ITEA 2

INFORMATION TECHNOLOGY FOR EUROPEAN ADVANCEMENT

openETCS

# *openETCS* itea2 Review

## WP7 – Toolchain Development

supported by:

Federal Ministry of Education and Research

Liberté • Égalité • Fraternité
RÉPUBLIQUE FRANÇAISE
MINISTÈRE DE L'ENSEIGNEMENT SUPÉRIEUR ET DE LA RECHERCHE

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GOBIERNO DE ESPAÑA
MINISTERIO DE CIENCIA E INNOVACIÓN

openETCS@ITEA2 Project

Michael Jastram

Paris, July 3rd 2013

# The Big Picture

Image courtesy of -Marcus- / FreeDigitalPhotos.net

# The Big Picture

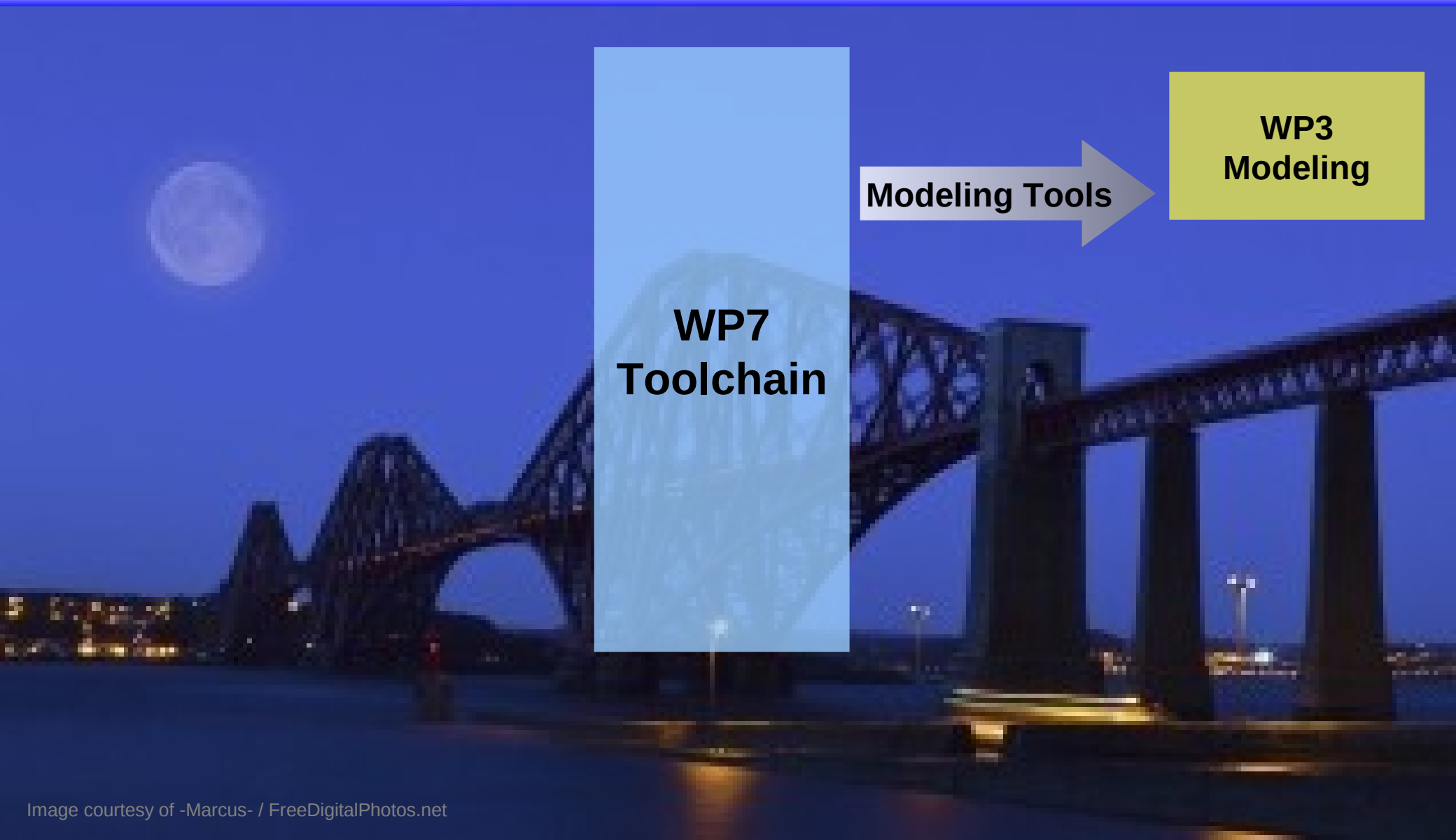


Image courtesy of -Marcus- / FreeDigitalPhotos.net

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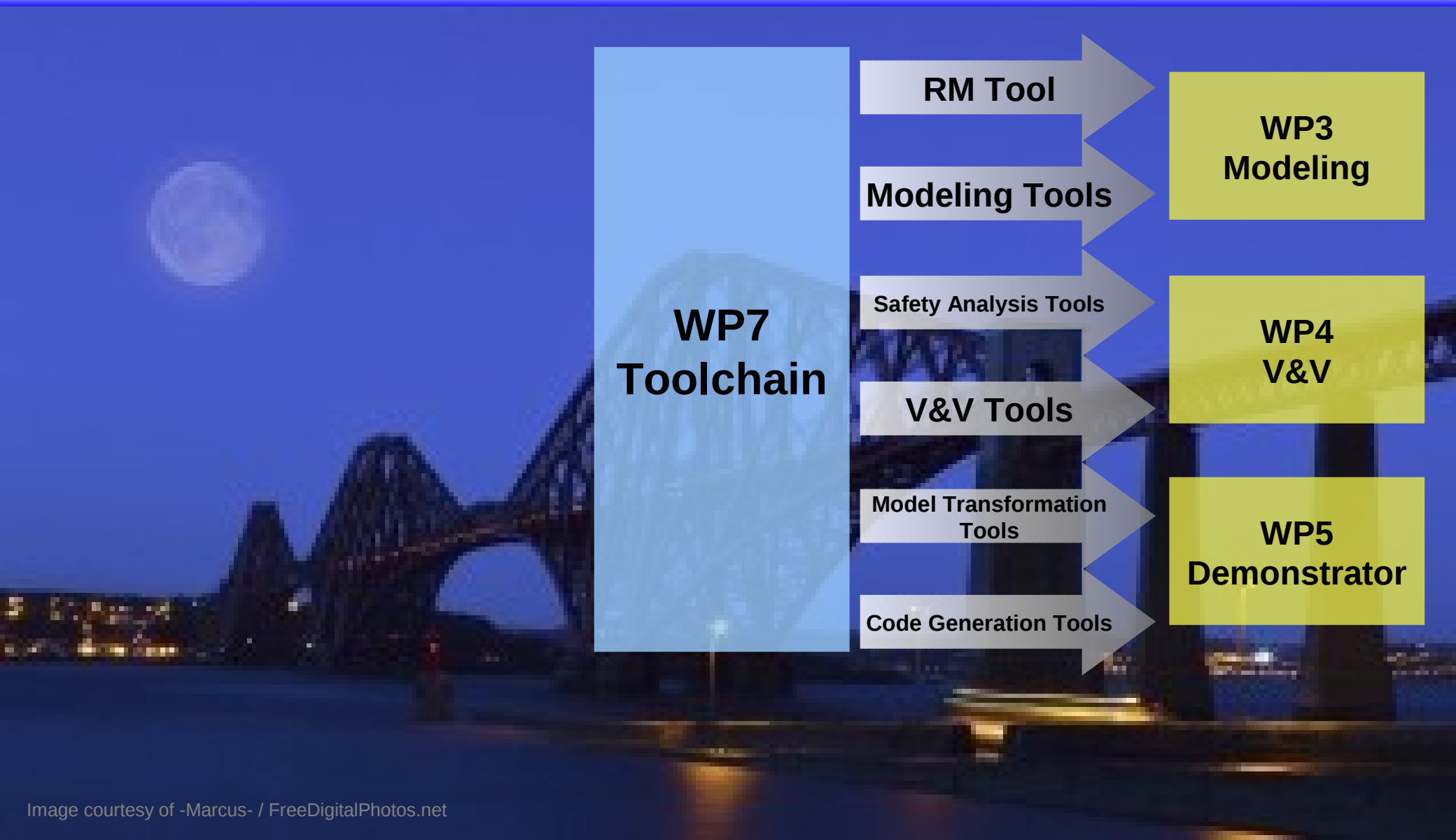


