The future of material handling in DC's

item picking system evolution

November 16, 2011 MHF Seminar
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Supporting statements

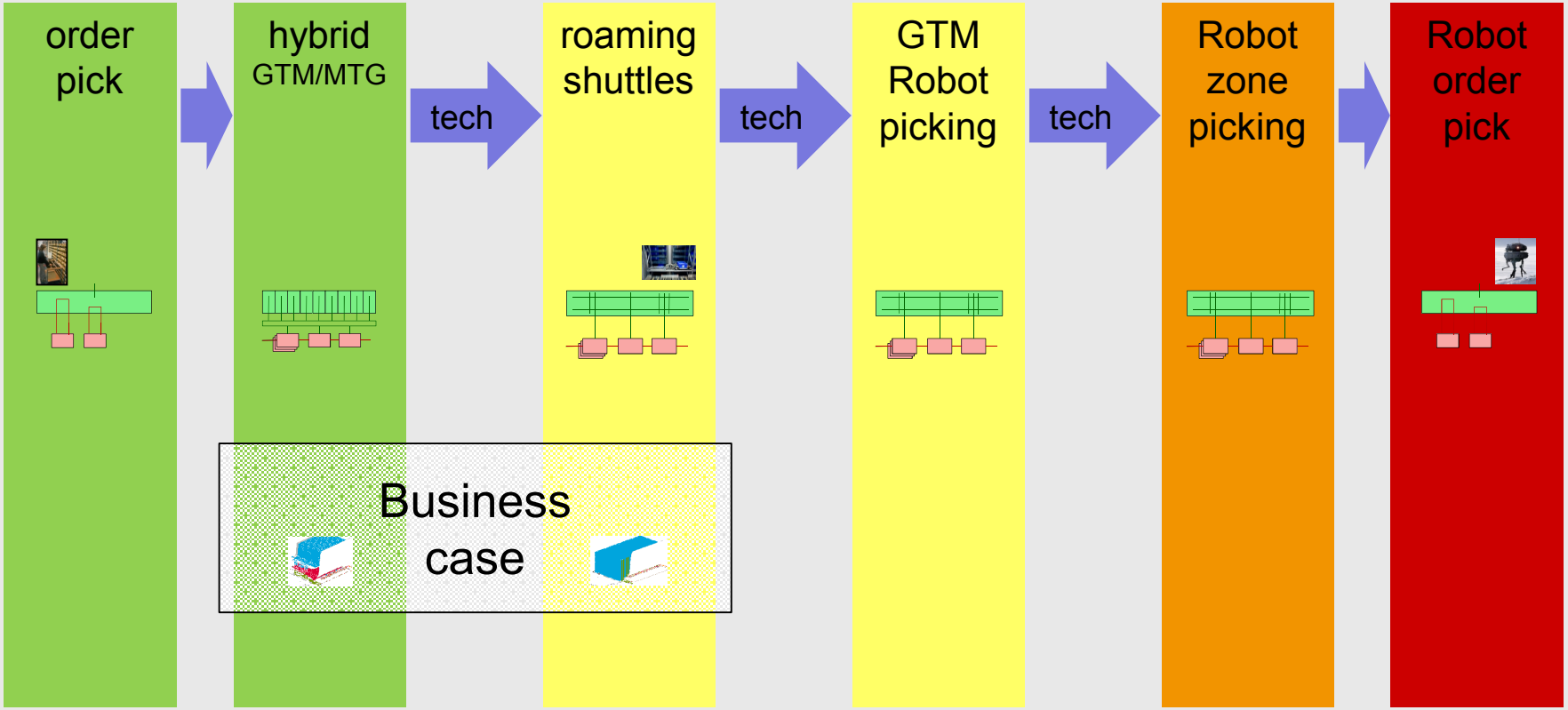
- Increased focus on risk management in - and increasing globalisation of Supply Chains call for more flexibility and robustness, in the whole Supply Chain as well as in DC's

  Flexibility is: scalability, portability
  Robustness is: availability, maintanability, business process

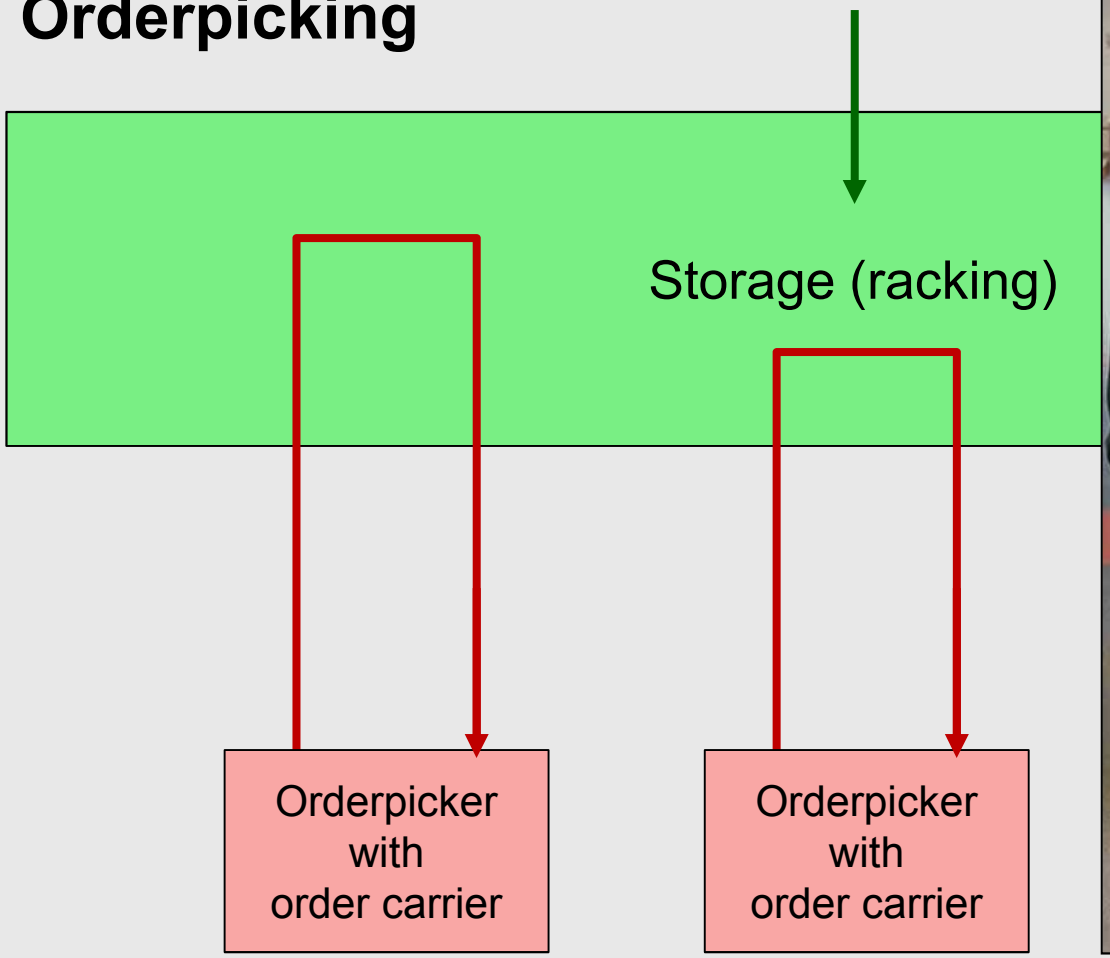
- Todays systems focus predominantly on efficiency.

