

Eplan Next26

WHERE INDUSTRY
MEETS TOMORROW

Product structuring: building a scalable engineering framework

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Masterclass

Product structuring: building a scalable engineering framework

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in digital engineering

I guide organizations in adopting digital engineering by creating a shared language and structure that enables effective collaboration and accelerates automation.



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With a clear focus on efficiency and collaboration,
I support companies in strengthening their engineering
processes and preparing for future challenges.



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Do you know why you are here?

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integration of smart digital technologies into engineering, manufacturing and processes

Industry 4.0

What we want

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Industry 4.0 = technology

What we want

What we do best

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Industry 4.0 = technology x **structure**

What we want

What we do best

Where we struggle

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Most of us are still here

Industry 3.0 = Automation of individual processes
Process structure

Industry 4.0 = Digitalization of the supply chain
System structure

We want to go here

Imagine you have a sheep.

Not just any sheep, *your* sheep - the one you raised from the very beginning.

Of course you are proud of it.

To you, it is clearly the most important sheep in the whole herd.

But... what are the odds that everyone else agrees with you?



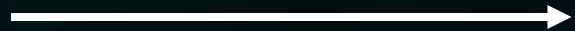
The product your make is your sheep.

Shift your perspective

From part, to part of

From product, to **system**

Product structure



System structure



herding from product structure to system structure

System Shepherds

Contents + Objective



- Board
- Magnetic cards
 - 8x red cards (=)
 - ~~2x green ++ cards (++)~~
 - 8x green cards (+)
 - 40x blue cards (-)
- ~~Card with ISO 81346 chart~~
- Markers

- Participants: Up to 4
- Age: 6+
- Duration: about 30 minutes

The goal is to build a system structure out of a product structure.

