BetaBeams WBS safety

E. Benedetto and E. Wildner

EUROnu Safety Workshop
Pre-Meeting

EUROnu guidelines

- Safety & Costing Workshop: 9-10/6/11, @ CERN

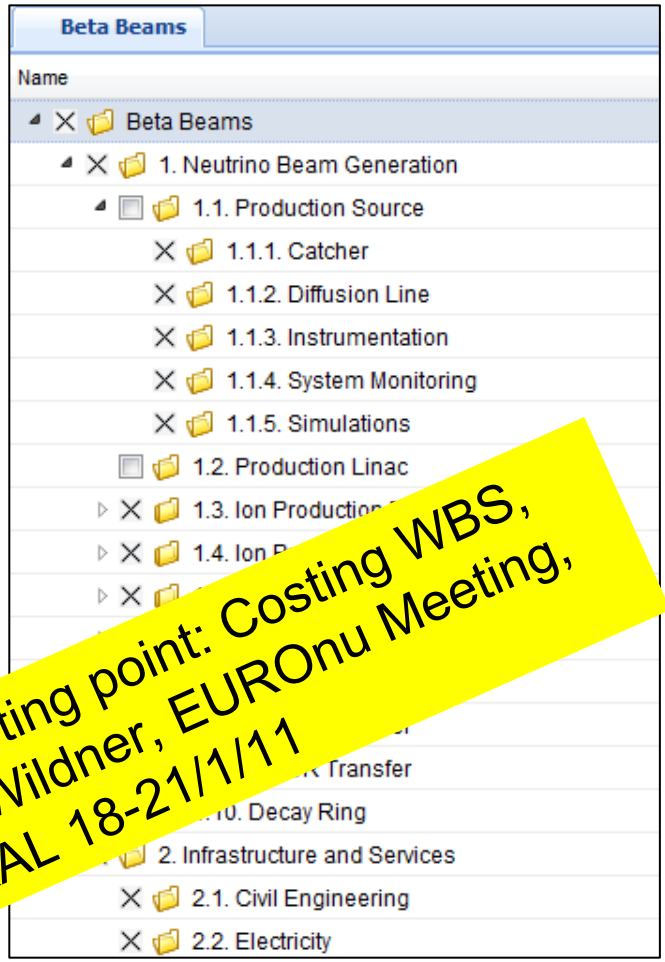
M.Dracos, EUROnu Annual Meeting, 21/1/2011, RAL

Organisation

- WBS for WP2, WP3, WP4 and WP5 to be prepared before the workshop, but before, the WPs have to well fix:
  - a baseline scenario
  - one main option (it will be painful to evaluate more options)
  - for open questions, the worst case will be considered
- WBS will be readjusted after the workshop according to the discussions/conclusions

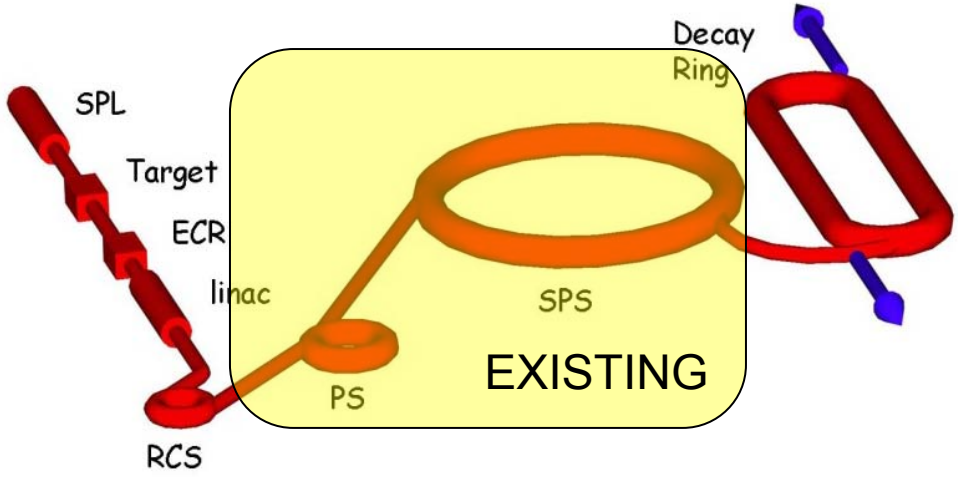
Beta Beam implementation

- Work Breakdown Structure (WBS)



Starting point: Costing WBS, E.Wildner, EUROnu Meeting, RAL 18-21/1/11

- Baseline: ^{6}He, ^{18}Ne
- Main Option: ^{8}Li, ^{8}B and Production Ring



1st Level…easy!

