The Future of PPX

Towards a unified and more robust ecosystem

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What is PPX?

What is PPX?

Syntax extensions for PPXes

- Extension points:

```
let x = [%eq: int list] [1; 2] [2; 3]
```

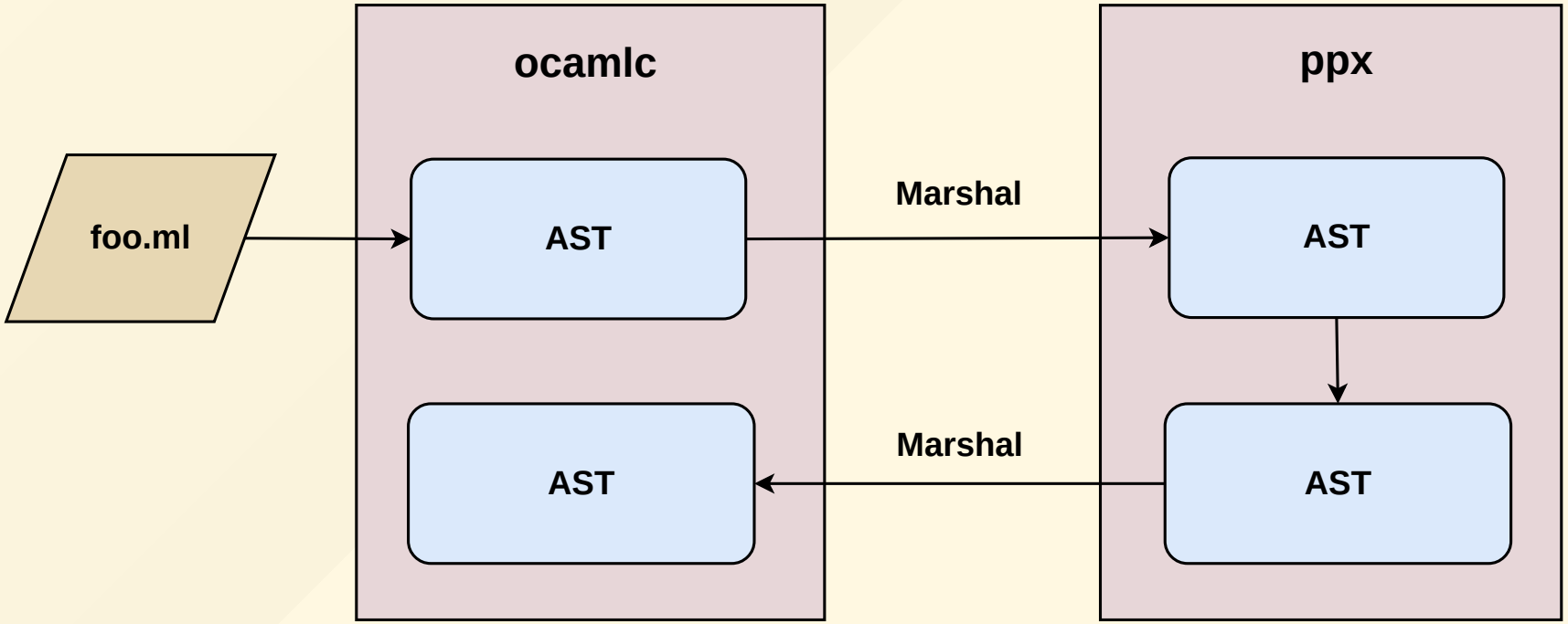
- Attributes:

```
type t = int list [@@deriving eq]
```

What is PPX?

