



ISOLDE Yield Database

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EN-STI-RBS



Status and Feature Requests

Status

- GUI lost after webpage update
- Partially restored (Tania)
db-link missing

Feature Requests

1. Major Modifications

- Extrapolation of yields for cases in which the release is understood well
- Yields for target in sub-optimal operation conditions („contaminations“)
- Submission of yields and faster availability

2. Other new features

- Link to the logbook entry in which the yield was documented
- Add fields: Target number, Measurement details, Rilis Information, Molecular sideband, Freshness of a Target, Target temperature
- Show release information
- Link to Rilis PSE from Yield database PSE
- Produced isotopes from a given target

Find the produced isotope from an element independent on target

Group	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	1A	2A	3B	4B	5B	6B	7B		8B		1B	2B	3A	4A	5A	6A	7A	8A
Period	Ion source:																	
1	+ Surface -																	
	hot Plasma cool																	
	Laser																	
1	2																	
	He																	
2	5 6 7 8 9 10																	
	B C N O F Ne																	
3	11 12 13 14 15 16 17 18																	
	Na Mg Al Si P S Cl Ar																	
4	19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36																	
	K Ca Sc Ti V Cr Mn Fe Co Ni Cu Zn Ga Ge As Se Br Kr																	
5	37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54																	
	Rb Sr Y Zr Nb Mo Tc Ru Rh Pd Ag Cd In Sn Sb Te I Xe																	
6	55 56 * 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86																	
	Cs Ba * Lu Hf Ta W Re Os Ir Pt Au Hg Tl Pb Bi Po At Rn																	
	111																	
	Rg																	
* Lanthanides *	57 58 59 60 61 62 63 64 65 66 67 68 69 70																	
	La Ce Pr Nd Pm Sm Eu Gd Tb Dy Ho Er Tm Yb																	
** Actinides **	89 90 91 92 93 94 95 96 97 98 99 100 101 102																	
	Ac Th Pa U Np Pu Am Cm Bk Cf Es Fm Md No																	

For more information please contact the ISOLDE Physics Coordinator, [Magdalena Kowalska](#)
 For more details please contact the ISOLDE RIB development Group, [Thierry Stora](#)
 Database and web application created by [Maguel Tesson](#) & [Irszula Herman-Izycka](#)

Feature Requests

User Report

Yield checks

manuel entry

Database yield input

Validation (TISD)

