



# ROMBIO



## Model-driven AI in Operations Management *from space exploration to (bio)manufacturing and healthcare*



Marion Vanorlé  
**marion@genko.be**  
*Business developer World*

Louis Deschanel  
**louis.deschanel@genko.be**  
*Business developer France*



Michael Saint-Guillain  
**michael@genko.be**  
+32 494 90 98 47  
CEO & cofounder



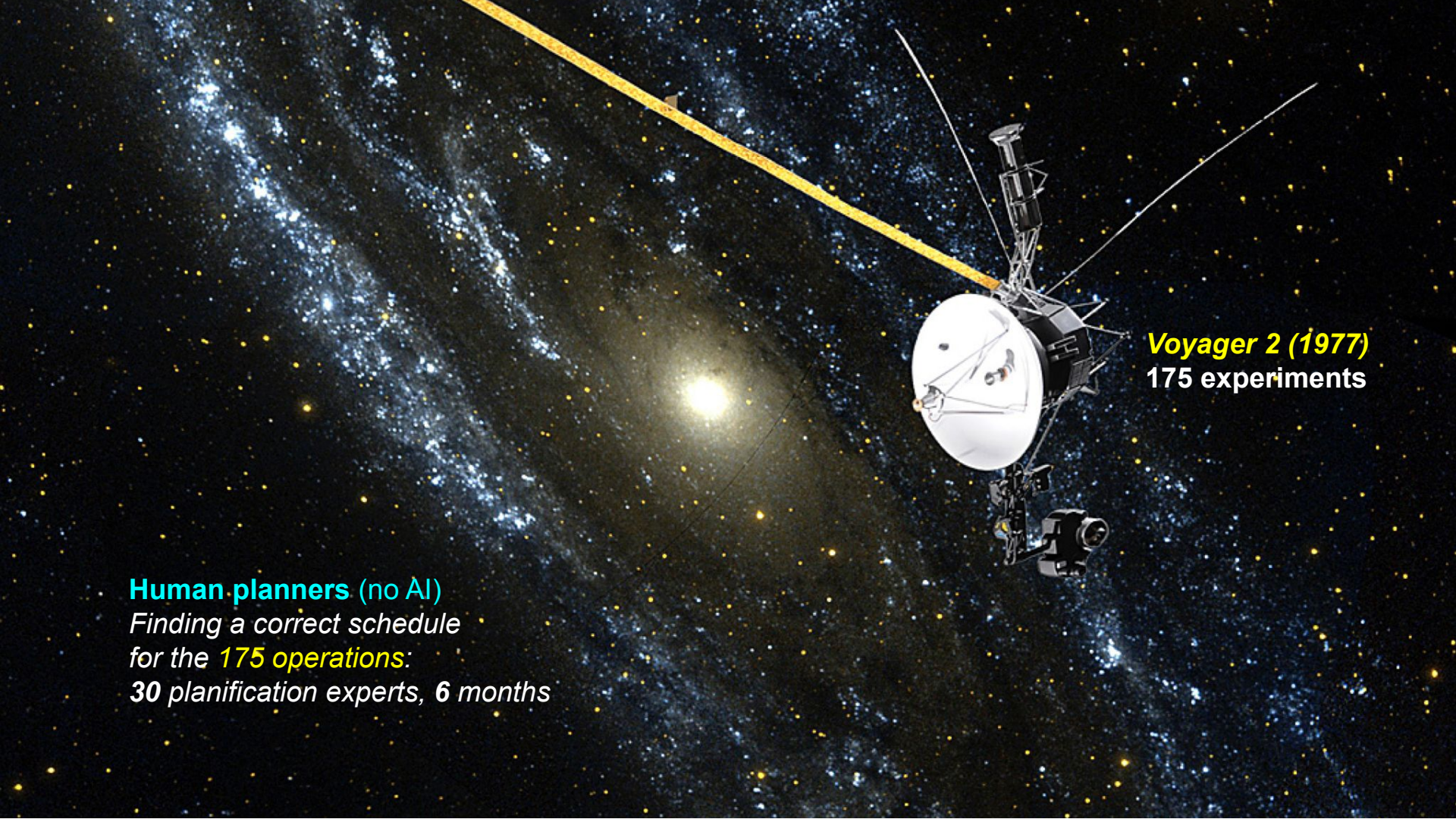


AI (combinatorial optimization) for **scheduling**



AI (combinatorial optimization) for **scheduling**

*Do you really need AI to make plannings?..*

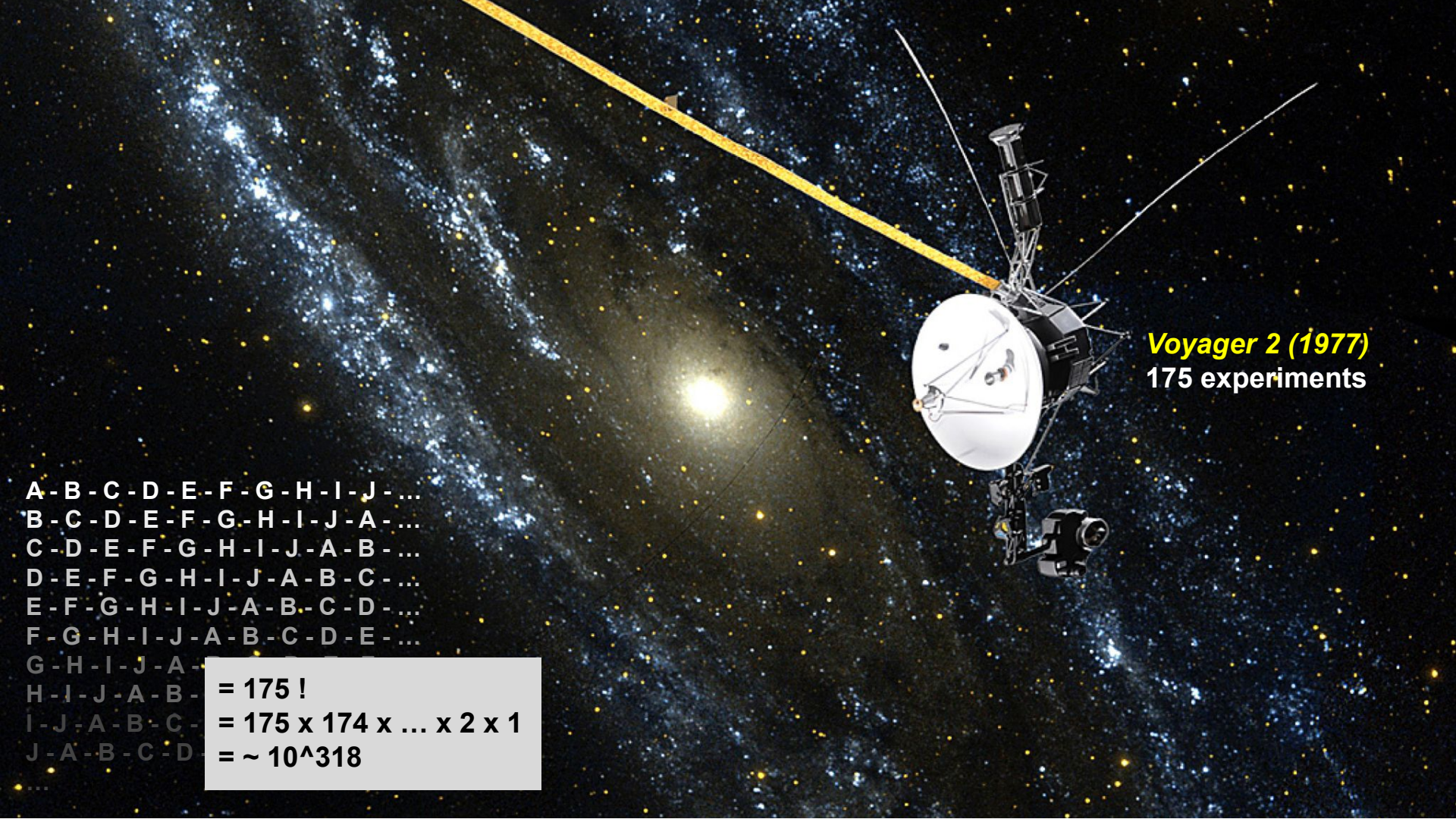
The image shows the Voyager 2 spacecraft in deep space. The spacecraft is a complex of various instruments and antennas, with a large white parabolic dish antenna prominently visible. A long, thin, golden-colored boom extends from the main body of the spacecraft. The background is a vast expanse of space filled with numerous stars of varying brightness and colors, and a prominent, bright, yellowish-white star is visible in the lower-left quadrant. The overall scene is a high-contrast, detailed representation of the spacecraft in its operational environment.