- Manual orderpicking is the most flexible concept, i.e. in today's world the "best" material handling system is no material handling system.

System evolution (item picking)

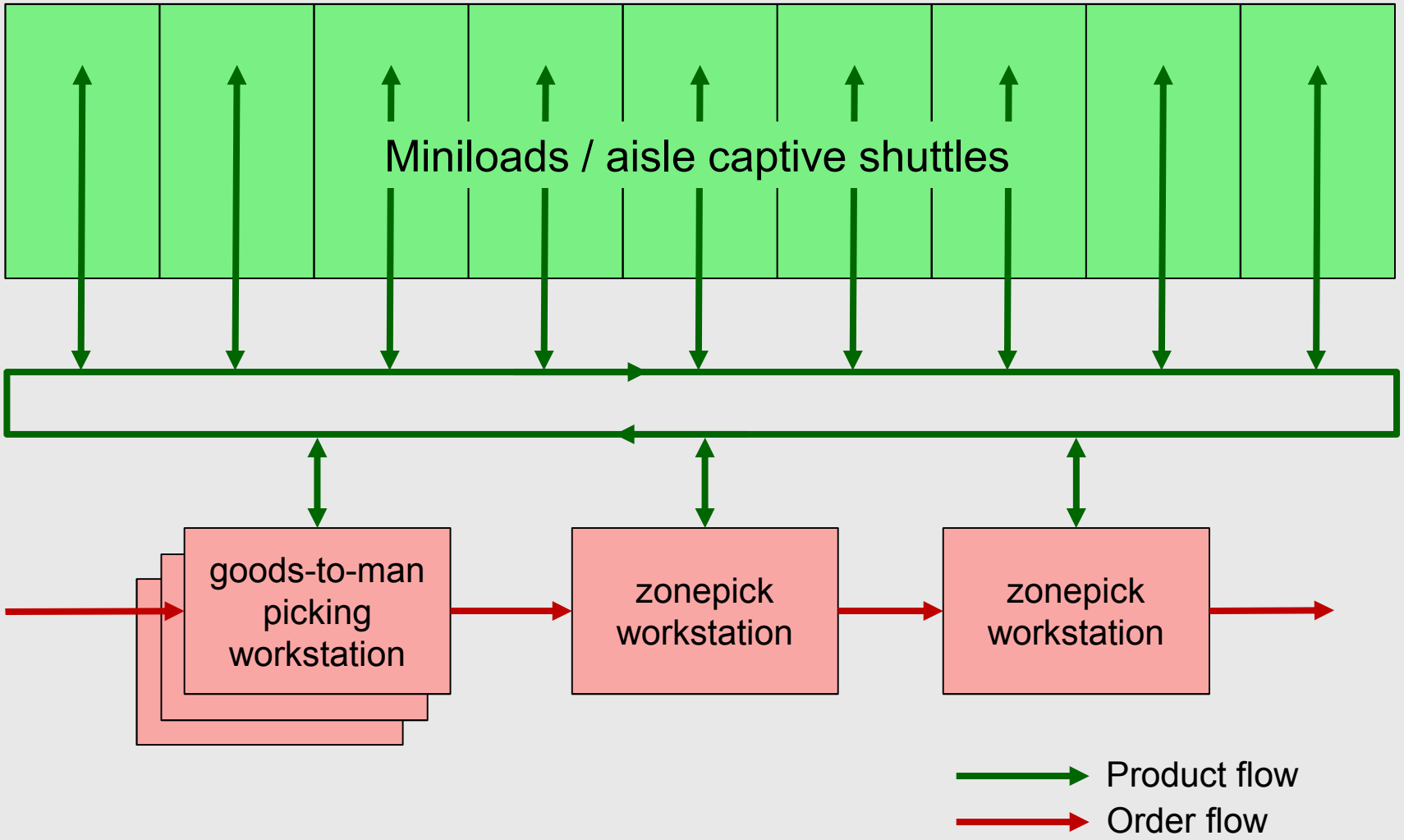