Compiler integration

```
ocamlc -ppx ppx foo.ml
```

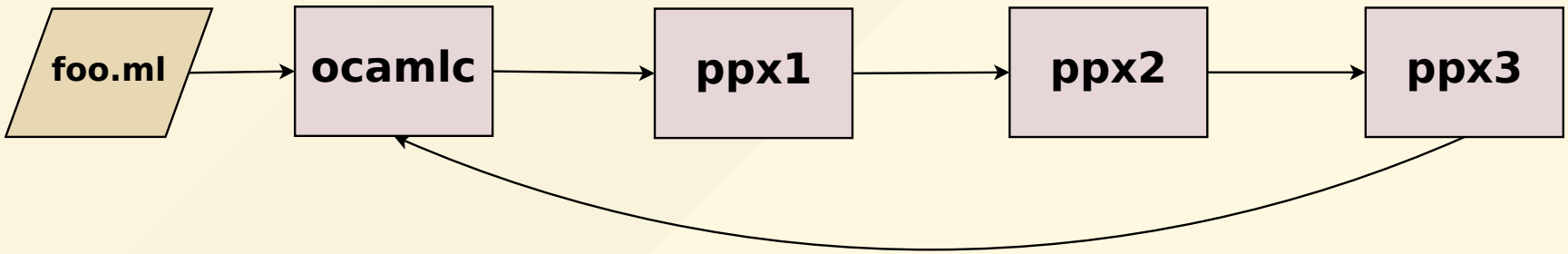


What are the issues with PPX?

What are the issues with PPX?

Combining several PPXes

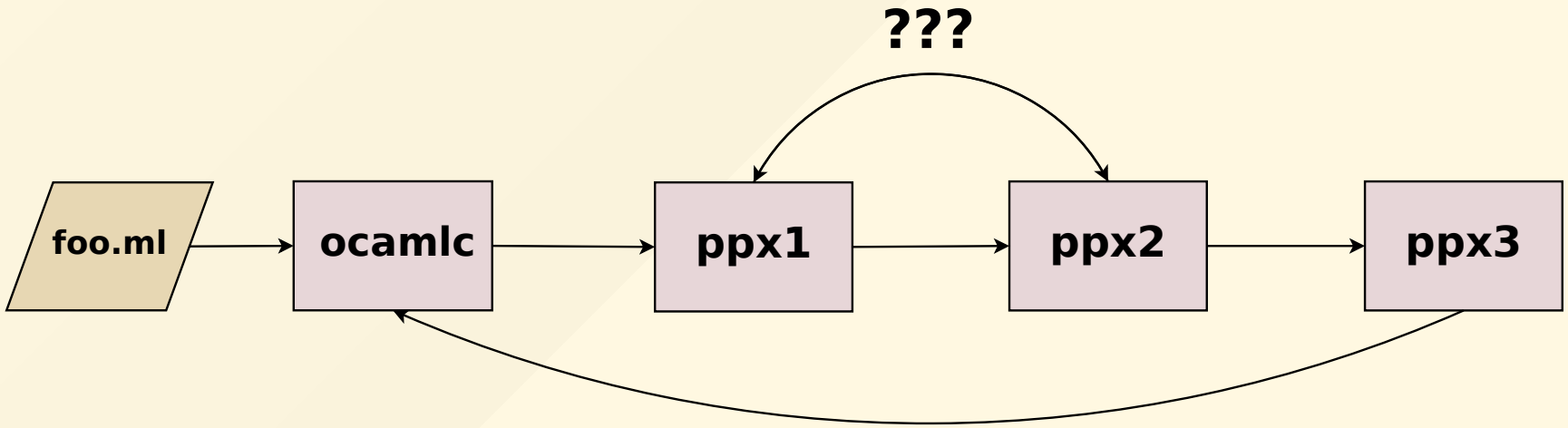
```
ocamlc -ppx ppx1 -ppx ppx2 -ppx ppx3 foo.ml
```



What are the issues with PPX?

Combining several PPXes

Is it equivalent to apply PPXes in different orders?