**Voyager 2 (1977)**  
175 experiments

**Human planners (no AI)**

*Finding a correct schedule  
for the **175 operations**:*

*30 planification experts, 6 months*



**Voyager 2 (1977)**  
175 experiments

A-B-C-D-E-F-G-H-I-J-...  
B-C-D-E-F-G-H-I-J-A-...  
C-D-E-F-G-H-I-J-A-B-...  
D-E-F-G-H-I-J-A-B-C-...  
E-F-G-H-I-J-A-B-C-D-...  
F-G-H-I-J-A-B-C-D-E-...  
G-H-I-J-A-B-C-D-E-F-...  
H-I-J-A-B-C-D-E-F-G-...  
I-J-A-B-C-D-E-F-G-H-...  
J-A-B-C-D-E-F-G-H-I-...  
...

= 175 !

= 175 x 174 x ... x 2 x 1

= ~ 10<sup>318</sup>

$10^{80}$ : #atoms  
Visible Universe



A-B-C-D-E-F-G-H-I-J-...  
B-C-D-E-F-G-H-I-J-A-...  
C-D-E-F-G-H-I-J-A-B-...  
D-E-F-G-H-I-J-A-B-C-...  
E-F-G-H-I-J-A-B-C-D-...  
F-G-H-I-J-A-B-C-D-E-...  
G-H-I-J-A-B-C-D-E-F-...  
H-I-J-A-B-C-D-E-F-G-...  
I-J-A-B-C-D-E-F-G-H-...  
J-A-B-C-D-E-F-G-H-I-...  
...

= 175 !

=  $175 \times 174 \times \dots \times 2 \times 1$

=  $\sim 10^{318}$

1 supercomputer / atom:  
(=  $10^{80} \times \text{IBM Summit}$ )  
?

**Voyager 2 (1977)**  
175 experiments

Supercomputer  
IBM Summit (2018)  
 $\sim 2 \times 10^{17}$  op./sec



$10^{80}$ : #atoms  
Visible Universe



A-B-C-D-E-F-G-H-I-J-...  
B-C-D-E-F-G-H-I-J-A-...  
C-D-E-F-G-H-I-J-A-B-...  
D-E-F-G-H-I-J-A-B-C-...  
E-F-G-H-I-J-A-B-C-D-...  
F-G-H-I-J-A-B-C-D-E-...  
G-H-I-J-A-B-C-D-E-F-...  
H-I-J-A-B-C-D-E-F-G-...  
I-J-A-B-C-D-E-F-G-H-...  
J-A-B-C-D-E-F-G-H-I-...  
...

= 175 !

=  $175 \times 174 \times \dots \times 2 \times 1$

=  $\sim 10^{318}$

1 supercomputer / atom:  
(=  $10^{80} \times \text{IBM Summit}$ )  
 **$\sim 10^{193}$  years**