Orderpicking

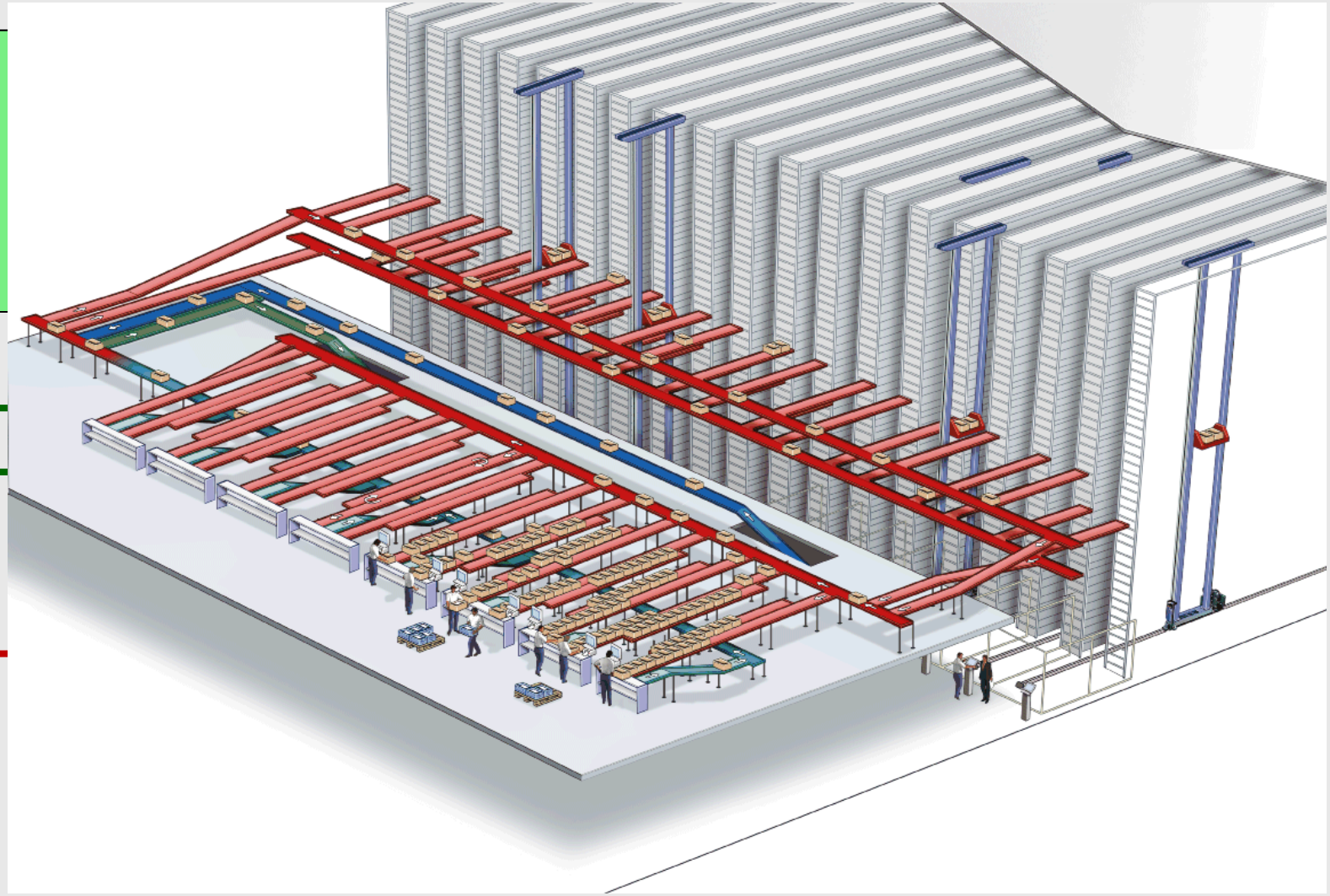


Product flow
Order flow

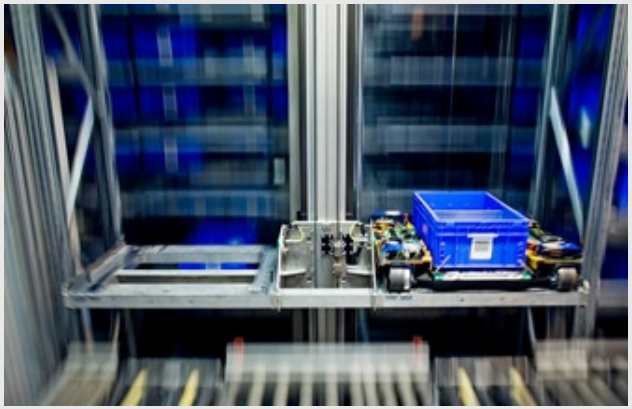
Hybrid goods-to-man / man-to-goods



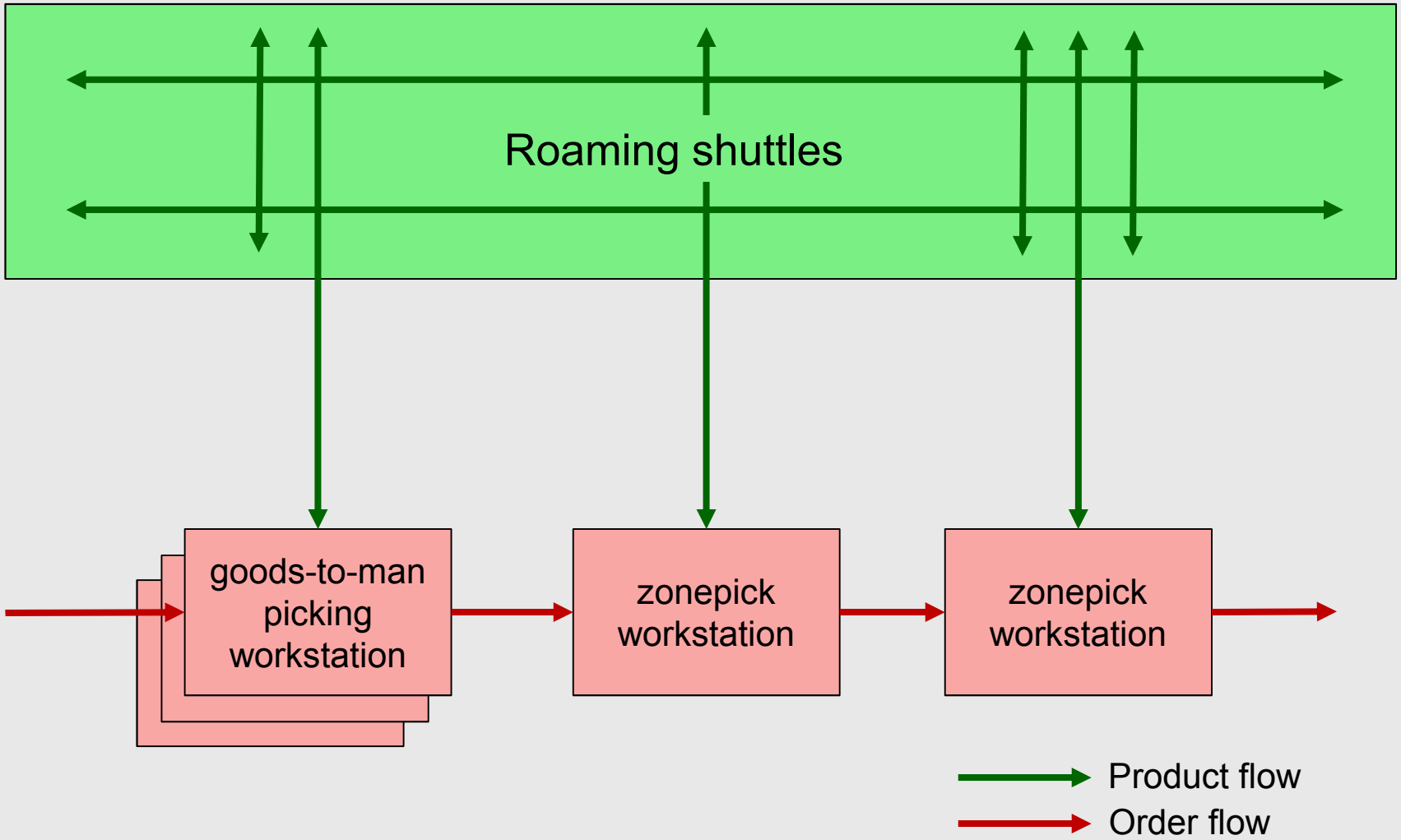