Image courtesy of -Marcus- / FreeDigitalPhotos.net

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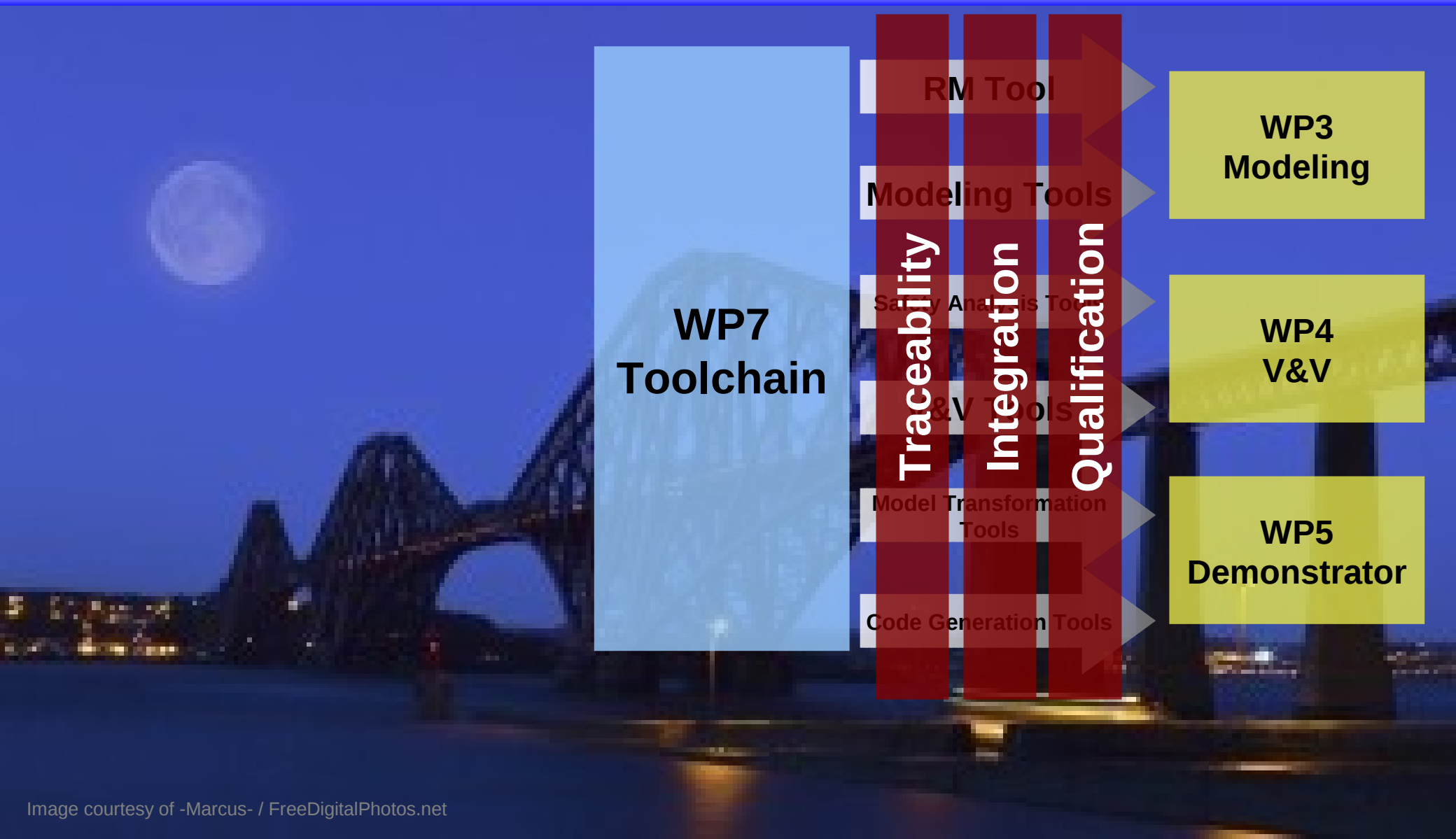


Image courtesy of -Marcus- / FreeDigitalPhotos.net

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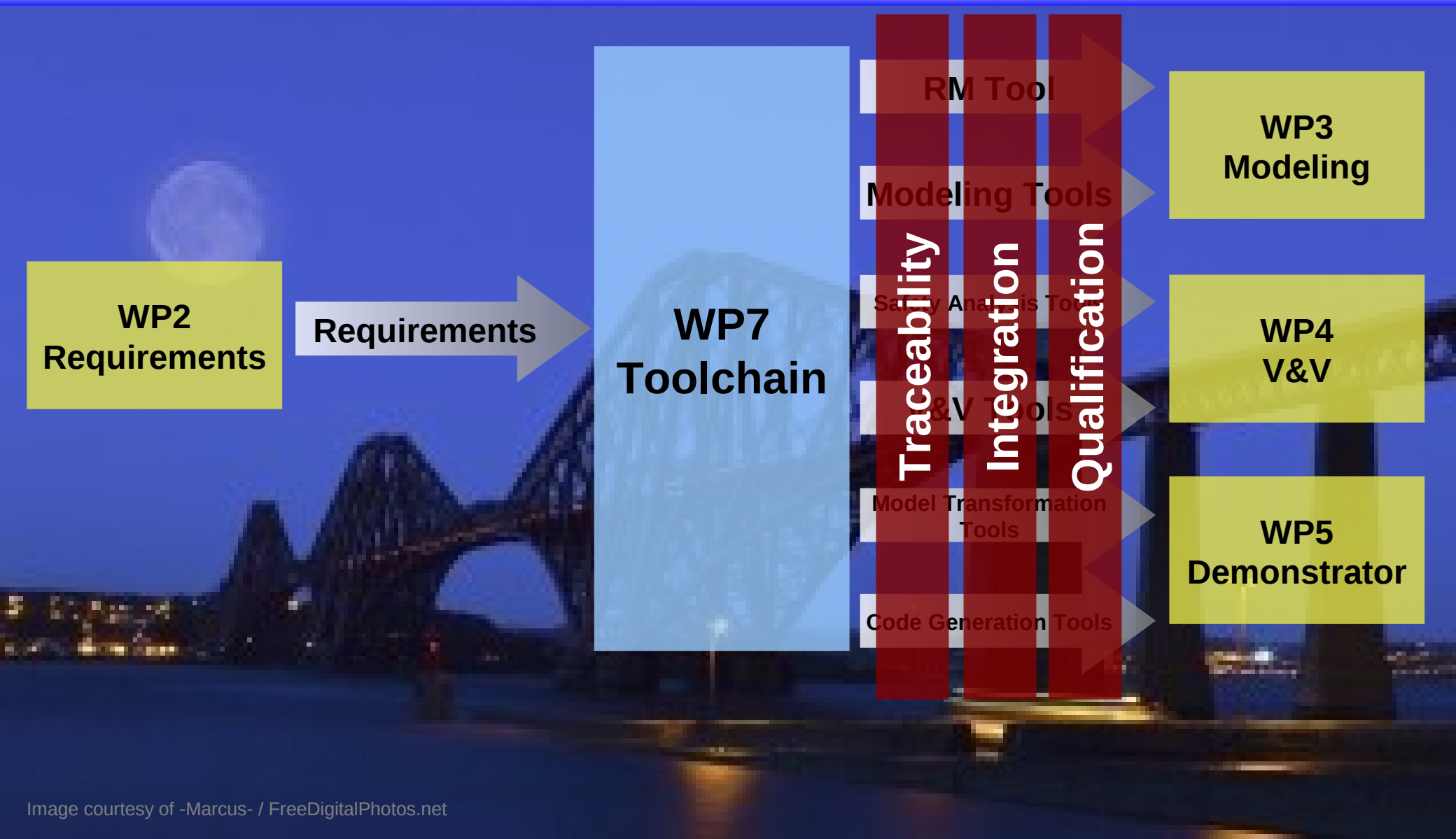