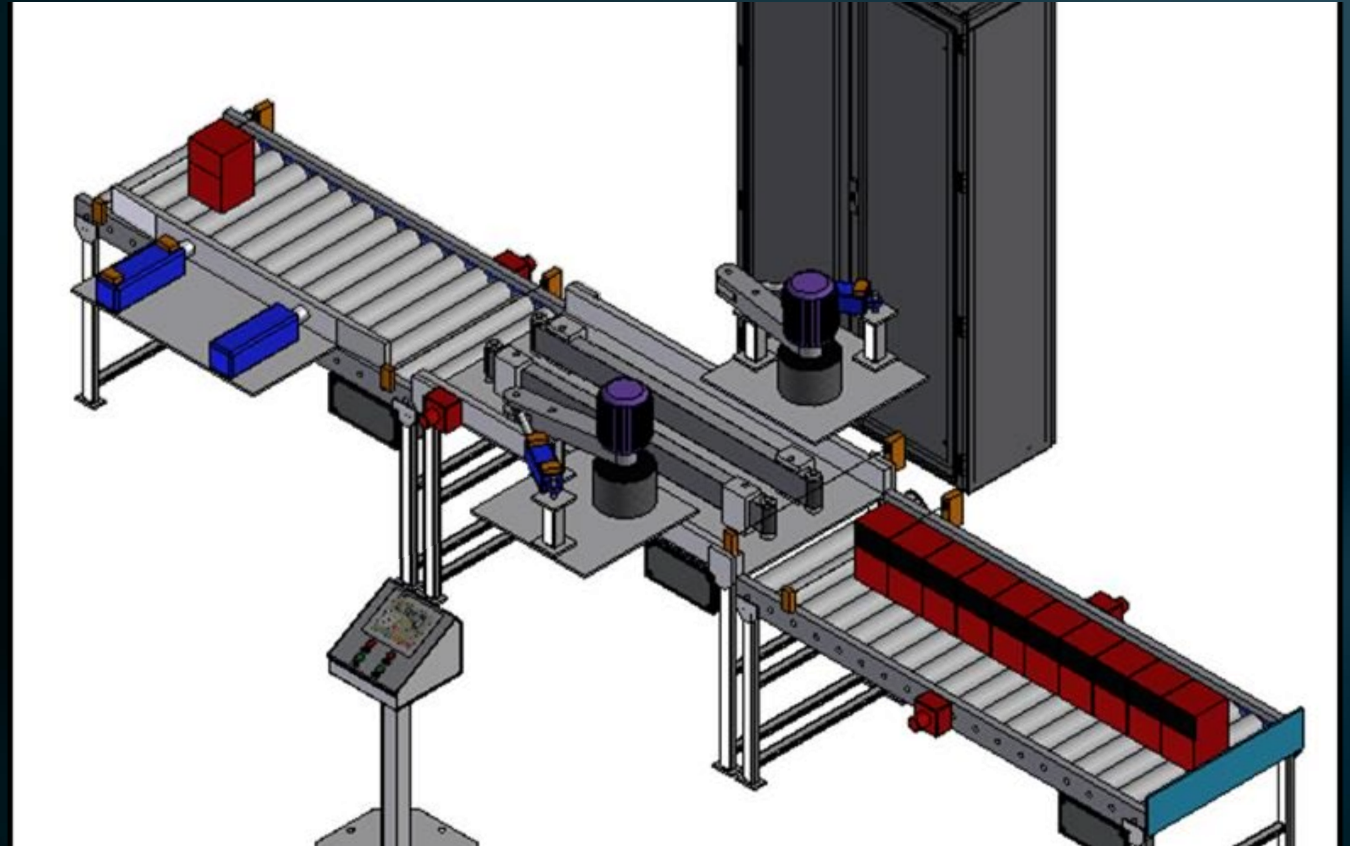


System Shepherds

Instructions

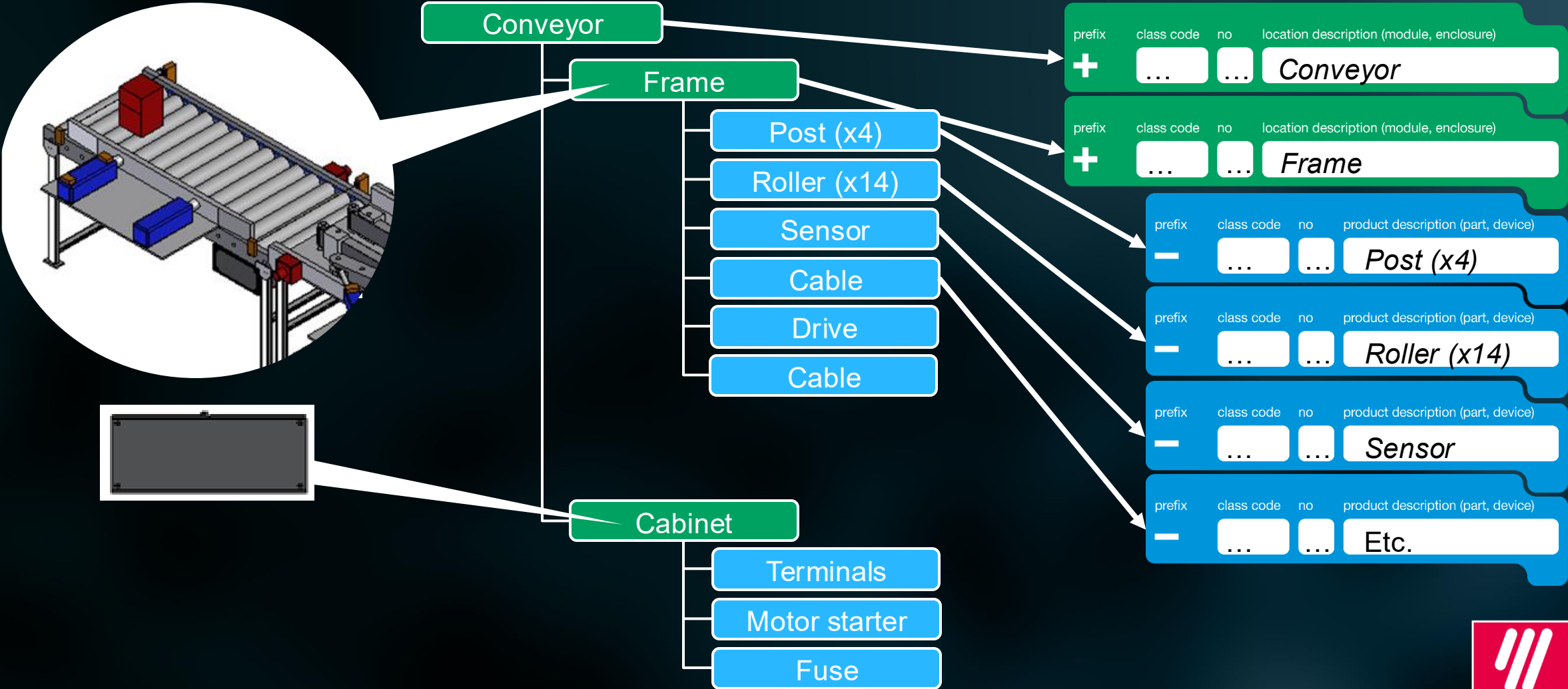


- The game includes 6 challenges;
 - Each challenge takes about 5 minutes;
 - Time is limited, so speed is essential;
 - Divide up the tasks and work together;
1. Go to the table with your seat number;
 2. Introduce yourselves;
 3. If you hear a sheep, be quiet and listen;