Hybrid goods-to-man / man-to-goods



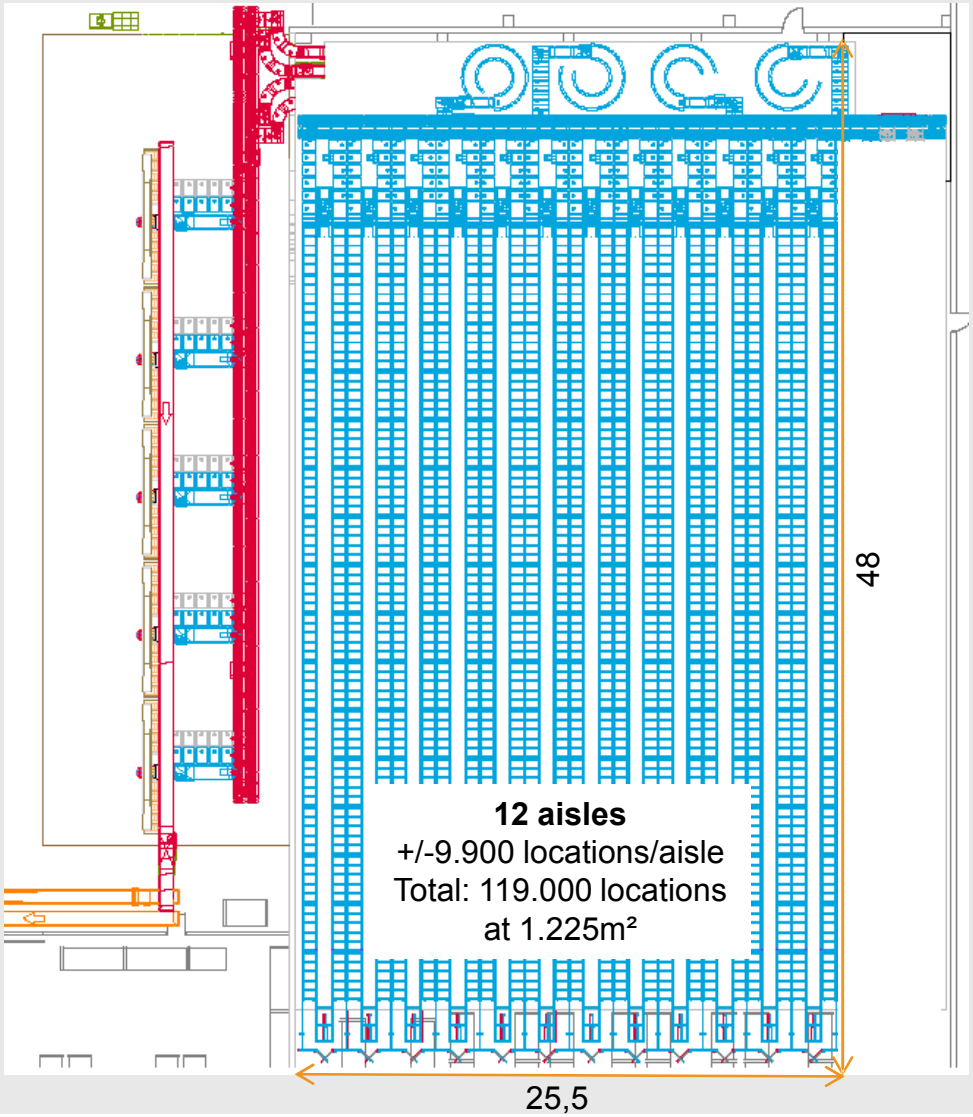
Enabling technology: roaming shuttles



Roaming shuttles

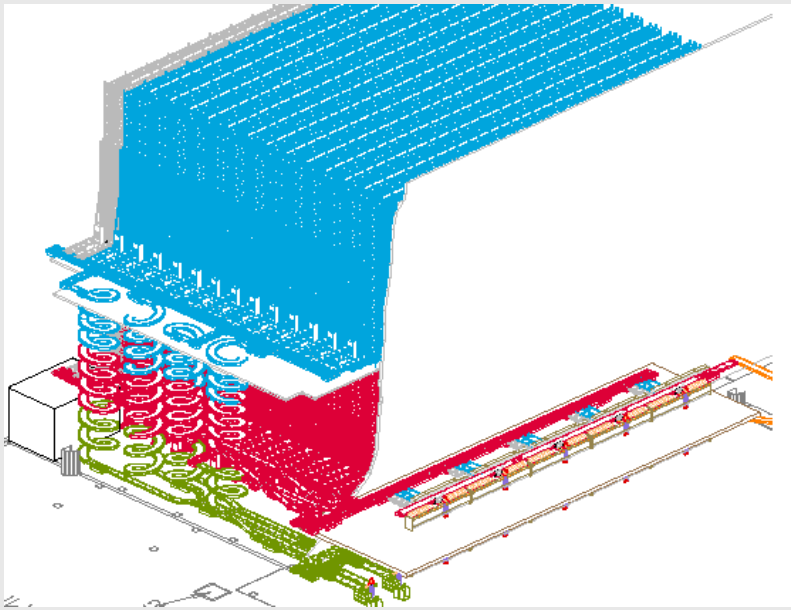


Business case: miniload design (1.625 OL/hr)