**Voyager 2 (1977)**  
175 experiments

Supercomputer  
IBM Summit (2018)  
 $\sim 2 \times 10^{17}$  op./sec

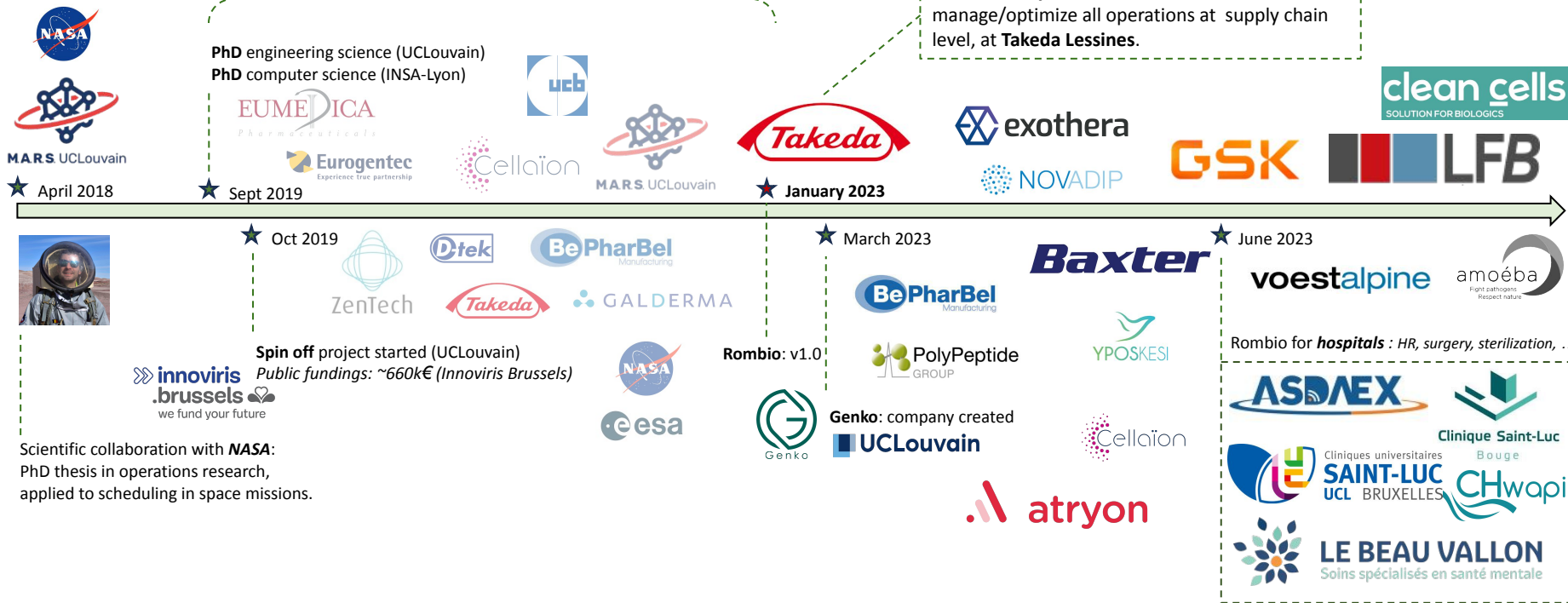




We are a young and **dynamic** academic spin off.  
**Rombio** has been **co-constructed** with our **customers**.  
 Version 1.0 was 100% developed under public fundings,  
 conducting **pilot experiments**, during 3.5 years.



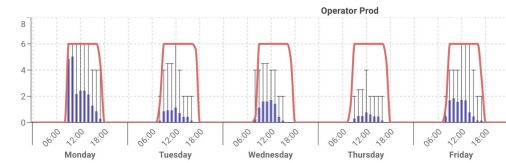
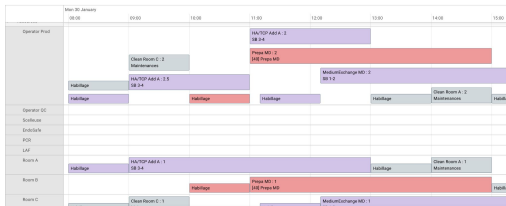
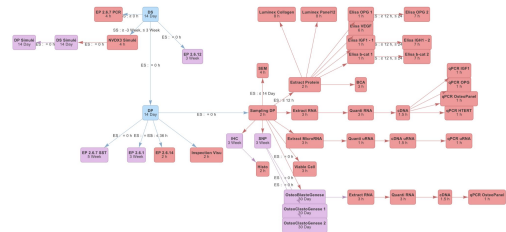
Since **January 2023**, Rombio used to  
 manage/optimize all operations at supply chain  
 level, at **Takeda Lessines**.



# Planning & Scheduling: *decision levels*

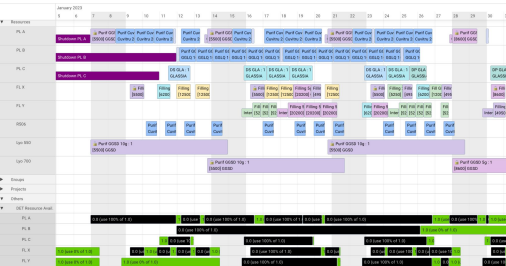
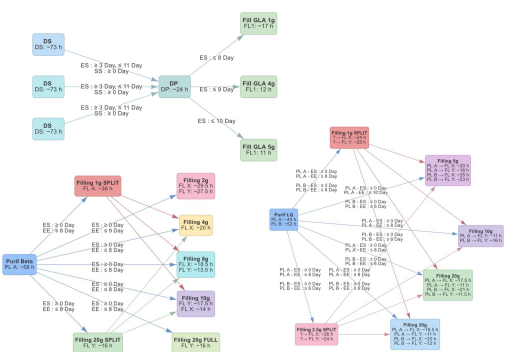
## Operational

Short term: weeks  
*Shop floor*



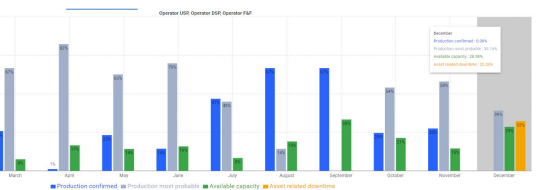
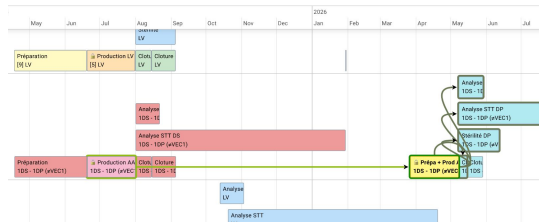
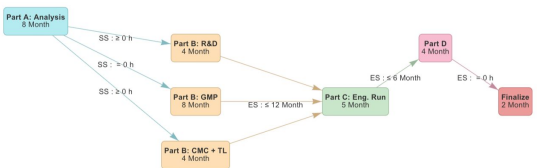
## Tactical

Middle term: months  
*Supply chain, S&OP*



## Strategical

Long term: years  
*Business Plan*



**Demo use case**  
**Takeda Lessines (Belgium)**

**Takeda Lessines (Belgium)**  
~ 1200 employees

**Roadmap**

- How to **model** manuf. processes?
- How to **schedule** operations
- Identify & Solve **bottlenecks**
- **Risk** / Uncertainty