Image courtesy of -Marcus- / FreeDigitalPhotos.net

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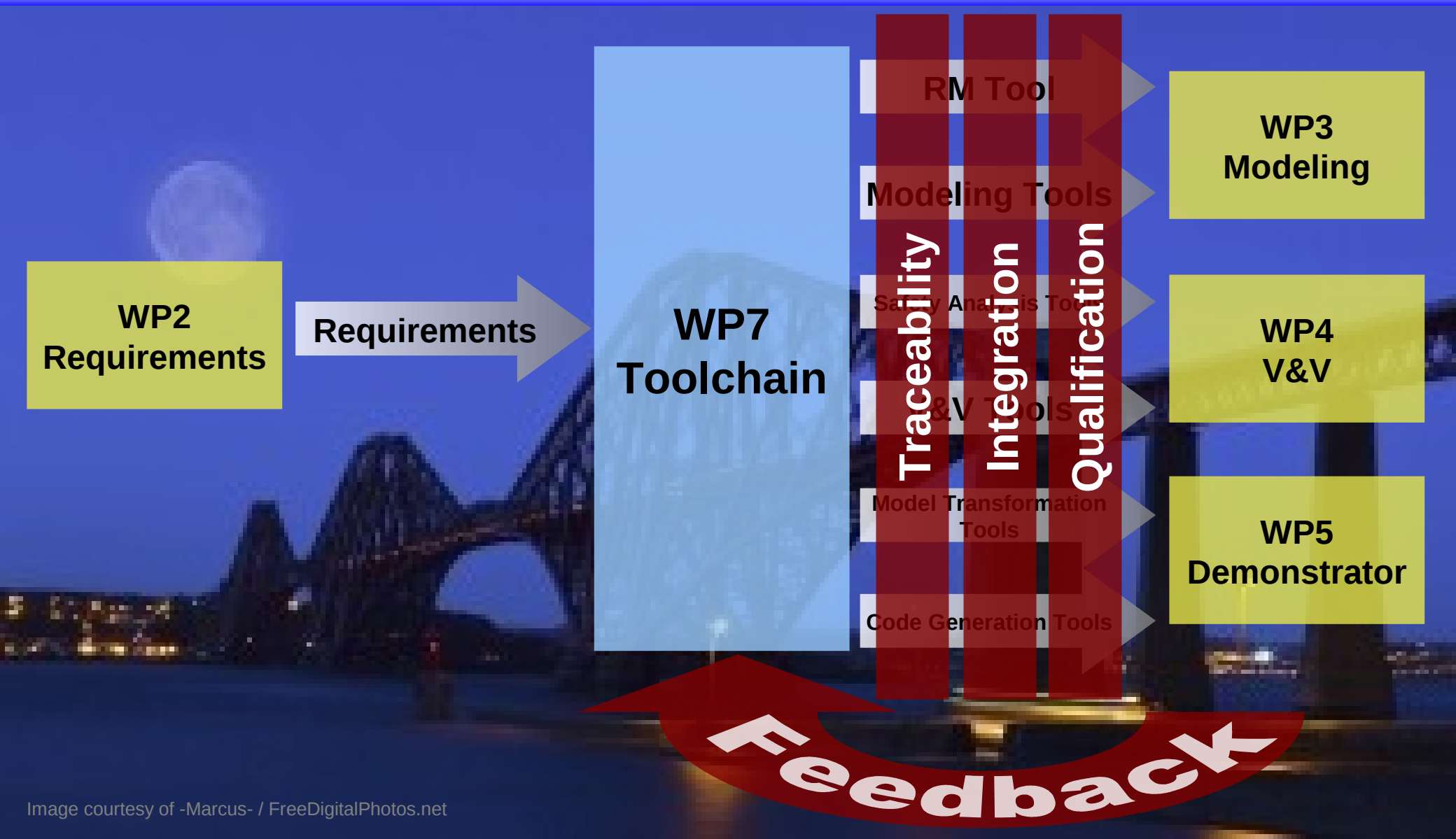
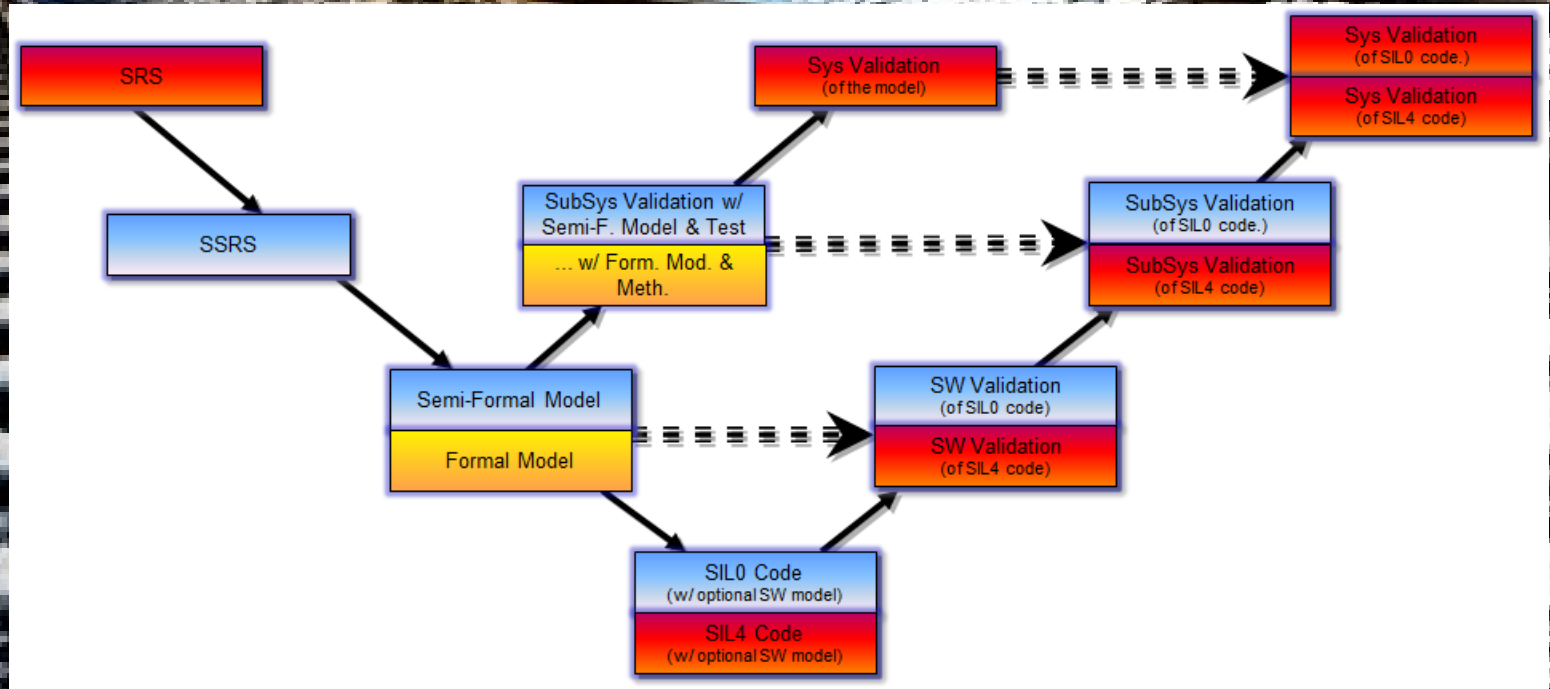



Image courtesy of -Marcus- / FreeDigitalPhotos.net

# An Integrated Tool Chain




Source: https://github.com/openETCS/requirements/tree/master/D2.6-9

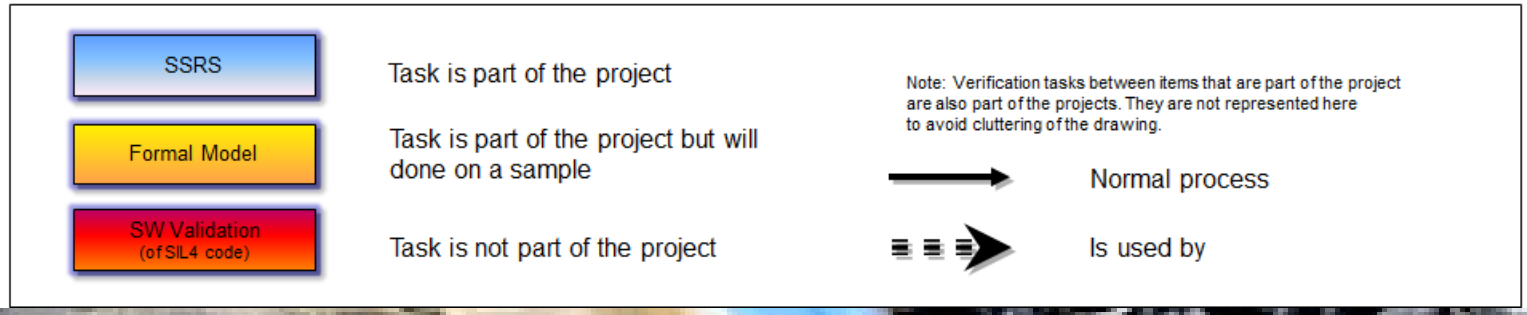



Image courtesy of graur codrin / FreeDigitalPhotos.net

# Workpackage Structure

WP7 **Toolchain**
Michael Jastram / Formal Mind

T7.1 **Primary Toolchain**
Marielle Petit-Doche / Systerel

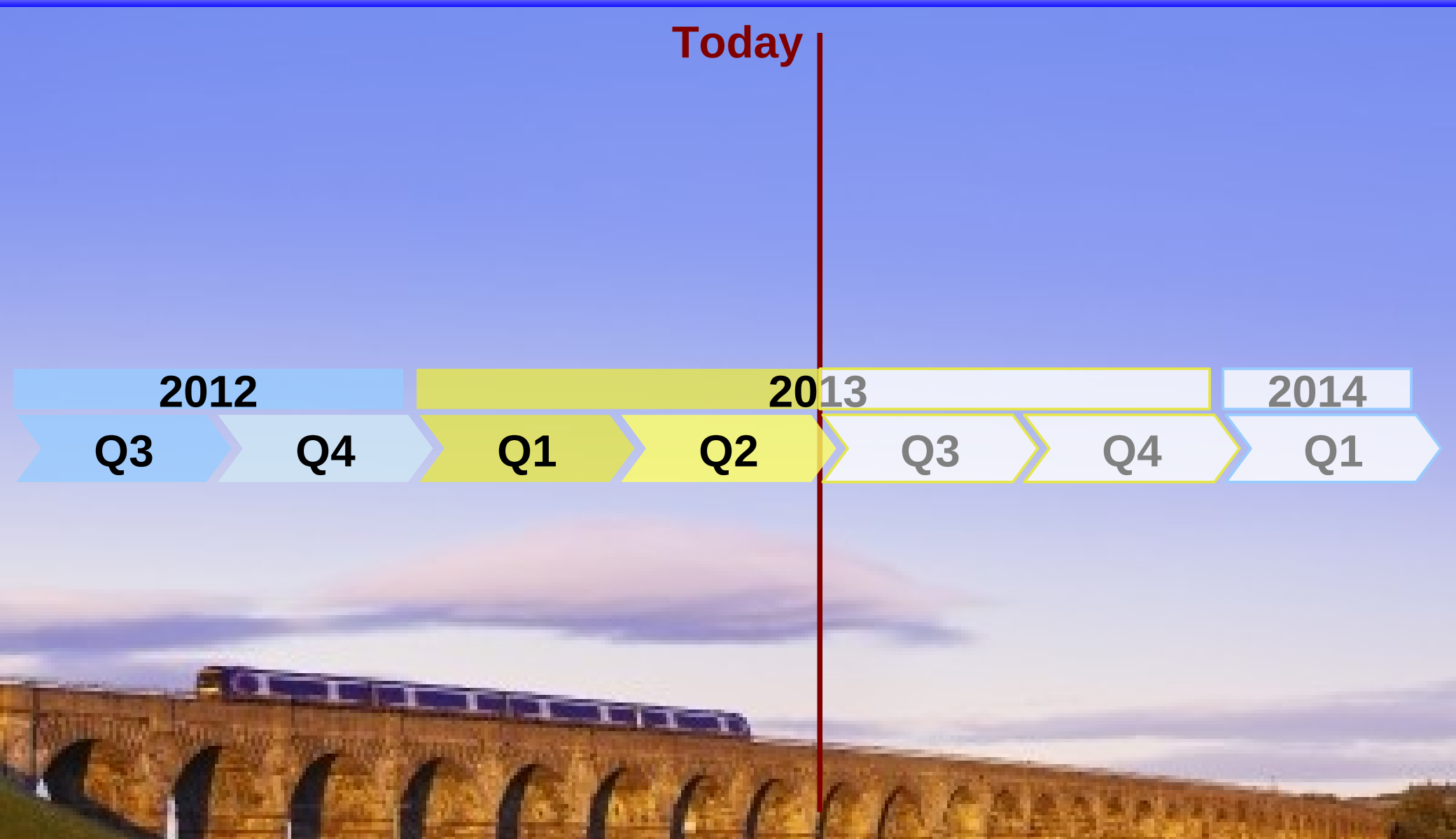
T7.2 **Secondary Toolchain**
Marielle Petit-Doche / Systerel