Easy to add more steps later

Publication

Yield#	A	Z	yield
1	105	Mo	5e+08

Yield#	Status	User
1	0	Mike

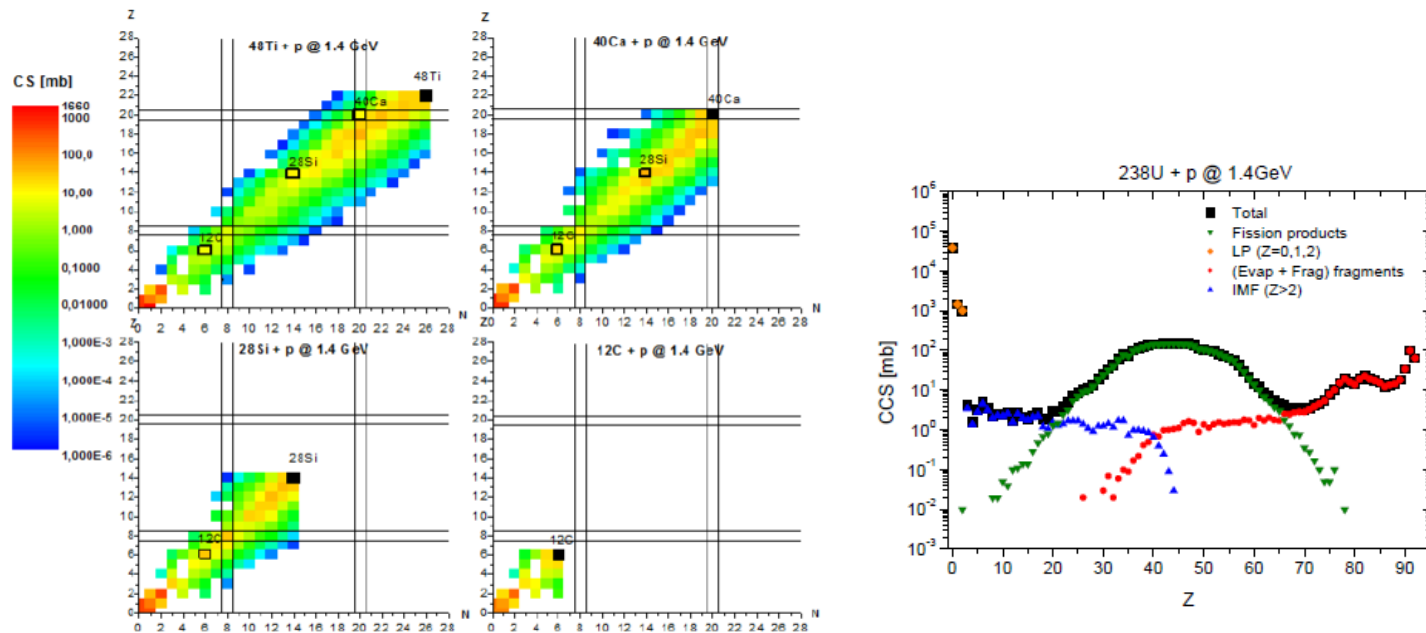
Yield#	Status	User
1	10	Bernard

Yield#	Status	User
1	20	Kristina



Data and requirements

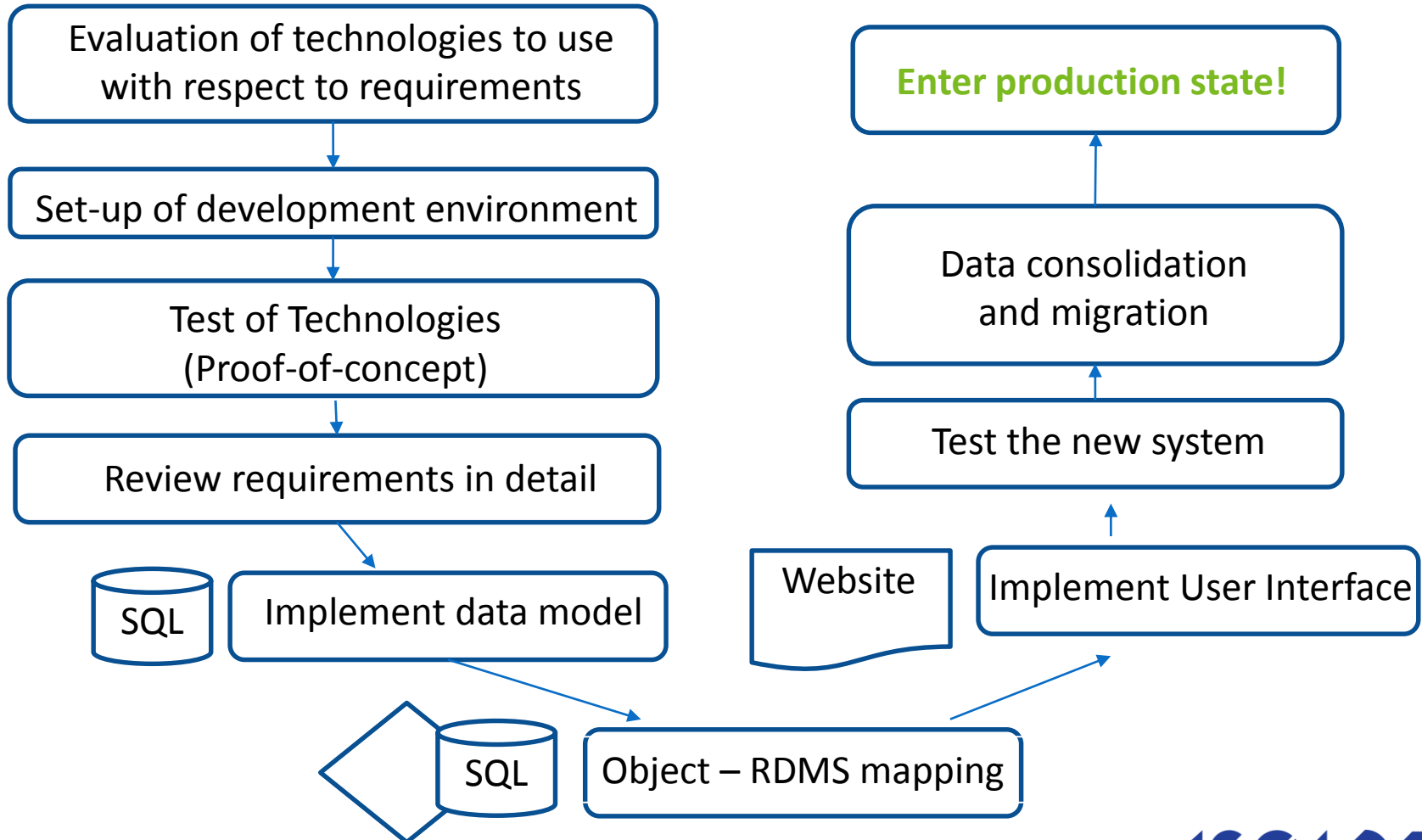
- To implement the requested yield extrapolation feature, production cross sections must be known.
- A number of ARBLABLA and FLUKA simulations have been performed mostly by Joao Pedro Ramos and Jozef Klimo (Slovak Acad. Sci)