**"Alpha" S/D**



**"Beta"**



**"Gamma"**

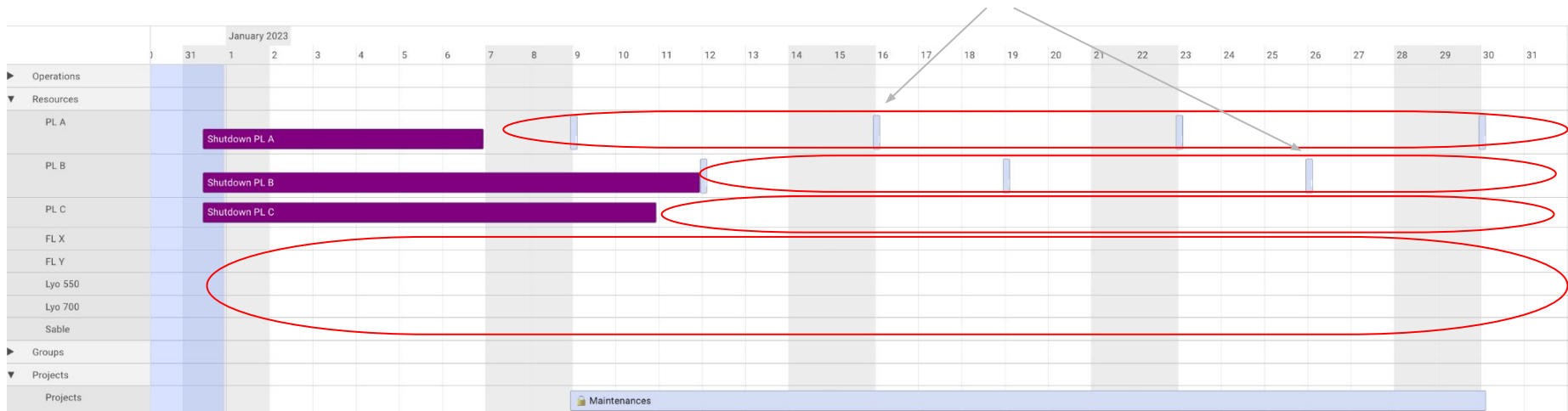


**Demo use case**  
**Takeda Lessines (Belgium)**

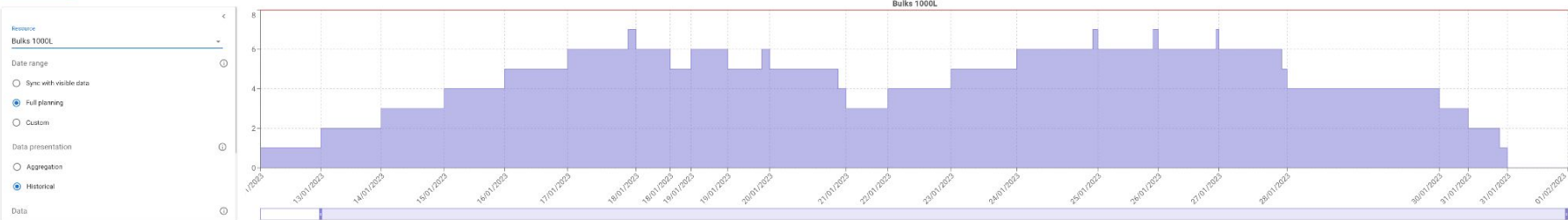
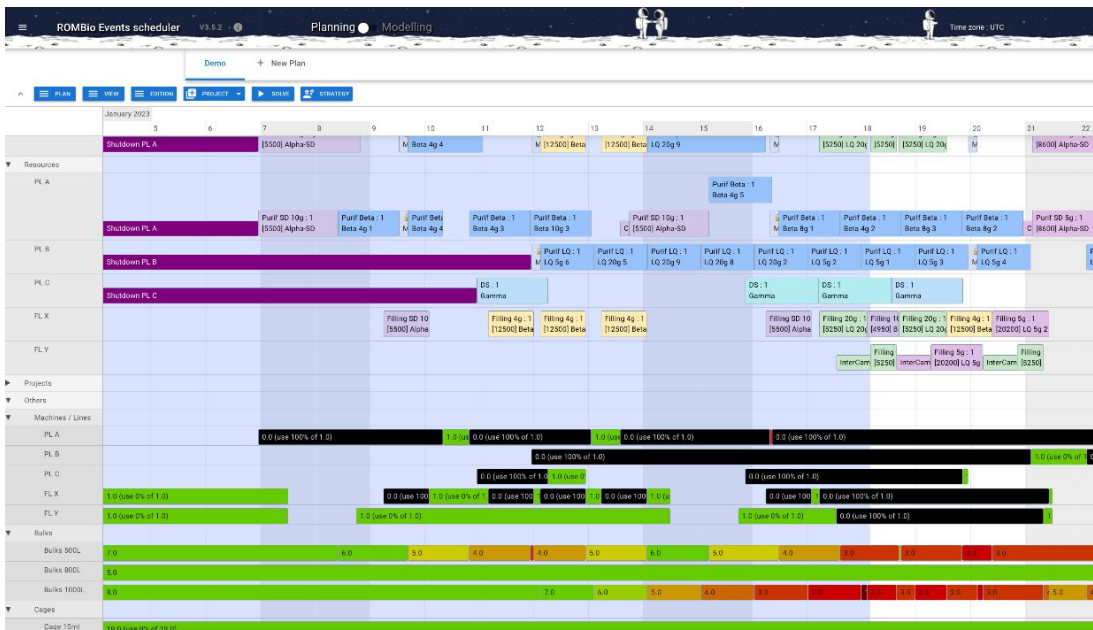


|                   |          |       |          |      |          |       |          |       |
|-------------------|----------|-------|----------|------|----------|-------|----------|-------|
| <b>Goal:</b>      | <b>1</b> | x 5g  | <b>2</b> | x 1g | <b>6</b> | x 5g  | <b>5</b> | x 4g  |
| <b>(#batches)</b> | <b>2</b> | x 10g |          |      | <b>9</b> | x 20g | <b>3</b> | x 8g  |
|                   |          |       |          |      |          |       | <b>4</b> | x 10g |

On **January 2025** (after shutdown!). Including maintenances. Limited resources! (*lines, bulks, cages, HR*)

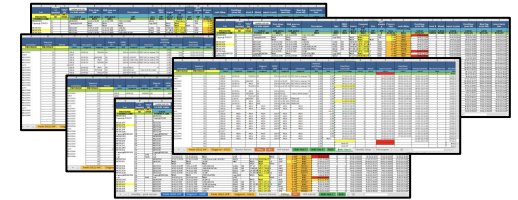


**Demo use case**  
**Takeda** Lessines (Belgium)



**Takeda Lessines** is using **Rombio** since Jan'23 at the *supply chain* scheduling level.

Rombio replaces **Excel**.



→ + **several slots** / year (+6%)

→ **1200** more patients / year cured.