T7.3 **Toolchain Development**
Jan Peleska & Cécile Braunstein
University Bremen

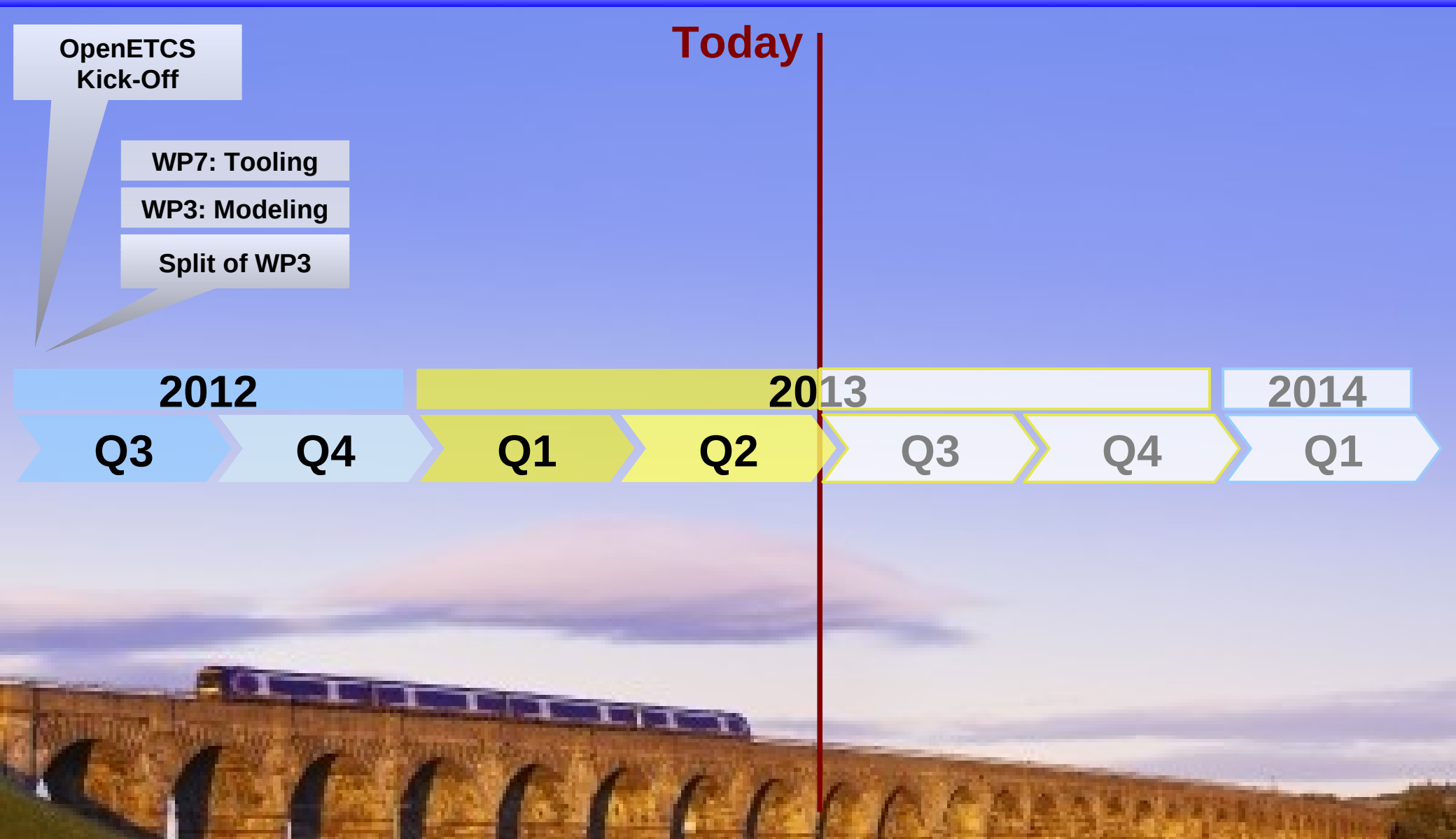
T7.4 **Ecosystem**
Jonas Helming / EclipseSource