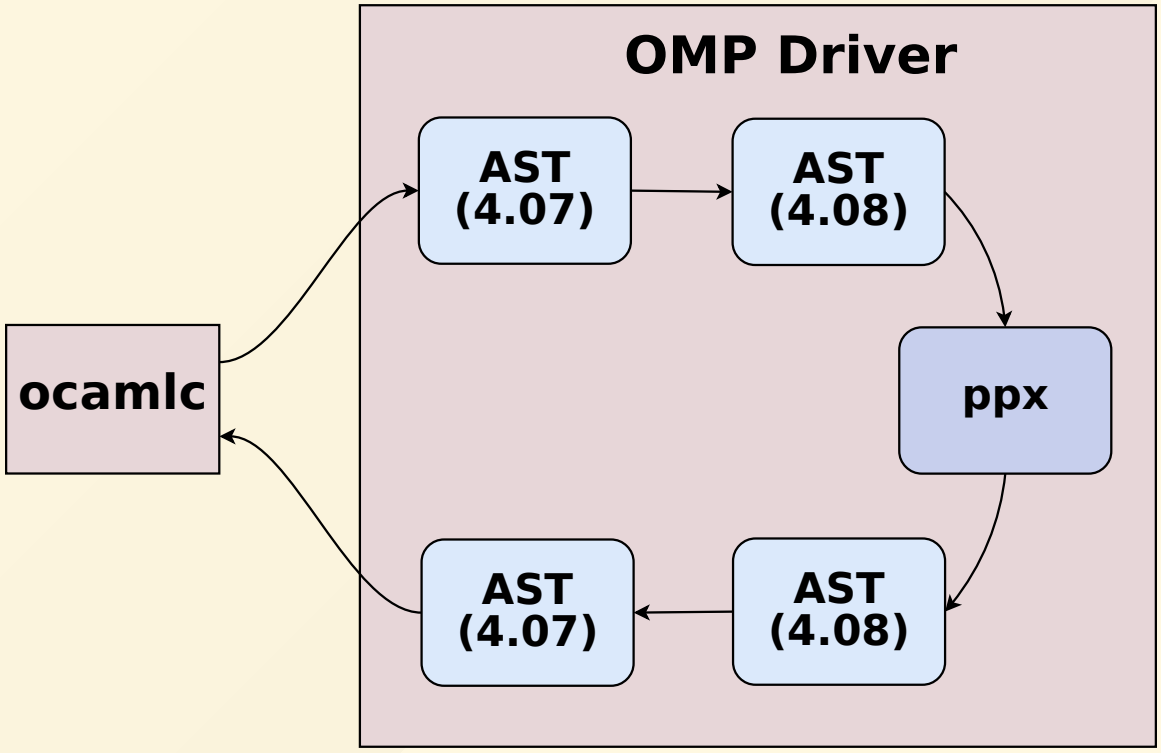


Issue for both PPX authors and users...