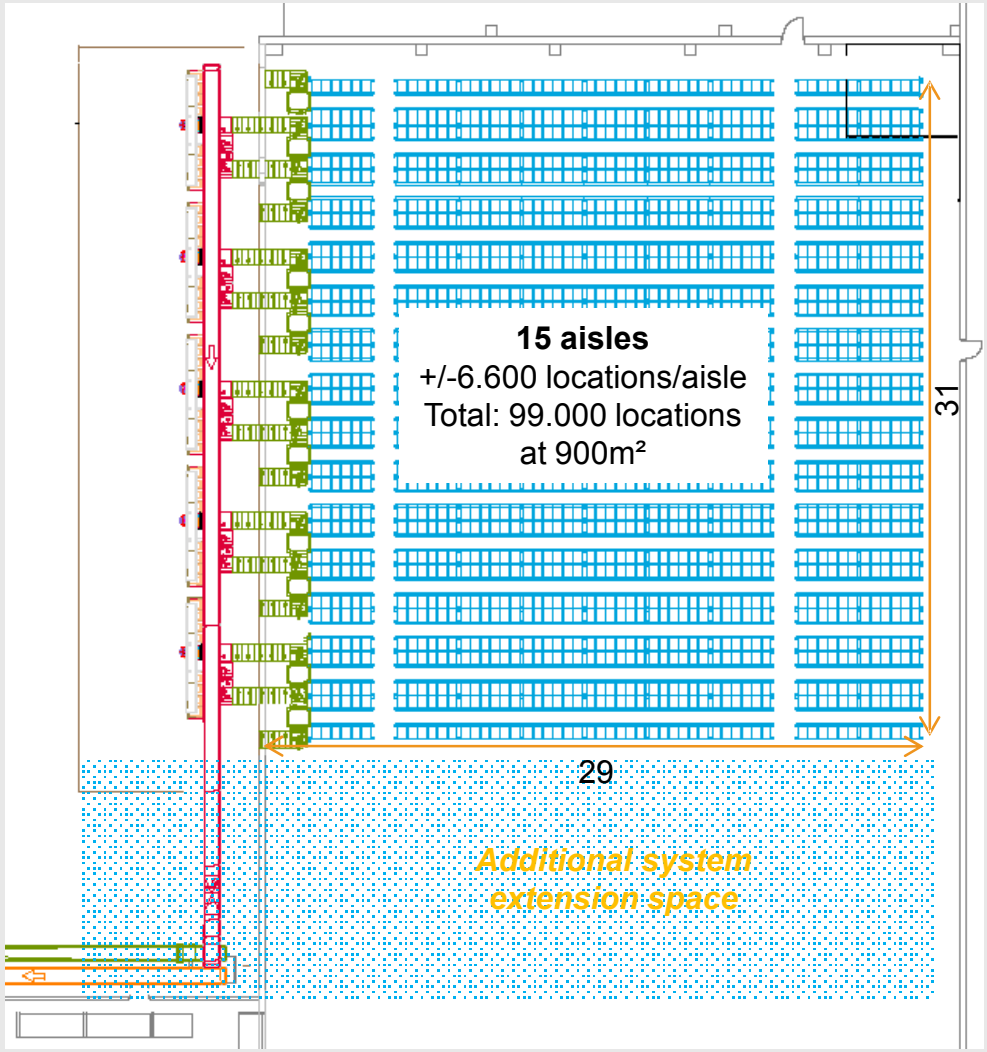


24 cranes in(12 aisles):

- 2.*400* totes in/out (FEM cycles)
  2.000 totes in/out @ 85% utilisation
- 119.000 storage locations
- 2 central loops up-to 3.000 totes/hour
- 10 pick-pack stations

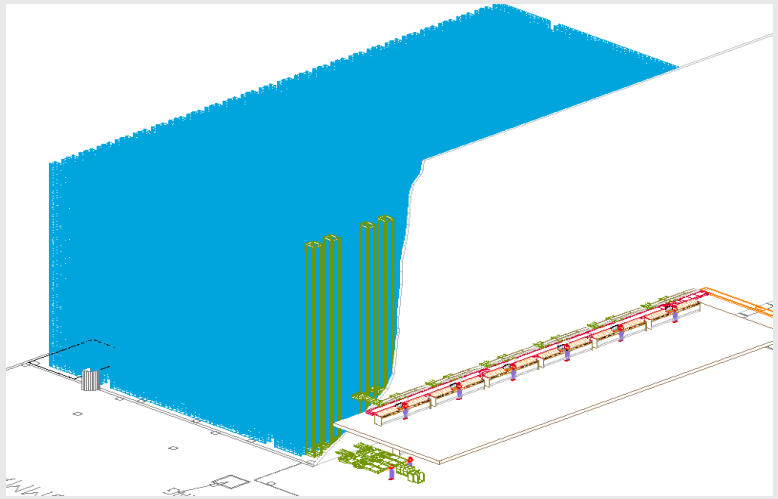


Business case: roaming shuttle design (1.625 OL/hr)

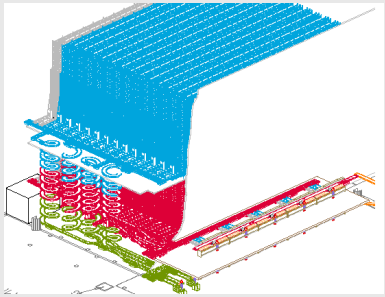


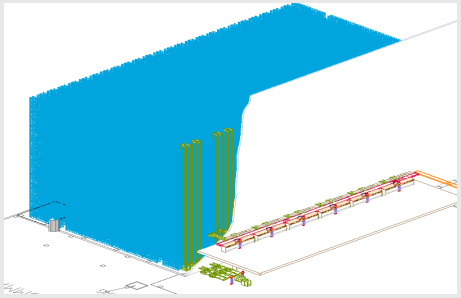
11 lifts, 54 shuttles (15 aisles):

- 54 x 40 = 2.160 totes in/out
  1.900 totes in/out @ 88% utilisation
- 99.000 storage locations
- 10 pick-pack stations



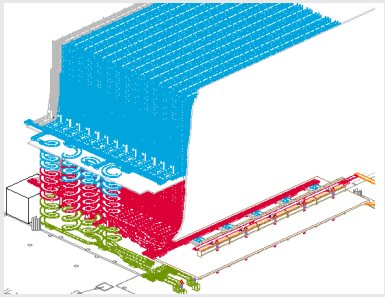
Business case: miniload vs. roaming shuttle

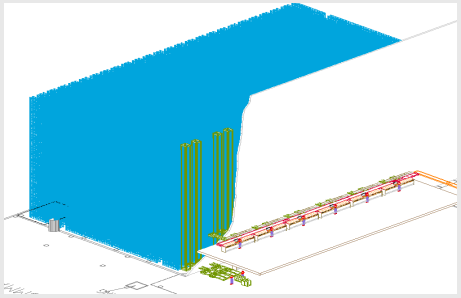




	Miniload	Roaming shuttle
Price	5.7M €	5.2M €
Performance	2850 € /cycle.hr 47.9 € /location 97 locations /m^2	2736 € /cycle.hr 52.5 € /location 110 locations /m^2
Availability	miniload: - 4.2% loop: - 50%	shuttle: - 1.9% lift: - 10%
Scalability	per aisle (12), storage capacity and throughput are linked	storage cap: per aisle(15) throughput: per shuttle/lift scaling independently!