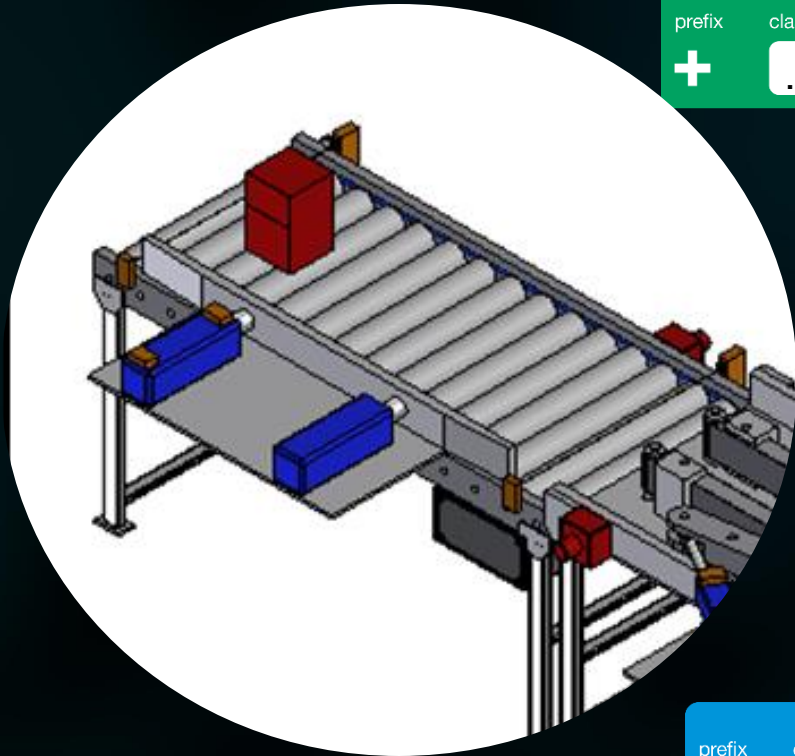
System Shepherds

Step 1: Write all the names from the product structure on the magnetic cards



System Shepherds

Step 2: Complete the structure (frame and cabinet) with missing parts



prefix class code no location description (module, enclosure)

+

...

...

?

prefix

class code

no

product description (part, device)

-

...

...

?

prefix

class code

no

product description (part, device)

-

...

...

?

prefix

class code

no

product description (part, device)

-

...

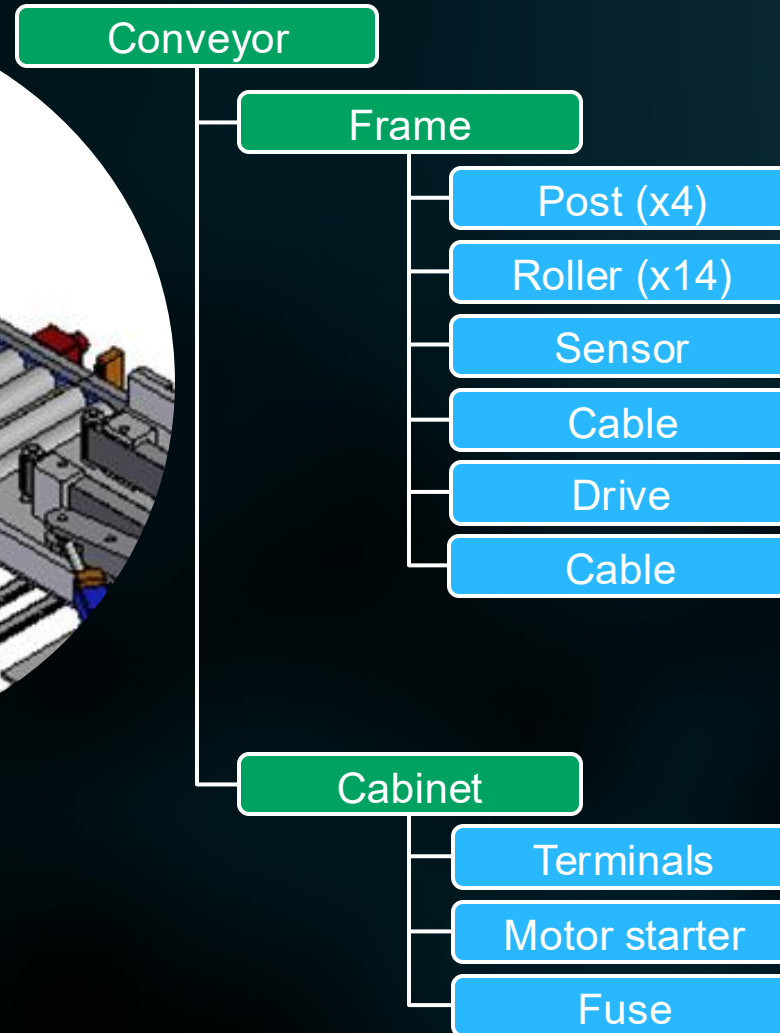
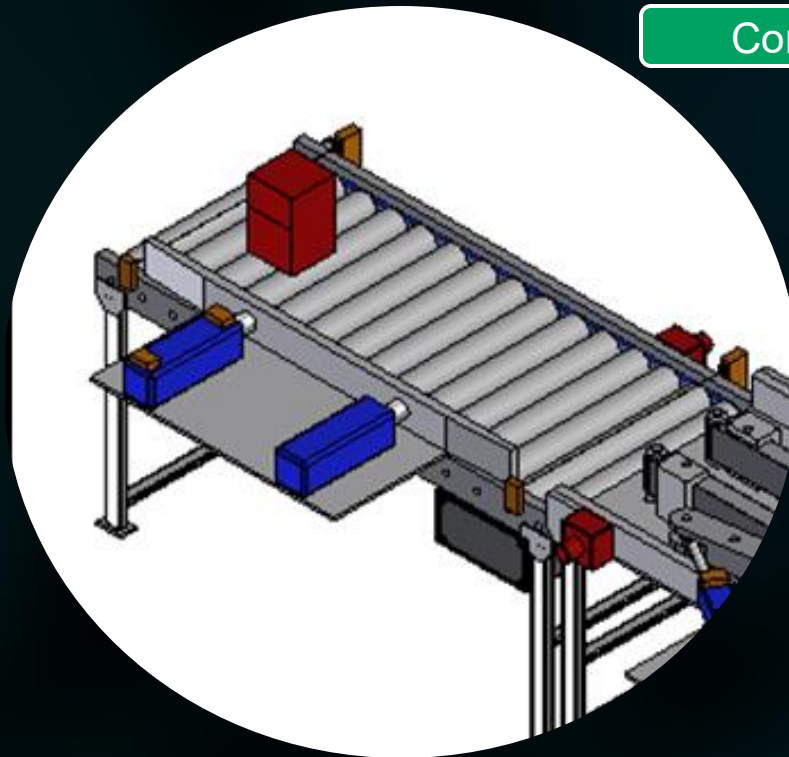
...