J. Klimo et. al, Simulations of production cross section of isotopes produced in spallation reaction using ABRABLA07 code

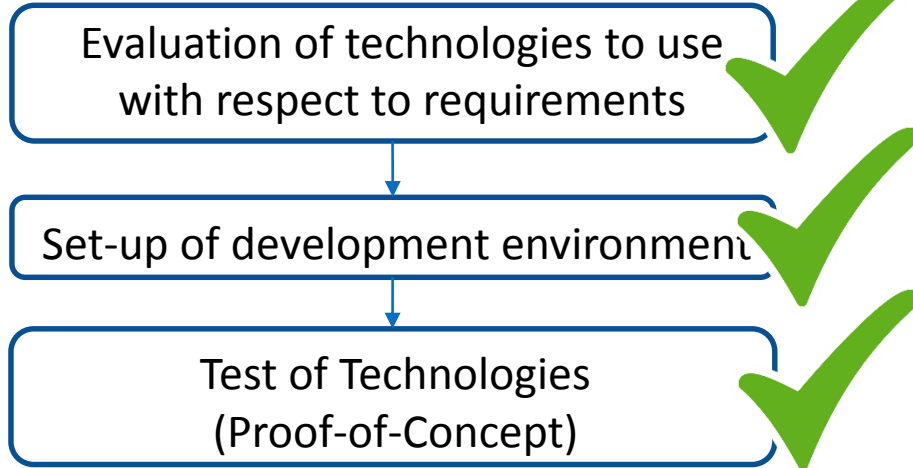
Technical Aspects

Development roadmap

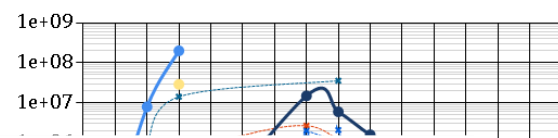


Technical Aspects

Development roadmap



- sub-micron SiC (PSB)
- Ti foil (PSB)
- U Carbide (SC)
- Si Carbide (SC)
- Sc Carbide (SC)
- UCx/graphite (PSB)
- SiC (PSB)
- Ti Metal foil (SC)
- Th/Ta Metal foil/powder (SC)
- Ta Metal foil (SC)



Yield Graph is generated by the server and transferred as picture to the client -> No Java or similar necessary

Uses CERN-SSO authentication

Hi classA

You are connected to

devdb11.cern.ch

Find the produced isotopes independent on the target

Group	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	1A	2A	3B	4B	5B	6B	7B	8B			1B	2B	3A	4A	5A	6A	7A	8A
Period																		
1	1 H																	2 He
2	3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne
3	11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr		
	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe	
	56 Ba	57 La	71 Lu	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
	88 Ra	89 Ac	103 Lr	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg							

Technical Aspects

Development roadmap

Evaluation of technologies to use with respect to requirements

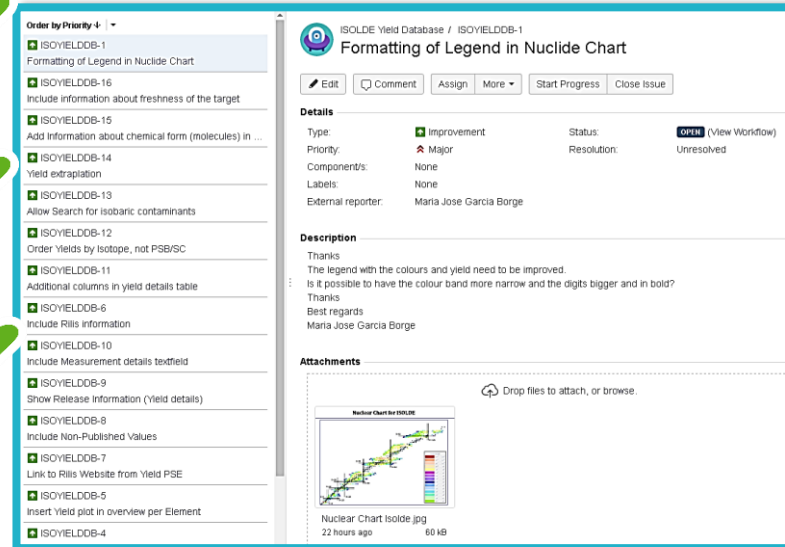
Set-up of development environment

Test of Technologies (Proof-of-Concept)

Review requirements in detail



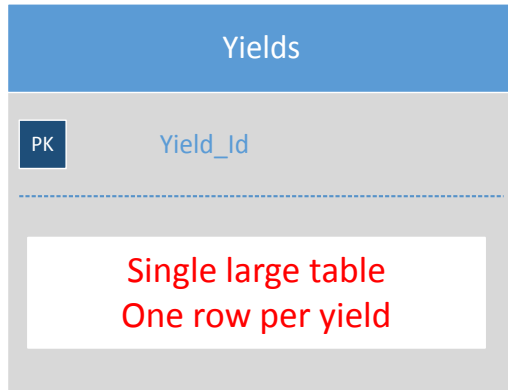
Implement data model



The screenshot displays the ISOLDE Yield Database interface. On the left, a list of issues is shown, ordered by priority. The selected issue, ISOLDEDB-1, is titled 'Formatting of Legend in Nuclide Chart'. The right-hand pane provides details for this issue, including its type (Improvement), priority (Major), and status (Unresolved). The description section contains a request for legend improvements in a nuclide chart. An attachment titled 'Nuclide Chart Isotope.jpg' is visible at the bottom of the details pane.