Image courtesy of Vichaya Kiatying-Angsulee / FreeDigitalPhotos.net

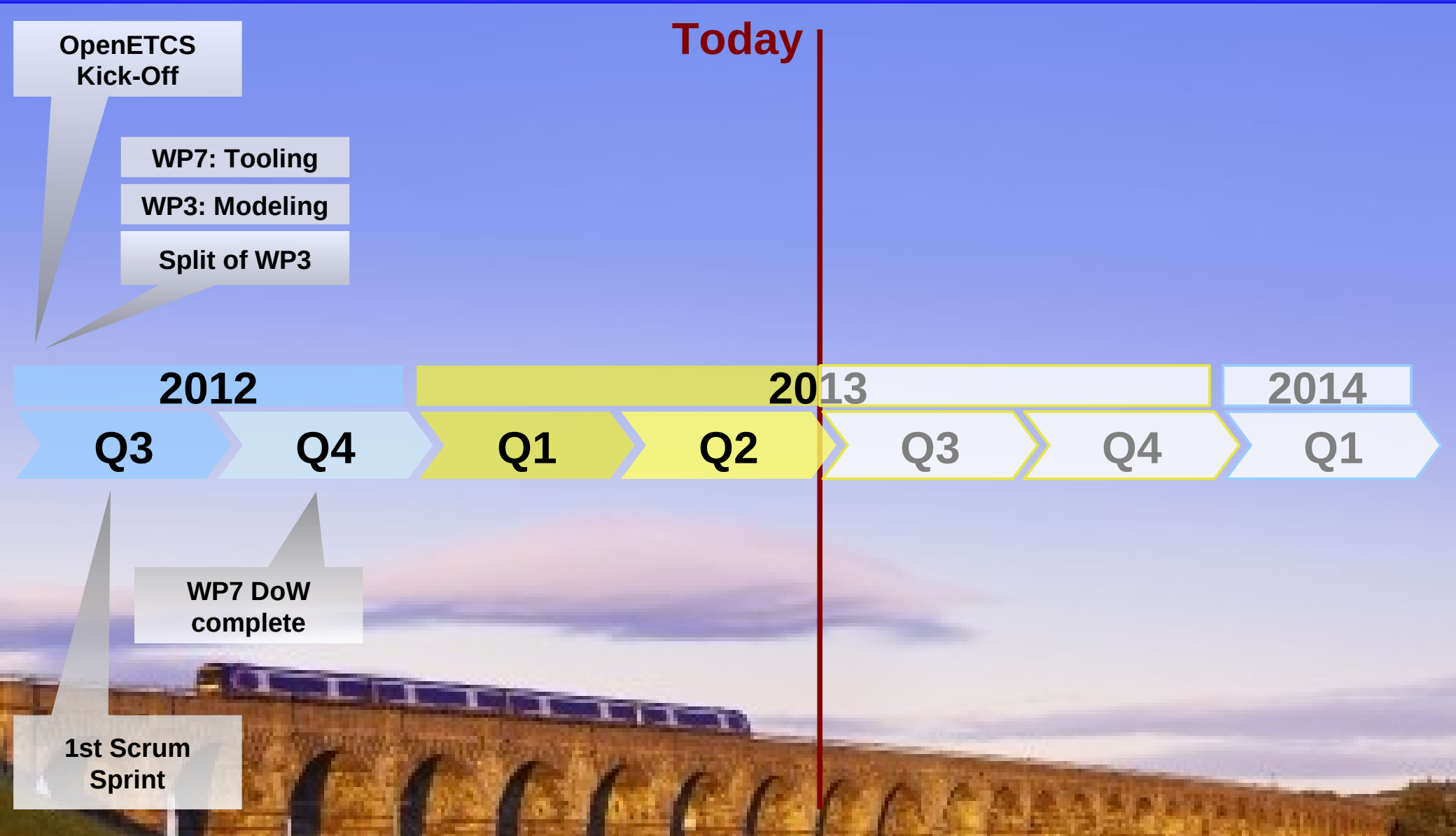
# Timeline



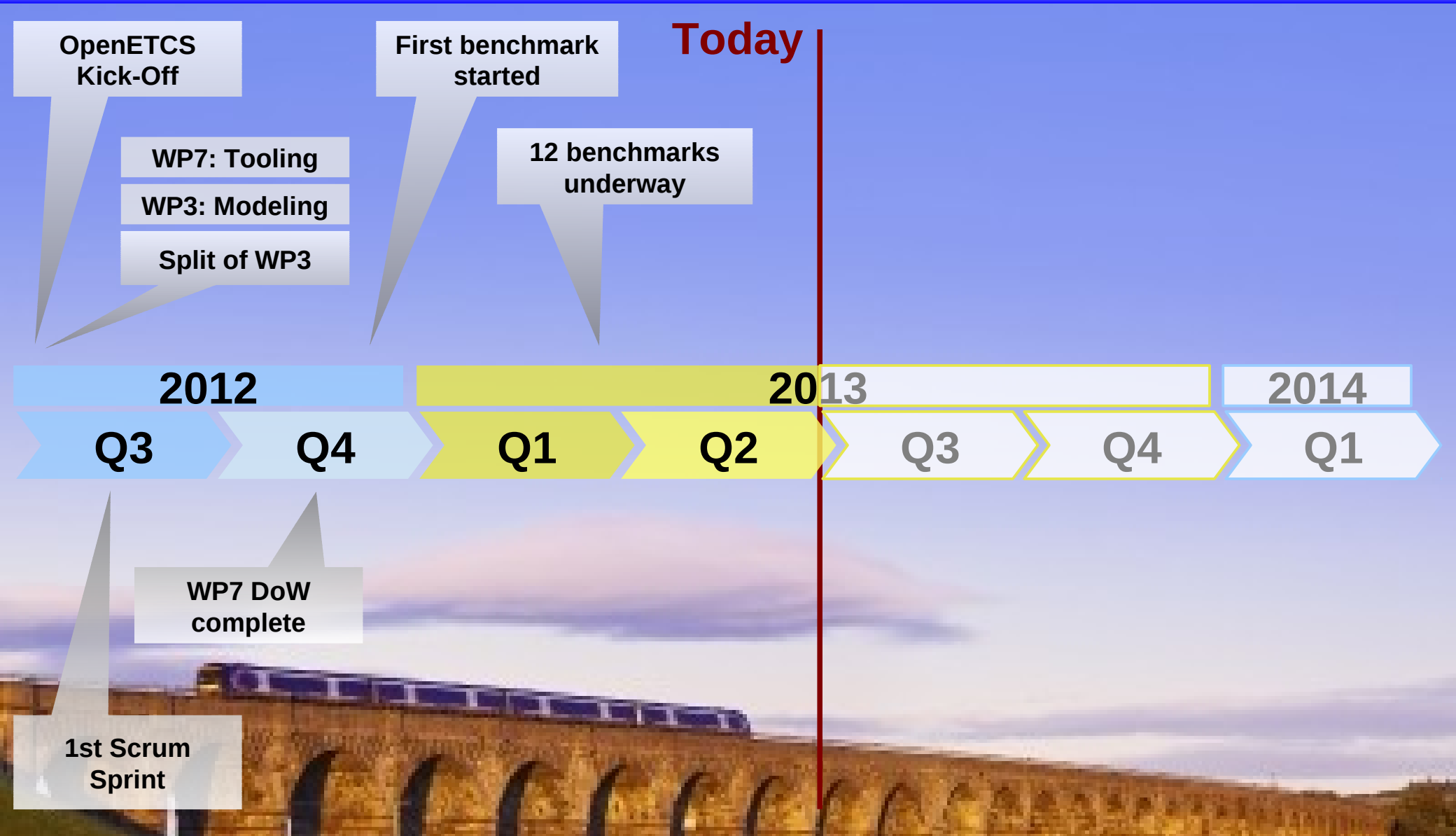
# Timeline


Today
OpenETCS Kick-Off
WP7: Tooling
WP3: Modeling
Split of WP3
2012
2013
2014
Q3
Q4
Q1
Q2
Q3
Q4
Q1

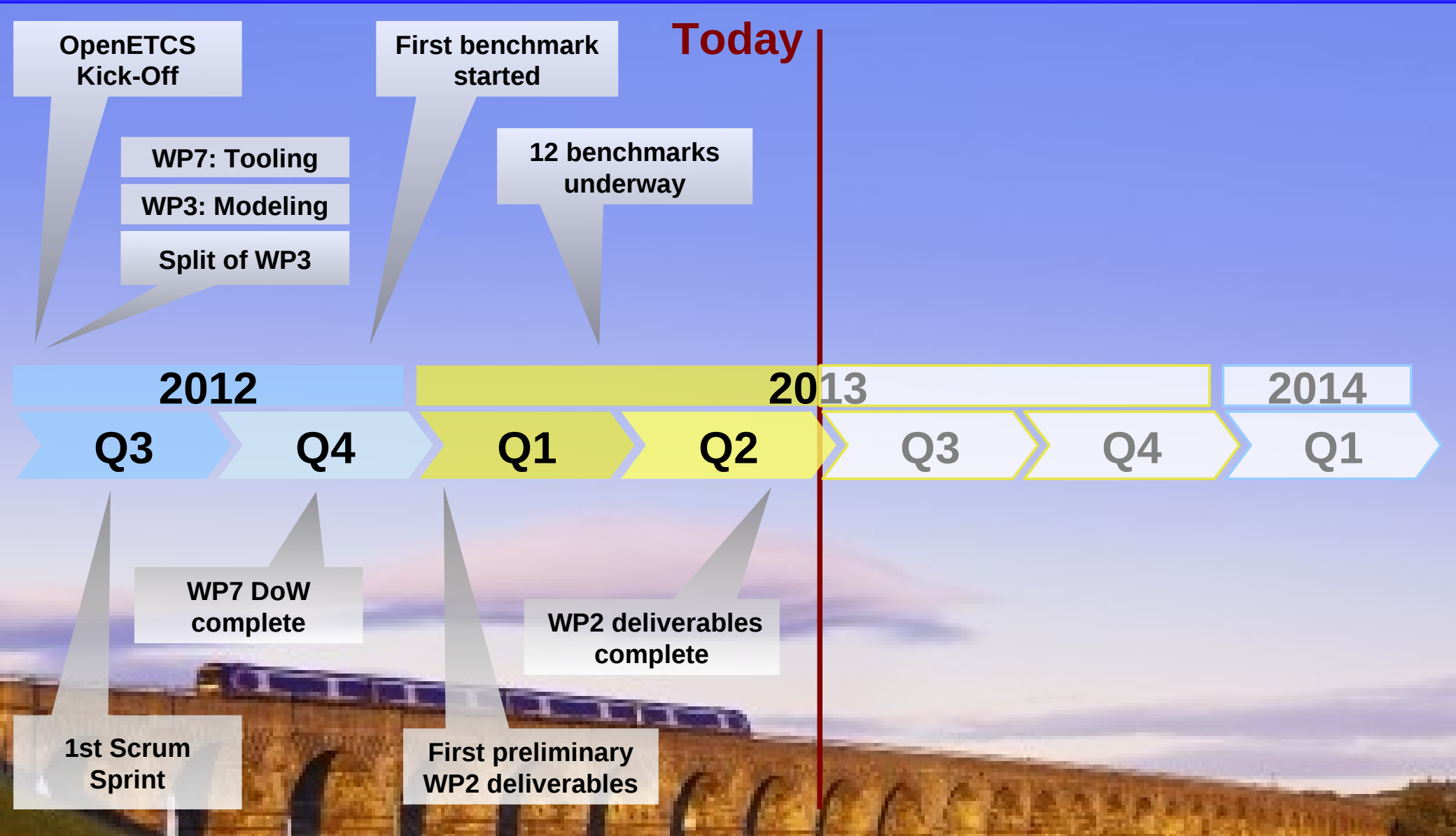
# Timeline


Today
OpenETCS Kick-Off
WP7: Tooling
WP3: Modeling
Split of WP3
2012
2013
2014
Q3
Q4
Q1
Q2
Q3
Q4
Q1
WP7 DoW complete
1st Scrum Sprint