Business case: miniload vs. roaming shuttle (ctd.)





	Miniload	Roaming shuttle
Maintainability	stock unavailability & throughput reduction	shuttle: no impact (spare) lift : throughput reduction
Portability	relocate miniloads & racking?	relocate shuttles & racking (KNEX?)
energy efficiency (ASRS)	54 VA / cycle.hr	10 VA / cycle.hr

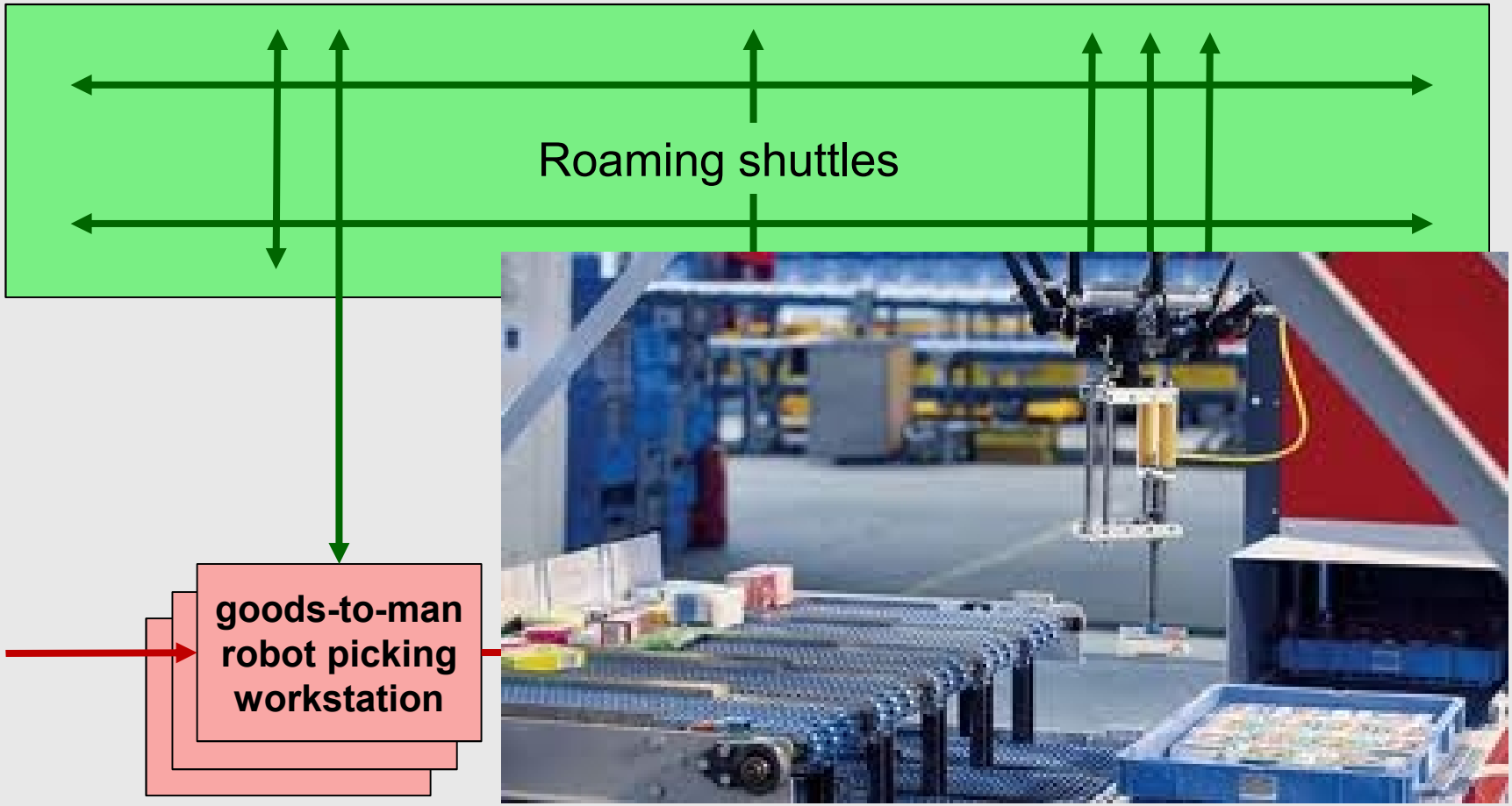
"**Ahlsell, Hans Norelius**: this system is cost efficient, has superior availability and scalability and is robust towards changes in the process.
In a business like ours, with continuous growth, it is a system that will fit our needs over a longer period of time".

Enabling technology: robots with vision

- State of the art: regular shapes in regular stacking patterns that can be handled with a vacuum gripper (upto 80% of volume).