→ increased revenue: **+12M€**

→ **160x** their Rombio licence fee

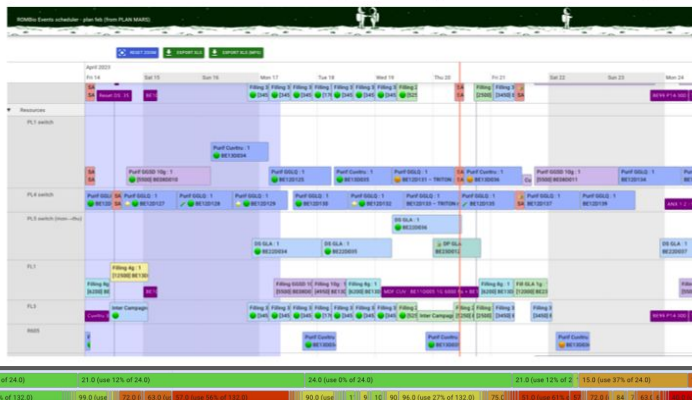




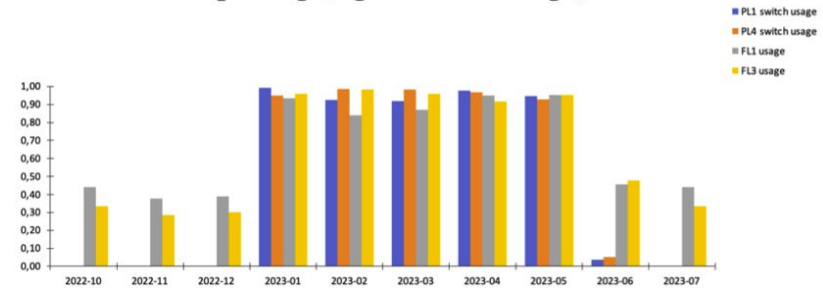
Operators notify the planner of their actual activities:  
real time **execution tracking**,  
using a simplified interface



### Share information through the operator read-only interface



### Statistical reporting (e.g. resource usage)



## Export the data to Excel

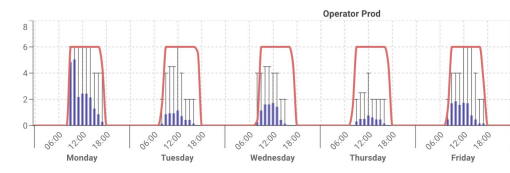
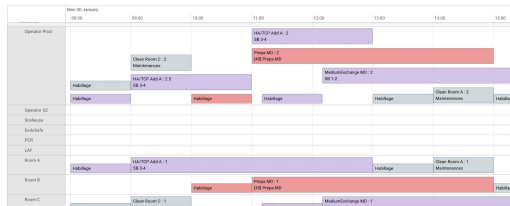
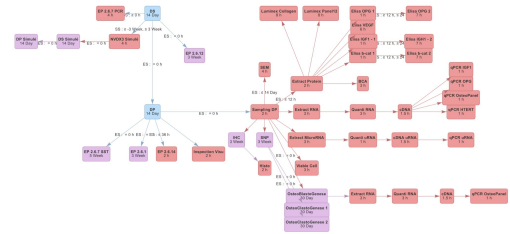
| Accession | A         |           | B         |           | C         |           | D         |           | E         |           | F         |           | G         |           | H         |           | I         |           | J         |           | K         |           | L         |           | M         |           | N         |           | O         |           | P         |           | Q         |           | R         |           | S         |           | T         |           | U         |           | V         |           | W         |           | X         |           | Y         |           | Z         |           | AA        |           | AB        |           | AC        |           | AD        |           | AE        |           | AF        |           | AG        |           | AH        |           | AI        |           | AJ        |           | AK        |           | AL        |           | AM        |           | AN        |           | AO        |           | AP        |           | AQ        |           | AR        |           | AS        |           | AT        |           | AU        |           | AV        |           | AW        |           | AX        |           | AY        |           | AZ        |           | BA        |           | BB        |           | BC        |           | BD        |           | BE        |           | BF        |           | BG        |           | BH        |           | BI        |           | BJ        |           | BK        |           | BL        |           | BM        |           | BN        |           | BO        |           | BP        |           | BQ        |           | BR        |           | BS        |           | BT        |           | BU        |           | BV        |           | BW        |           | BX        |           | BY        |           | CZ        |           | DA        |           | DB        |           | DC        |           | DD        |           | DE        |           | DF        |           | DG        |           | DH        |           | DI        |           | DJ        |           | DK        |           | DL        |           | DM        |           | DN        |           | DO        |           | DP        |           | DQ        |           | DR        |           | DS        |           | DT        |           | DU        |           | DV        |           | DW        |           | DX        |           | DY        |           | EZ        |           | FA        |           | FB        |           | FC        |           | FD        |           | FE        |           | FF        |           | FG        |           | FH        |           | FI        |           | FJ        |           | FK        |           | FL        |           | FM        |           | FN        |           | FO        |           | FP        |           | FQ        |           | FR        |           | FS        |           | FT        |           | FU        |           | FV        |           | FW        |           | FX        |           | FY        |           | FZ        |           | GA        |           | GB        |           | GC        |           | GD        |           | GE        |           | GF        |           | GG        |           | GH        |           | GI        |           | GJ        |           | GK        |           | GL        |           | GM        |           | GN        |           | GO        |           | GP        |           | GQ        |           | GR        |           | GS        |           | GT        |           | GU        |           | GV        |           | GW        |           | GX        |           | GY        |           | GZ        |           | HA        |           | HB        |           | HC        |           | HD        |           | HE        |           | HF        |           | HG        |           | HH        |           | HI        |           | HJ        |           | HK        |           | HL        |           | HM        |           | HN        |           | HO        |           | HP        |           | HQ        |           | HR        |           | HS        |           | HT        |           | HU        |           | HV        |           | HW        |           | HX        |           | HY        |           | HZ        |           | IA        |           | IB        |           | IC        |           | ID        |           | IE        |           | IF        |           | IG        |           | IH        |           | II        |           | IJ        |           | IK        |           | IL        |           | IM        |           | IN        |           | IO        |           | IP        |           | IQ        |           | IR        |           | IS        |           | IT        |           | IU        |           | IV        |           | IW        |           | IX        |           | IY        |           | IZ        |           | JA        |           | JB        |           | JC        |           | JD        |           | JE        |           | JF        |           | JG        |           | JH        |           | JI        |           | JJ        |           | JK        |           | JL        |           | JM        |           | JN        |           | JO        |           | JP        |           | JQ        |           | JR        |           | JS        |           | JT        |           | JU        |           | JV        |           | JW        |           | JX        |           | JY        |           | JZ        |           | KA        |           | KB        |           | KC        |           | KD        |           | KE        |           | KF        |           | KG        |           | KH        |           | KI        |           | KJ        |           | KK        |           | KL        |           | KM        |           | KN        |           | KO        |           | KP        |           | KQ        |           | KR        |           | KS        |           | KT        |           | KU        |           | KV        |           | KW        |           | KX        |           | KY        |           | KZ        |           | LA        |           | LB        |           | LC        |           | LD        |           | LE        |           | LF        |           | LG        |           | LH        |           | LI        |           | LJ        |           | LK        |           | LL        |           | LM        |           | LN        |           | LO        |           | LP        |           | LQ        |           | LR        |           | LS        |           | LT        |           | LU        |           | LV        |           | LW        |           | LX        |           | LY        |           | LZ        |           | MA        |           | MB        |           | MC        |           | MD        |           | ME        |           | MF        |           | MG        |           | MH        |           | MI        |           | MJ        |           | MK        |           | ML        |           | MM        |           | MN        |           | MO        |           | MP        |           | MQ        |           | MR        |           | MS        |           | MT        |           | MU        |           | MV        |           | MW        |           | MX        |           | MY        |           | MZ        |           | NA        |           | NB        |           | NC        |           | ND        |           | NE        |           | NF        |           | NG        |           | NH        |           | NI        |           | NJ        |           | NK        |           | NL        |           | NM        |           | NN        |           | NO        |           | NP        |           | NQ        |           | NR        |           | NS        |           | NT        |           | NU        |           | NV        |           | NW        |           | NX        |           | NY        |           | NZ        |           | OA        |           | OB        |           | OC        |           | OD        |           | OE        |           | OF        |           | OG        |           | OH        |           | OI        |           | OJ        |           | OK        |           | OL        |           | OM        |           | ON        |           | OO        |           | OP        |           | OQ        |           | OR        |           | OS        |           | OT        |           | OU        |           | OV        |           | OW        |           | OX        |           | OY        |           | OZ        |           | PA        |           | PB        |           | PC        |           | PD        |           | PE        |           | PF        |           | PG        |           | PH        |             | PI |  | PJ |  | PK |  | PL |  | PM |  | PN |  | PO |  | PP |  | PQ |  | PR |  | PS |  | PT |  | PU |  | PV |  | PW |  | PX |  | PY |  | PZ |  | QA |  | QB |  | QC |  | QD |  | QE |  | QF |  | QG |  | QH |  | QI |  | QJ |  | QK |  | QL |  | QM |  | QN |  | QO |  | QP |  | QQ |  | QR |  | QS |  | QT |  | QU |  | QV |  | QW |  | QX |  | QY |  | QZ |  | RA |  | RB |  | RC |  | RD |  | RE |  | RF |  | RG |  | RH |  | RI |  | RJ |  | RK |  | RL |  | RM |  | RN |  | RO |  | RP |  | RQ |  | RR |  | RS |  | RT |  | RU |  | RV |  | RW |  | RX |  | RY |  | RZ |  | SA |  | SB |  | SC |  | SD |  | SE |  | SF |  | SG |  | SH |  | SI |  | SJ |  | SK |  | SL |  | SM |  | SN |  | SO |  | SP |  | SQ |  | SR |  | SS |  | ST |  | SU |  | SV |  | SW |  | SX |  | SY |  | SZ |  | TA |  | TB |  | TC |  | TD |  | TE |  | TF |  | TG |  | TH |  | TI |  | TJ |  | TK |  | TL |  | TM |  | TN |  | TO |  | TP |  | TQ |  | TR |  | TS |  | TT |  | TU |  | TV |  | TW |  | TX |  | TY |  | TZ |  | UA |  | UB |  | UC |  | UD |  | UE |  | UF |  | UG |  | UH |  | UI |  | UJ |  | UK |  | UL |  | UM |  | UN |  | UO |  | UP |  | UQ |  | UR |  | US |  | UT |  | UU |  | UV |  | UW |  | UX |  | UY |  | UZ |  | VA |  | VB |  | VC |  | VD |  | VE |  | VF |  | VG |  | VH |  | VI |  | VJ |  | VK |  | VL |  | VM |  | VN |  | VO |  | VP |  | VQ |  | VR |  | VS |  | VT |  | VU |  | VV |  | VW |  | VX |  | VY |  | VZ |  | WA |  | WB |  | WC |  | WD |  | WE |  | WF |  | WG |  | WH |  | WI |  | WJ |  | WK |  | WL |  | WM |  | WN |  | WO |  | WP |  | WQ |  | WR |  | WS |  | WT |  | WU |  | WV |  | WW |  | WX |  | WY |  | WZ |  | XA |  | XB |  | XC |  | XD |  | XE |  | XF |  | XG |  | XH |  | XI |  | XJ |  | XK |  | XL |  | XM |  | XN |  | XO |  | XP |  | XQ |  | XR |  | XS |  | XT |  | XU |  | XV |  | XW |  | XX |  | XY |  | XZ |  | YA |  | YB |  | YC |  | YD |  | YE |  | YF |  | YG |  | YH |  | YI |  | YJ |  | YK |  | YL |  | YM |  | YN |  | YO |  | YP |  | YQ |  | YR |  | YS |  | YT |  | YU |  | YV |  | YW |  | YX |  | YY |  | YZ |  | ZA |  | ZB |  | ZC |  | ZD |  | ZE |  | ZF |  | ZG |  | ZH |  | ZI |  | ZJ |  | ZK |  | ZL |  | ZM |  | ZN |  | ZO |  | ZP |  | ZQ |  | ZR |  | ZS |  | ZT |  | ZU |  | ZV |  | ZW |  | ZX |  | ZY |  | ZZ |  |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-------------|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|----|--|
| Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession | Accession</ |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |    |  |