Production

- Production Source
- Production Linac
- Ion Production (ISOLDE-like)
- Ion Production Ring
- Collection + ECR Breeder

Accel + Storage

- Linac
- Transfer lines
- RCS
- PS & SPS (existing CERN machines)
- Decay Ring

Acceleration & Storage

- Existing machines (PS & SPS)
  - Integrate βBeams case in what existing
  - Work ongoing now for LHC Injectors

    Injectors and Experimental Facilities Committee 2011 Workshop, Monday Session:
    http://indico.cern.ch/conferenceOtherViews.py?view=standard&confId=123526
    - Run for another 25years
    - Radio protection, technical safety, consolidation, reliability
    - Access safety & control systems, shutdown activities,…
  - Safety: No specific modifications
  - Radio Protection:
    - **Activation** → Done & documented (within FP6, Eurisol):
      - Identified area of controlled access or remote handling
    - **Localized losses** & mitigation/shielding/collimators/… → To do
- Mainly for PS, SPS will follow

Acceleration & Storage

- New Machines: Decay Ring (cold), RCS, Lines
  - Safety: Learn from LHC experience
    1. Access system
    2. Fire detection system
    3. Evacuation alarm system
    4. Gas detection system
    5. Ventilation
    6. Electrical risks (Powering interlocked with Access)
    7. Oxygen deficiency hazard detection (cold machine)
    8. Cryogenic risks (cold machine)
    9. Civil engineering and construction
    10. Lifting/handling

tentative 2nd level, valid for all machines

Acceleration & Storage

- New Machines:
  - Radio Protection: Learn from CERN experience
    1. Environment (dose to public):
       1. Stray radiation
       2. Releases of radioactivity (air & water) into the environment
    2. Workers:
       1. Shielding
       2. Air & water activation
    3. Induced radioactivity in accelerator components
       1. Activated fluids and contamination risk (closed circuits, etc.)
       2. Optimized design of components (material composition)
       3. Optimized design for maintenance and repair
       4. Optimized handling of devices, remote handling
       5. Ventilation and pressure cascades

tentative 2nd level, valid for all machines

Acceleration & Storage

- New Machines:
  - Radio Protection: (continue)
    4. Radiation monitoring System (like RAMSES)
    5. Buffer Zones for Cool Down Repair Workshop (access control, filters, fire proof…)
    6. Operational Dosimetry system
    7. Closed systems (cooling water?)
    8. Maintenance & Remote handling
    9. Incident & accident releases
    10. Dismantling and waste treatment (high costs!)

tentative 2nd level, valid for all machines

Acceleration & Storage

- New Machines:
  - RP: Activation specific to βBeams
    - Decay Ring:
      - Momentum Collimators → **to do**
      - SC-magnets in radioactive environment → **done, EW**
      - Losses in magnets, how to deal with?
        - » Absorbers → **but impedance, how to remove/maintenance?**
        - » Beam dumps → **to be designed but standard**
      - Maintenance/Remote handling → **to do**
    - RCS:
      - Activation study → **done (FP6), on the surface?**
    - Linac for radioisotopes:
      - To do, but should not be an issue

Production area

- Production area (Linac, Target, ECR Breeder)
  - Radioactive environment (spallation is not “clean”)
  - ECR Breeder:
    - High magnetic fields, high voltages
    - Microwave & X-rays monitored
    - Need controlled access
  - Depending on the option:
    - Linac4 (or SPL) → will be “existing machines”
    - Spallation target
      - Is it comparable with ISOLDE or GANIL, SPIRAL2?
    - Production Ring with internal target
      - Depending on the target technology
        - » Gas-jet target: high pressure, etc…
        - » Lithium loop: should not get in touch with water
    - Collection device:
      - Oven, high temperatures

Questions

- WBS: to what detail?
- Which database, structure & connection to the costing WBS?
  - i.e. can we attach the entry ‘safety’ to the costing DB?
- Common tooling & methodology for the 3 facilities
- Contacts at CERN aware of our needs?
- Costing of the safety?