Technical Aspects

Issues with the old database layout



Z_ISOL	A_ISOL	GM_ISOL	NAME_TGT	THICK	X_TGT	Z	Z_TG	COMM_TC
5	8			499	0.43		6	
10	18		ZrO.177		8		40	8 ZrO2 fiber
10	19		ZrO.177		8		40	8 ZrO2 fiber
10	23		ZrO.177		8		40	8 ZrO2 fiber
10	24		ZrO.177		8		40	8 ZrO2 fiber
18	34		ZrO.177		8		40	8 ZrO2 fiber
18	35		ZrO.177		8		40	8 ZrO2 fiber
18	43							
18	44							
18	45							

Redundant ionformation for targets in each yield row

COMM_TGT_FIX	COMM_THICKN
C Multiwalled nanotubes	
Th/Nb Metal powder	17.6g Th /cm2, 70g Nb /cm2
1 Hot plasma ion	Th/Nb Metal powder
1 Hot plasma ion	Th/Nb Metal powder
1 Hot plasma at 1	Th/Nb Metal powder
1 Hot plasma at 1	Th/Nb Metal powder
1 Hot plasma at 1600C & Al vapour	
1 Hot plasma at 1600C & Al vapour	
1 Hot plasma at 1600C & Al vapour	

Multiple attributes in one field

60	ZrO2 felt	...
61	ZrO2 felt	...
62	ZrO2 fibers	...
63	fibers	...
64	foil	...
65	molten metal	...
66	nanostructured powder	...
67	pellets	...
68	powder	...
69	sub-micron SiC	...
70	sub-micron powder	...
71	thin Ta foil	...
72		...

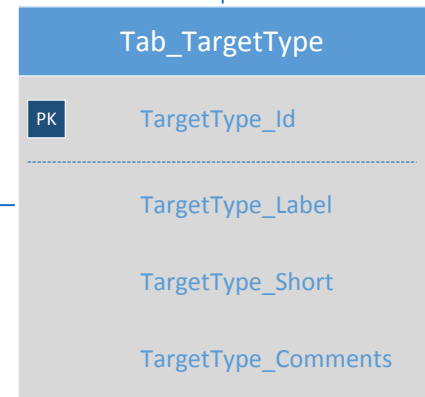
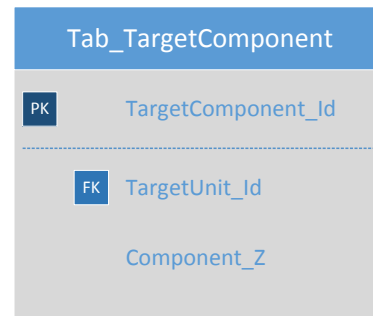
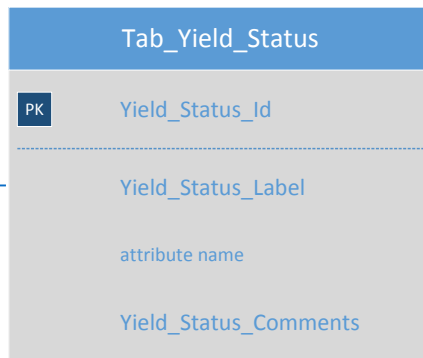
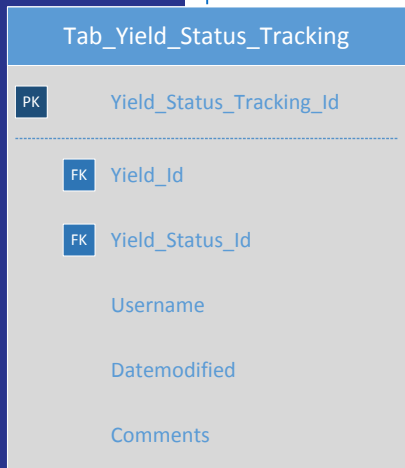
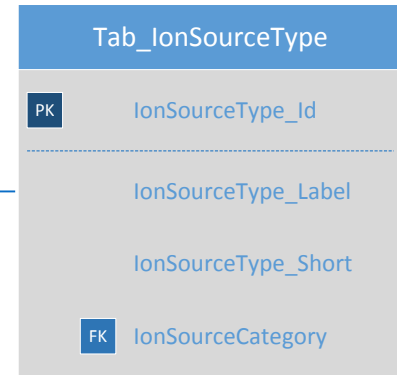
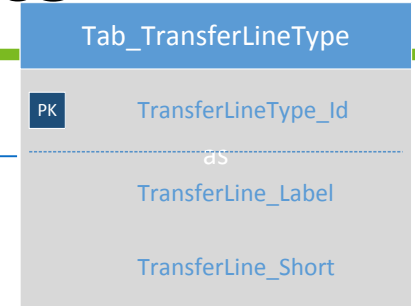
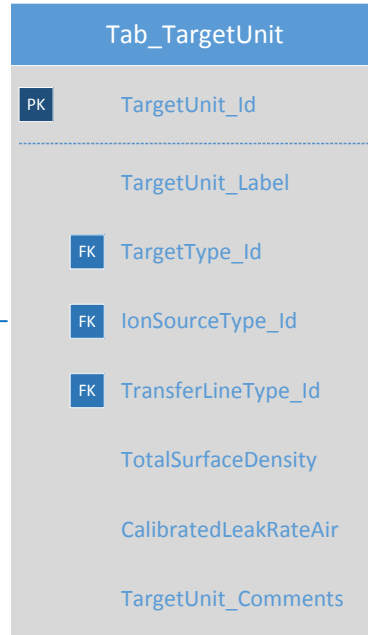
Inconsistent use of fields