ocaml-migrate-parsetree

ocaml-migrate-parsetree

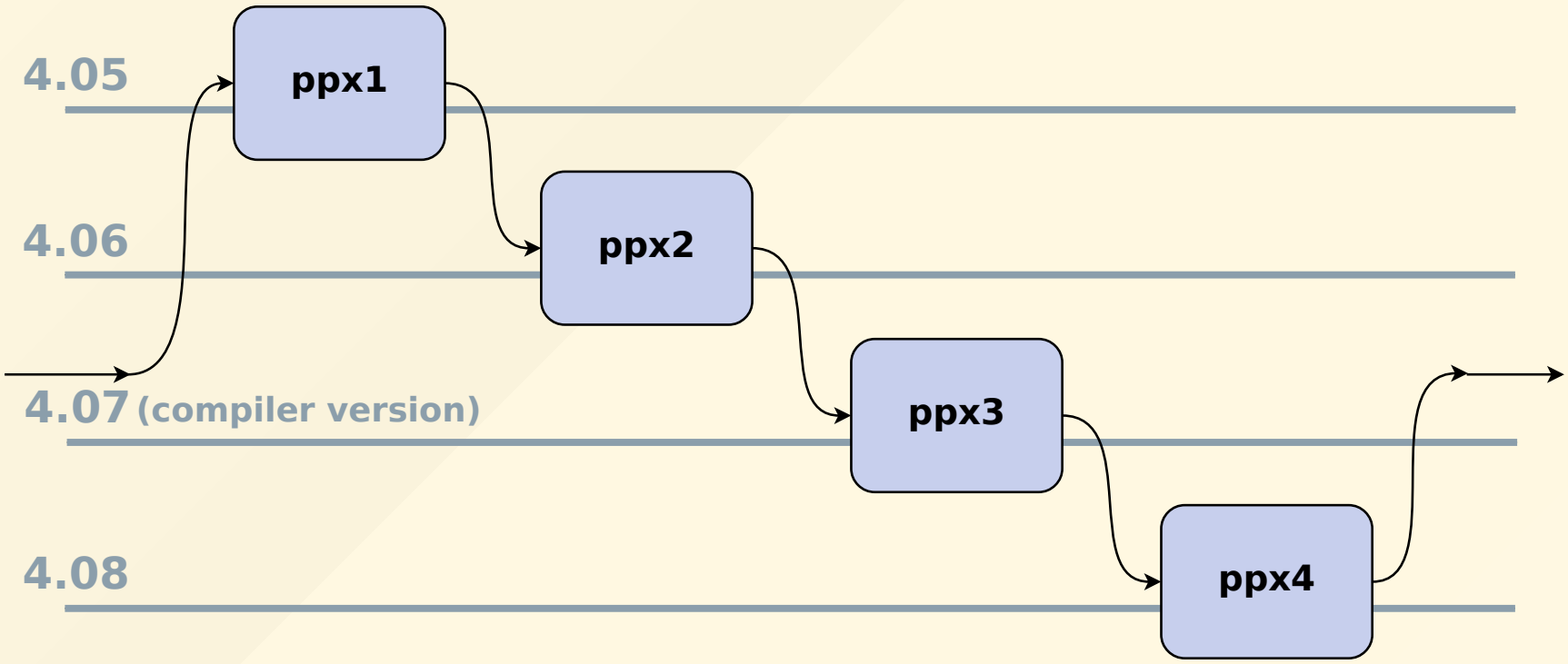
Driver



ocaml-migrate-parsetree

Combining several PPXes

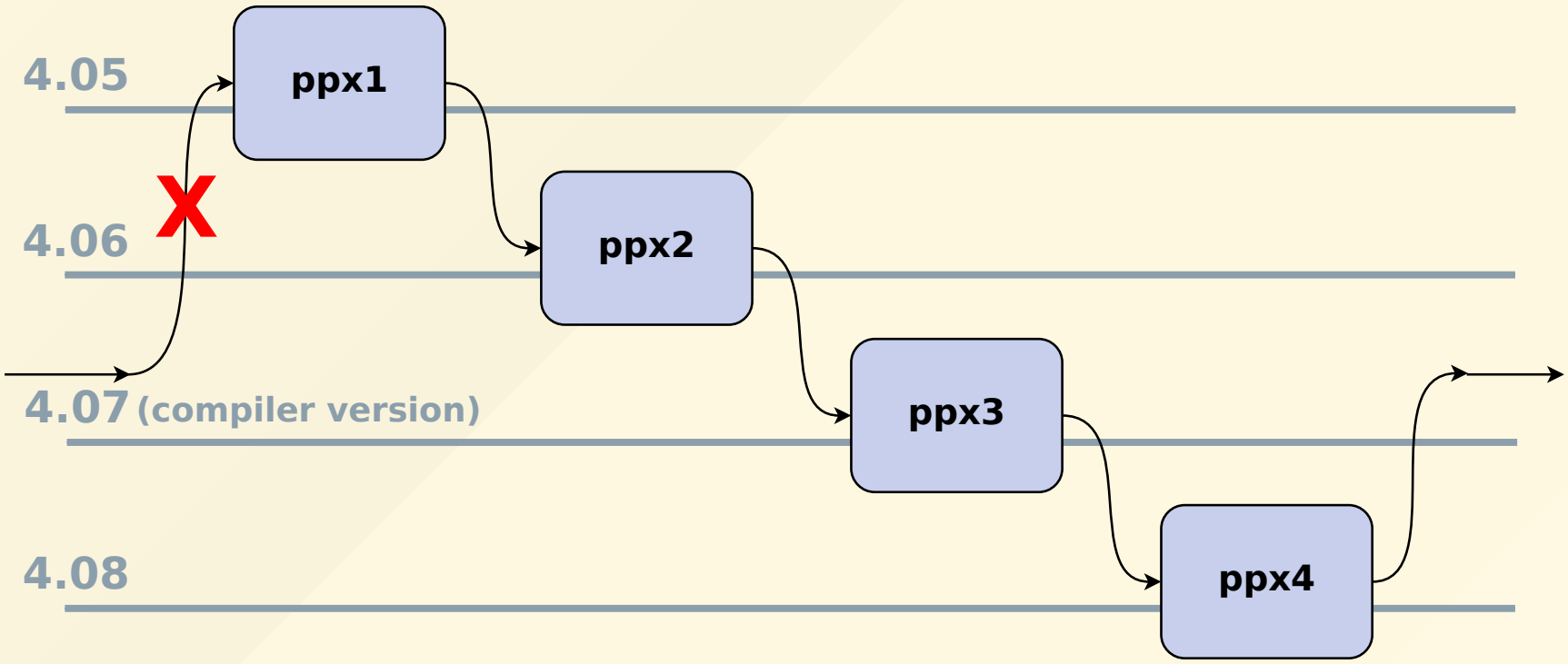
May involve a lot of AST migrations



ocaml-migrate-parsetree

Combining several PPXes