| 0.0 (use)      | 0.0 (use 61%)                   | 0.0 | 0.0 (use 87% of 24.0) |
|----------------|---------------------------------|-----|-----------------------|
| 90.0 (use 31%) | 93.0 (use 90.0 / 87.0 (use 34%) | 87. | 11                    |

# Planning & Scheduling: *decision levels*

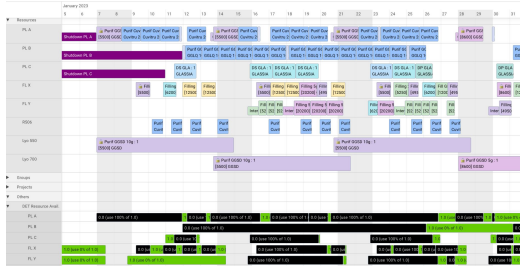
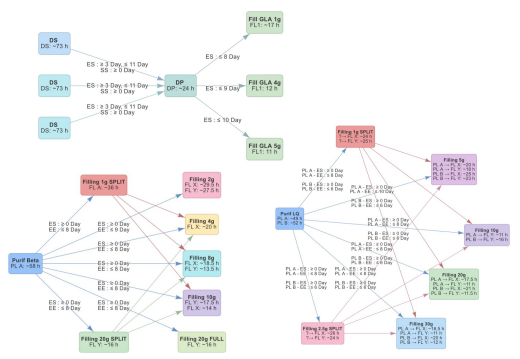
## Operational

