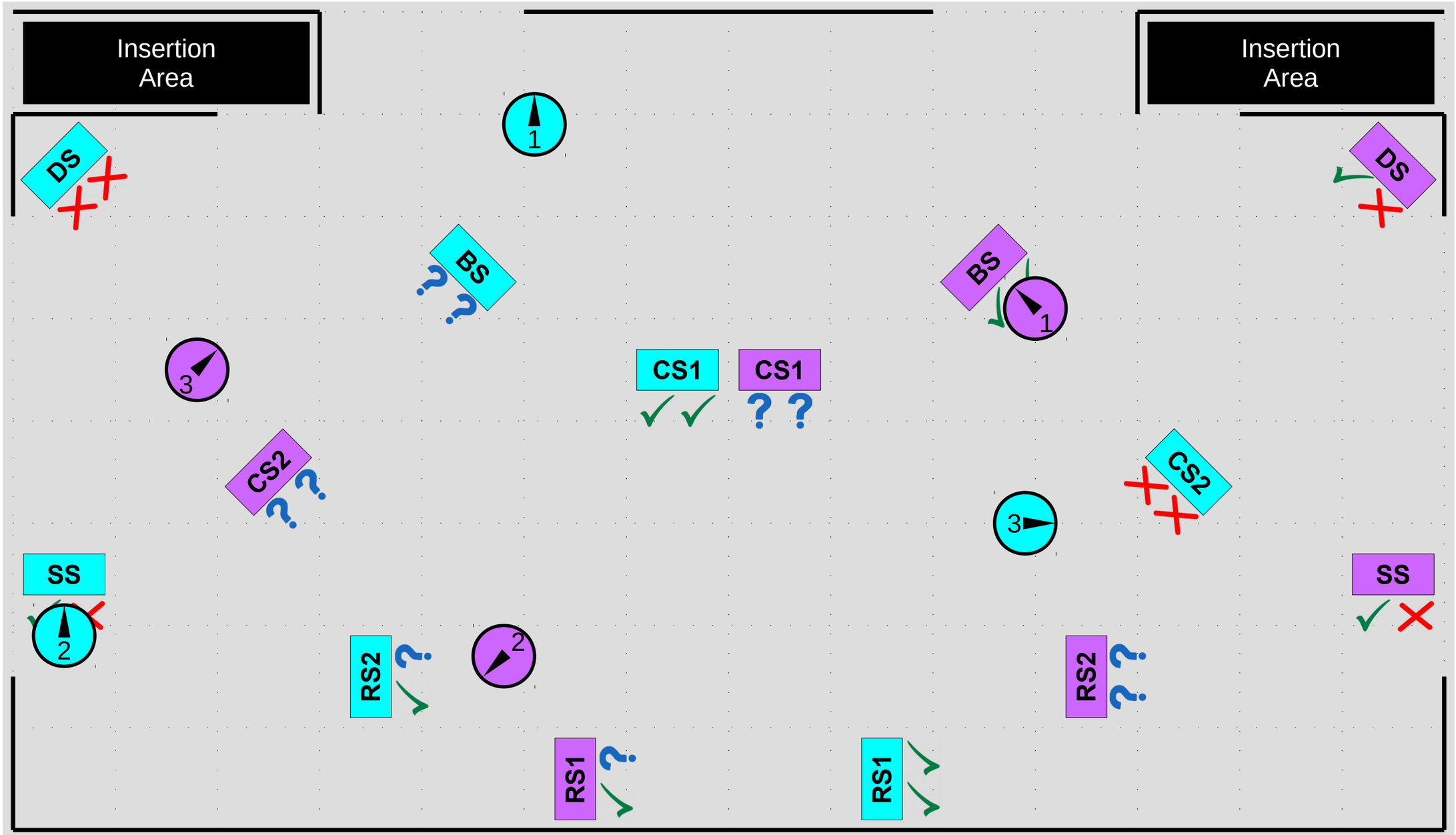
MAGENTA
GRIPS



first icon: reported position second icon: reported orientation

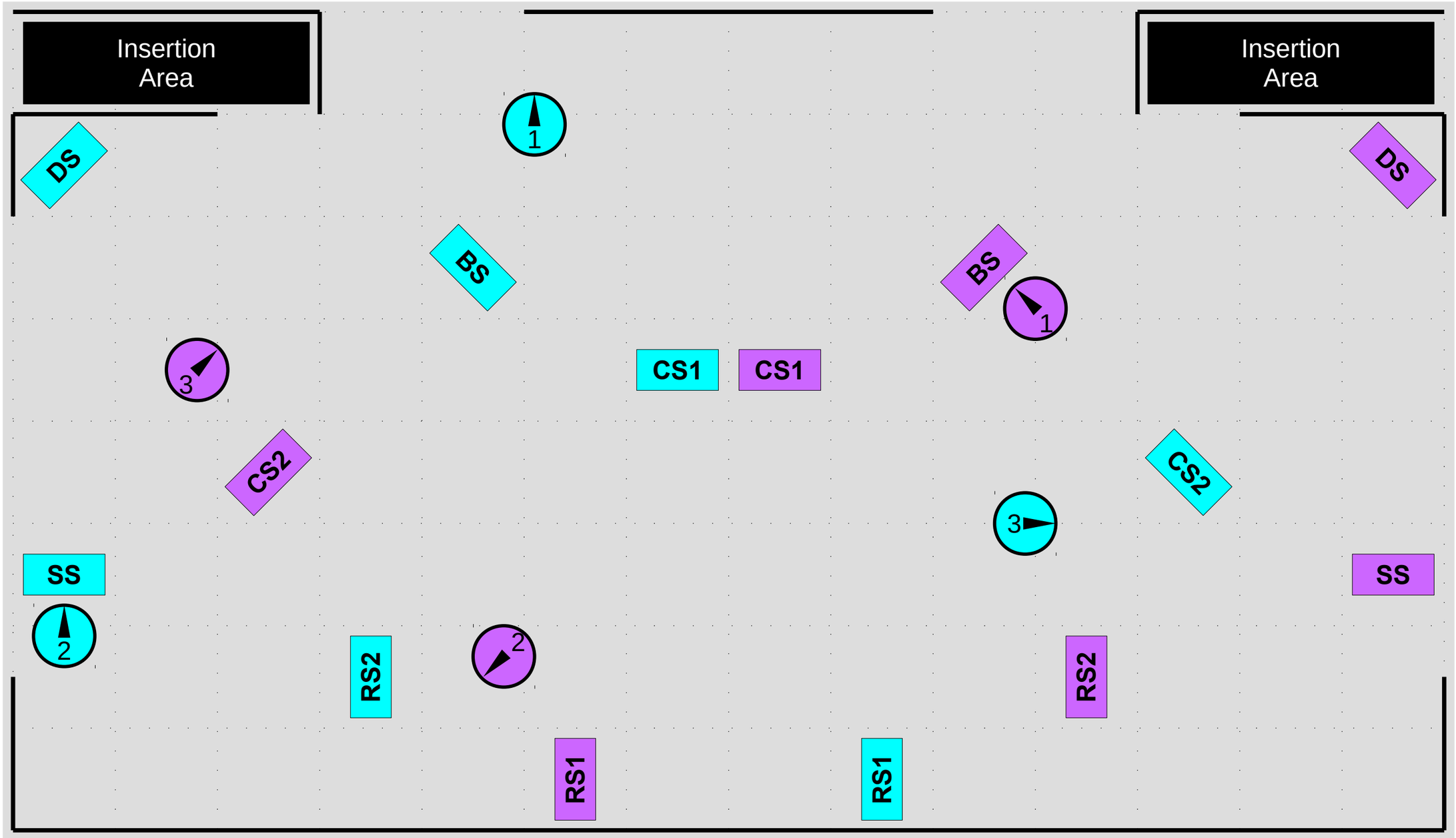
Production View

FIELD STATUS BOARD

STATE	PHASE	TIME	SCORE
RUNNING	PRODUCTION	10min 23s	50 / 50

CYAN
Carologistics

MAGENTA
GRIPS



Explanations:

Team Status Board - Exploration View:

- Table with detection status as word and as icon (first for explanation, second for relation to the Field Status Board)
- The word “zone” is not used because they are not clearly visible in the field. Instead the word “position” is used.

Team Status Board - Production View - Version 1:

- General game information: Displayed are the game phase, the current phase time (in min:sec) and the score for the respective team.
- Product progress is shown in percent and a progress bar with one element for each base, ring and cap element. Green colors indicate a completed element, yellow colors indicate an element in construction progress, red colors indicate a construction step, which hasn't started yet.
- The deadline can be displayed as an absolute time (“Deadline at min:sec”) or a relative time (“Deadline in min:sec”)
- In case more than four products have to be displayed, paging for the products can be implemented.
- Machine names are displayed in long version (e.g. “Base Station”), which explains the purpose, and short version (e.g. “BS”), how they are marked on the field status board or the physical game field. Anyway it should be possible to relate the displayed machines with the physical ones.
- The machines states are highlighted with the respective lamp states to make the relation between the physical machines and the real ones easier. Physical blinking lights are also blinking in the Team Status Board. Also the meaning of the light pattern is displayed to give the spectator an approximate idea what the machine is currently doing. The explanation can be quite short (Version 1) or longer (Version 2).