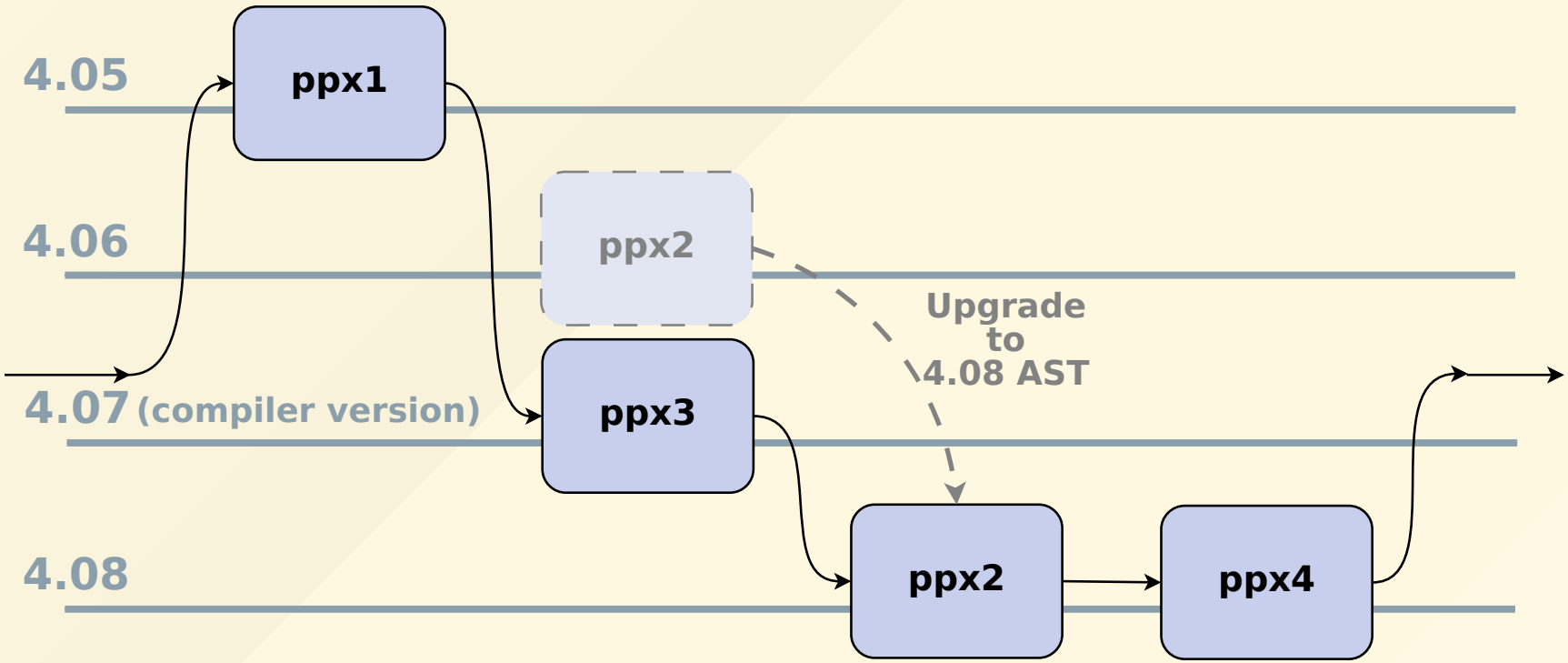
Backward migrations can fail



ocaml-migrate-parsetree

Combining several PPXes

The order is still an issue



ppxlib

ppxlib

- Recursively applies transformation to generated code.

```
let x = [%something ()] in
...
```