Short term: weeks  
*Shop floor*



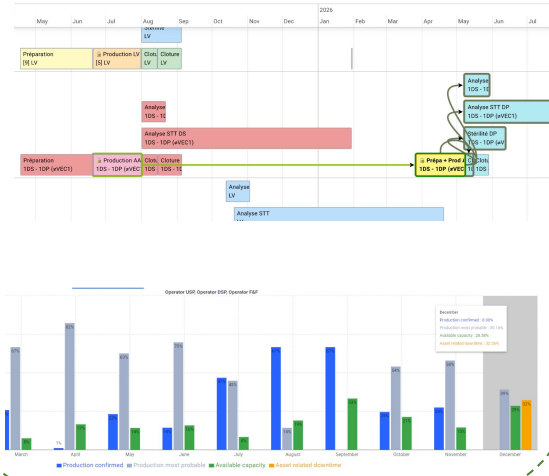
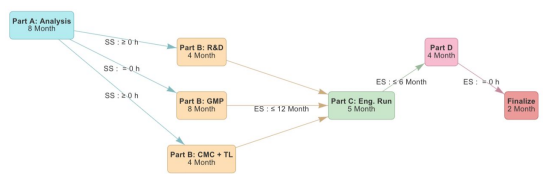
## Tactical

Middle term: months  
*Supply chain, S&OP*



## Strategical

Long term: years  
*Business Plan*



Resource investments (FTE's)  
Financial goals



# Demo use case Business plan (2~10 years)

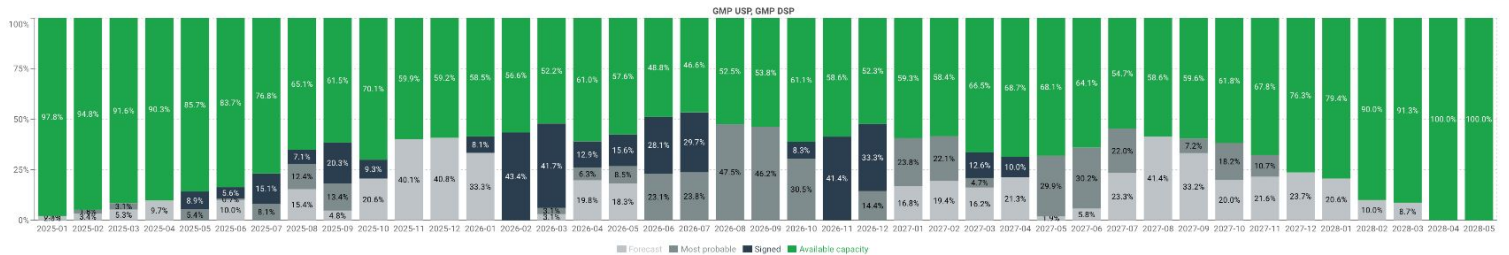
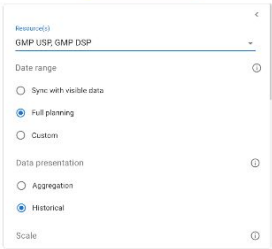
Strategic  
planning &  
scheduling

S&OP (strategical)

Resource investments (FTE's)  
Financial goals



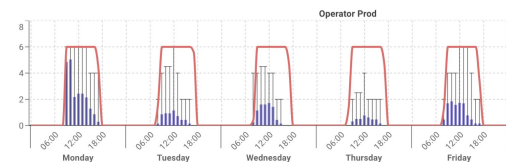
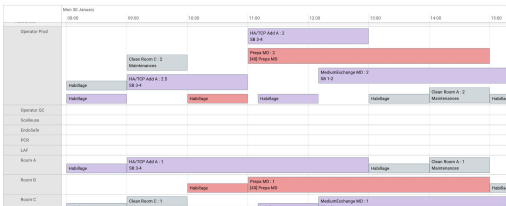
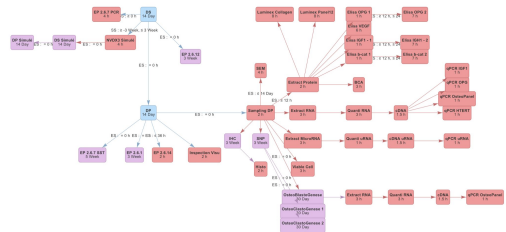
Resource Usage Resource(s) per Project



# Planning & Scheduling: *decision levels*

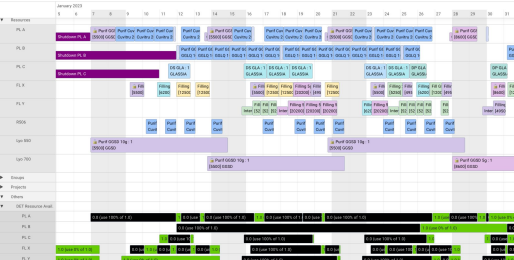
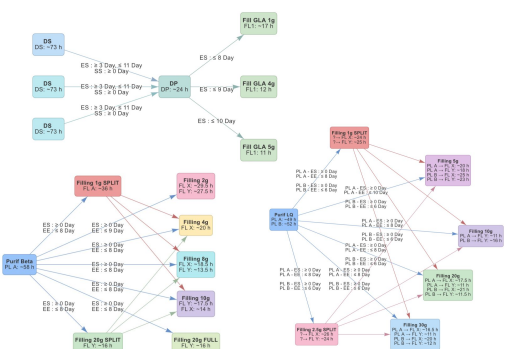
## Operational

Short term: weeks  
*Shop floor*



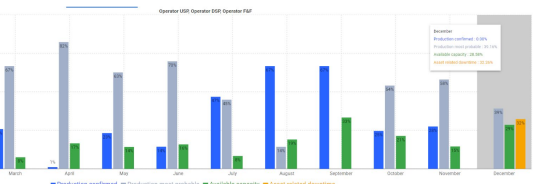
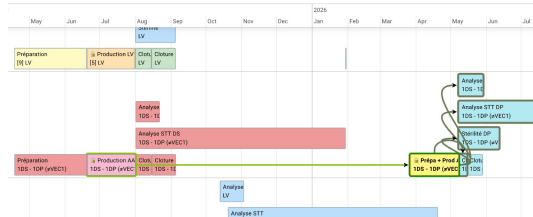
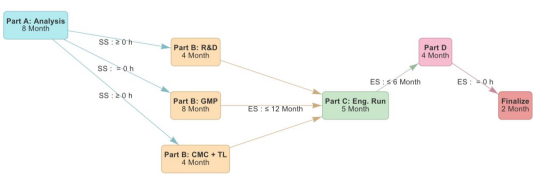
## Tactical