?

Optional: Discuss what information is missing to create a proper electrical design using this structure

System Shepherds

Step 3: Estimate the number of module variants



In a product structure, each (green) module (= assembly) has a part number.

If this module is - for example - equipped with 16 rollers, a variant is created, and thus a new part number. Including the module above it.

How many variants - and therefore part numbers - could this Conveyor module potentially have?

In what cases do these changes affect the electrical design?

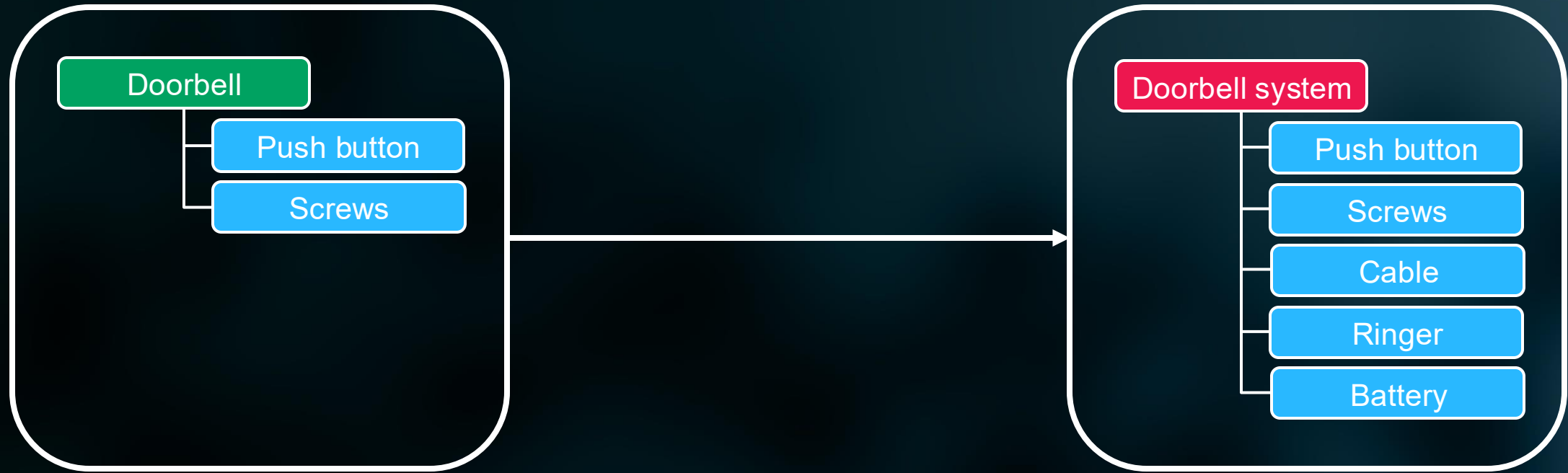
System Shepherds

Systems thinking



System Shepherds

Systems structure



Shift your perspective

From part, to part of

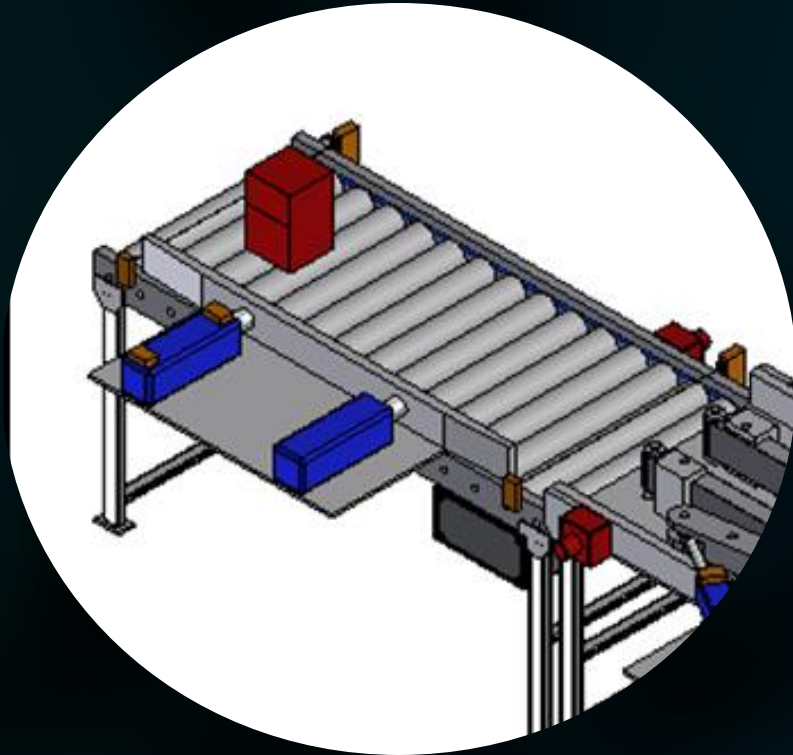