- Future: irregularly shaped and interlocking parts from chaotic storage

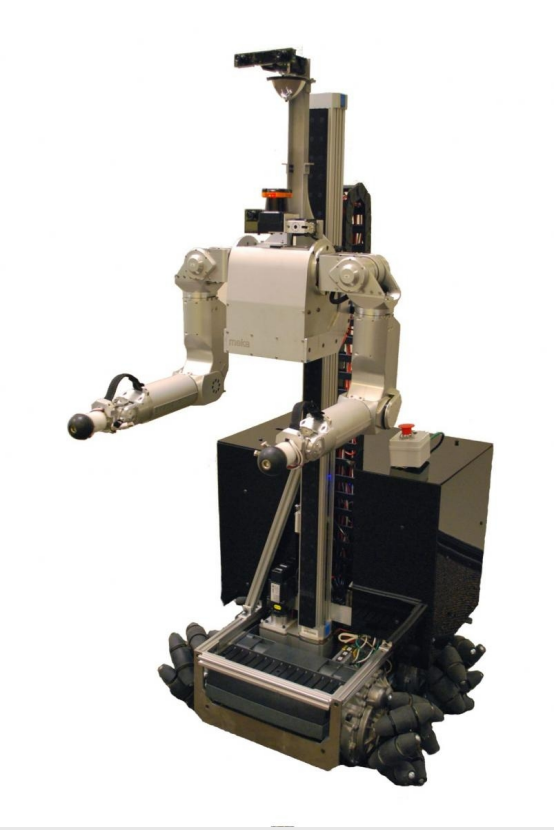
Goods-to-man robotpicking



Product flow

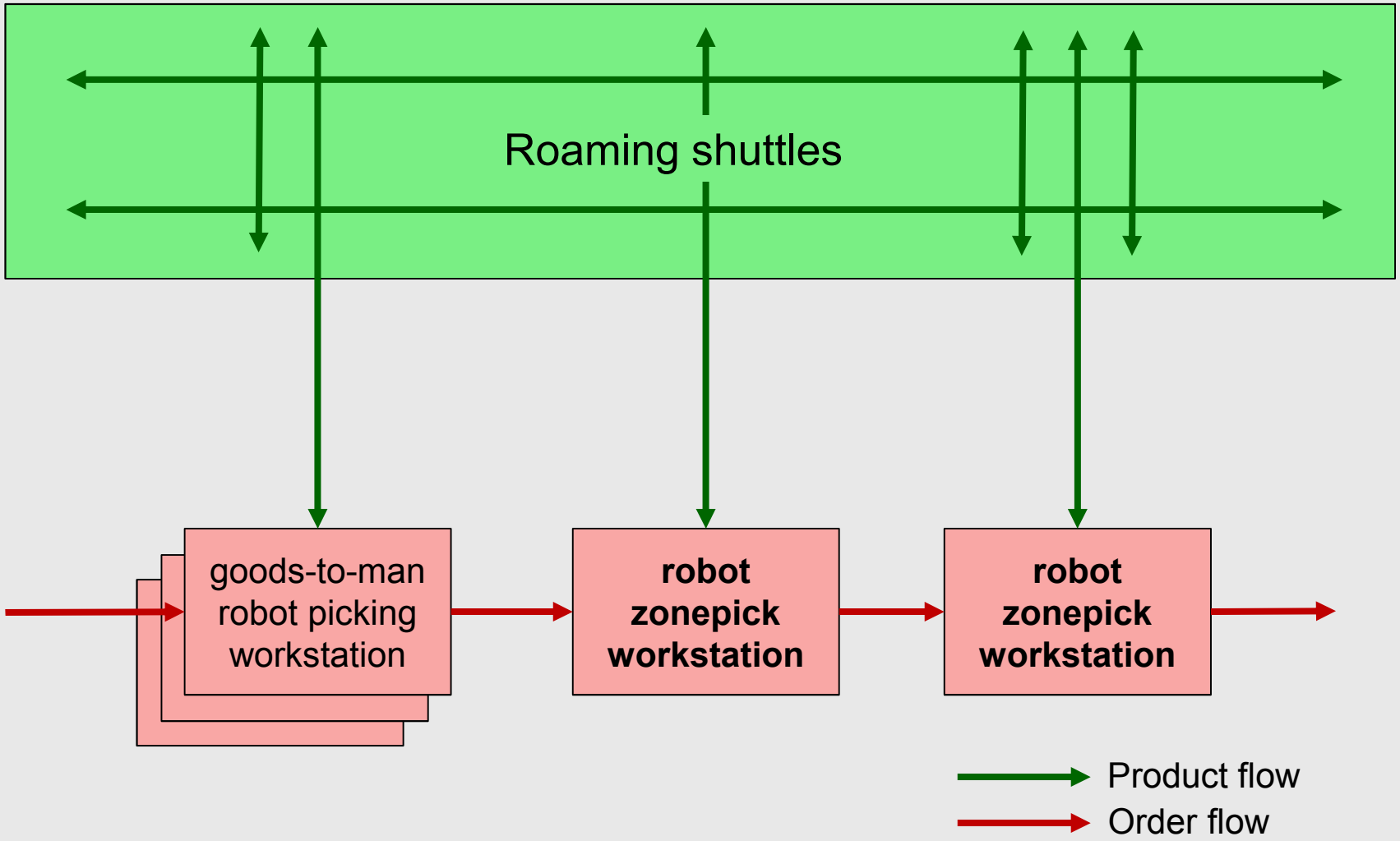
Order flow

Enabling technology: non-compliant robots with motion feedback

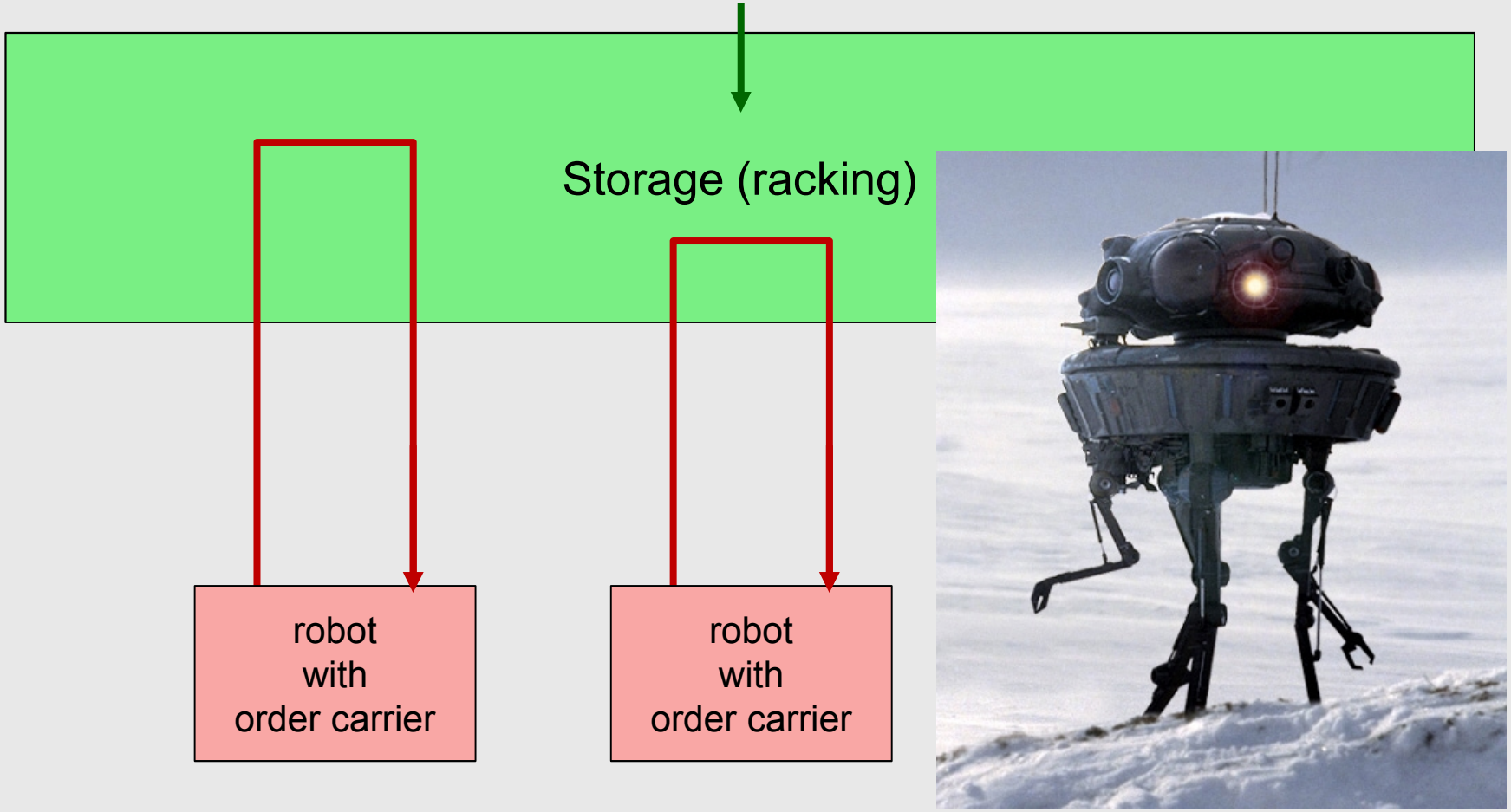


Georgiatech healthcare robotics lab: “Cody”.

Robot zonepicking