Middle term: months  
*Supply chain, S&OP*

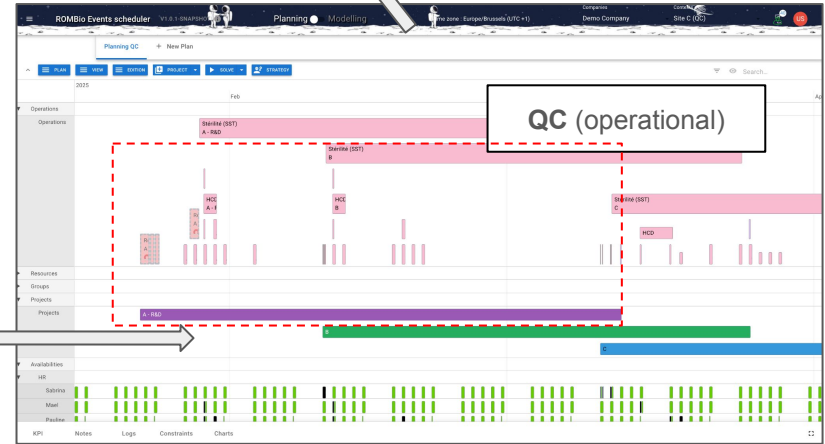
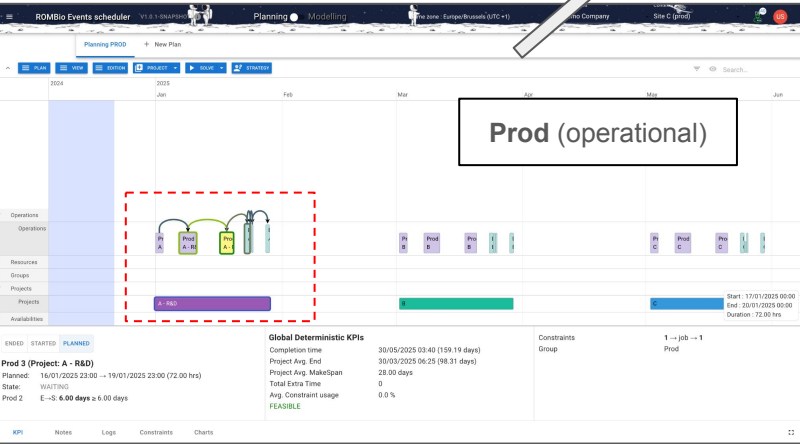
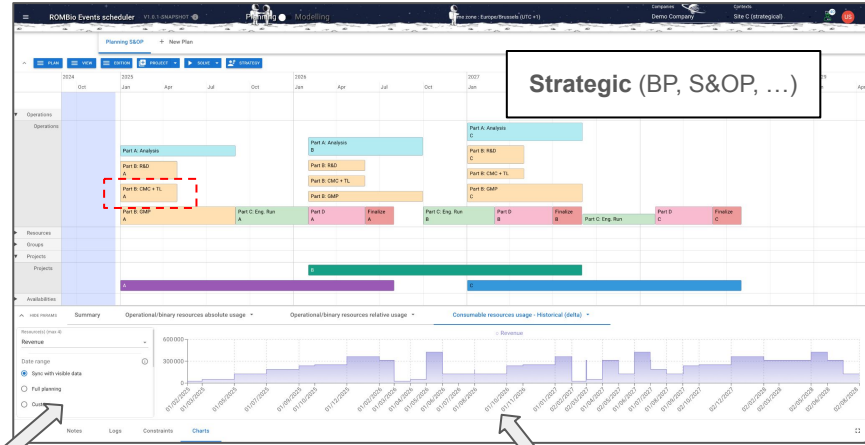


## Strategical

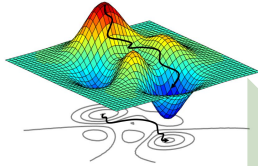
Long term: years  
*Business Plan*



# Multi-levels planning & scheduling



## Optimization engine



## Planning interface



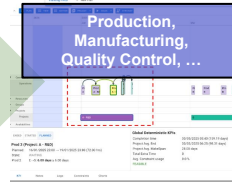
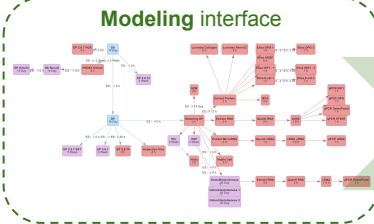
## Real Time Execution Tracking



## Multi-level planning & scheduling



## Modeling interface

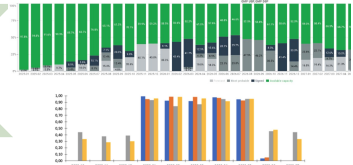


**ROMBIO**

Business Plan, Finance,  
S&OP, Procurement,  
Logistics, Maintenances

Project management,  
Scenario & capacity  
analysis, HR mngrt

## Data analysis & reporting charts



## Investments simulation

| Demand              |          |          |          |          |          |          |          |          |          |
|---------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Resources           | Demand   | 1.5m     | 2.5m     | 3.5m     | 4.5m     | 5.5m     | 6.5m     | 7.5m     | 8.5m     |
|                     | Quantity | 100 jobs | 200 jobs | 300 jobs | 400 jobs | 500 jobs | 600 jobs | 700 jobs | 800 jobs |
|                     | 6.00%    | 0%       | 0.7%     | 0%       | 0%       | 0%       | 0%       | 0%       | 0%       |
|                     | 8.00%    | 0%       | 0%       | 0%       | 0%       | 0%       | 0%       | 0%       | 0%       |
|                     | 10.00%   | 0%       | 0%       | 0%       | 0%       | 0%       | 0%       | 0%       | 0%       |
|                     | 12.00%   | 0%       | 0%       | 0%       | 0%       | 0%       | 0%       | 0%       | 0%       |
|                     | 14.00%   | 0%       | 0%       | 0%       | 0%       | 0%       | 0%       | 0%       | 0%       |
|                     | 16.00%   | 0%       | 0%       | 0%       | 0%       | 0%       | 0%       | 0%       | 0%       |
|                     | 18.00%   | 0%       | 0%       | 0%       | 0%       | 0%       | 0%       | 0%       | 0%       |
|                     | 20.00%   | 0%       | 0%       | 0%       | 0%       | 0%       | 0%       | 0%       | 0%       |
| Production Capacity |          | 0%       | 0%       | 0%       | 0%       | 0%       | 0%       | 0%       | 0%       |

## ERP / MRP / MES / Data integration



Michael Saint-Guillain  
michael@rombio.be  
+32 494 90 98 47