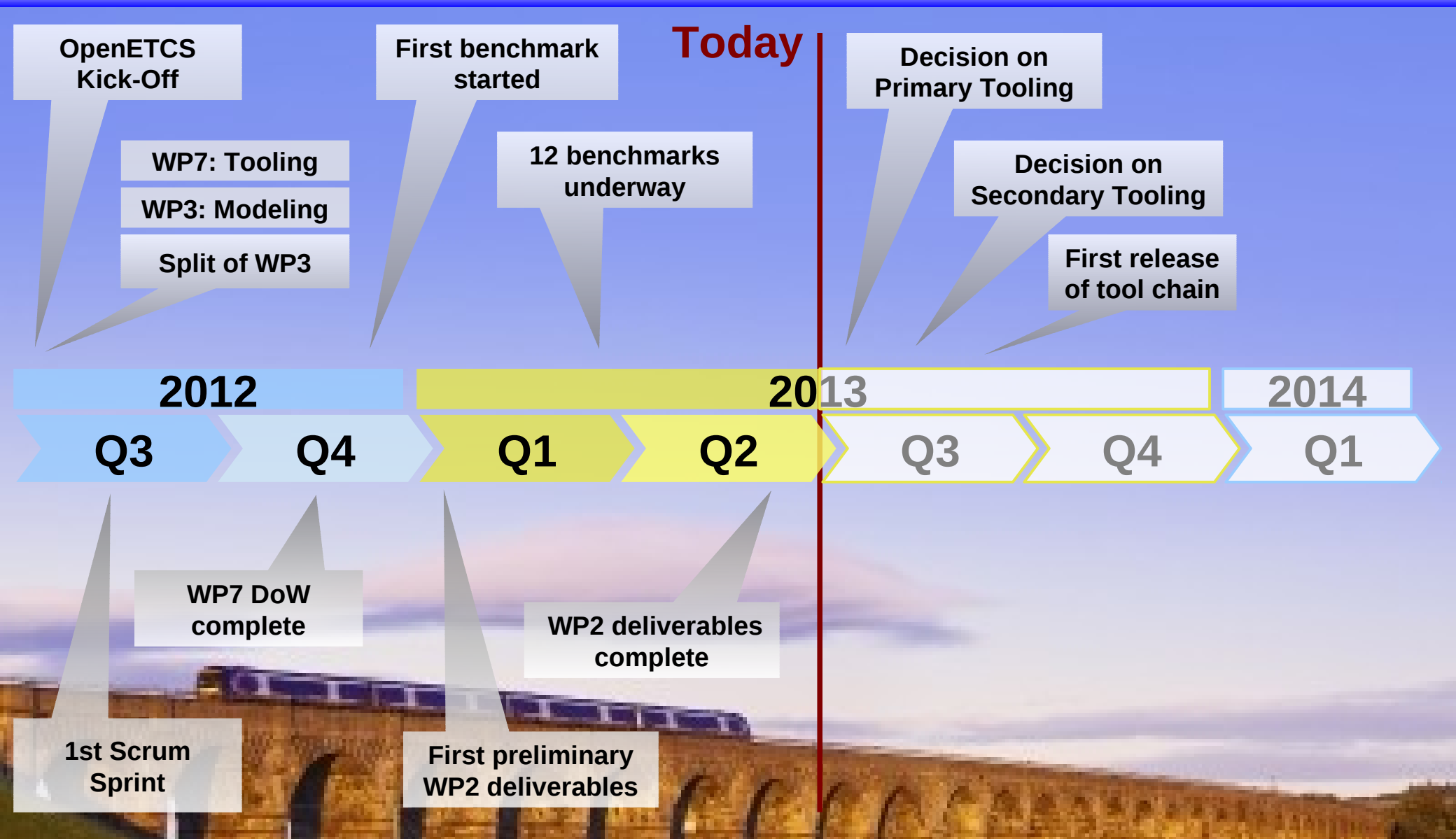
# Timeline


OpenETCS Kick-Off
First benchmark started
Today
WP7: Tooling
WP3: Modeling
Split of WP3
12 benchmarks underway
2012
2013
2014
Q3
Q4
Q1
Q2
Q3
Q4
Q1
WP7 DoW complete
1st Scrum Sprint

# Timeline


OpenETCS Kick-Off
First benchmark started
Today
WP7: Tooling
WP3: Modeling
Split of WP3
12 benchmarks underway
2012
2013
2014
Q3
Q4
Q1
Q2
Q3
Q4
Q1
WP7 DoW complete
WP2 deliverables complete
1st Scrum Sprint
First preliminary WP2 deliverables

# Timeline


OpenETCS Kick-Off
WP7: Tooling
WP3: Modeling
Split of WP3
First benchmark started
12 benchmarks underway
Today
Decision on Primary Tooling
Decision on Secondary Tooling
First release of tool chain
2012
2013
2014
Q3
Q4
Q1
Q2
Q3
Q4
Q1
1st Scrum Sprint
WP7 DoW complete
First preliminary WP2 deliverables
WP2 deliverables complete