expands into

```
let x = 1 + [%something_else ()] in
...
```

ppxlib

- Quality of life improvements

```
type t =
  { a : int
  ; b : string [@defualt "b"]
  }
[@@deriving make]
```

```
; b : string [@defualt "b"]
              ^^^^^^^^^^^^^^
Error: Uninterpreted attribute "defualt".
Hint: Did you mean "default"?
```

ppxlib

Limitations

Abstraction!

API

```
module Ast_408 : sig
  type expression
  type case

  val pexp_match : expression -> case list -> expression
  ...

  type concrete_expression =
    | Pexp_match of expression * case list
    | ...

  val deconstruct_expression
    : expression -> concrete_expression
end
```

```
let%expect "foo" =
  let+ x = f 42 in
  ...
```

desugared:

```
[%expect
  let "foo" =
    let+ x = f 42 in
    ...
]
```

- ppx_expect uses `Ast_407`
- `let+` is a 4.08 feature

Type equalities

```
module Ast_408 : sig
  type expression = Ast_407.expression
  type case = Ast_407.case
end
```

Good interop between ppx libraries

Fully dynamic AST

```
x + y
```

Static representation

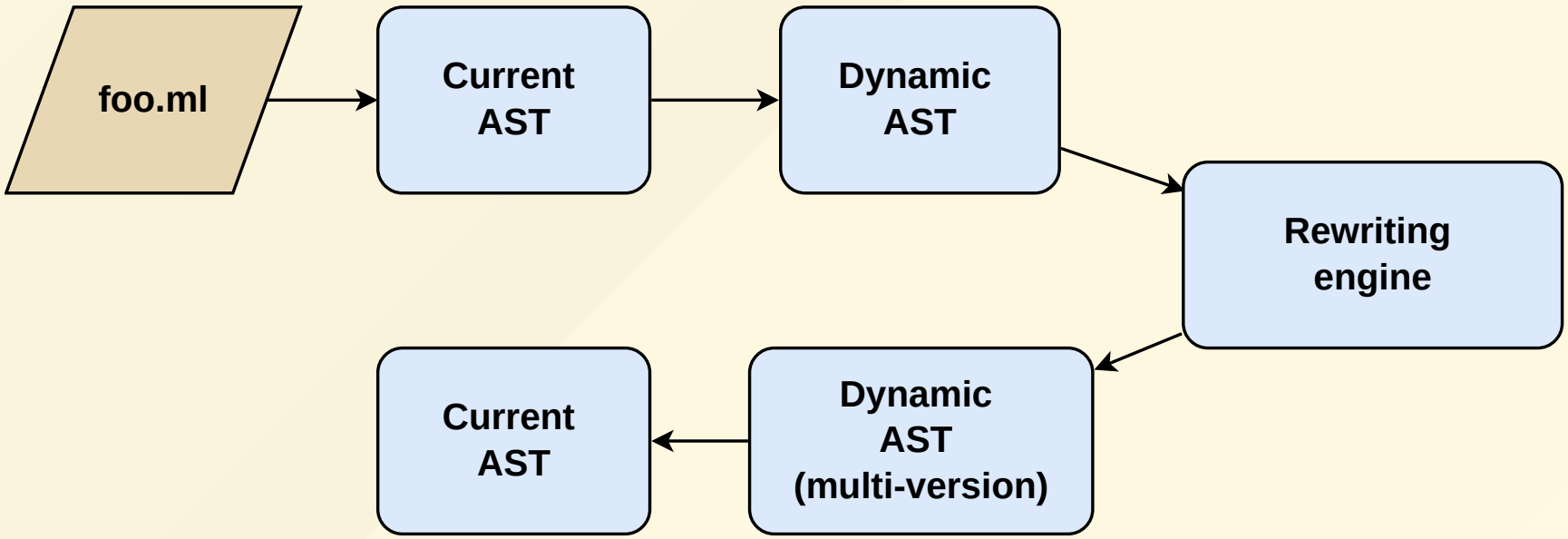
```
Add (Indent "x", Ident "y")
```

Dynamic representation

```
Term ("Add", [Term ("Ident", [String "x"]);
              Term ("Ident", [String "y"])
```