No	COMM_TGT	No	COMM_TGT
8	Depleted Ura	5	CaO powder
9	Depleted ura	6	CaO powder from CaCO3
53	U Carbide	26	Powder from CaCO3
54	UC2/graphite		
55	UCx/graphite		
56	Ucx/graphite		

Different labels for the same material

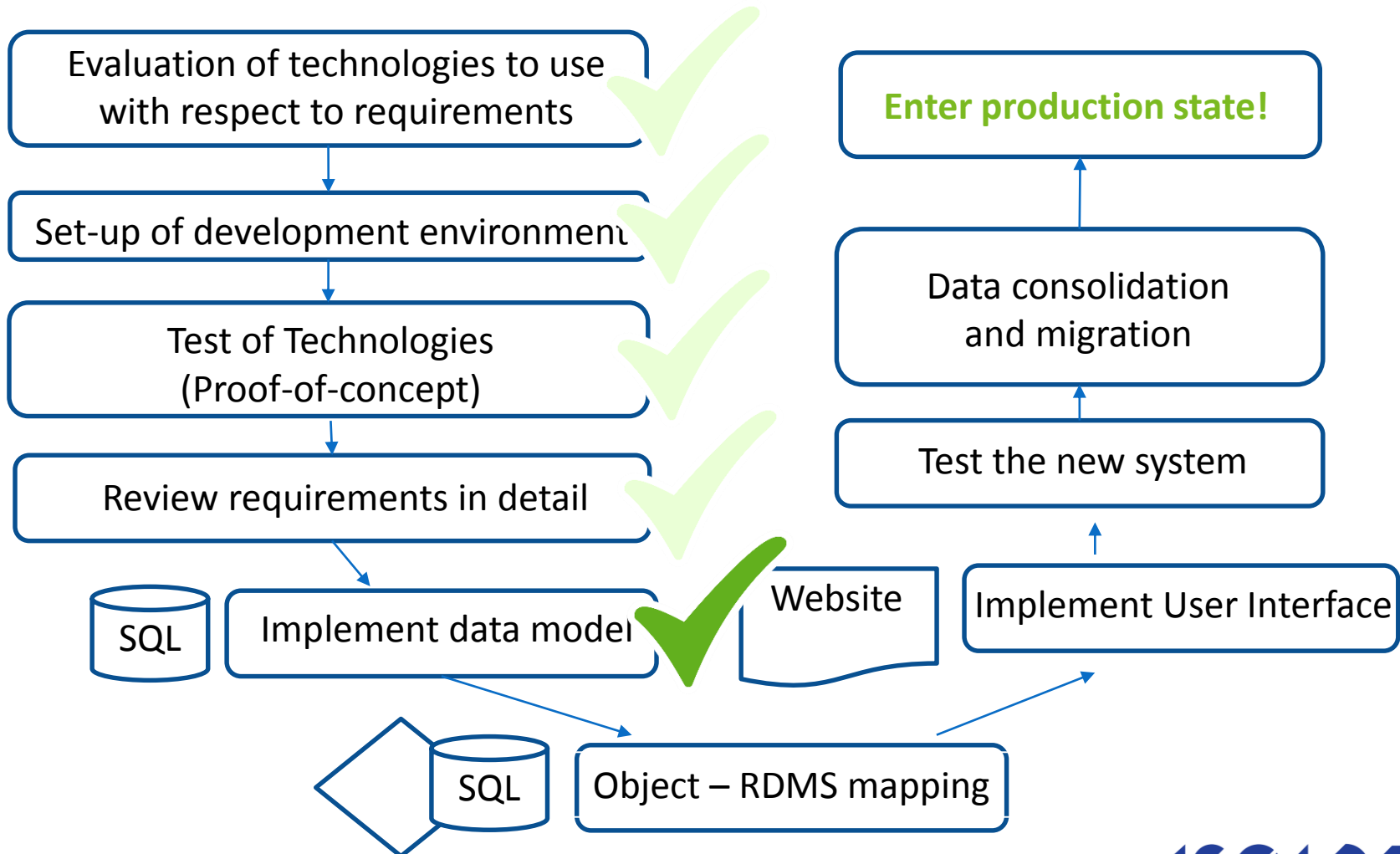
Technical Aspects

New Db design (excerpt)