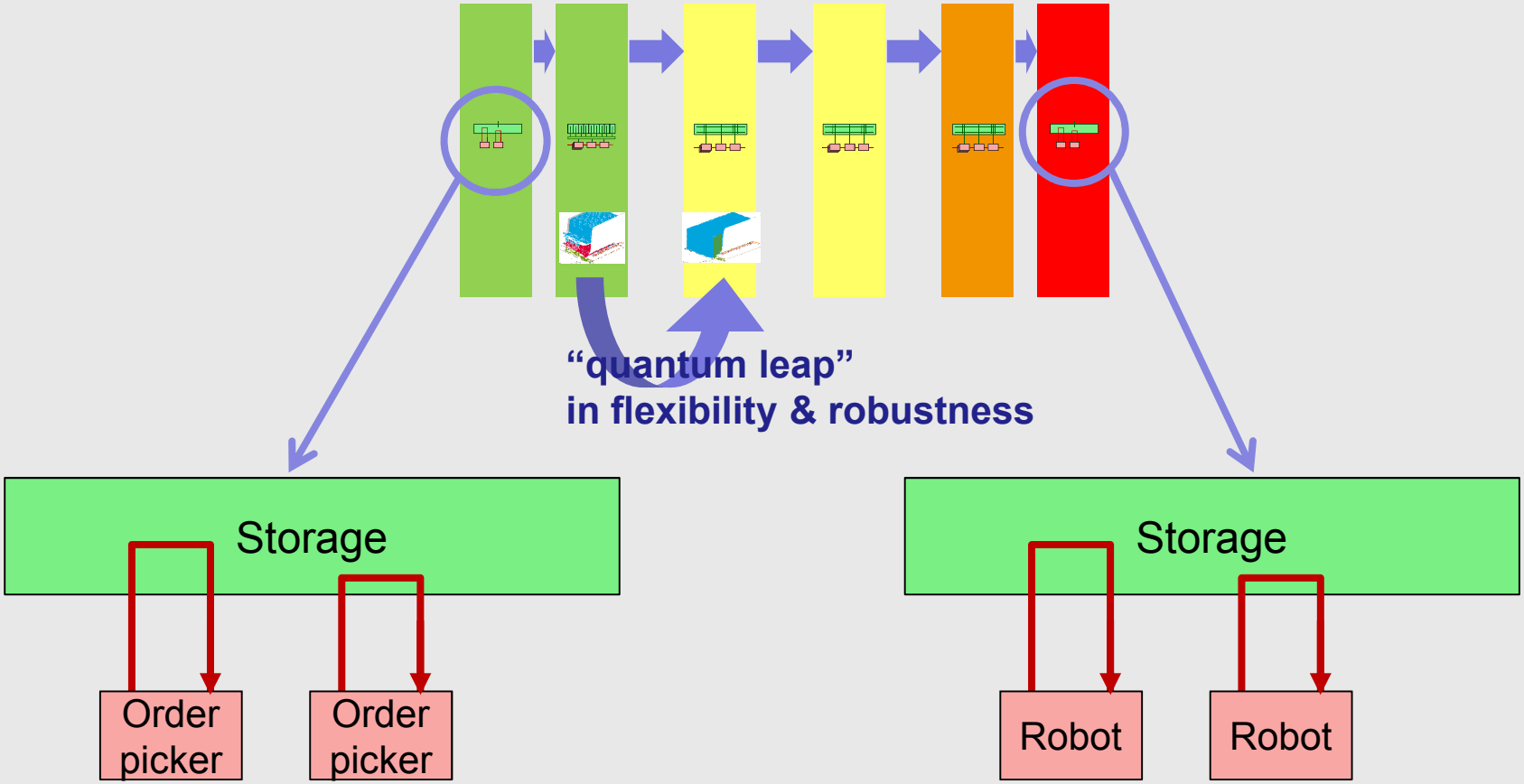
Orderpicking by mobile robots



Product flow

Order flow

System evolution: full circle

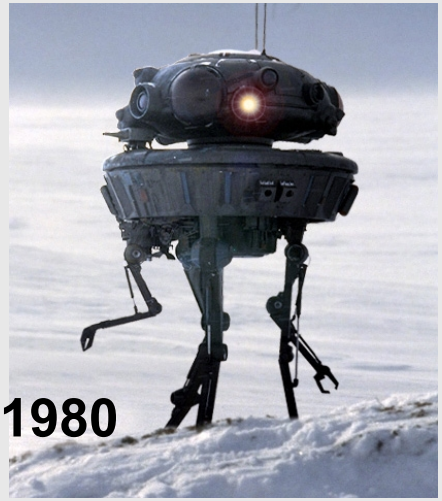


- Orderpicking is the most flexible and robust concept.
  Material handling systems of the future will increasingly deliver efficiency without sacrificing flexibility and robustness

Science fiction……

Star Trek 1966

2011



Star Wars 1980