# Timeline

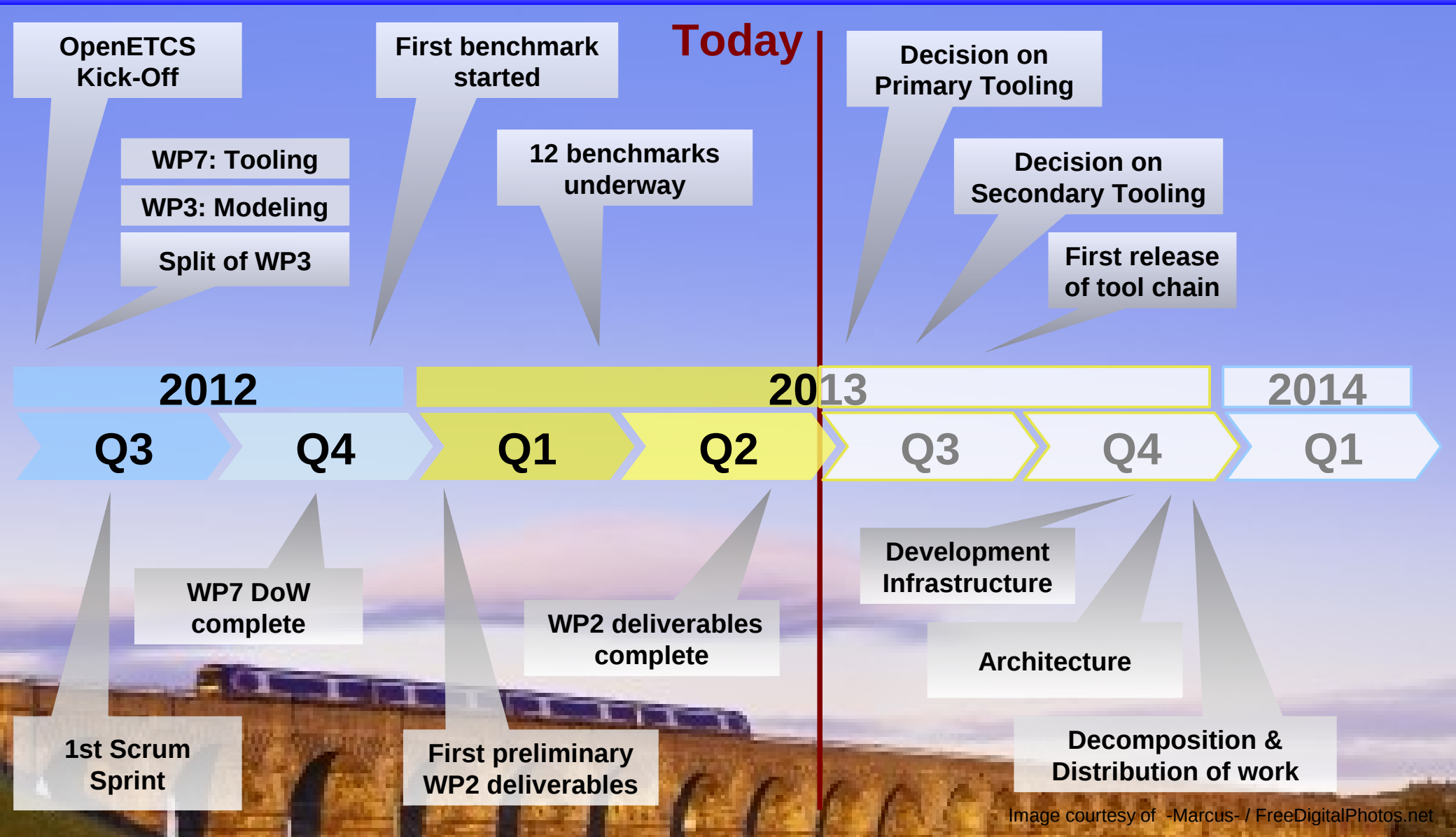



Image courtesy of -Marcus- / FreeDigitalPhotos.net

# Timeline

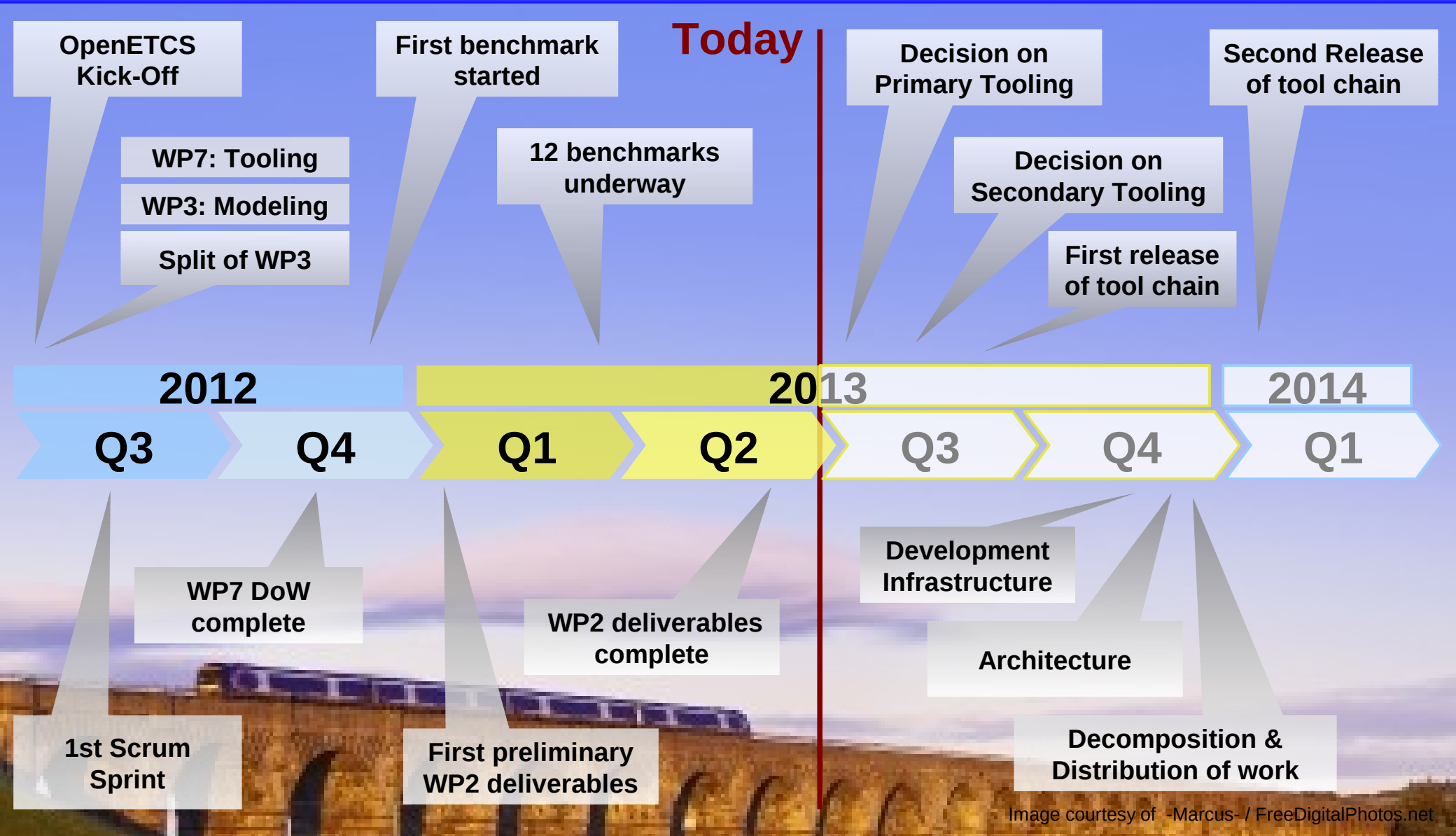



Image courtesy of -Marcus- / FreeDigitalPhotos.net

# 2014 – 2015: Regular releases

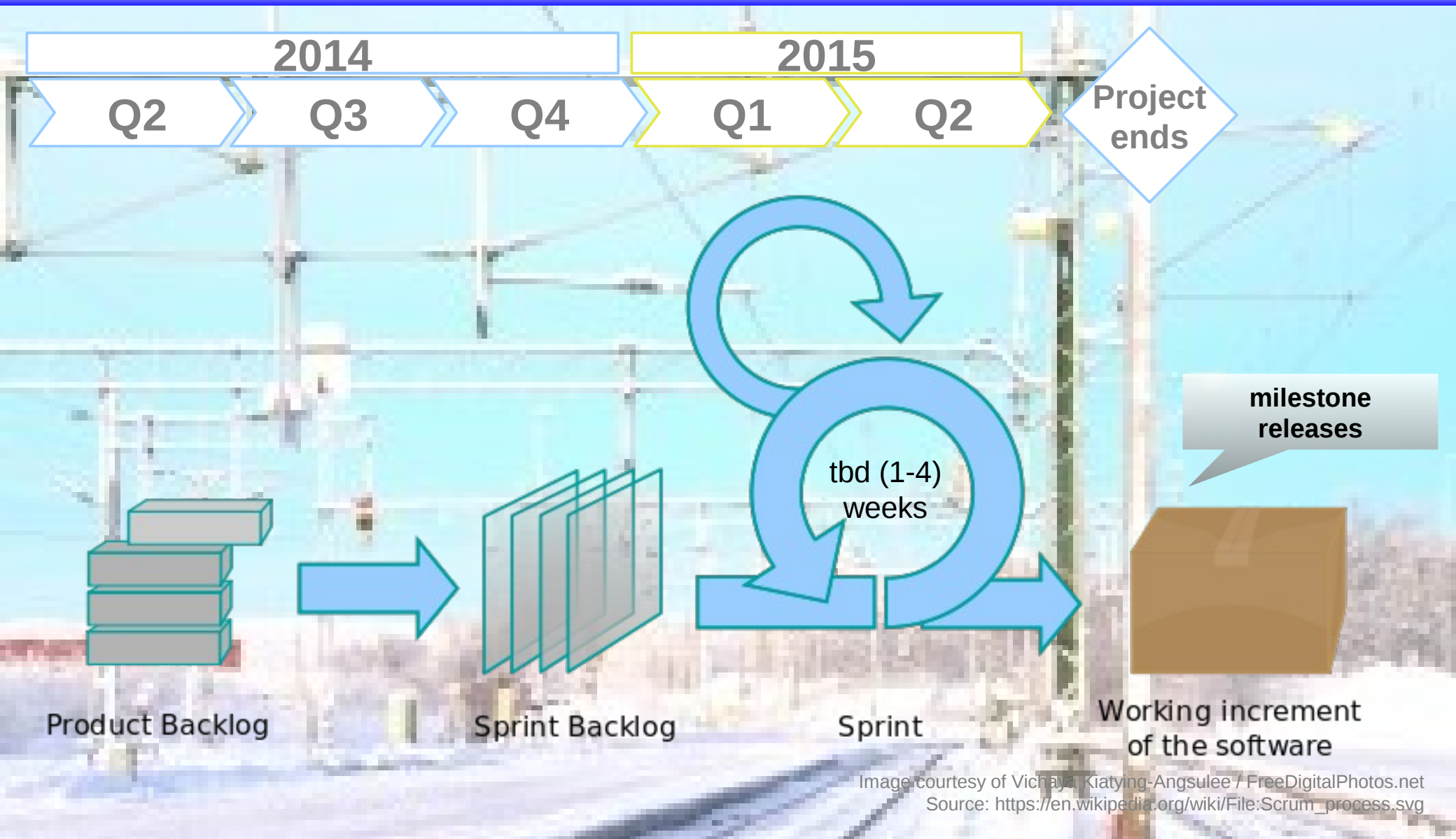



Image courtesy of Vichaya Kiatying-Angsulee / FreeDigitalPhotos.net
Source: https://en.wikipedia.org/wiki/File:Scrum_process.svg

# No deliverables yet, but...

| WP7 Objectives | | |
|---|---|---|
| **Date** | **Type of stone[5]/deliverable** | **Description** |
| *T0+13* | *D7.1 (Systerel)* | Report on the final choice(s) for the primary tool chain (means of description, tool and platform) |
| *T0+15* | *D7.2 (Systerel)* | Report on all aspects of secondary tooling (results of T7.2) |
| *T0+16* | *D7.4 (Uni-Bremen)* | Tool chain first release |
| *T0+19* | *D7.3 (Uni Bremen)* | Tool chain qualification process description |
| *T0+26* | | Regular releases according to Scrum Process |
| *T0+36* | *D7.5 (Eclipse Source)* | Ecosystem Artefacts: Proposed Terms of use, Proposed Committer Agreements, Proposed IP Policy, Proposed Development Process Description, Development Process Guidelines, Infrastructure Documentation, Infrastructure Template, Evolution Report of previous Deliverables |

Source: https://github.com/openETCS/management/blob/master/FPP/11025_openETCS_FPP_Annex_v301.pdf

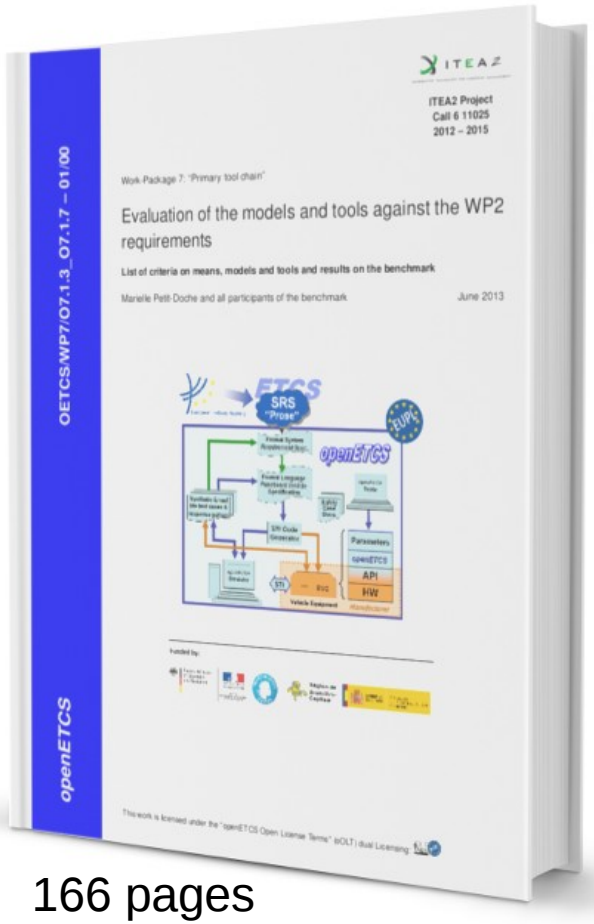
Image: ddpavumba / FreeDigitalPhotos.net