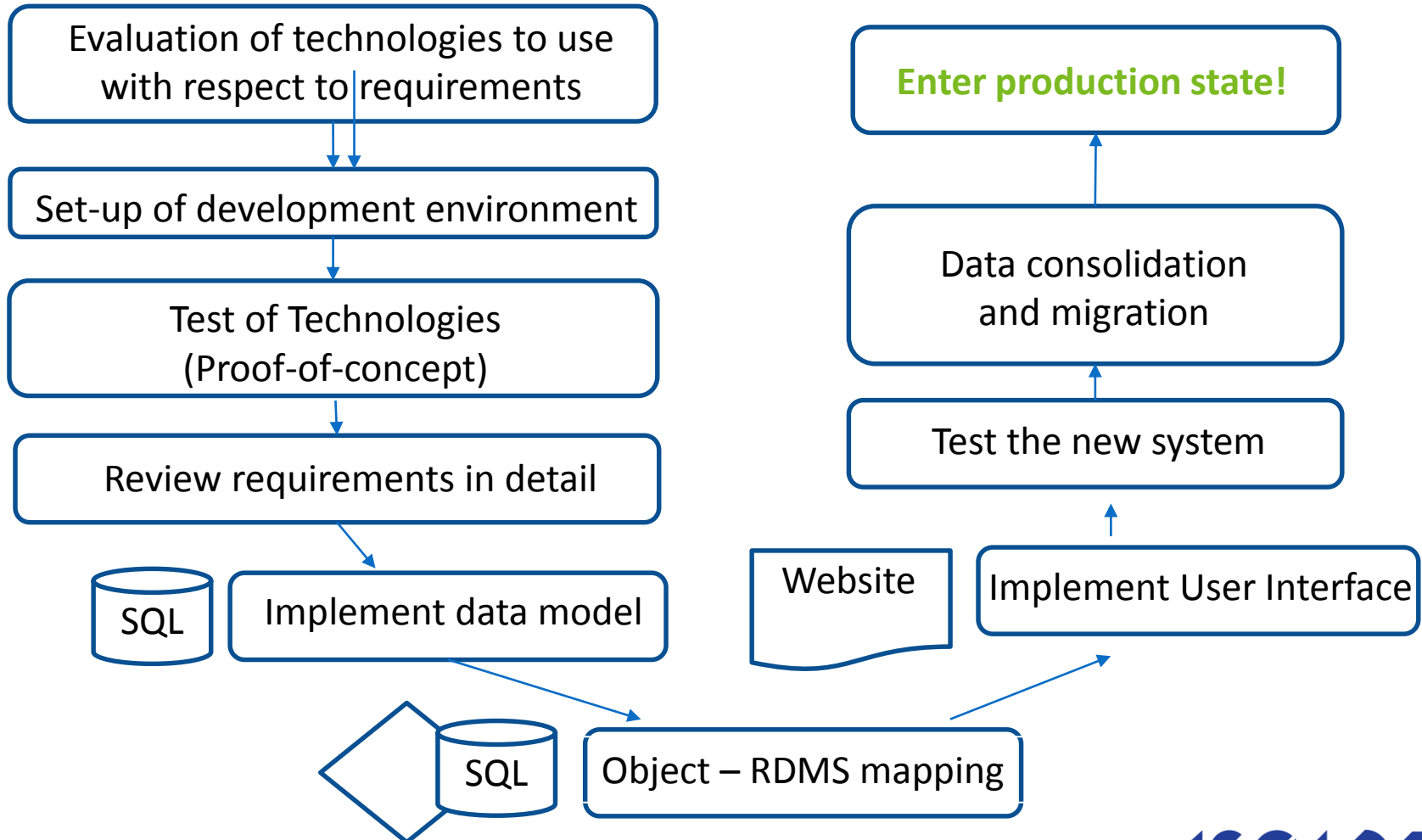
Technical Aspects

Development roadmap



Technical Aspects

Development roadmap



Technical Aspects

Development roadmap



Implement data model



Data consolidation and migration



Basic webinterface with

- Link to new database
- Similar to current yield website



➔ Ready to insert new yields!

