

# What is new in SCML 2021?

SCML Organizing Committee

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NEC-AIST  
AI Cooperative  
Research Laboratory

## Why SCML?

- ▶ The raison d'être for SCML is still the same: **to move automated negotiation further toward the real world.**
- ▶ The guiding principles in our design are:
  - ▶ **Simple enough but not too simple.**
  - ▶ **Continuity matters.**

## Main Changes

- ▶ More information about the market is made available to agents.
- ▶ Changes in the evaluation criterion for Standard and Collusion tracks.
- ▶ A new track emphasizing concurrent negotiation and learning more (OneShot).

# Outline

## Track Philosophies

## Changes in Existing Tracks

- More Information
- Evaluation Changes
- Behavioral Changes

## A New Track

- Difference between OneShot and other tracks



# Market Information

## Trading prices

- ▶ Trading prices representing a weighted running average of different product prices.
- ▶ Used internally but not available to agents in 2020.
- ▶ It is now available to the agent through the AWI in all tracks.

## Exogenous Contract Summary

- ▶ The total quantity and average prices of all exogenous contracts are now available through the AWI.
  - ▶ **Exogenous contracts for individual agents is still private information.**



# Evaluation Changes

## Consolidated Financial Statements

- ▶ This change affects the **collusion** track only.
- ▶ In 2020, the final score was the median score of all factories controlled by the agent.
- ▶ In 2021, the final score will be the consolidated truncated mean:
  - ▶ Scores of all factories controlled by the agent type **in a given simulation** are summed up giving one score per agent type per simulation
  - ▶ The truncated mean is calculated using these consolidated scores.
- ▶ This ensures that having one of your factories lose to the others will not affect your final scores.

## Finalist rule

- ▶ Finalists for the **collusion** track must have a reported nontrivial collusion strategy.

## Score calculation

- ▶ In 2021, the **truncated mean** will be used instead of the ~~median~~ for calculating final scores of agent types (i.e. outliers will be removed per agent type and the mean of the remaining scores will be the final score).

## New and modified Built-in components

Given the availability of [trading prices](#) and [exogenous contract summary](#) in 2021, we provide new agents and components that uses them to improve their behavior:

- ▶ **MarketAwareTradePredictionStrategy**: Uses the exogenous contract summary to provide a better estimate of trade.
- ▶ **KeepOnlyGoodPrices**: Uses the trading prices to sign only contracts that have acceptably good prices. By default, this means buying at no more than 50% above the trading price and selling no more than half that price. You can control these limits.
- ▶ **NegotiationStrategy**: Negotiation strategies now adjust the negotiation agenda to the trading price<sup>1</sup>.

<sup>1</sup>If run in an SCML2020World with no published trading prices, it will use catalog prices



# Agent Behavior

## New built-in agents

New agents are provided that use the new components utilizing market information. They all start with \*MarketAware\*

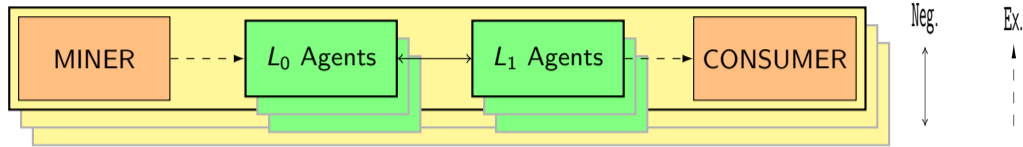
- ▶ **MarketAwareDecentralizingAgent**: Based on DecentralizingAgent
- ▶ **MarketAwareIndDecentralizingAgent**: Based on IndDecentralizingAgent
- ▶ **MarketAwareRangeAgent**: Based on RangeAgent
- ▶ **MarketAwareBuyCheapSellExpensive**: Based on BuyCheapSellExpensive
- ▶ **MarketAwareIndNegotiationsAgents**: Based on IndNegotiationsAgents
- ▶ ...

## Behavior of old built-in agents

You may see some changes in the behavior of old built-in agents because they use tighter negotiation issue spaces by default.



# SCML-OneShot Track



## Main Idea

- ▶ Same as SCML-OneShot but repeated.
- ▶ Main difference from SCML2020:
  - ▶ No need to think about **future** negotiations.
- ▶ Every day you get a **fresh set** of exogenous contracts.
  - ▶ Think of it as **yearly** instead of daily negotiation.



## More Information

Everything <https://scml.cs.borwn.edu>

Game Description <http://www.yasserm.com/scml/scml2021oneshot.pdf>

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A New Track

Difference between OneShot and other tracks

# Inventory

## Inventory Persistence

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### **Standard/Collusion**

Products never perish

### **OneShot**

All products perish at the end of each day.

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## Inventory Valuation in Score Calculation

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### **Standard/Collusion**

Inventory is valued at a fraction of the trading price at the end.

### **OneShot**

Inventory is not valued at all (because it perishes)

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### **Implications**

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- ▶ Never buy more than what you can produce and sell immediately.
  - ▶ Future market conditions **do not matter** for today's profit.
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# Market and Production Graph

## Production Graph

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### Standard/Collusion

Can have more than one intermediate product

### OneShot

Always have exactly one intermediate product

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### Implications

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- ▶ No need to consider the case when your agent has no exogenous contracts.
  - ▶ It is recommended [for future proofing](#) to either work in the middle of the production chain or fail gracefully.
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## Public Information

All tracks in 2021 have public market information that was not available in 2020:

- ▶ Trading prices
- ▶ Exogenous contracts summary.

# Long Term Planning

## Trading Strategy

### Standard/Collusion

Needed because market conditions in the future affect the value of buying/selling today

### OneShot

Not needed because market conditions in the future **cannot** affect the value of buying/selling today

### Implications

- ▶ You cannot hope to get high profits by devising agendas for your benefit.
- ▶ You need not to think about whom to negotiate with (even though you still can decide to end negotiations early with some partners).





# Negotiation Agenda

## Delivery Time

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### Standard/Collusion

Negotiable

### OneShot

Not-negotiable (always today)

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## Quantity

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### Standard/Collusion

May be good to buy/sell above your n. lines

### OneShot

It is never good to buy/sell above your n. lines

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### Implications

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- ▶ Simpler ufuns and smaller search spaces.
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## Exactness of UFuncs

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### Standard/Collusion

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It is **not** possible to define a utility function for a set of concurrent negotiations that exactly matches the effect of outcomes on your score

### OneShot

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- ▶ An exact ufunc is defined for the complete set of concurrent negotiations **but not for any subset of them.**
- ▶ ufuncs of an agent in different days are similar.

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### Implications

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- ▶ You may still need to define a ufunc for each negotiation independently.
- ▶ The relative stability (yet with some variability) of each partner's ufunc at different days, simplifies learning how to negotiate with them over the course of the simulation.

# Exogenous Contract Distribution

## Consistency of Exogenous Contracts

### Standard/Collusion

Exogenous contracts are distributed completely randomly in different days. For example if we have two agents *A* and *B* and the total quantity in exogenous contracts is 10, either can get 0, 10 or anything in between

### OneShot

Agents will tend to have relatively high or low quantities in their exogenous contracts consistently.

### Implications

- ▶ The unfuns of agents are not completely independent in all days opening the way to learn them over time during the simulation.





## Signing

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### Standard/Collusion

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All agents have the chance to sign/not sign agreements into contracts.

### OneShot

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Agreements are automatically signed into contracts

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### Implications

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- ▶ Once you or your partner ACCEPT an offer, it **immediately** becomes binding for both of you.
  - ▶ You cannot get redundant agreements and sign a subset of them into contracts.
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