# … but concrete results (primary tools)

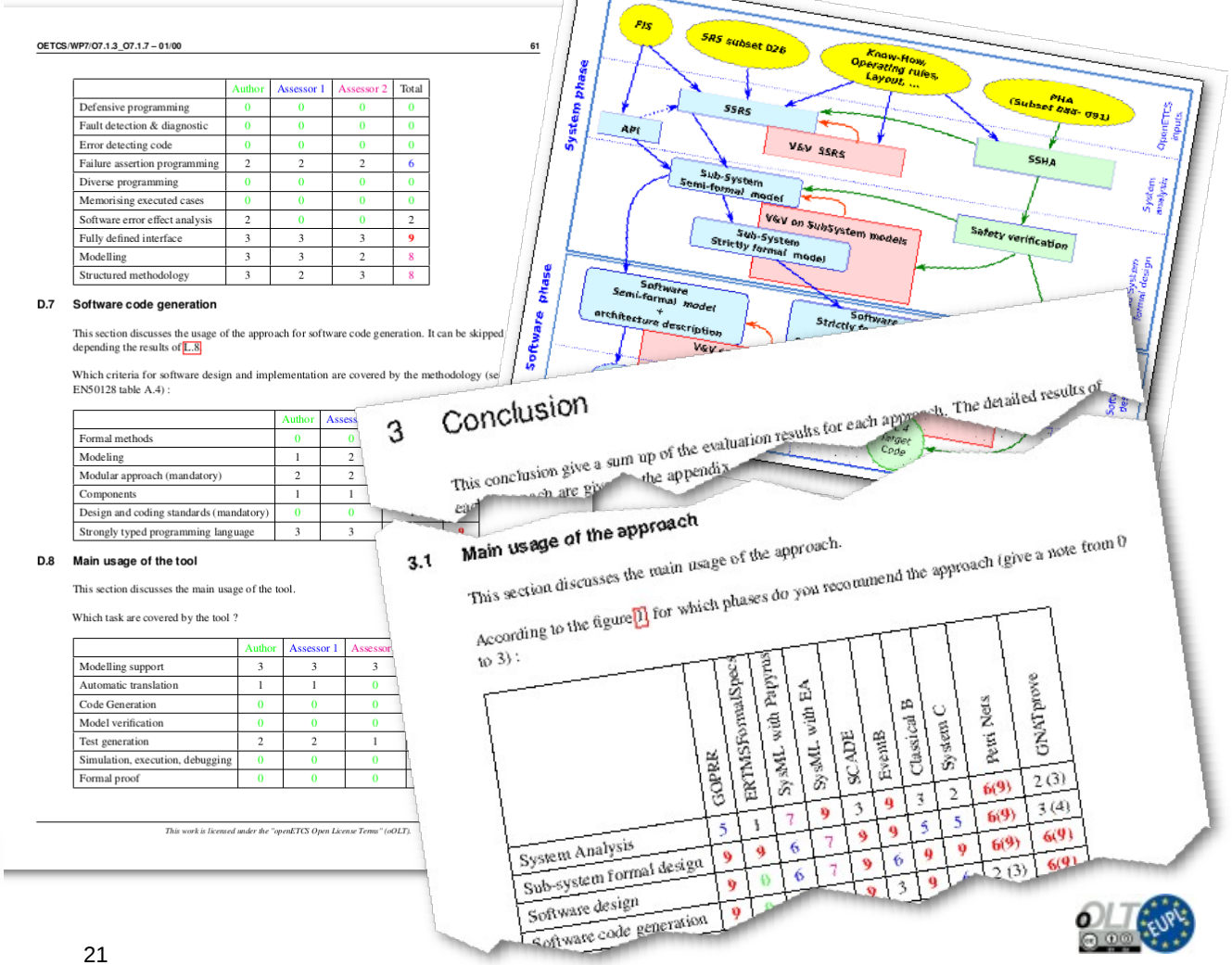
| Formalism / Tool | Status |
|---|---|
| SCADE 6.3.1 | Done |
| ERTMSFormalSpecs | Done |
| CORE Workstation 5.1 | **Stopped** |
| Event-B / Rodin 2.7 with ProR, ProB or AnimB and toolkit of provers (AtelierB, SMT,...) | Done |
| ClassicalB / AtelierB 4.0.2 | Done |
| Why3 0.80 | **Stopped** |
| GNATprove | Done |
| SysML/EA, RT-Tester | Done |
| GOPRR (GOPPRR) meta meta model / MetaEdit+ | Done |
| SysML / Papyrus | Done |
| SystemC | Done |
| UPPAAL | **Moved** |
| Petri Nets / Design/CPN | Done |

# Result: O7.1.3 – O7.1.7

https://github.com/openETCS/toolchain/blob/master/T7.1/O7.1.3_O7.1.7/Evaluation_against_WP2.pdf




166 pages

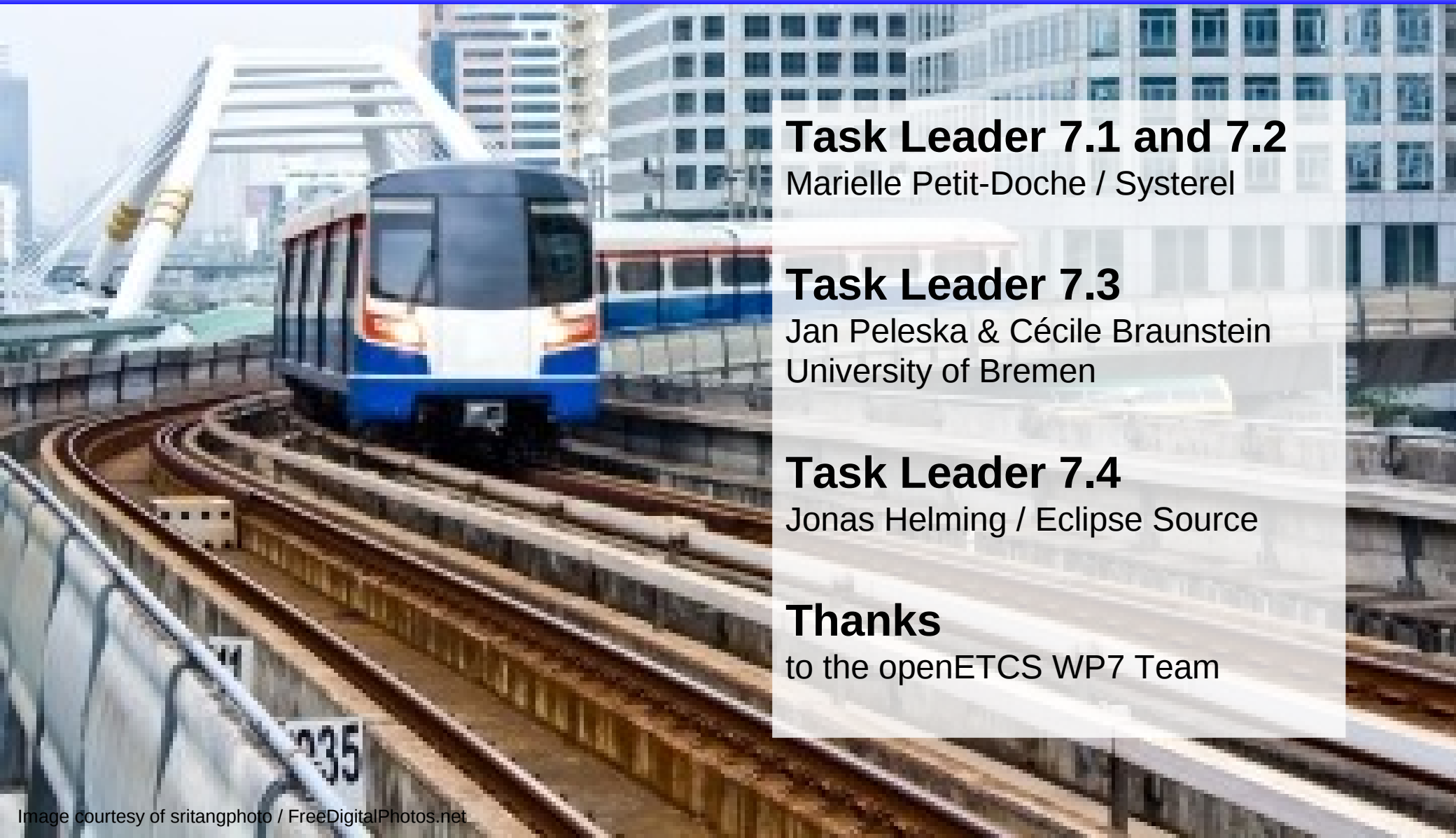


# … but concrete results (secondary tools)

| Formalism / Tool | Model transformation | Requirement management | Validation | Verification | Safety Analyses |
|---|---|---|---|---|---|
| AtelierB | | | X | X | |
| SCADE Suite | X | X | X | X | |
| UPPAAL | | | X | X | |
| Rodin + pluggins (ProR, ProB, SMT solvers, IUML,...) | X | X | X | X | X |
| CPN-Tools & SPENAT | | | X | X | X |
| Goal Structuring Notation (GSN) | | X | | | X |
| MaTeLo (Model Based Testing tool based on Markov Chains) | | X | X | | |
| Safety Architect (System Safety Analysis tool) | | | | | X |
| RT-tester | | | X | X | |
| Eclipse ProR | | X | | | |
| Fiacre and Tina, model-checking toolbox for Time Petri Nets | | | | X | |
| SPARK Ada | | | | | |

in Progress

# Thanks to the team



## Task Leader 7.1 and 7.2

Marielle Petit-Doche / Systerel

## Task Leader 7.3

Jan Peleska & Cécile Braunstein
University of Bremen

## Task Leader 7.4

Jonas Helming / Eclipse Source

## Thanks

to the openETCS WP7 Team

Image courtesy of sritangphoto / FreeDigitalPhotos.net