From product, to **system**

System Shepherds

Step 4: Write the system functions on the red (=) magnetic cards



1. Search for sensors and actuators;
2. What are their function in the system?
3. Write down these down on the red cards;
4. Try using noun + verb (such as “product grinding”)



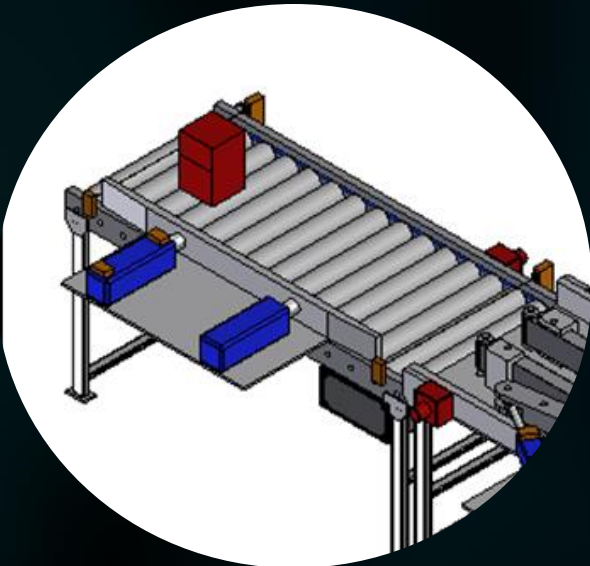
prefix	class code	no	function description (noun +verb)	
=			Product grinding	system
example				

Thinking in terms of systems and functions can be quite challenging. It's perfectly normal to fall back into old habits. But try to stick with it: what is the machine's purpose?

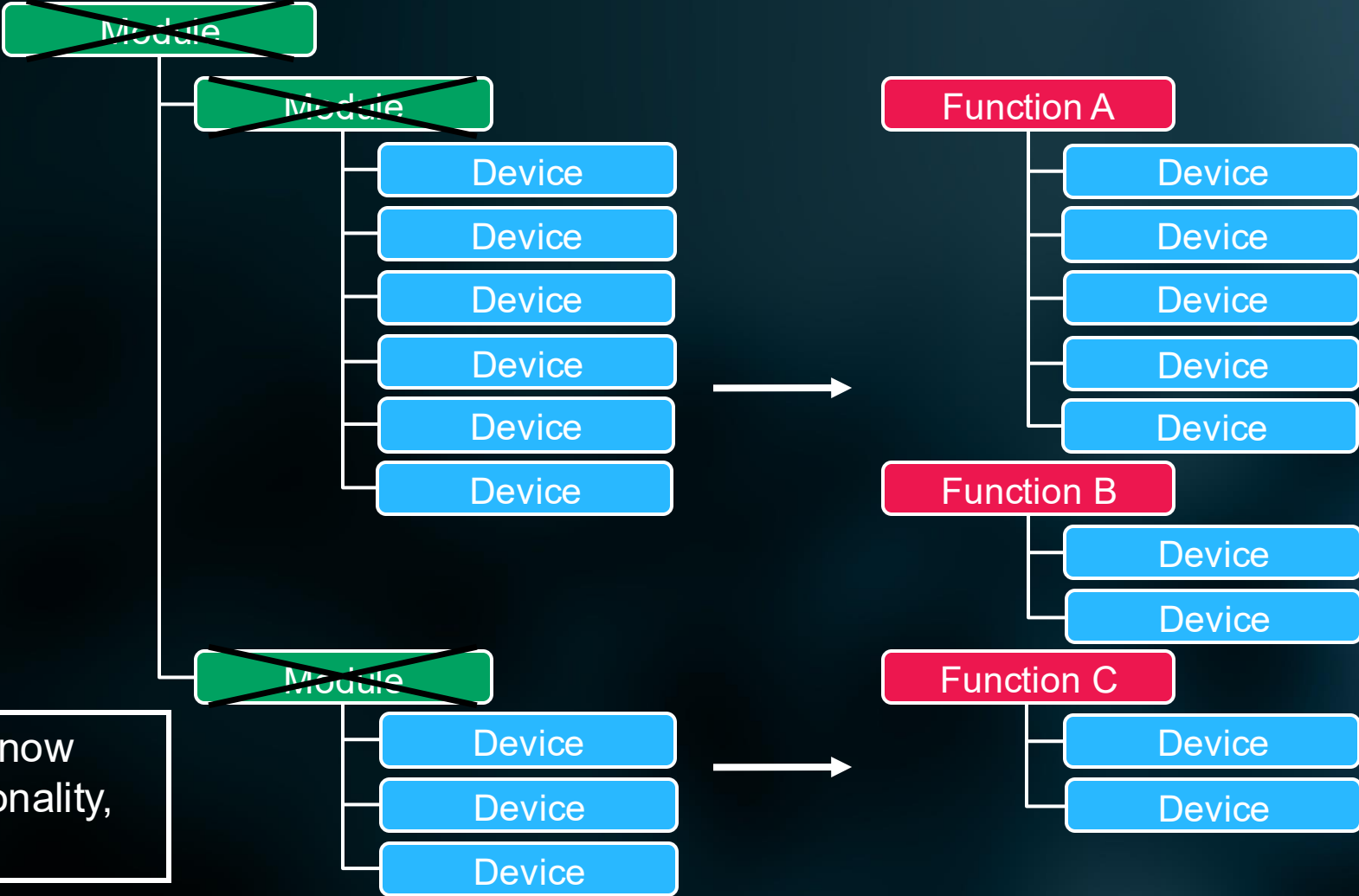
Shift your perspective from part, to part of from product to system