More advanced:

- User interaction
- Effusion and Diffusion
- Process optimization

New features:

- Yield tracking
- Yield prediction
- Flexible search
- Production yields

Milestone 1

Milestone 2

Milestone 3

Webinterface

ISOLDE Yield Database

localhost:57395/Yield_Home.aspx

CERN Accelerating science Sign in Directory

ISOLDE Yield Database

Yield information

- Yields by Element
- Yields by Mass Number
- Yields by Target Type

In-target production

- FLUKA
- ARBLABLA

Diffusion and Effusion

Yield prediction

The ISOLDE nuclide Chart

Find the produced isotopes independent on the target

Group	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
	1A	2A	3B	4B	5B	6B	7B	8B			1B	2B	3A	4A	5A	6A	7A	8A	
Period																			
1	1 H																		2 He
2	3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne	
3	11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar	
4	19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr	
5	37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe	
6	55 Cs	56 Ba	* 71 Lu	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn	
7	87 Fr	88 Ra	** 103 Lr	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg								
* Lanthanides			* 57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb			
** Actinides			** 89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No			

Ion source:

+	Surface	-
hot	Plasma	cool
	Laser	

For more information please contact the ISOLDE Physics Coordinator, [Karl Johnston](#)
 For more details please contact the ISOLDE RIB development Group, [Thierry Stora](#)
 Database and web application created by: [Manuela Turrión](#) & [Urszula Herman-Izycka](#)

Webinterface

ISOLDE Yield Database

localhost:57395/YieldByElement_Basic.aspx?Z=36

CERN Accelerating science Sign in Directory

ISOLDE Yield Database

Yield information

- Yields by Element
- Yields by Mass Number
- Yields by Target Type

In-target production

- FLUKA
- ARBLABLA

Diffusion and Effusion

Yield prediction

The ISOLDE nuclide Chart

Krypton - Yield Overview

Element	Isotope	Half life	PSB / SC*	Yield/uC	Target
Kr	96	0.080 s	PSB	1.30e+5	U Carbide
Kr	94	0.20 s 1	PSB	3.30e+6	U Carbide
Kr	94	0.20 s 1	SC	1.42e+6	Th Carbide
Kr	95	0.78 s 3	PSB	3.40e+5	U Carbide
Kr	95	0.78 s 3	SC	7.78e+4	Th Carbide
Kr	95	0.78 s 3	PSB	2.20e+5	Th Carbide
Kr	93	1.286 s 10	PSB	3.50e+7	U Carbide
Kr	93	1.286 s 10	PSB	3.60e+7	Th Carbide
Kr	93	1.286 s 10	SC	8.56e+6	Th Carbide
Kr	92	1.840 s 8	PSB	1.30e+8	Th Carbide
Kr	92	1.840 s 8	PSB	1.00e+8	U Carbide
Kr	92	1.840 s 8	SC	4.43e+7	Th Carbide
Kr	85	10.756 y 18	PSB	3.00e+9	PbBi molten metal
Kr	74	11.50 m 11	SC	2.00e+6	Nb Metal powder
Kr	74	11.50 m 11	PSB	6.30e+6	Nb foil
Kr	74	11.50 m 11	PSB	5.50e+5	ZrO2 fibers

- U Carbide (PSB)
- Th Carbide (PSB)
- Th Carbide (SC)

- PbBi molten metal (PSB)
- Nb Metal powder (SC)
- Nb foil (PSB)

[Production details: Target density, Ion Source, Reference, ...](#)

Webinterface

ISOLDE Yield Database Sign in Directory

← → ↻ localhost:57395/YieldByElement_Detail.aspx?Z=36

ISOLDE Yield Database

Yield information

- Yields by Element
- Yields by Mass Number
- Yields by Target Type

In-target production

- FLUKA
- ARBLABLA

Diffusion and Effusion

Yield prediction

The ISOLDE nucl...