- A short text explains, what each robot is currently doing. This text should be sent by the robot itself to avoid misinterpretations by the refbox. The content of the displayed actions depends on the teams, but should always be understandable for spectators. This would be a necessary change in terms of communications with the refbox. The respective information could be included into the BeaconSignal message.
- The active time of the robot is calculated by the refbox. It can be interpreted as “movement time”, where the robot is driving around, or as “busy time”, where the robot e.g. processes a product, but is not necessarily moving around during the whole time. The last one would require further changes in the communication with the refbox. The respective information could be included into the BeaconSignal message.

Team Status Board - Production View - Version 2:

- Mostly the same content as Version 1
- Product progress is displayed not by a progress bar, but with check marks (finished) and gears (in construction) for each production step. A big check mark on top of the product marks a finished and delivered product, while an orange arrow marks a finished but undelivered product. Products in construction are marked by gears on the top.
- The machines states are labeled with a more detailed explanation of the respective state.

Field Status Board:

- Its primary purpose is to relate the machine names with the corresponding machines and to relate the robots to a team.

- Setup View: The zone names are displayed in this view at the respective positions to support the referees for setting up the machines. Also input and output markings are displayed here for each machine.
- Exploration View: The machines have two additional icons, which represent their detection status. The first icon stands for the reported zone/position, the second icon stands for the reported orientation. Three states can be displayed each: check marks for a correct report, crosses for an incorrect report and question marks for an unreported zone or orientation.
- Production View: The board just shows the current positions of all robots and machines. It should still be visible to be able to relate the machine names with the physical machines and to relate the robot numbers with their teams. If the field status board is omitted this information should be clear in a different way.