System Shepherds

Step 5: Move the blue device cards to the red function cards they belong to

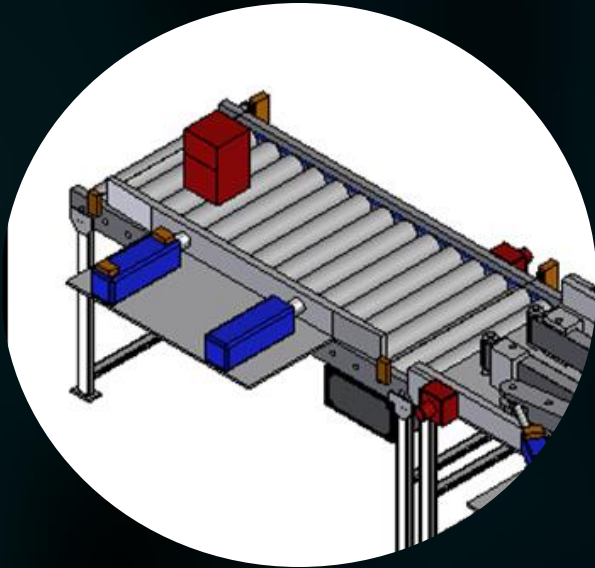


Please note: The blue cards now represent the device's functionality, not its physical appearance.



System Shepherds

Step 6: Estimate the amount of function variants



While the number of module variants can increase exponentially, the functions often remain the same.

How many function variants could this conveyor potentially have?

Please note: The blue cards now represent the device's functionality, not its physical appearance.