Krypton - Yield Details

Isotope	Half life	Driver	GeV	Yield/uC	Target	Thickness	Ion source	Laser	Line	n-Converter	Sideband	Target	Reference	ShowAll
⁸⁶ Kr	0.080 s	PSB		1.30e+5	U Carbide	50.00 g/cm ²	Plasma-Cold-MK7	off	cold	No		UC2.213	[178]	Show all
⁸⁴ Kr	0.20 s	SC		1.42e+6	Th Carbide	55.00 g/cm ²	Plasma-Cold-MK7	off	cold	No		Th.Mig.0642	[232]	Show all
⁸⁴ Kr	0.20 s	PSB		3.30e+6	U Carbide	54.00 g/cm ²	Plasma-Cold-MK7	off	cold	No		UC2.190	[178]	Show all
⁹⁵ Kr	0.78 s	SC		7.78e+4	Th Carbide	55.00 g/cm ²	Plasma-Cold-MK7	off	cold	No		Th.Mig.0643	[232]	Show all
⁹⁵ Kr	0.78 s	PSB		2.20e+5	Th Carbide	57.00 g/cm ²	Plasma-Cold-MK7	off	cold	No		ThC.027	[178]	Show all
⁹⁵ Kr	0.78 s	PSB		3.40e+5	U Carbide	54.00 g/cm ²	Plasma-Cold-MK7	off	cold	No		UC2.190	[178]	Show all
⁹³ Kr	1.286 s	SC		8.56e+6	Th Carbide	55.00 g/cm ²	Plasma-Cold-MK7	off	cold	No		Th.Mig.0641	[232]	Show all
⁹³ Kr	1.286 s	PSB		3.60e+7	Th Carbide	57.00 g/cm ²	Plasma-Cold-MK7	off	cold	No		ThC.027	[178]	Show all
¹¹ C	20.39 m	PSB	1.4	4.40e+4	HfO2 fibers	14.00 g/cm ²	Plasma-Helicon	off	nn	No		UC2.190	[178]	Show all
¹¹ C	20.39 m	PSB		2.10e+5	Mg Oxide	2.50 g/cm ²	Plasma-Cold-MK7	off	cold	No		Th.Mig.0640	[232]	Show all
¹¹ C	20.39 m	PSB		6.20e+6	TiOx fibers	7.30 g/cm ²	Plasma-Cold-MK7	off	cold	No		UC2.190	[178]	Show all
												PbB1.264	[175]	Show all
												Nb.Mig.0627	[232]	Show all
												Nb.088	[179]	Show all
												ZrO.177	[179]	Show all
												Nb.Mig.0632	[232]	Show all
												Th.Mig.0634	[232]	Show all

References

- [180] U. Koester; et al. Nucl. Instr. Meth. B 204 (2003) 303 [10.1016/S0168-583X\(03\)00505-6](https://doi.org/10.1016/S0168-583X(03)00505-6)
- [191] M. Kronberger et al. Nucl. Instr. Meth. B 317 (2013) 438-441 [10.1016/j.nimb.2013.07.032](https://doi.org/10.1016/j.nimb.2013.07.032)
- [193] T. M. Mendonca et al. Nucl. Instr. Meth. B 329 (2014) 1 [10.1016/j.nimb.2014.03.003](https://doi.org/10.1016/j.nimb.2014.03.003)
- [195] J. P. Ramos et al. Nucl. Instr. Meth. B 320 (2014) 83-88 [10.1016/j.nimb.2013.12.009](https://doi.org/10.1016/j.nimb.2013.12.009)
- [200] U.C. Bergmann, et al. Nucl. Phys. A 701 (2002) 363 [10.1016/S0375-9474\(01\)01611-6](https://doi.org/10.1016/S0375-9474(01)01611-6)
- [232] H.-J. Kluge (editor) ISOLDE Guide for Users. CERN 86-05 (1986)

Full text links (doi)



**In the ISOLDE Yield Database the beam intensities for isotopes of the elements measured at ISOLDE PSB (PS Booster with 1.0 or 1.4 GeV protons) are presented looking at the available SC yields (0.6 GeV protons).*

For more information please contact the ISOLDE Physics Coordinator, [Karl Johnston](#)
 For more details please contact the ISOLDE RIB development Group, [Thierry Stora](#)
 Database and web application created by: [Manuela Turroni](#) & [Urszula Herman-Izvycka](#)



Webinterface

ISOLDE Yield Database x
localhost:57395/YieldById.aspx

CERN Accelerating science Sign in Directory

ISOLDE Yield Database

...

Yield information

- Yields by Element
- Yields by Mass Number
- Yields by Target Type

In-target production

- FLUKA
- ARBLABLA

Diffusion and Effusion

Yield prediction

The ISOLDE nuclide Chart

Secondary beam

Yield Id	2598
Isotope	105 Mo (35.6 s 16)
Yield	1.50e+11 uC
Method	T
Comment	Yield_comment Test yield!
Total Current	1234pA (Total current comment)
Sideband	MX5
m/q	234
Separator	GPS
Transmission	81%

Primary beam

Driver	PSB
Energy	2.50
Neutron number	15
Mass number	20

Release

Alpha	0.74
Rise time	0 s
Fast fall time	0.37 s
Slow fall time	0.37 s
Release fraction	50.00%

Target Unit

Unit	Zr.Mig.0543
Material	Zr Oxide
Ion source	Hot Plasma
Source eff.	10.00%
Transferline	Hot
Total Thickness	
Gas leak	
Supplied Gas	CF4
Comments	
Source temperature	2273
Target temperature	2500
n-conv. used	Yes
Protons taken	1.00e+08
Target conditions	Target comment
Laser status	Laser on

Thanks!

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