Migration functions (Changelog)

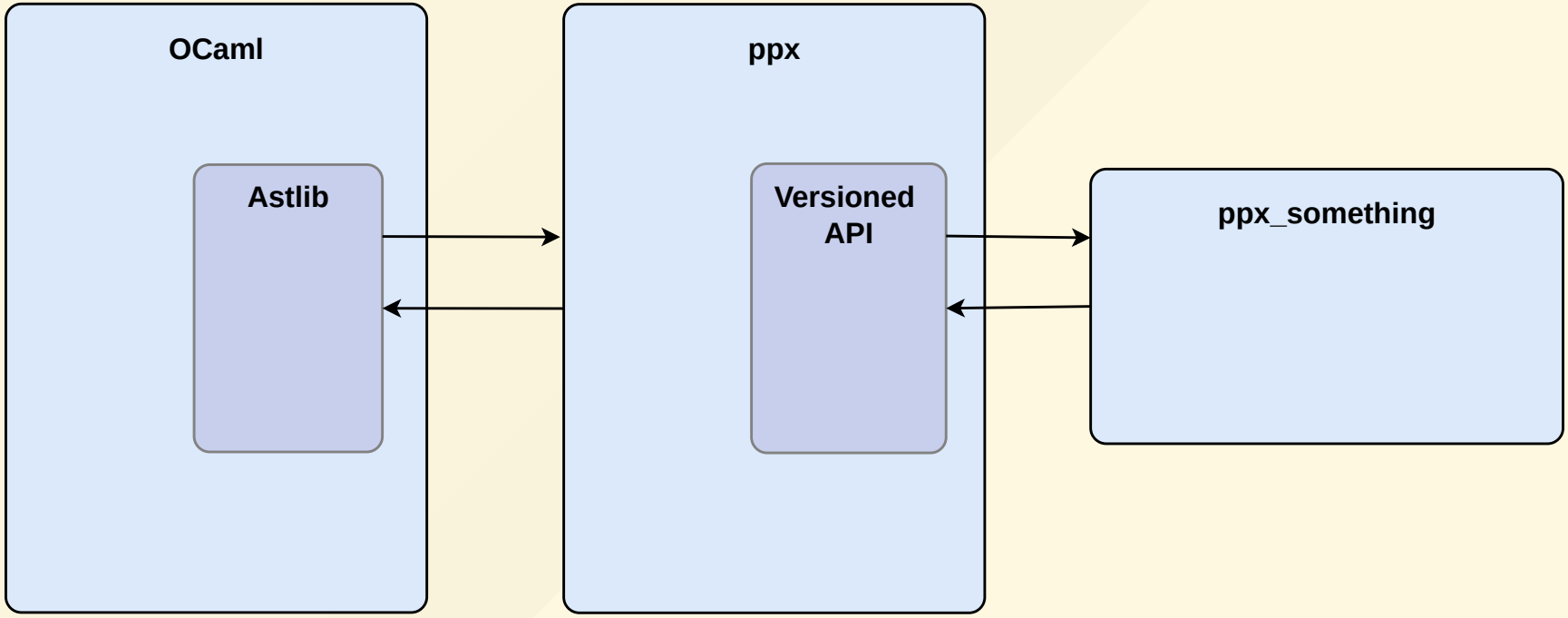
New flow


foo.ml
Current AST
Dynamic AST
Rewriting engine
Dynamic AST (multi-version)
Current AST

Astlib

- dynamic AST
- changelog
- conversion to and from current Parsetree types

Astlib



The upgrading story

Thanks!

https://github.com/NathanReb/future-of-ppx-talk