Product transport system

Belt drive system

Drive

Cable

Terminal strip

Motor starter

Fuse

Product detecting system

Sensor

Cable

Human safety system

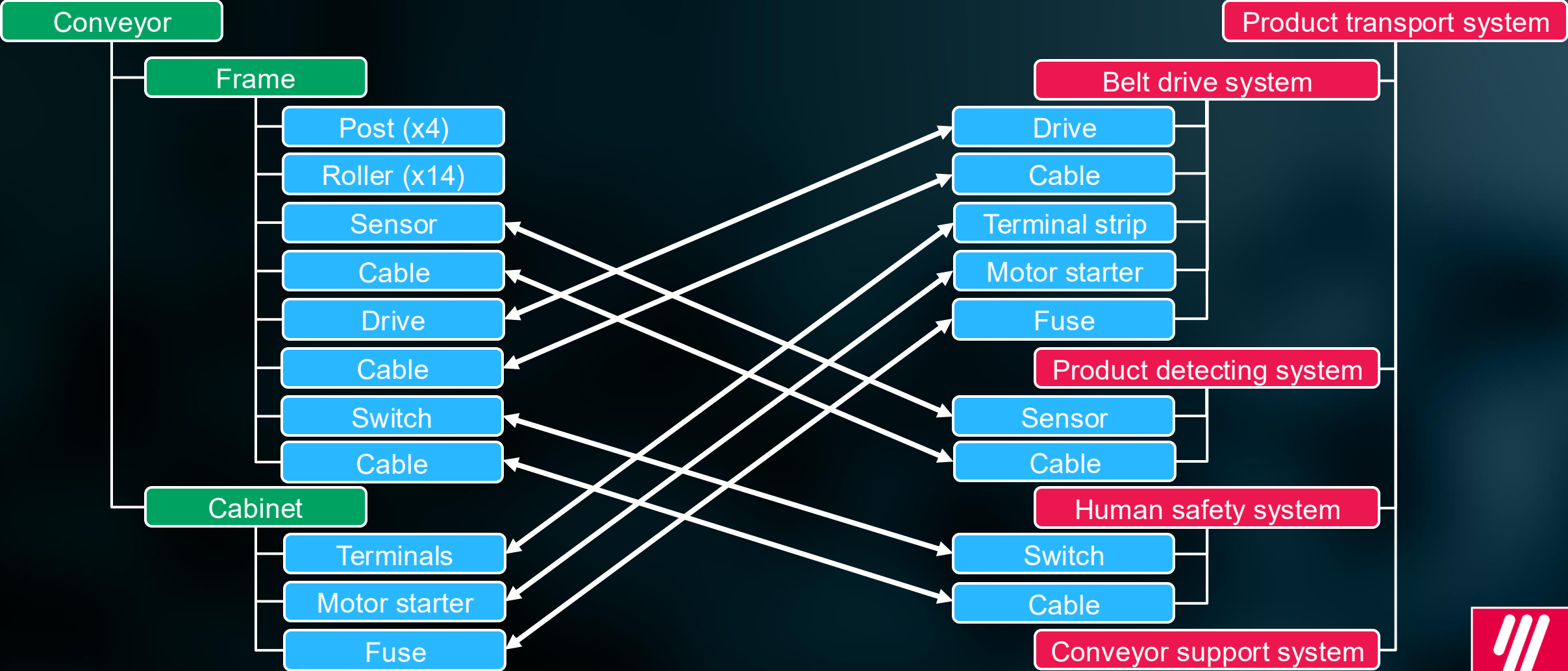
Switch

Cable

Conveyor support system

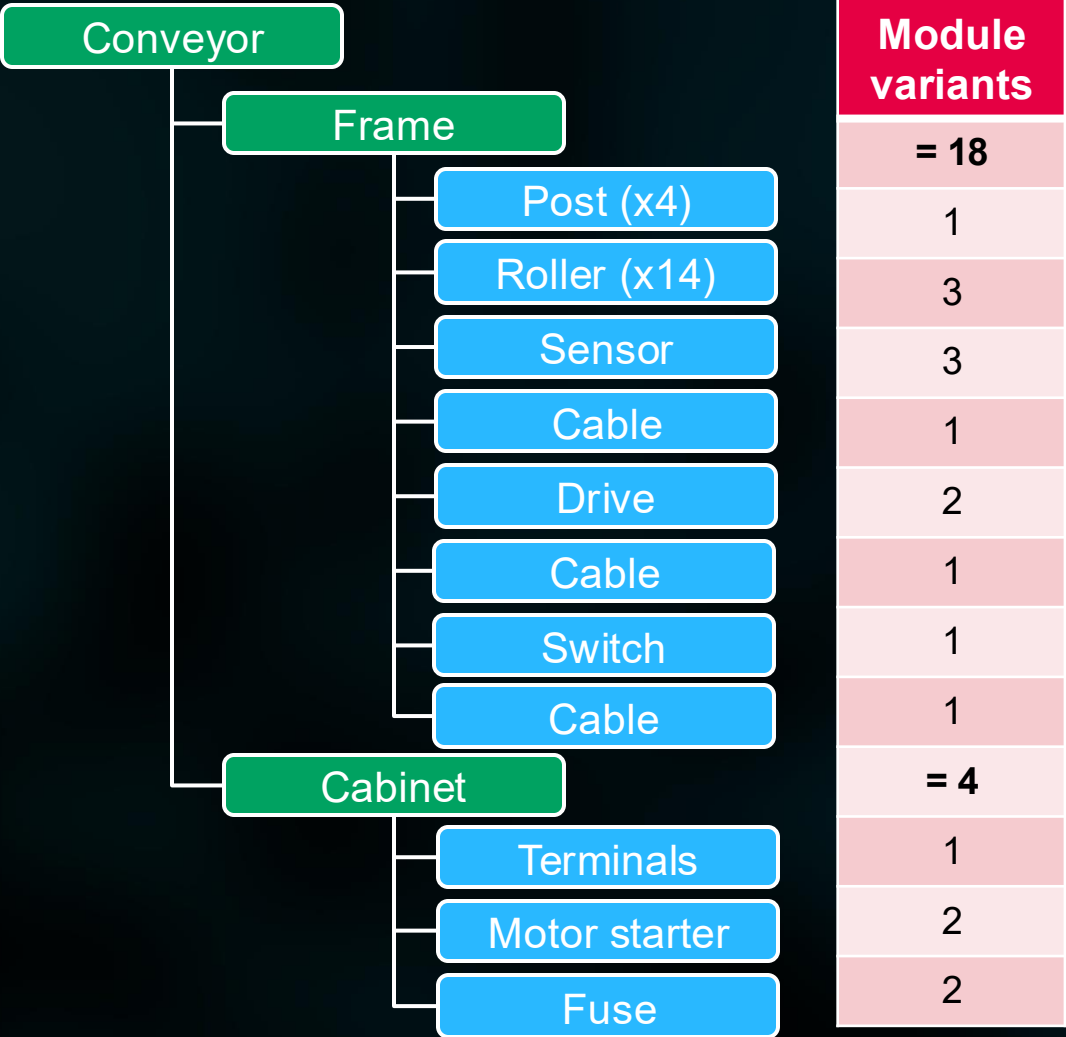
System Shepherds

Result

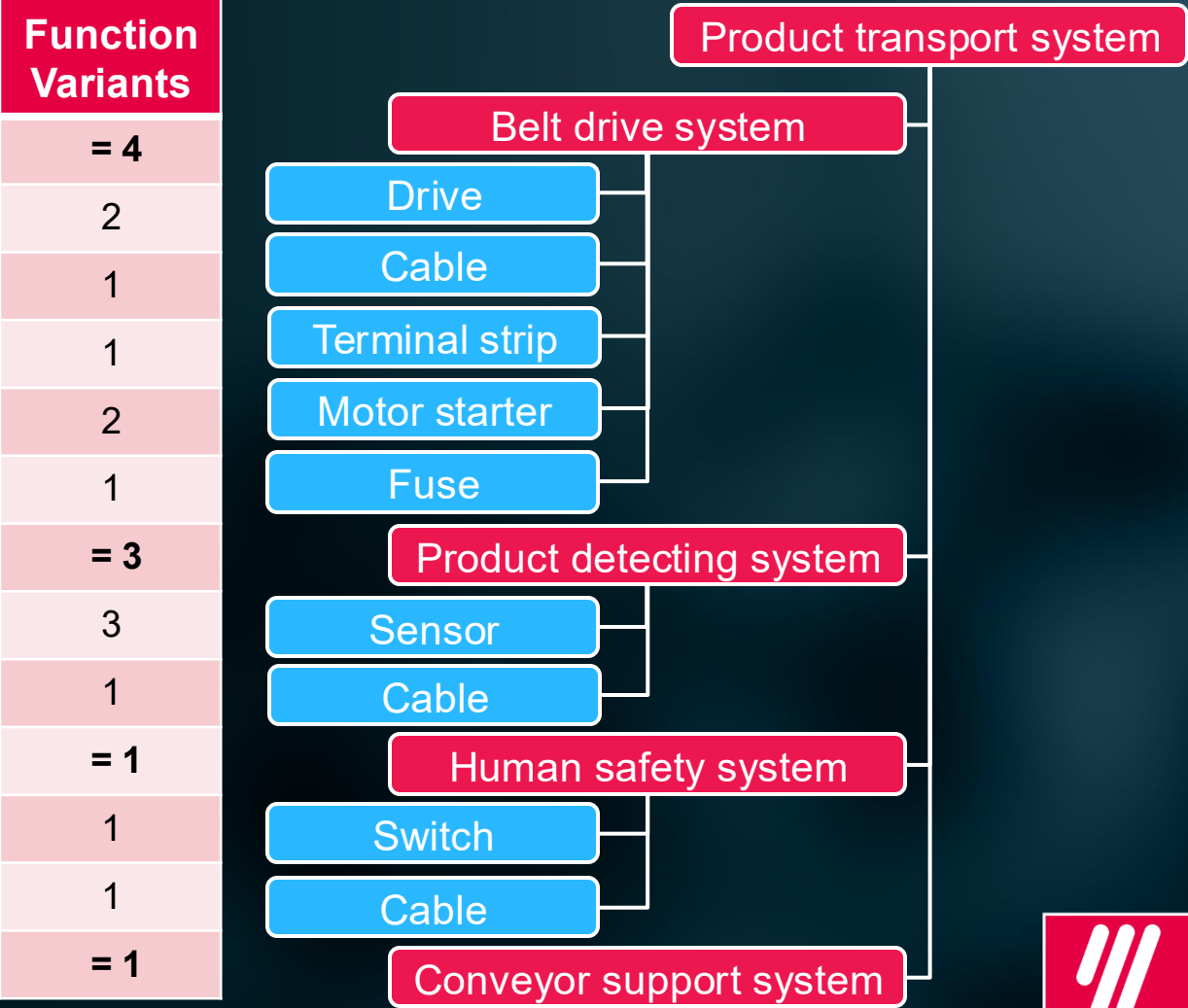


System Shepherds

Product structure with physical appearance



System structure with functional appearance





building a scalable engineering framework

Industry 4.0 = technology x **structure**

What we want

What we do best

Where we struggle

Shift your perspective

From part, to part of

From product, to **system**

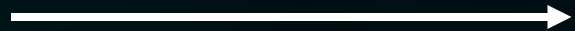
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Product structure



System structure



*Do you like the game?
Share your feedback with me!*



herding from product structure to system structure
for building a scalable digital engineering framework